Islamic Republic of Iran
Ministry of Energy

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Completion Report

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Japan International Cooperation Agency (JICA)
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Completion Report

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in Islamic Republic of Iran

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Abbreviation table

BHRC	Building and Housing Research Center
C/P	Counterpart personnel
EE&C	Energy Efficiency and Conservation
ESCO	Energy Service Company
IFCO	Iran Fuel Conservation Company
IPMVP	International Performance Measurement & Verification Protocol
IRESCO	Iran ESCO Association
JAESCO	Japan Association of Energy Service Company
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
MoM	Minute of Meeting
MOE	Ministry of Energy
MEAF	Ministry of Economic Affairs and Finance
MOP	Ministry of Petroleum
MPO	Management Planning Organization
MRUD	Ministry of Road and Urban Development
M&V	Measurement and Verification
OIPEEE	Office for the Improvement of Productivity and Economy of Electricity and Energy
PBO	Plan and Budget Organization (formerly MPO)
PEEEO	Planning and Economics of Electricity and Energy Office (formerly OIPEEE)
PDM	Project Design Matrix
PO	Plan of Operation
R/D	Record of Discussion
SABA	Iran Energy Efficiency Organization
SATBA	Iran Renewable Energy and Energy Efficiency Organization(formerly SABA)
SUNA	Iran Renewable Energy Organization
SPAC	Presidential Deputy of Strategic Planning and Supervision

Chapter 1 Summary

1.1 Background

The Islamic Republic of Iran (hereinafter referred to as “Iran”) accounts for 10.9% of oil deposits in the entire world. However, in spite of depending largely on exports of oil for Iranian foreign currency earnings, the amount of domestic consumption of oil has been increased. Energy consumption in the residential and commercial sector is the largest account of about 36% in fiscal year 2010. Particularly, energy consumption of buildings classified in the residential and commercial sector has increased constantly, and general energy consumption occupies 36% of general energy supply in Iran. The promotion of the Energy Efficiency and Conservation (hereinafter referred to as “EE&C”) in the building sector is now the most immediate priority mission of the Ministry of Energy (hereinafter referred to as “MOE”) in Iran.

The Japan International Cooperation Agency (hereinafter referred to as “JICA”) implemented a development study for the “Institutional Capacity Development on Energy Management in the Building Sector in Iran” from 2010 to 2011, which supported the formulation of the roadmap and action plan to promote energy efficiency in buildings. In this study, it was identified that the energy service company (hereinafter referred to as “ESCO”) framework is one of the effective measures for promoting EE&C in the building sector by a private sector initiative. So far, there is a lack of human resources to consider EE&C and lack of fund to introduce EE&C appliances in Iran, despite the formulation of the policies and legislations such as the “Subsidy Reform Law” and the “Energy Consumption Pattern Reform Law” issued in December 2010 and March 2011, respectively.

Under this circumstance, the Government of Iran (hereinafter referred to as “GOI”) officially requested the Project on Implementation of Pilot Projects (hereinafter referred to as “the Project”) to introduce ESCO for government buildings to the Government of Japan. Under the support of JICA, this Project is expected to provide knowledge and skills to promote ESCO system for government buildings in Iran. The record of discussion to launch the project was exchanged between JICA and Ministry of Energy in October 2013, and the Project started at January 2014.

1.2 Objective

The objective of the Project is to carry out technical cooperation and technology transfer regarding the know-how of implementation of ESCO project, further policy, and institution framework for the promotion of the ESCO business model to GOI, based on Japan's experience that ESCO business had contributed EE&C in the building sector.

Output 1: An institutional framework to promote ESCO business in Iran is strengthened.

Output 2: The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.

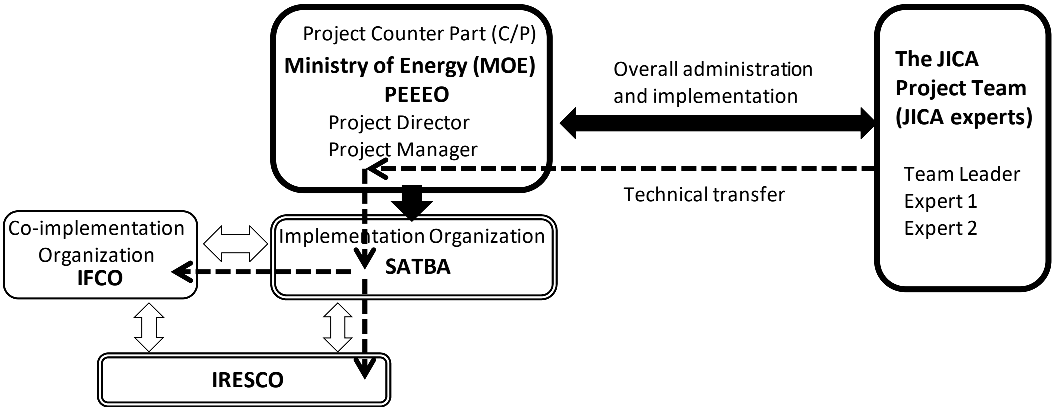
Output 3: The ESCO pilot projects are implemented in government's buildings for development of ESCO business.

Output 4: Policy recommendation for the promotion of ESCO business is formulated.

1.3 Operational Organization

1.3.1 Counterpart and Implementation Body

The project organizational chart is shown in Figure 1-1. The roles and assignments of related organizations are as follows:



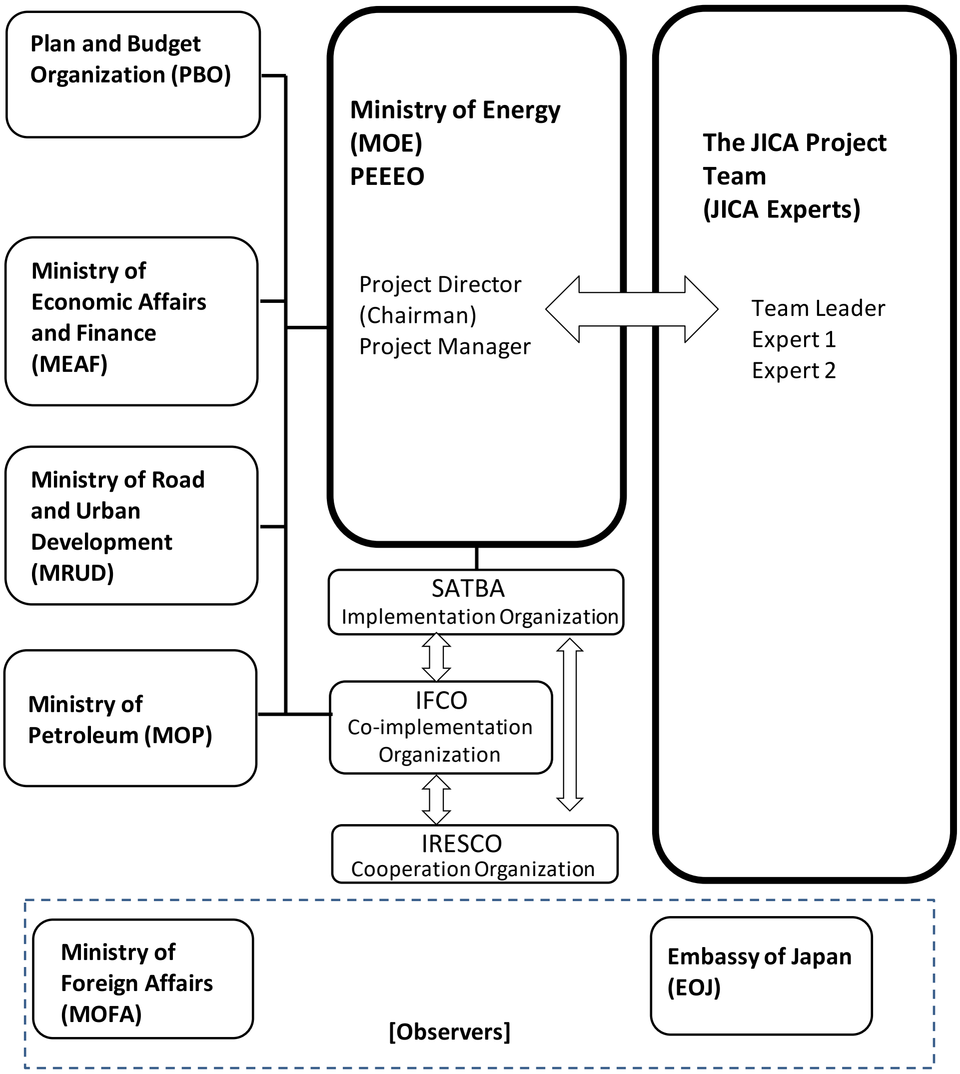
Source: Prepared by the JICA Project Team

Figure 1-1 Project Organizational Chart

PEEEO of MOE assigned a project director and a project manager to be responsible for the overall administration and implementation of the Project and to be responsible for supporting managerial and technical issues of the Project, respectively. SATBA acted on the implementation organization of the Project that is a governmental cooperation under MOE and has responsibility to promote EE&C on the electrical field in Iran. In addition, in order to formulate a comprehensive organization for the promotion of EE&C from both the electrical field and the heat field of Iran, the Iranian Fuel Conservation Company (IFCO) has set a co-implementation organization because IFCO is a state-owned company under the Ministry of Petroleum (hereinafter referred to as “MOP”) and has responsibility to promote EE&C on heat field in Iran. The Iran ESCO Association (hereinafter referred to as “IRESCO”), founded in June 2012 as a private association, cooperated the implementation of the Project through MOE, SATBA, and IFCO, and was provided technology transfer and shared necessary information through SATBA.

1.3.2 Formulation of Joint Coordinating Committee

Because several organizations should keep a mutual contact in order to implement the project smoothly and surely, the Joint Coordinating Committee (hereinafter referred to as “JCC”) is formulated; therefore, the general director of PEEEO was assigned as chairman. Figure 1.2 indicates the structure of JCC.



PBO is the institution responsible for planning.
Initially, it was Presidential Deputy of Strategic Planning and Supervision (SPAC).
After that, it became Management and Planning Organization (MPO) due to organizational change, and it became PBO as of December 2018.

Source: Prepared by the JICA Project Team

Figure 1.2 Structure of JCC

Chapter 2 Activities

2.1 Outline of activity

2.1.1 Implementation flow

The business flow chart is as shown in Attachment 2. The activity was divided into two stages, i.e. first and second stage. The second stage was kicked off after confirmation the outcome of the first stage.

First stage: January 2014 - February 2016

Second stage: April 2016 - December 2018

Among the work related to 【Output 3】, the former two (two) activities, i.e. until【S3-2】 "Energy audits for Government’s buildings are implemented by ESCO’s”, were completed within first stage. Then the latter five (5) activities, i.e. from【S3-3】 "Support to complete plan of pilot project", were carried out within the second stage

2.1.2 Expected output

Output and work item of the Project were shown in Table 2.1.

Table2.1 Output and Work Item of the Project

Output	Work Item	
【Output 1】 An institutional framework is established to promote the energy service company (ESCO) business in the Islamic Republic of Iran.	【S1-1】 Study of measures and policies to promote ESCO business 【S1-2】 Support for preparation of the regulations and guidelines for the ESCO association (IRESCO) 【S1-3】 Support for establishment of the institutional framework for the ESCO association (IRESCO)	First stage
【Output 2】 The capacity of Iran Government and the Iran ESCO Association (IRESCO) is developed in order to introduce ESCO in government buildings.	【S2-1】 Support for preparation of procedures and manuals to introduce ESCO 【S2-2】 Support to complete contract models and formats for ESCO's 【S2-3】 Capacity development for awareness raising and training	
【Output 3】 The introduction of ESCO in government buildings is considered and promoted.	【S3-1】 Selection of candidate sites for energy audit in Government's buildings 【S3-2】 Energy audits for Government's buildings are implemented by ESCO companies	
	【S3-3】 Support to complete plan of pilot project of ESCO 【S3-4】 Capacity development for ESCO companies 【S3-5】 Pilot projects for Government's buildings are implemented by ESCO companies 【S3-6】 Study to introduce ESCO business in Government's buildings 【S3-7】 Monitoring of Pilot Projects	Second stage
【Output 4】 Policy recommendations are made for the introduction of ESCOs.	【S4-1】 Study on introduction of ESCO's in Government's buildings 【S4-2】 Study for monitoring and measurement of ESCO project 【S4-3】 Policy recommendations are made for the introduction of ESCO's	

Source: Prepared by the IICA Project Team

2.1.3 Project schedule

Project Schedule is shown in Figure 2.1.

First field survey: January 24, 2014 - January 30, 2014

Second field survey: April 4, 2014 - May 1, 2014

Third field survey: September 12, 2014 - October 2, 2014

Fourth field survey: February 7, 2015 - March 8, 2015

Fifth field survey: October 29, 2015 - November 27, 2015

Sixth field survey: May 13, 2016 - June 17, 2016

Seventh field survey: October 28, 2016 - November 26, 2016

Eighth field survey: December 1, 2017 - December 15, 2017

Ninth field survey: January 12, 2018 - February 9, 2018

Tenth field survey: June 19, 2018 - July 13, 2018

In addition, because implementation of the pilot projects was delayed due to the following factors, progress of the Project was delayed for seven (7) months from the assumed schedule at the commencement of second stage.

✓ It took time to negotiate fitting between the set of service contents of the ESCO business that are established mainly by performance guarantee principal and the procurement & contract method of the Iranian government organization;,

✓ Personnel change frequently occurred on the building side including the department in charge of contract and it became necessary to repeat consultation; and,

✓ It took time for the fund to examine loans to ESCO companies.

2.1.3 PDM

PDM (Project Design Matrix) of the Project is as shown in Attachment 1.

The PDM was changed three times during the project implementation period, and the final version was approved at the Fifth JCC. The main changes are as follows.

PDM1: Extended overall process due to the delay of the pilot projects

PDM2: Qualitatively and quantitatively clarify indicators and reflect actual situation at the time of evaluation

PDM3: Fix the evaluation index of the overall goal

Source: Prepared by the JICA Project Team

Figure 2.1 Project schedule

2.2 Output 1: An Institutional Framework is Established to Promote ESCO Business in the Islamic Republic of Iran

2.2.1 Study of Measures and Policies to Promote ESCO Business

The JICA Project Team clarified issues on the promotion of ESCO business in Iran and suggested countermeasures through an interview from the Renewable Energy and Energy Efficiency Organization (hereinafter referred to as SATBA) and a member of IRESCO.

Issues and countermeasures for promotion of ESCO business in Iran were shown in Table 2.2.

Table 2.2 Issues and Countermeasures for Promotion of ESCO Business in Iran

Position	Issues	Countermeasures
ESCO company	Owing to high interest rate, it is so difficult to implement ESCO project with the scheme that ESCO company will provide the fund for construction and pay it back in multiple years.	The JICA Project Team recommended that the ESCO type, where the building owner will provide the fund for construction, will be applied on the pilot projects. The JICA Project Team advised that GOI should consider the introduction of interest subsidies scheme for ESCO business.
ESCO company	Owing to the low price of energy tariff, it is so difficult to implement such project that recovers investment from the amount of reduction of energy cost.	The building owner can purchase electric power at low energy tariff due to governmental subsidy. The JICA Project Team advised that GOI should consider the application of appropriate energy tariff without subsidy for ESCO business.
ESCO company	There are few measuring instruments in Iran and it is costly to measure and verify.	The JICA Project Team advised the introduction of labor-saving method in the M&V phase of the ESCO project.
SATBA	The procedure and protocol are not clarified so far.	The JICA Project Team recommended the preparation of the ESCO manual.
SATBA	Until now, the consultant company implemented the energy audit work with the consultant fee as compensation; it is difficult to implement walk through of ESCO company without compensation.	The JICA Project Team advised the introduction of labor-saving method in the planning phase of the ESCO project.

Source: Prepared by the JICA Project Team

2.2.2 Support for the Preparation of the Regulations and Guidelines for the Iran ESCO Association (IRESCO)

The most important activities to achieve Output 1 are to support the establishment of the institution of IRESCO and to prepare the regulations and guidelines of IRESCO. Because IRESCO is a private organization in Iran, the JICA Project Team supported IRESCO through the Ministry of Energy (MOE) and SATBA. The JICA Project Team provides IRESCO with necessary information as much as possible even with their short stay; IRESCO provided their regulations and guidelines with the guidance of the JICA Project Team.

The JICA Project Team tries to discuss with the board member of IRESCO whenever they go to Iran in order to introduce the activities of Japan Association of ESCO (JAESCO) and explain their regulations and guidelines.

2.2.3 Support for the Establishment of the Institutional Framework for the Iran ESCO Association (IRESCO)

Even if 150 companies are recognized to have activities in the energy service field in Iran, only 20 companies belong to IRESCO. The small number of IRESCO members is a serious issue. Even if a company does not join IRESCO, the company can be active as an energy service company (same situation as Japan). IRESCO levies on its own members, so IRESCO cannot increase its member companies without presenting obvious advantage. On the other hand, in case IRESCO remains as an organization with few members, the Government of Iran (GOI) cannot prioritize the representative of ESCO companies and hear the voice of IRESCO.

IRESCO was founded in June 2012, with the approval of MOE and Ministry of Petroleum (MOP), and is placed under SPAC. However, IRESCO does not get appropriate support, e.g., financial support, from GOI. It actually acts as an independent public organization. Based on Japanese experience, it is better for GOI to support IRESCO and establish close relationship. For example, the Government of Japan (GOJ) provides office space inside the Energy Conservation Center, Japan (ECCJ) building and some subsidies that ESCO companies can apply for easily being in the ESCO business.

As this issue has to be resolved, it is important to establish mutual cooperation until IRESCO has appropriate capacity and strong organization.

The activity plan of IRESCO that was shared with the board member of IRESCO is shown in Table 2.3. IRESCO already tried to prepare its activity plan, guidelines, and other documents through its own effort. IRESCO understood the importance of the establishment of a mutual cooperation framework, as further described in its plan.

Table 2.3 Activity Plan of IRESCO

Main Objective	Secondary objective	Solutions	Percent Work	Person Liable
1- promote the role of IRESCO	1-1 The Establishment and operation of institutional and operational mechanisms	1-1-1 Development of codes and by-laws and financial regulations for the administration and development of the IRESCO's activities	100%	Mr. Khosrow Shahi
		1-1-2 Formulation of laws and codes and non-financial criteria necessary for the administration and development of the IRESCO 's activities	100%	Mr. Kenari
		1-1-3 The preparation and approval of organizational structures to strengthen community organization Forum, the role of the members better, and transparency of the organization in terms of providing services to customers	100%	Mr. Najafi
		1-1-4 Establishment, governance and development of website of IRESCO	100%	Mr. Kenari
	1-2 Diversification of income sources of IRESCO	1-2-1 Development of membership (by invitation and continuous calls for an increase in members, please visit the website of the guilds and invited the firms in the field of energy and energy services, and other related measures)	(Absorption of at least 20 members)	Safari engineer support.
		1-2-2 national and international conferences in the field of income from energy services in the country (and attract supporters)	(At a conference)	Dr. Najafi
	1-3 Development Community authority in the field of energy in the national and international levels	1-3-1 Establishment, governance and development of information system (based on the system of notification)	100%	Mr. Khosrow Shahi
		1-3-2 Database creation and operation of energy services in the country	100%	Engineer side with the cooperation of all members
		1.3.3 Participation in seminars and organizing seminars and meetings	(At least 2 seminars)	board of directors
		1-3-4 Free to negotiate and participate actively in exhibitions	(Min. 2 shows)	board of directors
		1-3-5 Holding lectures seasonal	(Minimum 3 days)	Mr. Safari
		1-3-6 Compilation of articles in scientific journals (negotiating to assign a specific page within two to three JOURNAL power energy management in the country)	(At least 2 Journal)	Ms. hunting with the cooperation of all members
		1-3-7 Signed an agreement with the Community standards applicable to the authority of optimization and energy services	100%	Mir Shams
		1-3-8 Signed an agreement with the Technical and Vocational Training Forum for authority about optimization and energy services	100%	Mr. nearby
		1-3-9 Contributions to the qualification and ranking of energy service companies	(Communication and readiness)	Secretary
2- cooperation with government agencies , commun	2-1 Cooperation with government agencies and community development policy	2-1-1 Private sector representatives in the field of energy services in the negotiations, meetings	(In the event).	Board of directors
		2.1.2 Provide advice to decision-making in the field of energy management and energy services	(For reference).	Board of directors
		2-1-3 Cooperation with government agencies and policy-making	(For reference).	Board of directors

ity organizations and public policy		bodies and public institutions in the development of rules and regulations, and		
		2-1-4 Planned relationship with Saab, and the Ministry of Energy and its affiliated organizations.	(On the basis of negotiation and planning).	In terms of organization will be determined
		2-1-5 Connection with the planned optimization of the energy and oil ministry and its affiliated organizations.	(On the basis of negotiation and planning).	In terms of organization will be determined
		2-1-6 Communication and cooperation with the parliament and Majlis Research Center		In terms of organization will be determined
		2-1-7 Contacts with the vice president strategic planning and monitoring		In terms of organization will be determined
	2-2 Development of cooperation with other organizations	2-2-1 Communication and cooperation with the Department of Environment		In terms of organization will be determined
		2-2-2 Communication and cooperation with municipalities		In terms of organization will be determined
		2-2-3 Cooperation with other institutions if necessary request		In terms of organization will be determined
3- Empowerment and Development areas of activity members	3-1 Development of the energy services market	3-1-1 Understand the business environment and contributing to the development of energy services	(Industrial / a type of building).	Mir Shams, Bthayy engineer, Mr. Rezaie
		3-1-2 Assessment of equipment and new tools and new technologies	(About 10 tools and equipment on Board).	Mr. Bthayy
		3-1-3 Introduction of qualified firms providing services to consumers, and government authorities	(Presented by member companies of the organizations).	Board of directors
	3-2 Members of empowerment and capacity development	3-2-1 To support and defend the rights and interests of trade and professional members	(As applicable)	Board of directors
		3-2-2 Knowledge of the professional development of members through professional meetings	(At least 2 meetings).	Board of directors
		3-2-3 Provide information about technology, projects, activities	(Creating part of the Association website for information on this subject).	Engineer side with the cooperation of all members
	3-3 Integration and boost trade among members	3-3-1 Greater participation of members in the field of dialogue and cooperation activities and spread unity through the formation of working groups and committees, professional associations	(Formation of working groups and regular meetings).	Respect for further discussion at the Board of Directors

Source: Prepared example translation in English by the JICA Project Team based on the activity plan of IRESCO that wasprepared by IRESCO in Persian.

2.3 Output 2: The Capacity of Iran Government and IRESCO is Developed to Introduce ESCO in Government Buildings

2.3.1 Support for Preparation of Procedures and Manuals to Introduce ESCO

The JICA Project Team supported to prepare the ESCO manual (hereinafter referred to as "the Manual") reference material in case of the implementation of the ESCO project on government buildings.

During the preparation, the JICA Project Team advised by referring the manual that was prepared by JAESCO or governmental body in Japan. SATBA prepared the Manual with ownership with localizing in order to comply with governmental procedure and protocol in Iran.

The composition of the ESCO manual for government buildings is shown in Table 2.4.

Table 2.4 Composition of ESCO Manual for Government Buildings

Contents
Abstract
Contracts based on Energy Efficiency
Finance of Contracts based on Energy Efficiency
Types of Contract and Project Services
Performance-based Agreements (Performance)
Non-performance-based Agreements (Non-performance)
Consulting Services
Details of Contracts of Energy Service Companies
Measurement and Verification
ESCO Contracts Components
Activities and Executable Projects by ESCO
Standard Service Description for Activity of Energy Service Companies
Standard Service Description for Activity of Energy Optimization Consulting Engineers Companies
Legal Provisions concerning Energy Service Companies

Source: Prepared example translation in English by the JICA Project Team based on the Manual that wasprepared by GOI in Persian.

The Manual (example translation in English) is attached as deliverables on technical cooperation activities. The Manual would be published on the website of SATBA. After the implementation of the pilot projects, it should be revised based on the acknowledgement obtained through experience in the ESCO pilot project.

2.3.2 Support to Complete the Contract Models and Formats for ESCO

The JICA Project Team introduced a sample item of ESCO contract, e.g., risk allocation on the ESCO business, based on some practices of ESCO project in Japan, and clarified the basic provisions to be specified in the ESCO contract. On the other hand, the JICA Project Team had gone through two draft ESCO contracts, which were prepared by one of the ESCO companies and IFCO prior to the commencement of the Project, and pointed out the difference from ESCO contract in Japan. The JICA Project Team discussed with SATBA and IRESCO the newly prepared contract models and formats for ESCO apart from the abovementioned two draft ESCO contracts.

Under the Project, IRESCO will prepare the contract models and formats for ESCO by referring to the ESCO contract in Japan, and these would be applied on the ESCO pilot project.

The composition of contract models and formats for ESCO is shown in Table 2.5. The contract models and formats were utilized as contract on pilot projects and shall be revised to fit with Iranian business manner based on experience of pilot project.

The contract models and formats for ESCO (sample translated in English) are attached as deliverables of the technical cooperation activities.

Table 2.5 Composition of Contract Models and Formats for ESCO

Contents
Article 1: Object of Contract
Article 2: Contract Duration
Article 3: Value of Contract
Article 4: Employer’s and Contractor's Obligations
Article 5: No Assignment
Article 6: Guarantee
Article 7: Evaluating the amount of savings, surveying and certifying
Article 8: Maintenance
Article 9: Contract changes
Article 10: Insurance
Article 11: Training
Article 12: Suspension of the contract
Article 13: Termination of the contract
Article 14: Natural and unexpected events (Force majeure)
Article 15: Regulations governing the contract and disputes conciliation
Article 16: Notices

Source: Prepared example translation in English by the JICA Project Team based on the Manual that wasprepared by GOI in Persian

2.3.3 Capacity Development for Awareness Raising and Training

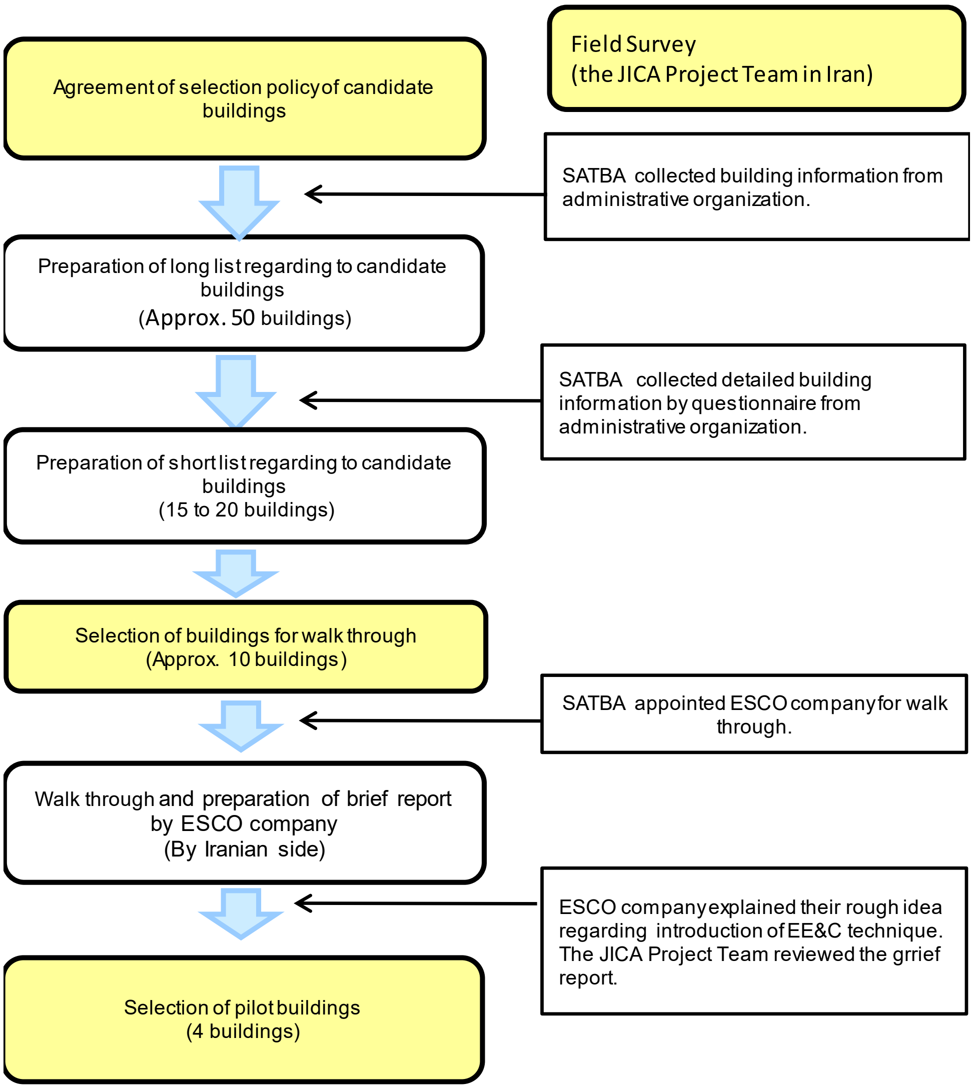
The JICA Project Team introduced some practice in Japan through presentations on a series of three (3) Workshops, two (2) on the first stage and one (1) on the second stage. The detail items is described in section 2.8. On the first (1^{st}) Work shop, the JICA Project Team introduced challenge of dawn era and best practices of ESCO business in Japan, in order to share recognition of usefulness of ESCO business on acceleration of EE&C in building sector. On the second (2^{nd}) Work shop, the JICA Project Team introduced new ESCO scheme that was proposed as improvement model in Japan and financial mechanism, in order to share recognition of necessity of frequent modification of ESCO scheme with change of business environment. On the third (3^{rd}) Work shop, the JICA Project Team made main actors of the pilot projects, i.e. building owner and ESCO companies, presented knowledge, EE&C benefit, barriers for implementation of ESCO business, and counter proposals to overcome those through experience of two pilot projects, and further shared finding and countermeasure based on Japan experience.

Out of mentioned Work shop, SATBA held series of orientation for capacity development to ESCO companies in Iran utilizing the Manual and/or the Contract Models and Formats for ESCO.

2.4 Output 3: The Introduction of ESCO in Government Buildings is Considered and Promoted

2.4.1 Selection of Candidate Sites for Energy Audit in Government Buildings

The building that would be carried out ESCO pilot project on was selected on the first stage, then ESCO pilot project will be implemented on the second stage. Work flow for selection of the building of ESCO pilot project is shown in Figure 2.2.



Source: Prepared by the JICA Project Team

Figure 2.2 Work flow for selection of the building of ESCO pilot project

2.4.2 Energy audits for Government's buildings are implemented by ESCO companies

At end of the first stage, the JICA Project Team carried out walk through as collaboration work with ESCO companies against seven (7) buildings, out of nine (9) candidate buildings that were carried out pre-walk through by ESCO companies. Summary of seven (7) buildings that was carried out walk through on and its evaluation is shown in Table 2.6. After discussion with ESCO companies, the JICA Project Team suggested four (4) buildings with feasibility of ESCO pilot project.

The JICA Project Team evaluated seven (7) buildings from aspect of progress of collection of energy consumption data, difficulty of collection of energy consumption to be complemented for ESCO proposal in detail, EE&C technology and its investment cost those were proposed through walk through survey, and issues to be overcome that was clarified through walk through survey. Then JICA Project Team explained conclusion with finding to MOE and SATBA.

Table 2.6 Site that the JICA Project Team carried out walk through and its evaluation

Site	ESCO company who prepared brief report	Feasibility of ESCO pilot project	Evaluation
Ministry of Economic Affairs and Finance (MEAF)	Asiawatt	Feasible	Recommended
Medical Science University	Farayand Toseah Pooya	Feasible	Recommended
Building that is owned by MoE	Isfahan Saman Energy	NON Feasible	NOT Recommended
Region 2 of the Tehran municipality	Saman Energy Nafis	NON Feasible	NOT Recommended
Region 9 of the Tehran municipality	Saman Energy Nafis	NON Feasible	NOT Recommended
Tehran Vaterinary University	Terakit Omron Parsian	Feasible	Recommended
Building of Tehran power distribution company	Pishrun Energy	Feasible	Recommended

Source: Prepared by the JICA Project Team

As the result, from out of mentioned four (4) buildings, two (2) buildings of MEAF building and Tehran distribution company head office building were selected as ESCO pilot building target. Mentioned two (2) buildings were selected by both viewpoints of building owner side and ESCO company side. The reasons of selection were followings,

✓ ESCO companies in charge of two buildings were very cooperative and positive respectively,

✓ ESCO companies in charge of two buildings were main member of IRESCO as director company and deeply understood ESCO business scheme,

✓ ESCO companies in charge of two buildings had capacity to prepare ESCO proposal and expressed willing to implement ESCO project under their ownership

✓ In Tehran power distribution company case, the building owner was under the influence of MOE and it means that the building owner was respected to cooperate implementation of pilot project.

✓ In MEAF case, the building owner participated first (1st) training in Japan and it means that the building owner was respected to understand ESCO scheme deeply and cooperate implementation of pilot project.

2.4.3 Support to complete plan of pilot project of ESCO

The JICA Project Team supported that each ESCO companies prepared ESCO plan against mentioned two (2) buildings where were selected on ESCO pilot project through closely discussion with each ESCO companies. Especially, regarding with following items, the JICA Project Team gave each ESCO company based on Japan experience.

✓ The policy and principal on setting of baseline and calculation of benefit regarding EE&C

✓ The policy and principal for packaging as combination of EE&C items on preparation of ESCO proposal

✓ The policy and principal for implementation of detailed audit

✓ The policy and principal Measurement and Verification (M&V)

Summary of ESCO proposal that were prepared by each ESCO companies was shown in Table 2.7.

Table 2.7 Summary of ESCO proposal

Name of buildings		MEAF	Tehran power distribution company building
Annual amount of energy reduction	Electric power (kWh per annual)	750,000	176,000
	Natural gas (m³ per annual)	10,000	49,170
Annual amount energy cost reduction	(Million IRR per annual)	1,653	362
Initial cost for ESCO project implementation	(Million IRR)	5,850	1,072
ESCO service period	(months)	43	67

Source: Prepared by the JICA Project Team based on sorting each ESCO proposal that were prepared by ESCO companies

2.4.4 Capacity development for ESCO companies

The JICA Project Team supported Asiawatt and Pishrun Energy on preparation of ESCO documentation and making consensus between building owner and ESCO company.

(1) ESCO contract format

Regarding ESCO contract format, ESCO model contract that was prepared through activities described in section 2.3.2 was adopted based on advice by the JICA Project Team. And the JICA Project Team explained risk allocation in Japan typical case.

However, as the result, ESCO model contract was adopted in MEAF case, conventional consulting service contract format was applied in Tehran power distribution company case because building owner did not adequately understand ESCO scheme.

(2) Negotiation of signing ESCO contract

The JICA Project Team expected ESCO contract kicked off detailed audit as soon as each ESCO pilot building was selected and were signed three (3) months later after commencement of detailed audit. However, it took one year or more from each ESCO pilot building was selected to signing of each ESCO contract.

1) Accompanying of SATBA on the negotiation between building owner and ESCO company

The JICA Project Team frequently emphasised importance of support to each ESCO company by SATBA because two (2) pilot projects were trial Shared Savings ESCO (hereinafter referred to as SS-ESCO) scheme as first time in Iran. In MEAF building ESCO case, SATBA gave Asiawatt support as SATBA accompanied ESCO negotiation meeting with staff of building owner in charge and complementarily explained ESCO scheme and meaning of ESCO business promotion, and circumstance of preparation of ESCO model contract by IRESCO. On the other hand, in Tehran power distribution company case, Pishrun Energy did not enjoy appropriate support from SATBA, then it took so much time until signing of ESCO contract.

2) Shortage of awareness to ESCO business scheme from building owner side

ESCO business scheme was not almost understood by building owner. Governmental staff has recognition to deal with it as conventional contract procedure even if ESCO pilot project. Therefore, governmental staff resist the way of selection of contract award and term of payment following performance regarding EE&C.

(3) Measurement and Verification (M&V)

The JICA Project Team explained that many ESCO projects in United Stated of America (USA) adopt Measurement and Verification (M&V) that is carried out by third party who are nor technical staff of building owner and ESCO company. On the other hand, many ESCO projects in Japan adopt M&V that is carried out by ESCO company. In case of M&V by third party, building owner can get M&V report with neutral perspective, however may is taken some of risk, e.g. reporter analyzes with short of understanding ESCO project in detailed and/or M&V cost is more expensive. Because it relates with local business manner, the JICA Project Team let ESCO company judge whether type is more appropriate in Iran. As the result, in MEAF project case, Asiawatt chose M&V that was carried out by third party, in Tehran power distribution company project case, Pishrun Energy chose M&V that was carried out by themselves. In addition, M&V that was carried out by third party is chosen in ESCO model contract.

(4) Evaluation of benefit regarding EE&C

International Performance Measurement and Verification Protocol (IPMVP) is most known and most adopted as protocol regarding M&V. However, the JICA Project Team advised IPMVP may not be best way to calculate benefit regarding EE&C. That is why IPMVP require much measurement data to calculate benefit regarding EE&C although few measurement instruments are permanently installed at appropriate measurement point on building in general. It means that additional installation of measurement instrument is needed, permanently or temporarily, in order to comply with requirement of IPMVP.

In Japan case, many ESCO project adopt simpler M&V methodology under mutual agreement between ESCO company and building owner, even IPMVP is recognized ideal methodology.

The JICA Project Team explained that the methodology dealing with just entire energy consumption of a building using monthly invoice both power and gas is high risk because it includes external error of EE&C, e.g. additional installation without relation on ESCO project and/or change of operation hour of building in whole or in part. The JICA Project Team emphasised that it is better to separately calculate benefit regarding EE&C system by system that ESCO equipment was introduced as much as possible.

As the result, in both of MEAF building and Tehran power distribution company project case, benefit regarding EE&C was evaluated as methodology in almost referring with IPMVP.

2.4.5 Pilot projects for Government's buildings are implemented by ESCO companies

Two ESCO pilot projects as MEAF building ESCO and Tehran power distribution company ESCO were implemented.

(1) MEAF building ESCO

1) Summary of MEAF building

MEAF building is head quarter building of MEAF with almost 80,000 square meter of floor area. Heat source equipment that was scoped by ESCO pilot project is shown in Picture 2.1.

Source: Prepared by the JICA Project Team

Picture 2.1 Heat source equipment that was scoped by MEAF building ESCO

2) Summary of MEAF building ESCO

Series of EE&C items that were proposed to MEAF were shown in Table 2.8.

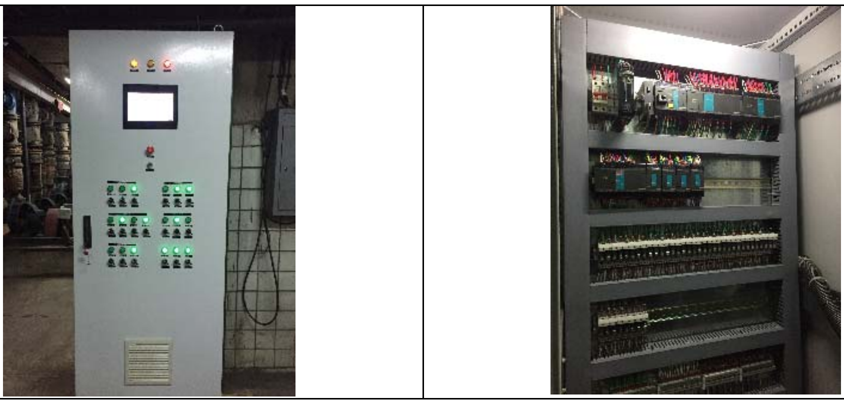
Overview of equipment for EE&C that were introduced in MEAF building was shown in Picture 2.2.

Table 2.8 Series of EE&C items that were proposed to MEAF

EE&C item and activities	Cost (Million IRR)	Benefit	Phase
Detailed audit	550	0	First contract (already valid)
Introduction of chilling water and hot water pump control system by PLC	1,200	826	
Introduction of cooling water pump control system	800	197	
Operation improvement	780	212	
Introduction of Fan Coil Unit control system	900	165	Second contract (not yet)
Introduction of LED lighting fixture	1,500	253	
Measurement and Verification	120	0	
Total	5,850	1,653	-

NA stands for the item that Asiawatt did not clarify due to their confidential

Source: Prepared by the JICA Project Team



Source: Prepared by the JICA Project Team

Picture 2.2 Overview of equipment for EE&C that were introduced in MEAF

In MEAF building ESCO, ESCO proposal separated two (2) ESCO projects due to restriction that negotiation contract should be within specified amount against. One contract was made agreed as of September 2018, however the other contract remained under negotiation.

In MEAF building ESCO case, detailed audit was carried out using some mobile instruments.

3) Sequence of MEAF building

Sequence of MEAF building from selection as ESCO pilot project target to completion of construction.

- ✓ Selection as ESCO pilot project target: May 2016
- ✓ Submission of ESCO proposal: November 2016
- ✓ Signing ESCO contract: April 2017
- ✓ Detailed audit (measurement): three months from signing of ESCO contract
- ✓ Completion of construction: January 2018 (excluded a part)

ESCO service started from September 2017 as operation improvement.

(2) Tehran power distribution company building ESCO

1) Summary of Tehran power distribution company building

Tehran power distribution company building is one of office building owned by Tehran power distribution company building with 6,400 square meter of floor area. Tehran power distribution company is one of state owned company as subsidiary of MOE.

Heat source equipment that was scoped by Tehran power distribution company building ESCO is shown in Picture 2.3.

Source: Prepared by the JICA Project Team

Picture 2.3 Heat source equipment that was scoped by Tehran power distribution company building ESCO

2) Summary of Tehran power distribution company building ESCO

Series of EE&C items that were proposed to Tehran power distribution company were shown in Table 2.9.

In Tehran power distribution company building ESCO case, detailed audit was omitted because Pishrun Energy already carried out measurement work similar detailed audit using some mobile instruments prior to submission of ESCO proposal through walk-through survey.

Table 2.9 Series of EE&C items that were proposed to Tehran power distribution company

EE&C item and activities	Cost (Million IRR)	Benefit (Million IRR/yr)
Detailed audit, Design cost	210	0
Introduction of chiller control system	82	8
Introduction of electromagnetic expansion valve for chiller	110	6
Chiller operation stopped after working hours	188	194
Boiler standby after working hours	188	60
Introduction of boiler control system	12	74
Introduction of Fan Coil Pump control system	65	11
Introduction of Cooling Tower Fan control system	65	9
Introduction on-line monitoring system	90	0
Measurement and Verification	62	0
Total	1,072	362

Source: Prepared by the JICA Project Team

3) Sequence of Tehran power distribution company

Sequence of Tehran power distribution company building from selection as ESCO pilot project target to completion of construction.

- ✓ Selection as ESCO pilot project target: May 2016
- ✓ Submission of ESCO proposal: November 2016
- ✓ Signing ESCO contract: July 2017
- ✓ Completion of construction: July 2017
- ✓ Start of ESCO service: August 2017

(3) Fund procurement

Initially, regarding fund procurement, Japan Project Team expected adoption of Guaranteed Savings ESCO (hereinafter referred to as GS-ESCO) using budget by MOE based on term of Record of Discussion that was official agreement between JICA and Iran government.

GS-ESCO is ESCO scheme that building owner has responsibility to provide fund for construction at initial phase of ESCO project. On the other hand, SS-ESCO is ESCO scheme that ESCO company has responsibility to provide fund for construction at initial phase of ESCO project. In SS-ESCO case, construction cost will be paid back by ESCO service fee that is paid at the achievement of payment term by multiple times. It means that SS-ESCO is higher risk scheme than GS-ESCO from view point of ESCO company. And SS-ESCO requires longer contract period than GS-ESCO because the contract can not be closed until construction cost is paid back.

In consideration phase of ESCO implementation, SATBA expected that "the Act Concerning Partial Resolution of the Hindrances to Competitive Production and Developing the State Financial System" (hereinafter referred to as twelve article act) is available for ESCO fund supply. Twelve (12) article act was originally issued on April 2015, and specified to ensure amount of budget for EE&C project with one billion USD annually and five hundred trillion IRR. The pros points of twelve article act were to be expected both of application of low interests and international market price of oil reduction through introduction of EE&C equipment.

However, in order to utilize fund based on twelve article Act, approval by related Ministry is needed prior to its application, and the protocol for application is very complex. So, MOE selected utilizing Power Energy Industry Research & Technology Fund (hereinafter referred to as PEIRT Fund) that Niroo Research Institution (NRI) has influence on as main sponsor, who was subsidiary body of MOE. NRI fund had ninety-eight billion IRR of budget scale and was found for investment to venture company who act in the field of power and energy in Iran, establishment of Special Purpose Company (SPC), and supply of loan to private company (10% interests). Loan supply was examined by eight (8) member from MOE, SATBA, power distribution company. In case that a company would like to utilize PEIRT Fund the ESCO company was required to submit loan application with project plan. SATBA expected that it took one-month duration for loan examination at least prior to commencement of loan examination. And SATBA asked application of low interest as 10% or less to PEIRT because the pilot projects were under control of MOE.

As the result, it took so much time for loan examination and 10% or more interest was applied on the pilot projects. Assumed pros of PEIRT Fund was not realized. Pishrun Energy gave up utilizing of PEIRT Fund and implemented Tehran power distribution company ESCO with own budget.

2.4.6 Study to introduce ESCO business in Government's buildings

The JICA Project Team surveyed issues that were clarified through implementation of the pilot projects based on interview with both of building owner side and ESCO company side.

The JICA Project Team make both of building owner side and ESCO company side obviously recognize mentioned issues, then asked both of them to present issues and proposals to be dissolved on third (3rd) Work Shop that was held on July 3, 2018. Issues and proposals were shared through presentation. Especially, importance as MOE, SATBA, and PBO played their role in the future was clarified.

The JICA Project Team proposed that MOE, SATBA, and PBO should prepare support plan to ESCO company side based on issues and proposals. And, the JICA Project Team prepared proposal from Japan side based on information obtained by interview survey. Proposals prepared by both Iran side and Japan side shared on the fifth (5th) Joint Coordinated Committee (JCC) that was held on July 10, 2018.

2.4.7 Monitoring of Pilot Projects

The JICA Project Team monitored pilot projects as visualization of EE&C benefit and clarification of issues in operation phase of ESCO project.

The JICA Project Team analysed M&V reports those were prepared by ESCO companies in order to confirm usefulness of introduction of ESCO business and visualize its EE&C benefit. Further the JICA Project Team clarified issues in operation phase of ESCO project through series of interview from building owners and ESCO companies.

2.5 Output 4: Policy recommendations are made for the introduction of ESCO's

The JICA Project Team made building owners and ESCO companies as main actors of ESCO project recognized issues on promotion of ESCO business scheme through implementation of the pilot projects. Then the JICA Project Team made them shared mentioned barriers and proposals to solve those to Iran government through presentation on Work shop. The JICA Project Team made Iran government considered political countermeasure with common view on mentioned barriers and request. Finally mentioned political countermeasure was presented and discussed at JCC.

2.5.1 Study of barrier on introduction of ESCO's in Government's buildings

Prior to negotiation with building owner, the JICA Project Team prospected following barriers on introduction of ESCO's in Government's buildings based on interview with both of SATBA and ESCO companies.

✓ Pre-qualification system for ESCO companies

✓ Existing bidding system (selection protocol of award company on ESCO project)

In this regard, the JICA Project Team proposed that mentioned two (2) barriers was relieved as extraordinary measures and was tried to dissolve after some ESCO pilot projects instead of waiting implementation of the pilot projects until preparation of countermeasure against those. However, Asiawatt and Pishrun Energy faced with the other following barriers out of mentioned two (2) barriers until signing of each ESCO contract, so pilot projects were delayed very much than initially expected.

✓ Authorization of ESCO model contract

✓ Shortage of understanding regarding ESCO business scheme by building owner and fund supplier

✓ Periodically promotion of governmental staff

✓ Delay of loan examination

Mentioned four (4) barriers was clarified through firsthand implementation of actual ESCO project. And the JICA Project Team was shed light on barriers through interview with both of ESCO companies and building owners. Then the JICA Project Team asked to share mentioned barriers and proposal to solve those to them by presentation on Work shop.

2.5.2 Study of barrier for implementation of ESCO project

In ESCO business scheme, some risks may rise until termination of ESCO project period, suddenly or frequently. For example, change of precondition of ESCO and unachieved of original prospective benefit regarding EE&C by ESCO project may be occurred. Therefore the JICA Project Team monitored that some barriers were actualized or not, and if yes, what kind of barrier was actualized.

Unfortunately, following barriers were actualized.

- ✓ Necessity of adoption of M&V by third party
- ✓ No or delay payment of ESCO service fee

As barriers on introduction of ESCO's in Government's buildings described in section 2.5.1, the JICA Project Team was shed light on barriers through interview with both of ESCO companies and building owners. Then the JICA Project Team asked to share mentioned barriers and proposal to solve thoswrae to them by presentation on Work shop.

2.5.3 Policy recommendations are made for the introduction of ESCO’s

As conclusion of mentioned activities, JICA Project Team prepared policy recommendation for introduction of ESCO’s. policy recommendations were shared to all of stakeholders through presentation at third Work shop and fifth JCC.

Detail items of policy recommendation are described in chapter 5.

2.6 Training in Japan

2.6.1 First Training in Japan

The first training in Japan was conducted from January 19, 2015 to January 24, 2015 for government staff so that the participants will learn the national policy and financial support based on Japan's practice.

The names, organizations, and job titles of the participants in the first training in Japan is shown in Table 2.10. Further the training schedule of the first training in Japan is shown in Table 2.11. In order to establish some schemes for the promotion of ESCO business under mutual cooperation, all participants were assigned from management class of relevant governmental organizations with EE&C. Also, the capacity of GOI was developed for the acceptance of policy recommendations that the JICA Project Team would suggest after the implementation of the pilot projects.

Table 2.10 Participants in the First Training in Japan

S/N	Name	Job Title	Organization
1	Mr. Effatnejad Reza	Deputy General Director	MOE
2	Mr. Akbari Hamid	Master Expert of Energy Efficiency in Demand Sector (Building and Industry)	MOE
3	Ms. Bigdeli Somayeh	Expert	MOE
4	Mr. Akbarisayar Mohammad	Manager	SATBA
5	Mr. Sadeghi Nourbakhsh	Manager	SATBA
6	Ms. Paknejad Soodabeh	Councilor of Distributed Coordination Deputy in D.S.M	Tavanir (governmental electric power company)
7	Mr. Peyman Karimifard	Manager of Power System Analysis	Tavanir
8	Mr. Assadianahmadabad Ehesan	Expert	PBO
9	Mr. Mahmoud Hafezian	General Manager	MEAF

Source: Prepared by the JICA Project Team

Table 2.11 Training Schedule of the First Training in Japan

Date	Time	Item	Organization
Jan. 19, 2015	10:00～11:30	Briefing	
	11:30～12:30	Orientation	JICA, Nippon Koei Co., Ltd.
	14:00～17:00	Discussion with ESCO companies in Japan （JAESCO）	International Affairs / Board, JAESCO
Jan. 20, 2015	9:00～12:00	Discussion with an ESCO financer in Japan	Mitsubishi UFJ Lease and Finance Ltd.
	14:00～17:00	Policy and financial support from MLIT for EE&C of building	Building Environment Office, Housing Bureau, Ministry of Land, Infrastructure, Transport and Tourism, Japan
Jan. 21, 2015	9:00～12:00	The role that Energy Conservation Center, Japan (ECCJ) has played in promoting ESCO in Japan; Discussion with ECCJ	International Capacity Building Center for Energy Conservation, International Cooperation Division, The Energy Conservation Center, Japan
	14:00～17:00	Policy and financial support from MOE for greenhouse gas reduction	Ministry of the Environment, Japan
Jan. 22, 2015	10:00～12:00	Site visit	Yokohama City University Hospital
	14:00～17:00	Policy and financial support from Tokyo Metropolitan Government for promoting ESCO	Tokyo Metropolitan Government
Jan. 23, 2015	9:30～11:30	Wrap up meeting	JICA, Nippon Koei

Source: Prepared by the JICA Project Team

On the discussion with ESCO companies in Japan (JAESCO), two companies, i.e. Japan Facility Solution (JFS) and Hitachi, who acted from dawn era of ESCO business in Japan introduced their ESCO project practice, new ESCO scheme that was proposed as improvement model in Japan, and Energy Service Provider (ESP) scheme. Some participants asked the reason that leasing became mainstream on SS-ESCO and its interest rate.

On the discussion with an ESCO financer in Japan, Mitsubishi UFJ Lease and Finance Ltd. presented that leasing was aggressively utilized on EE&C project in Japan as shown in adoption of leasing accounted for ten (10) present or more. Further the presenter showed its historical background and its importance.

On the site visit, ESCO company explained summary of their ESCO project. And building owner presented issues that they faced until the time and benefit of their ESCO project. Then participants walked through site.

On the discussion with Ministry of Land, Infrastructure, Transport and Tourism, Ministry of the Environment, Tokyo Metropolitan Government, each government introduced policy regarding both of EE&C and carbon dioxide (CO_2) reduction, its background, impact to be expected, and subsidy to promote those policy.

Despite the short duration of one (1) week training in Japan, almost all intended objectives were achieved due to the following reasons:

a) Participants obtained advices from ESCO companies in Japan who had much experience and actual practices through mutual discussion.
b) Participants shared the recognition of the importance of establishing a financial mechanism for ESCO business.
c) Participants shared the recognition of the importance of introducing the policy for promotion of ESCO business.

Prior to the training in Japan, a self-evaluation test was conducted, where two participants were evaluated under grade 3, four participants under grade 2, and three participants were non-available. But after the training, two participants, four participants, and one participant became grades 5, 4, and 3, respectively, during their self-evaluation. (Grade 5 indicates the highest rank of evaluation and shows that participants obtain adequate and deep knowledge.) Especially, they recognized the importance of the establishment of financial mechanism for ESCO business, like leasing scheme. Out of the nine participants, four replied that the training is a little short while one participant replied that it is short.

2.6.2 Second Training in Japan

Second (2nd) Training in Japan was implemented on the period from April 15, 2017 to April 27, 2017 against government staff and member of ESCO company, with aim that participants will learn the M&V methodology, performance guarantee, energy saving technology from Japan's practice.

Name, Organization and Job title of participant on second training in Japan is shown in Table 2.12, Training schedule on the second training in Japan is shown in Table 2.13. In order to accelerate promotion of ESCO business through understanding M&V methodology in duration of ESCO contract period and EE&C item in Japan, all participants were assigned from manager class who belong to relevant governmental organizations with E&C and manager of ESCO companies who carried out the pilot projects.

Table 2.12 Participant on second training in Japan

S/N	Name	Job title	Organization
1	Mr. Mohammad Shafiezadeh	General Director	MOE
2	Mr. Rahim Azimi	Deputy of General Manager	MEAF
3	Mr. Alireza Abdollah Shirazi	Manager of ESCO Project	MOE
4	Mr. Mojtaba Gorbani	Expert of Economic Evaluation of Projects	MOE
5	Mr. Mohammad Khezeli	Expert of Projects	MOE
6	Mr. Saeed Amani	Office Manager of Energy Conservation in Building Department	SATBA
7	Mr. Amir Doudabinezhad	Deputy of Education and Energy Consumption Optimization	SATBA
8	Mr. Ehsan Assadian Ahmadabad	Expert of International Affairs	PBO
9	Ms. Maryam Namjoobaghini	Manager	Teheran Power Distribution Company
10	Mr. Tooraj Bathaie	Managing Director	Pishrun Energy Co.
11	Mr. Alimohmmad Mirshams	Managing Director	Asiawatt Co.

Source: Prepared by the JICA Project Team

Source: Prepared by the JICA Project Team

Picture 2.4 Second training in Japan

Table 2.13 Training schedule on the Second training in Japan

Date	Time	Item	Organization
Apr. 17, 2017	10:00～12:30	Briefing and Orientation	JICA
	14:00～16:00	Lecture (M&V methodology)	Nippon Koei Co., Ltd.
Apr. 18, 2017	9:00～11:00	Discussion with JAESCO	Japan Association of Energy Service Companies
	13:00～16:30	Factory tour	Azbil Corporation
Apr. 19, 2017	9:30～12:00	Discussion with JASE-W	Japanese Business Alliance Smart Energy Worldwide Asahi Glass Co., Ltd. Kawasaki Heavy Industries, Ltd. Nippon Steel & Sumikin Engineering Co., Ltd.
	14:00～15:30	Discussion with METI	Ministry of Economy, Trade and Industry, Japan
Apr. 20, 2017		Transportation to Osaka	
	14:00～16:00	Discussion with Osaka Prefecture	Osaka Prefecture
Apr. 20, 2017	10:00～12:30	Factory visit（Daikin Industries, Ltd.）	Daikin Industries, Ltd.
	14:30～16:00	Site visit（Osaka Prefectural Central Library）	Osaka Prefecture
Apr. 24, 2017	9:30～11:30	Site visit （Kyo-bashi Environment Station）	Takasago Thermal Engineering Co., Ltd.
	14:00～16:00	Lecture (Finance Mechanism)	Mitsubishi UFJ Lease & Finance Company Limited
Apr. 25, 2017	9:20～11:00	Site visit （Mitsui Memorial Hospital）	Tokyo Gas Engineering Solutions Corporation
	13:30～15:00	Wrap up meeting	JICA、Nippon Koei Co., Ltd.

Source: Prepared by the JICA Project Team

On the lecture (M&V methodology), presenter emphasised both of performance guarantee and service providing contract essentially distinguished ESCO business from conventional EE&C construction project. Importance of implementation of ESCO project under mutual cooperation between a building owner a ESCO company was understood.

In order to minimize M&V cost, it is important to choose optimal M&V methodology as per EE&C items to be introduced.

On the discussion with JAESCO, presenter emphasised that energy management acts important role on promotion of EE&C activities and energy management service was provided under support from national energy policy in Japan.

On the discussion with JASE-W, secretariat presented summary of activities of JASE-W, then Asahi Glass introduced EE&C item by double glazing Further Kawasaki Heavy Industry introduced both of gas turbine and gas engine Combined Heating and Power (CHP) system, Nippon Steel & Sumikin Engineering introduced on-site energy providing project. Participants lively asked practice and EE&C benefit per introduced EE&C item.

On the discussion with Ministry of Economy, Trade and Industry, Japan, presenter explained trend of energy consumption of building sector in Japan and its counter policy. Especially, participants lively asked summary of Rationalization in Energy Use Law in Japan, unique Top Runners Approach for EE&C, subsidy to EE&C project.

On the discussion with Osaka prefecture, presenter shared issues of ESCO project they faced, series of track record regarding their ESCO project, their flow-chart of ESCO project implementation. Participants asked motivation that they tried ESCO project and comprehensive evaluation system as a way for selection of ESCO proposal that is the closest with building owner requirement.

On the lecture of finance mechanism of Japan, presenter proposed that subsidy to introduction of EE&C facility is more reasonable approach than subsidy to energy tariff of electric power and/or gas as GOI applied. In addition, presenter emphasised that it is better way to choose and focus limited EE&C item on consideration of ESCO project because ESCO company can obtain know-how regarding preparation of ESCO proposal rapidly and deeply. Finally, presenter proposed foundation of state owned leasing company in order to promote ESCO business speedy and surely because fund procurement is one of main issues for promotion of ESCO business.

On the site visit to Azbil cooperation, presenter introduced practice of ESCO their project, compensation way of energy consumption baseline, payment and/or penalty procedure in case that ESCO company could not achieve their guaranteed EE&C performance.

On the factory visit to Daikin Industries, presenter introduced their project regarding Heat, Ventilation Air Conditioning (HVAC) system in Iran and the most state of the art HVAC system. Especially, building multi-air conditioning system was introduced so that was improved by Daikin called as VRV.

On the site visit to Osaka Prefectural Central Library, participants saw series of ESCO facility , i.e. photovoltaic power system, replacement to LED lighting fixture, replacement to heat source, and introduction of new operation system for HVAC pumps. Issues that ESCO company faced on the construction phase were introduced.

On the site visit to Kyo-bashi Environment Station, both of natural draft system and outdoor air cooling system as front line system of HVAC were introduced. Participants saw such system with presentation of wind stream, discussed about its operation and control.

On the site visit to Mitsui Memorial Hospital, summary of energy service contract and efficient operation of CHP system. Participants discussed about its operation and control.

In eself-evaluation regarding usefulness of that were gained knowledge and experience through training in Japan, four (4), two (2), one (1) people were for "A" grade evaluation, "B" grade evaluation, and for "C" grade evaluation respectively after training in Japan. It showed that the training was effective.

2.7 Participation on the Joint Coordinating Committee (JCC)

As meetings for coordinating stakeholders of implementation of the Project, totally, five (5) JCCs were held in entire project period, i.e. two (2) JCCs in first stage and three (3) JCCs in second stage.

2.7.1 First JCC

First (1st) JCC was held on April 16, 2014. Participants list and agenda of First (1st) JCC were attached on attachment 6.

At first Mr. Shafiezadeh, General Director of PEEEO, MOE explained summary of the Project, next Mr. Takeuchi, chief representative of JICA Iran Office, stated background of the Project, at third the JICA Project Team presented objective of the Project, Project Design Matrix (hereinafter referred to as "PDM") and Plan of Operation (hereinafter referred to as "PO"), further requested that each stakeholder provide SATBA with cooperation on implementation of the Project.

On the other hand, the other participants from stakeholder organizations explained their own activities regarding EE&C and efforts of introduction of ESCO business in Iran until now. All of participants shared recognition of importance of implementation of the Project for realization of the national policy regarding EE&C in Iran.

PDM0 and work plan was approved by First (1st) JCC, the three parties, i.e. MOE, JICA, the JICA Project Team sighed on the Minutes of Meeting of First (1st) JCC. Mentioned minutes was attached on attachment.

Source: Prepared by the JICA Project Team

Picture 2.5 First JCC

2.7.2 Second JCC

Second (2^{nd}) JCC was held on November 14, 2015. Participants list and agenda of second (2^{nd}) JCC were attached on attachment.

At first Mr. Sato, chief representative of JICA Iran Office, stated opening speech, next Mr. Shafiezadeh, General Director of EEEO, MOE presented current situation of the Project, at third Mr. Doodabi Nejad, Deputy of Improvement Center, SATBA presented series of activities and achievements on the duration of First (1^{st}) stage. The JICA Project Team presented issues on the promotion of ESCO business in Iran and its countermeasure.

Mr. Shafiezadeh presented that MOE and SATBA was under selecting work of candidate buildings for the pilot projects based on finding of series of walk through surveys that were carried out as collaboration with the JICA Project Team and ESCO companies. And he emphasised importance of continuous cooperation from ESCO companies for proceeding the Project and promised that MOE as responsible organization of the Project would coordinate stakeholder organizations. IRESCO replied that they would cooperate the pilot projects and emphasised formulation of financial mechanism such as loan with low interest and subsidy for ESCO business.

PDM1 (revised version of PDM0) and revised version of PO1 (revised version of PO0) was approved by second (2^{nd}) JCC, the three parties, i.e. MOE, JICA, the JICA Project Team sighed on the Minutes of Meeting of second (2^{nd}) JCC. Mentioned minutes was attached on attachment.

2.7.3 Third JCC

Third (3^{rd}) JCC was held on November 8, 2016. Participants list and agenda of third (3^{rd}) JCC were attached on attachment.

At first Mr. Shafiezadeh, General Director of PEEEO, MOE presented current situation of the Project, Mr. Sato, chief representative of JICA Iran Office, expressed their gratitude and greetings for cooperation so far, next at third Mr. Akbari, SATBA, reported on all of their activities regarding the Project. Further Mr. Akbari explained that it took long time to make building owners understood ESCO business and to deal with procedure regarding ESCO contract, because building owner had no experience before those pilot projects.

Mr. Ismail, Association of Building Engineers, explained their mission and activities and expressed they would cooperate in the –EE&C field.

Mr. Shafiezadeh would like to ask each stakeholder to cooperate so that future pilot projects will proceed smoothly. The three parties, i.e. MOE, JICA, the JICA Project Team sighed on the Minutes of Meeting of third (3rd) JCC. Mentioned minutes was attached on attachment.

Source: Prepared by the JICA Project Team

Picture 2.6 Third JCC

2.7.4 Fourth JCC

Fourth (4th) JCC was held on January 23, 2018. Participants list and agenda of fourth (4th) JCC were attached on attachment 6.

At first Mr. Shafiezadeh, General Director of PEEEO, MOE presented current situation of the Project, Mr. Kobayashi, chief representative of JICA Iran Office, explained the issues regarding implementation of the Project and requested further cooperation from relevant organization, ESCO companies explained the current situation and issues of the pilot projects and said they would like the MOE to intervene actively.

And Mr. Ogawa, member of the Evaluation Team for terminal evaluation of the Project, explained the evaluation of the Project.

The two parties, i.e. MOE, JICA sighed on the Minutes of Meeting of fourth (4th) JCC. Mentioned minutes was attached on attachment.

Source: Prepared by the JICA Project Team

Picture 2.7 Forth JCC

2.7.5 Fifth JCC

Fifth (5th) JCC was held on July 10, 2018. Participants list and agenda of Fifth (5th) JCC were attached on attachment 6.

At first Mr. Shafiezadeh, General Director of PEEEO, MOE, stated opening speech as kicking off of conference. At second Mr. Kobayashi, chief representative of JICA Iran Office, requested the MOE to follow up on the pilot projects in the future and stated that implementation of the Project expects development of the ESCO business in Iran by this project.

Mr. Akbari, SATBA, reported the progress and achievement status of the pilot projects.

Mr. Najafi, Chairman of IRESCO, asked for the task of the pilot projects and follow up on the pilot projects in the future. ESCO companies made remarks on the points and challenges through the pilot projects.

Mr. Shirazi, Manager of PEEEO, MOE, reported the achievement of the PDM and promotion of the ESCO project.

Mr. Hoseini, PBO, spoke about the role of PBO for promoting ESCO project.

The JICA Project Team sorted issues of the pilot projects and suggested countermeasures to overcome those based on practice in Japan.

Finally, Mr. Shafiszade wrapped up the summary regarding all of presentation and conducted cooperation of stakeholders for the promotion of ESCO business in the future.

The three parties, i.e. MOE, JICA, the JICA Project Team sighed on the Minutes of Meeting of fifth (5th) JCC. Mentioned minutes was attached on attachment.

Source: Prepared by the JICA Project Team

Picture 2.8 Fifth JCC

2.8 Work shop

Totally, three (3) Work shops were held in entire project period, i.e. two (2) Work shops in first stage and one (1) Work shop in second stage.

2.8.1 First Work shop

Summary of First (1st) Work shop is shown in Table 2.14. Presentation materials of third Work shop is affixed as attachment 7.

Table 2.14 Summary of First Work shop

Date	April 22, 2014
Venue	Conference room in NIROO institute
Item	a) History of ESCO (Energy Service COmpany) in Japan b) Supporting Program related ESCO and EE & C in Japan c) Introduction of Practice related ESCO in Japan
	

Source: Prepared by the JICA Project Team

Totally 75people participated on the First (1st) Work shop. 63 people participated from private companies of Iran, i.e. excluding participants from Iran governmental organization. Some people joined from Iran branches of six (6) Japan companies.

Both of the JICA Project Team and participants had active discussion regarding the pilot project on the question and answer session. Participants asked investment scale on typical ESCO project in Japan the way of fund procurement, and policy for sharing of EE&C benefit between building owner and ESCO company in case of SS-ESCO. It indicated Iranian participants had high interesting and high expectation on the pilot project.

2.8.2 Second Work shop

Summary of second (2^{nd}) Work shop is shown in Table 2.15. Presentation materials of third Work shop is affixed as attachment 7.

Table 2.15 Summary of second Work shop

Date	November 23, 2015
Venue	Conference room in NIROO institute
Item	a) Introduction of success practice and new ESCO scheme in Japan b) ESCO finance scheme in Japan
	

Source: Prepared by the JICA Project Team

Approximately 30 people participated on the second (2^{nd}) Work shop. Some participant asked interest rate or lease scheme regarding finance purchasing mechanism in Japan. It indicates that finance purchasing mechanism with high interest is important issue in Iran.

2.8.3 Third Work shop

Summary of Third (3^{rd}) Work shop is shown in Table 2.16. Presentation materials of third Work shop is affixed as attachment 7.

Table 2.16 Summary of Third Work shop

Date	July 3, 2018
Venue	Conference room in NIROO institute
Item	a) ESCO Project at Ministry of Economy Affairs and Finance Building b) A Review on Achievements and Challenges of ESCO Project In Building of Tehran Power Distribution Company c) Recommendation for Improvement of ESCO scheme in Iran (through finding on the two pilot projects)
	

Source: Prepared by the JICA Project Team

Approximately 20 people participated on the third (3^{rd}) Work shop. Regarding the pilot projects, the building owners and the ESCO company respectively announced the knowledge gained through implementation of the pilot projects, the EE&C benefit of the pilot projects, and the obstacle (barrier) in implementing the ESCO project in Iran.

The JICA Project Team shared issues that were clarified through implementation of the pilot projects and introduced countermeasures problem overcome those based on Japan experience.

Chapter 3 Issues and Countermeasures in the Operation

3.1 Issues in the Operation

3.1.1 Domestic Procedure and Language Barrier

It took a long time to obtain some documents from the counterpart in Iran because the Government of Iran has a complicated procedure. Additionally, almost all of the documents were written in Persian language only.

3.1.2 Different Calendar

Iranian people use the Persian calendar, such that they celebrate Nowruz as their specific New Year's event and follow other Muslim events, such as Ramadan and Eid. During these events as well as traditional festivals in Japan, the work performance of Iranian people may decline.

3.1.3 Change of Organization

The Renewable Energy and Energy Efficiency Organization (SATBA) was formed by the integration of two organizations, namely the Renewable Energy Organization of Iran (SUNA) and the Energy Efficiency Organization of Iran (SABA), in March 2017. SATBA is recognized to promote energy efficiency and to develop clean and renewable energy in the country. As of December 2017, the internal organizational structure in SATBA has not yet been finalized to manage the Project. This significantly affected the implementation of the second half of the Project.

Internal restructuring in the Ministry of Energy (MOE) also took place during the project period. The Office for the Improvement of Productivity and Economy of Electricity and Energy (OIPEEE), wherein the Project Director and the Project Manager belonged to, was re-organized as the Planning and Economics of Electricity and Energy Office (PEEEO). Besides, Management and Planning Organization (MPO), one of the Joint Coordinated Committee (JCC) members, was also restructured and became the Planning and Budget Organization (PBO).

The organizational restructuring in the government organizations caused less efficiency in the implementation of the Project.

3.2 Countermeasures in the Operation

3.2.1 Local Assistant

A local assistant who had knowledge on the Project was hired in order to carry out support work in the duration that JICA Project Team is in Japan. The JICA Project Team can clarify progress situation and press preparation of documents and deliverables by dispatching the local assistant.

The deadline of preparation of documents and deliverables was set in consideration of time loss by domestic procedure and time for translation. The local assistant picked up the documents and deliverables upon the approval of the domestic procedure and immediately translated them from Persian to English.

3.2.2 Appropriate Schedule

In order to ensure an adequate number and time for meetings, each trip schedule was decided to take into account the holidays and religious events because the workable period per trip of each team member in Iran is limited to two or three weeks for some reasons. Therefore, it is not advisable to go to Iran during the periods of Nowruz, their traditional New Year's event, and Ramadan, a religious event in Islamic countries.

The JICA Project Team was divided into two, i.e., one pre-visiting member and one post-visiting member for each trip. It means that the JICA Project Team could stay for one month or more in Iran, owing to setting of an overlap duration of approximately one week between the pre-visiting member and the post-visiting member.

3.2.3 Close Consultation with MOE

The activities of the counterpart organization were obviously reduced as a result of the change of the organization from SABA to SATBA. Although the JICA expert frequently proposed to have a meeting with SATBA, the official-in-charge from SATBA ignored it.

In order to proceed with the technical cooperation project, the JICA expert tried to keep close consultations with MOE, e.g., the JICA expert gives MOE advice to proceed with the pilot project, and the JICA expert directly shared the progress and issues of each pilot project to MOE based on the interview with Asiawatt and Pishrun Energy.

Chapter 4 Achievement of Project Objective

4.1 Output 1

"Joint Terminal Evaluation Report For The Project On Implementation of Pilot Projects to Introduce ESCO For Government's Buildings in Islamic Republic in Iran" (hereinafter referred to as the Evaluation Report) was prepared in January 2018 by both JICA and the Iran government.

Regarding "An institutional framework to promote ESCO business in Iran is strengthened" as output 1, achievement status at joint terminal evaluation as of January 2018 and as of September 2018, are shown in Table 4.1.

Output 1 is evaluated as unachieved because the indicator 1.2 was not achieved. The main reason is that the role of SATBA to promote ESCO business has not been clarified as a result of the organizational restructuring from SABA to SATBA, in the middle of the cooperation project. The JICA Project Team pointed out clarification of roles and responsibilities; however, SATBA did not complete the work.

Table 4.1 Achievement of Output 1

Summary of Output 1	Status	
	At joint terminal evaluation (as of January 2018)	As of September 2018)
An institutional framework to promote ESCO business in Iran is strengthened.	Likely to be Achieved	Likely to be achieved (after JICA project period)
Indicators of Output 1	-	-
1.1. Regulations and guidelines in IRESCO are upgraded.	Achieved	Achieved
1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MEAF, PBO, financial institutions, to promote ESCO project in building sector are clarified	Likely to be achieved	Likely to be achieved (after JICA project period)

Source: Prepared by the JICA Project Team based on "Joint Terminal Evaluation Report For The Project On Implementation of Pilot Projects to Introduce ESCO For Government's Buildings in Islamic Republic in Iran"

It is hoped that the promotion system, responsibility and role sharing etc. will be clarified by consultation with related organizations at the Energy Council that MOE and PBO participate in the future.

4.2 Output 2

Regarding "the knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened" as output 2, the achievement status at joint terminal evaluation as of January 2018 and the achievement status as of September 2018 are shown in Table 4.2.

Output 2 is evaluated as achieved. The indicator 2.3 was not achieved at the joint terminal evaluation report. At the final trip, the third workshop was held by MOE/SATBA, and the requirement was satisfied.

Table 4.2 Achievement of Output 2

Summary of Output 2	Status	
	At joint terminal evaluation (as of January 2018)	As of September 2018
The knowledge and the capacity of the government organizations, including local authorities and IRESCO, for the introduction of ESCO projects are strengthened.	Likely to be Achieved	Achieved
Indicators of Output 2	-	-
2.1. A manual for the introduction of the ESCO project for government organizations and local authorities is developed.	Achieved	Achieved
2.2. Performance contract models for ESCO project are upgraded.	Achieved	Achieved
2.3. More than five trainings and seminars regarding ESCO project are organized by MOE/SATBA.	Likely to be Achieved	Achieved

Source: Prepared by the IICA Project Team based on "Joint Terminal Evaluation Report for the Project on Implementation of Pilot Projects to Introduce ESCO for Government Buildings in Islamic Republic in Iran"

Regarding the relevant ESCO standard contract of indicator 2.2, SATBA is applying for approval to PBO.

However, awareness with regard to the ESCO business does not penetrate to the building owner and fund supplier. It is important to carry out an awareness campaign regarding the ESCO business frequently and continuously.

4.3 Output 3

Regarding “the ESCO pilot projects are implemented in government buildings for the development of the ESCO business” as output 3, the achievement status at joint terminal evaluation as of January 2018 and the achievement status as of September 2018 are shown in Table 4.3.

Output 3 is evaluated as unachieved. On the unachieved indicator 3.5, although the ESCO company submitted their performance report more than three months to the building owner and shared it to SATBA, SATBA has not finished its analysis. The unachieved indicator 3.6 is expected to be achieved after the JICA project period if the ESCO company submits their performance report for more than one-year duration.

Table 4.3 Achievement of Output 3

Summary of Output 3	Status	
	At joint terminal evaluation (as of January 2018)	As of September 2018
The ESCO pilot projects are implemented in government’s buildings for development of ESCO business.	Likely to be achieved （after JICA project period）	Likely to be achieved （after JICA project period）
Indicators of Output 3	-	-
3.1. More than 50 candidate buildings are selected by MOE/SATBA.	Achieved	Achieved
3.2. Energy audit with walk-through is conducted at more than five candidate buildings by more than 5 ESCOs.	Achieved	Achieved
3.3. Proposals of the ESCO pilot project are submitted by at least four ESCOs, and at least two are approved by MOE/SATBA.	Achieved	Achieved
3.4. At least two ESCO pilot projects are launched.	Achieved	Achieved
3.5. Monthly performance reports are submitted at least three times by ESCO and analyzed by MOE/SATBA (supported by JICA experts).	Likely to be achieved	Likely to be achieved
3.6. Performance reports including one-year performance activities are submitted for at least two pilot projects by ESCOs and are approved by MOE/SATBA (after JICA project period).	Likely to be achieved （after JICA project period）	Likely to be achieved （after JICA project period）

Source: Prepared by the IICA Project Team based on “Joint Terminal Evaluation Report For The Project On Implementation of Pilot Projects to Introduce ESCO For Government’s Buildings in Islamic Republic in Iran”

The pilot projects continue to be monitored by the MOE even after the technical cooperation project period, the result is reported to JICA, and it is also shared to related organizations.

4.4 Output 4

Regarding "policy recommendation for the promotion of ESCO business is formulated" as output 4, the achievement status at joint terminal evaluation as of January 2018 and the achievement status as of September 2018 are shown in Table 4.4.

Output 4 is evaluated as unachieved. The indicator 4.1 was proposed to MOE at the fifth JCC that was held on 10 July 2018. MOE hoped to reflect the policy recommendation on the next five-year plan of the Iran government; therefore, Output 4 is expected to be achieved after the JICA project period.

Table 4.4 Achievement of Output 4

Summary of Output 4	Status	
	At joint terminal evaluation (as of January 2018)	As of September 2018
Policy recommendation for the promotion of ESCO business is formulated.	Likely to be achieved （after JICA project period）	Likely to be achieved （after JICA project period）
Indicators of Output 4	-	-
4.1 Policy recommendation and ESCO business model submitted by MOE/SATBA to Iran government for decision making (after JICA project period).	Likely to be achieved （after JICA project period）	Likely to be achieved （after JICA project period）

Source: Prepared by the IICA Project Team based on "Joint Terminal Evaluation Report For The Project On Implementation of Pilot Projects to Introduce ESCO For Government's Buildings in Islamic Republic in Iran"

In the future, after the responsibility and role etc. of related organizations are clarified at the Energy Council, it is hoped that MOE will make policy proposals for ESCO business dissemination.

4.5 Project Purpose

Regarding "the establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses" as project objective, the achievement status at joint terminal evaluation as of January 2018 and the achievement status as of September 2018 are shown in Table 4.5.

The project purpose is evaluated as unachieved. The energy conservation effect of the two pilot projects can be expected to be about 15% at the proposal. It was confirmed that there is a possibility that it will be sufficiently business if the business environment such as legal maintenance is prepared.

Table 4.5 Achievement of Project Purpose

Summary of Project Purpose	Status	
	At joint terminal evaluation (as of January 2018)	As of September 2018
The establishment of the ESCO business model is promoted through the capacity development of the Government of Iran and ESCO association to promote ESCO businesses.	Likely to be achieved（after JICA project period）	Likely to be achieved（after JICA project period）
Indicators of Project Purpose	-	-
At least two ESCO pilot projects demonstrate energy saving and energy efficiency to achieve ESCO business.	Likely to be achieved（after JICA project period）	Likely to be achieved（after JICA project period）

Source: Prepared by the IICA Project Team based on "Joint Terminal Evaluation Report For The Project On Implementation of Pilot Projects to Introduce ESCO For Government's Buildings in Islamic Republic in Iran"

One year has not passed since the pilot project was implemented, and the results of the project have not been verified. It is expected that MOE will continuously monitor after the end of the technical cooperation project period and verify the result.

4.6 Overall goal

Both the overall goal and the objectively verifiable indicators of this technical cooperation project were set as shown in Table 4.6, and those were approved on the 5th JCC, vide PDM version 3 of attachment 1.

Table 4.6 Objectively Verifiable Indicators of this Technical Cooperation Project

Overall Goal	Energy Efficiency and Conservation (EE&C) in the building sector will be promoted through the introduction of ESCO for government buildings.
Objectively Verifiable Indicators	✓ Building where ESCO is implemented will have energy consumption reduced by at least 10%. ✓ ESCO for government buildings will be officially introduced from 2020.

Source: Prepared by the JICA Project Team

Chapter 5 Recommendations for Introducing ESCO Business to Government Buildings

5.1 Continuation and Monitoring of the Pilot Projects

5.1.1 Continuation of the Pilot Projects

Two ESCO pilot projects are in progress. The ESCO contract periods for the two projects are 67 months and 43 months, respectively, and only about one year has passed since the two projects were implemented as of July 2018. For this reason, the energy saving effect has not been verified, and the results of the pilot projects have not been evaluated.

Table 5.1 Two Pilot Projects

	MEAF building ESCO	Tehran power distribution company building ESCO
ESCO Company	Asiawatt	Pishrun Energy
Contract Date	12 April, 2017	18 July, 2017
Contract Period	43 months	67 months
Important issues as of July 2018	Due to the upper limit of the contract amount, the contract was divided into two, but the second contract is not yet concluded.	As energy usage increased due to operation change of facilities, the energy saving effect by ESCO could not be verified. ESCO service fee to ESCO company has not been paid.

Source: Prepared by the JICA Project Team

The required monitoring period for the ESCO project is at least two years. Several problems and barriers have already been found in two ESCO pilot projects. Some barriers have already been solved, but there are problems that have not yet been solved. Even now ESCO companies and building owners are continuing their efforts to solve them.

The following two items are the problems confronted by ESCO companies. MOE needs to take measures to solve these problems in cooperation with the stakeholders.

- Concluding the second contract in the MEAF building ESCO
- Unpaied of service fee and Measurement and Verification (M&V) in the Tehran power distribution company building ESCO

The following mentioned problems and barriers found in the pilot projects should be solved to promote the ESCO project in Iran in the future. The pilot projects will continue, and MOE and SATBA will need to continuously monitor them.

(1) Qualification of ESCO company

In general, Iran has rating and certification system as prequalification on participation of public works. The mentioned rating and certification system are categorized by service field, however the rating and certification on field regarding ESCO business did not set. Even if the ESCO company has adequate capacity of implement ESCO project at government buildings, certification from PBO is required.

(2) Authorization of ESCO contract

In general, Iran has series of standrad contract as authorized one contracting with public agency. But there is no authorized standard contract in the field related to ESCO business. The ESCO contract of the pilot project was to adopt the ESCO model contract prepared in the Project. However, since the ESCO model contract was not authorized by the PBO, it took considerable time to conclude the contract.

In MEAF building ESCO case, the building owner confirmed to the PBO that there is no problem in adopting the ESCO model contract as temporary solution. In Teheran distribution company ESCO case, the building owner has not agreed adoption of ESCO model contract which has not been authorized by the PBO.

(3) Financial arrangement to ESCO

In general, the market interest rate in Iran is around 14%. ESCO company may take high risk in Shared Savings ESCO (SS-ESCO) that ESCO company shall arrange fund as initial cost regarding introduction of equipment for ESCO. ESCO company must sign long-term service contracts to recover funds of the initial investment costs and repay high-interest funds for a long period of time until the contract ends.

Regarding the funds used in the pilot project, the fund judges lacked understanding of the framework of the ESCO project, and it took a long time from application to approval. In addition, the interest rate on funds was high at 10%, not the financial support scheme attractive to the ESCO business.

In the case of the MEAF building ESCO, it took time to review the fund and the contract was delayed. As a result, the introduction of equipment for ESCO became after payment of borrowings, and the implementation of the ESCO pilt project was delayed greatly.

In Tehran distribution company building ESCO, Pishrun Eergy of the ESCO company chose to use its own funds as it abandons utilization of the fund because the funds can not be made in time to start ESCO service.

(4) Shortage of awareness on ESCO business

SATBA continues to promote understanding of the ESCO business framework for ESCO companies, and ESCO companies fully understand ESCO business. However, building owner side as one of stakeholder has still no knowledge of the frameworkon of the ESCO business. ESCO business is a new scheme for building owner. If the building owner who introduces the ESCO business does not understand the framework of the ESCO business, the project will not conclude a contract.

In both ESCO pilot cases, ESCO company had taken much time for frequently explaining scheme of ESCO business and meanings of implementation of ESCO pilot.

(5) Periodical personnel change of governmental staff

Periodic personnel changes of governmental staffs are also done in Iran.

In the case of the MEAF building ESCO, there were cases due to personnel changes of the contract signatory owner and the manager in charge of the technical department during the contract negotiation. In Tehran distribution company building ESCO, there was a personnel change of the person responsible for the technical department during contract negotiation. The ESCO companies of both projects decided to reexamine the ESCO business framework and ESCO proposal each time the person in charge changed.

(6) Bidding system (contract procedure) for ESCO

In general, Iran has restriction against contract without going through bidding as negotiated contract. In the pilot projects, it was contracted with an ESCO company who carried out an energy audit survey as a special case under a negotiated contract.

Since the bidding system of the ESCO project is a proposal type, it is impossible to prepare the Term of Reference and to set the fixed amounts to be bidding conditions. Actually, scope of ESCO service includes all steps from upstream to downstream of project, i.e. feasibility study, design work, construction work, and M&V work, each ESCO company should make their ESCO proposal that includes original set of EE&C menus. On the other hand, in the case of negotiated contracts, the annual contract amount that one contractor can contract with a negotiated contract is limited. In the MEAF building ESCO case, ESCO company accepted to divide one set of ESCO proposal into two contracts to keep amount of each contract within the annual contract amount. One of two contract was agreed. However, rest one contract is still in negotiation phase.

5.1.2 Monitoring of the Pilot Projects

After the termination of the Project, the two pilot projects will be continued.

MOE and SATBA will continuously monitor the pilot projects. It is necessary for MOE and SATBA to share the results with the Iranian stakeholders, to consider the measures to deal with the issues and problems, and to develop the environment for promoting the ESCO business.

(1) Inadequacy of the private sector organization regarding ESCO promotion ESCO

RESCO was already established in 2012 as an organization regarding ESCO promotion from the ESCO company side. However, IRESCO does not consists of not many members and did not do have efficient activities due to limited manpower and budget. IRESCO, a private organization, has not been admitted publicly without financial support from the Government of Iran, it is necessary to improve the status of IRECSO with the recognition of the ESCO project.

(2) Publicity of ESCO project by publishing the results of pilot project

ESCO companies need to share the results of pilot projects with IRESCO and ESCO companies and to develop the capacity of ESCO companies. On the other hand, the building owner needs to widely publicize the effort of the pilot project and try to promote understanding of the ESCO business.

(3) Continue pilot project and need new technical cooperation

MOE and SATBA need to monitor the pilot projects to be continued and report them to JICA. In the future, if it is difficult for the Iranian side to solve newly discovered issues, new technical cooperation by JICA and JAESCO can be considered.

5.2 Overall Goal

5.2.1 Objectively Verifiable Indicators

The objectively verifiable indicators of the overall goal of the Project were was set as shown in Table 5.2. (refer to PDM version 3)

Table 5.2 The objectively verifiable indicators and the overall goal of the Project

Overall Goal	Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.
Objectively Verifiable Indicators	✓ Building where is implemented ESCO will be reduced energy consumption at least 10%. ✓ ESCO for government buildings will be officially introduced from 2020.

Source: Prepared by the JICA Project Team

The energy saving effect by the ESCO project is set at 10%. Judging from the effect of pilot projects (proposal base), it is a target value that can be achieved sufficiently.

On the other hand, the timing of the introduction of the ESCO business in government buildings was set at 2020 after two years. The implementation of the ESCO project is targeted at two years after considering that it will take some time to improve certain aspects of the environment, such as legal development.

5.2.2 Activities to Achieve the Overall Goal

To achieve the overall goal, the important activities that the Iranian organizations conducts are as follows.

(1) Verification of the performance of the pilot projects

This is the most important task to be carried out by Iranian organizations after the termination of the Project. MOE and SATBA should monitor the pilot projects continuously at least for one year. ESCO companies should report the performance of the pilot project to the building owner, MOE, and SATBA on a regular basis. MOE and SATBA should analyze and evaluate the report and share it with the stakeholders of the Projects.

(2) Clarification of roles and responsibilities of the related organizations for promotion of ESCO projects

The roles and responsibilities of the related organizations for the promotion of ESCO projects have not been clarified. The overall structure for the promotion of the ESCO business is under consideration. MOE recognized the necessity of involvement of PBO as a legal institution coordinator through the Project. MOE, SATBA, and PBO will discuss with other related organizations in the Energy Council and take necessary measures based on the decision of the Council.

5.3 Recommendations for Introducing ESCO Business to Government Buildings

5.3.1 Recommendations from the Iran Side

Recommendations for further promotion of the ESCO project in Iran are presented by the MOE, PBO and IRESCO at 5th JCC as follows:

(1) The government should establish a mechanism to evaluate and certify ESCOcompaniess.

(2) PBO should approve the ESCO model contract (SATBA has submitted the ESCO model contract to PBO for approval).

(3) MOE should establish the ESCO fund for financial support to ESCO.

(4) SATBA should conduct awareness seminars of the ESCO scheme to related organizations.

(5) The government should support IRESCO.

(6) A working group for the promotion of ESCO should be established in the government.

(7) IRESCO has an intention to implement a joint ESCO project with JAESCO.

(8) MOE would like to request an additional technical cooperation project from JICA for continuous support.

5.3.2 Recommendations from the JICA Project Team

Based on the above-mentioned recommendations from the Iran side, the JICA Project Team recommended for the introduction of the ESCO project to government buildings as follows:

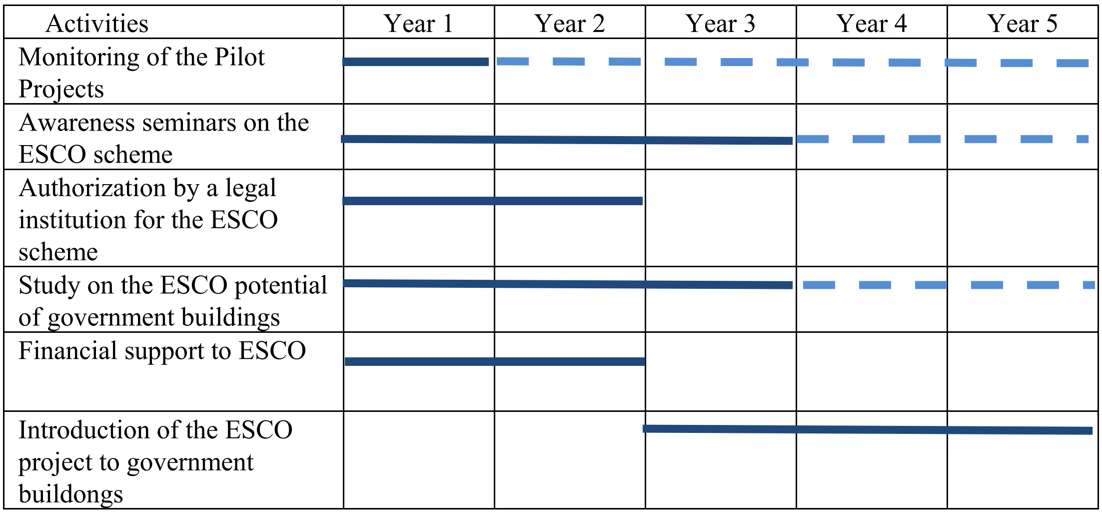
(1) Awareness seminars on the ESCO scheme should be conducted for the government and government building owners.

(2) There should be an authorization by a legal institution for the ESCO scheme.

(3) There should be a study on the ESCO potential of government buildings.

(4) Financial support must be provided to ESCO.

In addition, the JICA Project Team presented a draft implementation schedule to realize the introduction of the ESCO project two years later.



Source: Prepared by the JICA Project Team

Figure 5.1 Draft implementation schedule for introduction of the ESCO to government buildings

Attachment

1. PDM (PDM$_0$, PDM$_1$, PDM$_2$, and PDM$_3$)
2. Flow chart (PO0, PO1, and PO2)
3. Detailed Plan (Work Plan of First Stage and second Stage)
4. Dispatching Record of Expertise
5. Record of Training (First Training and second Training)
6. JCC (First JCC, second JCC, third JCC, fourth JCC, and fifth JCC)
7. Work shop (First Work shop, second Work shop, and third Work shop)

Attachment 1

PDM

(PDM$_0$, PDM$_1$, PDM$_2$, and PDM$_3$)

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Energy Efficiency Organization (IEEO/SABA), Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SABA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: 2014-2017 (4.0 years)

Version 0
April 16, 2014

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	- Implementation and planning of ESCO to Government buildings are prepared. - XX% of Energy consumption in the building sector is reduced.	- Performance records of ESCO for Government buildings. - Energy consumption data in the building sector.	Finance incentive for ESCO shall be prepared by Iranian side.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	- ESCO pilot projects to Government buildings are implemented. - ESCO business model in Iran through the ESCO pilot projects is established.	- Performance contract and implementation document of the ESCO pilot projects. (May 2016) - Reports of monitoring and verification of the ESCO pilot projects. (Apr. 2017)	The budget for the ESCO pilot projects shall be allocated by the Iranian side.
Outputs: 1. An institution framework is established to promote ESCO business in Iran.	- Regulations and guidelines for the IRESCO are completed. - Roles and responsibilities to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) are identified.	- Regulations and guidelines for the IRESCO. (Feb. 2015) - An institution framework and rule to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) (Feb. 2015)	
2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings.	- Procedures and manual of introduction of ESCO to Government buildings is completed. - Performance contract models for ESCO are prepared. - Seminar and training for capacity building are conducted for IRESCO members by SABA and IFCO.	- Procedures and manual of introduction of ESCO to Government buildings. (Aug. 2015) - Performance contract models for ESCO. (Aug. 2015) - Records of seminar and training. (Aug. 2015)	The case studies of finance incentive schemes in Japan will be introduced in training course in Japan
3. The introduction of ESCO in Government's buildings is considered and promoted.	- Candidate buildings for ESCO pilot projects are selected by Iranian side. - Energy audit of ESCO planning for the candidate buildings are conducted by members of IRESCO. - Proposal and implementation plan for ESCO pilot project are prepared. - ESCO pilot projects to Government buildings are implemented. - Results of monitoring and verification of the ESCO pilot projects are reported. - Implementation plans to introduce ESCO for Government buildings are prepared.	- Short list of candidate buildings for ESCO pilot projects. (Feb. 2015) - Reports of energy audits of the candidate buildings. (Aug. 2015) - Proposal and implementation plan for ESCO pilot project. (Dec. 2015) - Results of monitoring and verification of the ESCO pilot projects. (May 2016) - Implementation plans to introduce ESCO for Government buildings. (Apr. 2017)	SABA and IFCO will be responsible for the result of monitoring and verification of the ESCO pilot projects.
4. Policy recommendations are made for the introduction of ESCOs	- ESCO business model in Iran through the ESCO pilot projects is established. - Policy and action plan to promote ESCO in building sector are prepared by MOE.	- Policy and action plan to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) (Nov. 2017)	

Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1. An institution framework is established to promote ESCO business in Iran. 1-1 Preparation and support for the institutional framework, regulations and guidelines for the establishment of ESCO association 2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings. 2-1 Preparation of procedures and manuals for the introduction of ESCOs 2-2 Preparation of contract models and formats for ESCOs 2-3 Capacity development for awareness raising and training 2-4 Introduction of case studies on Japan's policies, legislations and finance mechanisms for energy efficiency in buildings 3. The introduction of ESCO in Government's buildings is considered and promoted. 3-1 Capacity development for ESCO companies 3-2 Energy audits for Government's buildings by ESCO companies 3-3 Pilot projects are implemented by ESCO companies in order to introduce ESCO for Government's buildings 3-4 Monitoring of Pilot Projects 4. Policy recommendations are made for the introduction of ESCOs 4-1 Policy recommendations for the introduction of ESCO's	**The Japanese Side** A. Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B. Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Non **The Iranian Side:** A. Ministry of Energy: Project Counter Part ・ Project Director: General Director, Office for the Improvement of Productivity and Economy of Electricity and Energy (OIPEEE) ・ Project Manager: Head of Awareness & Training, OIPEEE B. SABA: Implementation Organization ・ Deputy of Demand Side Department ・ ESCO Department C. IFCO: Co-Implementation Organization D. IRESCO: Cooperation Organization **Joint Coordinating Committee(JCC)** A. Chairperson: ・ General Director of OIPEEE B. Member of Iranian Side ・ MOE ・ Presidential Deputy of Strategic Planning and Supervision (SPAC) ・ Ministry of Economy and Finance (MOEF) ・ Ministry of Petrol (MOP) ・ Ministry of Road and Urban Development (MRUD) ・ SABA ・ IFCO ・ IRESCO C. Member of Japanese side ・ JICA Experts ・ Representatives from JICA IRAN Office ・ Other personnel concerned to be assigned by request of other members D. Observer ・ Ministry of Foreign Affairs (MOFA) ・ Embassy of Japan (EoJ)	

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Energy Efficiency Organization (IEEO/SABA), Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SABA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: 2014-2018 (4.5 years)

Version 1
November 14, 2015

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	- Implementation and planning of ESCO to Government buildings are prepared. - XX% of Energy consumption in the building sector is reduced.	- Performance records of ESCO for Government buildings. - Energy consumption data in the building sector.	Finance incentive for ESCO shall be prepared by Iranian side.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	- ESCO pilot projects to Government buildings are implemented. - ESCO business model in Iran through the ESCO pilot projects is established.	- Performance contract and implementation document of the ESCO pilot projects. - Reports of monitoring and verification of the ESCO pilot projects.	The budget for the ESCO pilot projects shall be allocated by the Iranian side.
Outputs: 1. An institution framework is established to promote ESCO business in Iran.	- Regulations and guidelines for the IRESCO are completed. - Roles and responsibilities to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) are identified.	- Regulations and guidelines for the IRESCO. (Feb. 2015) - An institution framework and rule to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) (Feb. 2015)	
2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings.	- Procedures and manual of introduction of ESCO to Government buildings is completed. - Performance contract models for ESCO are prepared. - Seminar and training for capacity building are conducted for IRESCO members by SABA and IFCO.	- Procedures and manual of introduction of ESCO to Government buildings. (Jan. 2016) - Performance contract models for ESCO. (Jan. 2016) - Records of seminar and training. (Aug. 2015)	The case studies of finance incentive schemes in Japan will be introduced in training course in Japan
3. The introduction of ESCO in Government's buildings is considered and promoted.	- Candidate buildings for ESCO pilot projects are selected by Iranian side. - Energy audit of ESCO planning for the candidate buildings are conducted by members of IRESCO. - Proposal and implementation plan for ESCO pilot project are prepared. - ESCO pilot projects to Government buildings are implemented. - Results of monitoring and verification of the ESCO pilot projects are reported. - Implementation plans to introduce ESCO for Government buildings are prepared.	- Short list of candidate buildings for ESCO pilot projects. (Oct. 2015) - Reports of energy audits of the candidate buildings. (Jan. 2016) - Proposal and implementation plan for ESCO pilot project. (Jun 2016) - Results of monitoring and verification of the ESCO pilot projects. - Implementation plans to introduce ESCO for Government buildings.	SABA and IFCO will be responsible for the result of monitoring and verification of the ESCO pilot projects.
4. Policy recommendations are made for the introduction of ESCOs	- ESCO business model in Iran through the ESCO pilot projects is established. - Policy and action plan to promote ESCO in building sector are prepared by MOE.	- Policy and action plan to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO)	

Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1. An institution framework is established to promote ESCO business in Iran. 1-1 Preparation and support for the institutional framework, regulations and guidelines for the establishment of ESCO association 2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings. 2-1 Preparation of procedures and manuals for the introduction of ESCOs 2-2 Preparation of contract models and formats for ESCOs 2-3 Capacity development for awareness raising and training 2-4 Introduction of case studies on Japan's policies, legislations and finance mechanisms for energy efficiency in buildings 3. The introduction of ESCO in Government's buildings is considered and promoted. 3-1 Capacity development for ESCO companies 3-2 Energy audits for Government's buildings by ESCO companies 3-3 Pilot projects are implemented by ESCO companies in order to introduce ESCO for Government's buildings 3-4 Monitoring of Pilot Projects 4. Policy recommendations are made for the introduction of ESCOs 4-1 Policy recommendations for the introduction of ESCO's	**The Japanese Side** A. Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B. Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Non **The Iranian Side:** A. Ministry of Energy: Project Counter Part ・ Project Director: General Director, Office for the Improvement of Productivity and Economy of Electricity and Energy (OIPEEE) ・ Project Manager: Head of Awareness & Training, OIPEEE B. SABA: Implementation Organization ・ Deputy of Demand Side Department ・ ESCO Department C. IFCO: Co-Implementation Organization D. IRESCO: Cooperation Organization **Joint Coordinating Committee(JCC)** A. Chairperson: ・ General Director of OIPEEE B. Member of Iranian Side ・ MOE ・ Managing and Planning Organization (MPO) ・ Ministry of Economy and Finance (MOEF) ・ Ministry of Petrol (MOP) ・ Ministry of Road and Urban Development (MRUD) ・ SABA ・ IFCO ・ IRESCO C. Member of Japanese side ・ JICA Experts ・ Representatives from JICA IRAN Office ・ Other personnel concerned to be assigned by request of other members D. Observer ・ Ministry of Foreign Affairs (MOFA) ・ Embassy of Japan (EoJ)	

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Renewable Energy and Energy Efficiency Organization (SATBA),
Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SATBA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: January 25, 2014-July 24, 2018 (54 months: JICA project period)

Version 2
January 22, 2018

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	-XXX.XXXX by 2023 (to be determined by the Project)	-XXX.XXXX (to be determined by the Project)	Policies on EE&C for the building sector are maintained.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve ESCO business.	Project completion report including the verification report of the pilot project. (by MOE/SATBA)	Recommendation formulated by the Project is reflected in energy policies and budget allocation.
Outputs: 1. An institutional framework to promote ESCO business in Iran is strengthened.	1.1. Regulations and guidelines in the IRESCO are upgraded. 1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.	1.1. Project documents (Regulations and guidelines) 1.2. Project documents (*for example: demarcation table describing roles and responsibilities among organizations, after organizational restructuring)	
2. The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened..	2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed 2.2. Performance contract models for ESCO project are upgraded 2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA	2.1. Project document (the manual) 2.2. Project document (the contract models) 2.3 Project documents (records of the trainings and seminars)	
3. The ESCO pilot projects are implemented in government's buildings for development of ESCO business..	3.1. More than 50 candidate buildings are selected by MOE/SATBA 3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs. 3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA 3.4. At least, 2 ESCO pilot projects are launched 3.5. Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts) (*monthly performance data) 3.6. Performance reports including one-year performance activities are submitted by ESCOs for at least 2 pilot projects, and approved by MOE/SATBA (after JICA project period)	3.1. Project documents (for example: progress report of pilot projects) 3.2. Project documents (ditto) 3.3. Project documents (ditto) 3.4. Project documents (ditto) 3.5. Project documents (ditto) 3.6. Project documents (completion report)	Budget for pilot projects is secured and disbursed by MOE as planed
4. Policy recommendation for the promotion of ESCO business is formulated.	4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	4.1. Project Documents (for example: policy proposal paper)	

Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran 1-2. To support IRESCO in preparing its internal guidelines 1-3. To give advice to IRESCO on strengthening intuitional capacity 1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business. 2-1. To develop a manual to introduce ESCO project for government organization buildings. 2-2. To collect the existing contract models for ESCO project. 2-3. To develop contract models for ESCO project in building sector in Iran 2-4. To organize trainings and seminars for ESCOs and government organizations 2.5. To introduce policies, legislations and finance mechanisms for EE&C and ESCO project for building sector in Japan 3-1. To select the candidate buildings for energy audit 3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings 3-3. To support ESCOs in planning the pilot projects. 3-4. To supervise and monitor the pilot projects implemented by ESCOs 3-5. To analyse monthly performance data of pilot projects submitted by ESCOs. 4-1. To review the project activities and results including seminars, manuals, performance of pilot projects 4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran 4-3. To submit the recommendation to the last JCC meeting (during the JICA project period) 4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran. 4-5. To submit the recommendation to Iranian government for decision making.	**The Japanese Side** A. Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B. Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Nill **The Iranian Side:** A. Ministry of Energy: Project Counterpart ・ Project Director: General Director, General Director, Planning and Economics of Electricity and Energy Office (PEEEO) ・ Project Manager: Head of International cooperation of PEEEO B. SATBA: Implementation Organization ・ (Deputy of Demand Side Department*) ・ (ESCO Department*) *name of department, position are provisional C. IFCO: Co-Implementation Organization D. (IRESCO: Cooperation Organization) **Joint Coordinating Committee(JCC)** A. Chairperson: ・ General Director of PEEEO B. Member of Iranian Side ・ MOE ・ Plan and Budget Organization (PBO) ・ Ministry of Economy and Finance (MOEF) ・ Ministry of Petrol (MOP) ・ Ministry of Road and Urban Development (MRUD) ・ SATBA ・ IFCO ・ IRESCO C. Member of Japanese side ・ JICA Experts ・ Representatives from JICA Iran Office ・ Other personnel concerned to be assigned by request of other members D. Observer ・ Ministry of Foreign Affairs (MOFA) ・ Embassy of Japan (EoJ)	

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Renewable Energy and Energy Efficiency Organization (SATBA),
Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SATBA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: January 25, 2014-July 24, 2018 (54 months: JICA project period)

Version 3
July 10, 2018

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	ESCO for government buildings will be officially introduced from 2020. Building where is implemented ESCO will be reduced energy consumption at least 10%.	Implementation of ESCO for Government building Evaluate of performance of ESCO	Policies on EE&C for the building sector are maintained. Authorization by a legal institution for ESCO Scheme.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve ESCO business.	Project completion report including the verification report of the pilot project. (by MOE/SATBA)	Recommendation formulated by the Project is reflected in energy policies and budget allocation.
Outputs: 1. An institutional framework to promote ESCO business in Iran is strengthened.	1.1. Regulations and guidelines in the IRESCO are upgraded. 1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.	1.1. Project documents (Regulations and guidelines) 1.2. Project documents (*for example: demarcation table describing roles and responsibilities among organizations, after organizational restructuring)	
2. The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened..	2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed 2.2. Performance contract models for ESCO project are upgraded 2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA	2.1. Project document (the manual) 2.2. Project document (the contract models) 2.3 Project documents (records of the trainings and seminars)	
3. The ESCO pilot projects are implemented in government's buildings for development of ESCO business..	3.1. More than 50 candidate buildings are selected by MOE/SATBA 3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs. 3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA 3.4. At least, 2 ESCO pilot projects are launched 3.5. Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts) (*monthly performance data) 3.6. Performance reports including one-year performance activities are submitted by ESCOs for at least 2 pilot projects, and approved by MOE/SATBA (after JICA project period)	3.1. Project documents (for example: progress report of pilot projects) 3.2. Project documents (ditto) 3.3. Project documents (ditto) 3.4. Project documents (ditto) 3.5. Project documents (ditto) 3.6. Project documents (completion report)	Budget for pilot projects is secured and disbursed by MOE as planed
4. Policy recommendation for the promotion of ESCO business is formulated.	4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	4.1. Project Documents (for example: policy proposal paper)	

Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran 1-2. To support IRESCO in preparing its internal guidelines 1-3. To give advice to IRESCO on strengthening intuitional capacity 1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business. 2-1. To develop a manual to introduce ESCO project for government organization buildings. 2-2. To collect the existing contract models for ESCO project. 2-3. To develop contract models for ESCO project in building sector in Iran 2-4. To organize trainings and seminars for ESCOs and government organizations 2.5. To introduce policies, legislations and finance mechanisms for EE&C and ESCO project for building sector in Japan 3-1. To select the candidate buildings for energy audit 3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings 3-3. To support ESCOs in planning the pilot projects. 3-4. To supervise and monitor the pilot projects implemented by ESCOs 3-5. To analyse monthly performance data of pilot projects submitted by ESCOs. 4-1. To review the project activities and results including seminars, manuals, performance of pilot projects 4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran 4-3. To submit the recommendation to the last JCC meeting (during the JICA project period) 4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran. 4-5. To submit the recommendation to Iranian government for decision making.	**The Japanese Side** A. Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B. Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Nill **The Iranian Side:** A. Ministry of Energy: Project Counterpart ・ Project Director: General Director, General Director, Planning and Economics of Electricity and Energy Office (PEEEO) ・ Project Manager: Head of International cooperation of PEEEO B. SATBA: Implementation Organization ・ (Deputy of Demand Side Department*) ・ (ESCO Department*) *name of department, position are provisional C. IFCO: Co-Implementation Organization D. (IRESCO: Cooperation Organization) **Joint Coordinating Committee(JCC)** A. Chairperson: ・ General Director of PEEEO B. Member of Iranian Side ・ MOE ・ Plan and Budget Organization (PBO) ・ Ministry of Economy and Finance (MOEF) ・ Ministry of Petrol (MOP) ・ Ministry of Road and Urban Development (MRUD) ・ SATBA ・ IFCO ・ IRESCO C. Member of Japanese side ・ JICA Experts ・ Representatives from JICA Iran Office ・ Other personnel concerned to be assigned by request of other members D. Observer ・ Ministry of Foreign Affairs (MOFA) ・ Embassy of Japan (EoJ)	

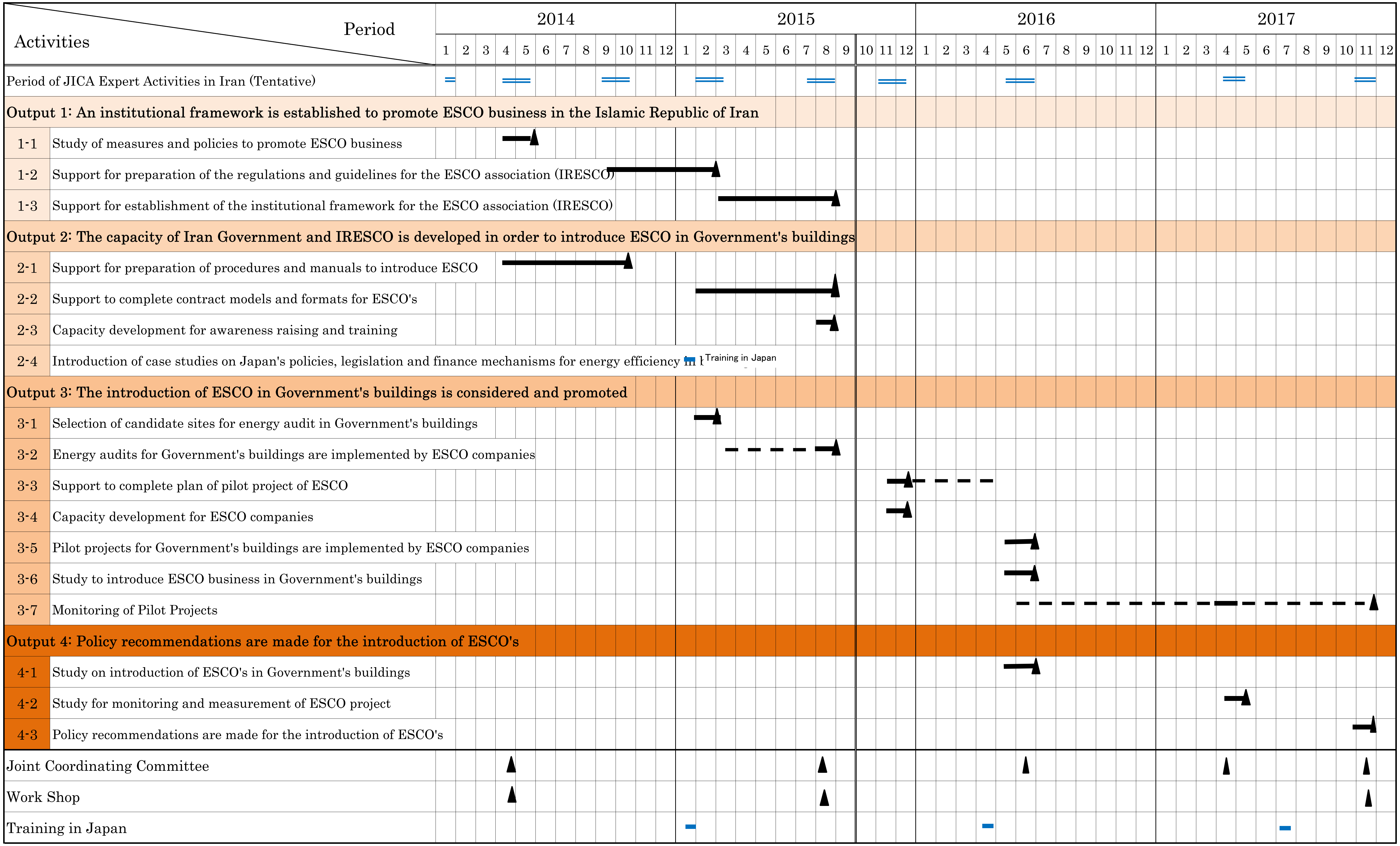
Attachment 2

Flow chart

(PO0, PO1, and PO2)

Plan of Operation

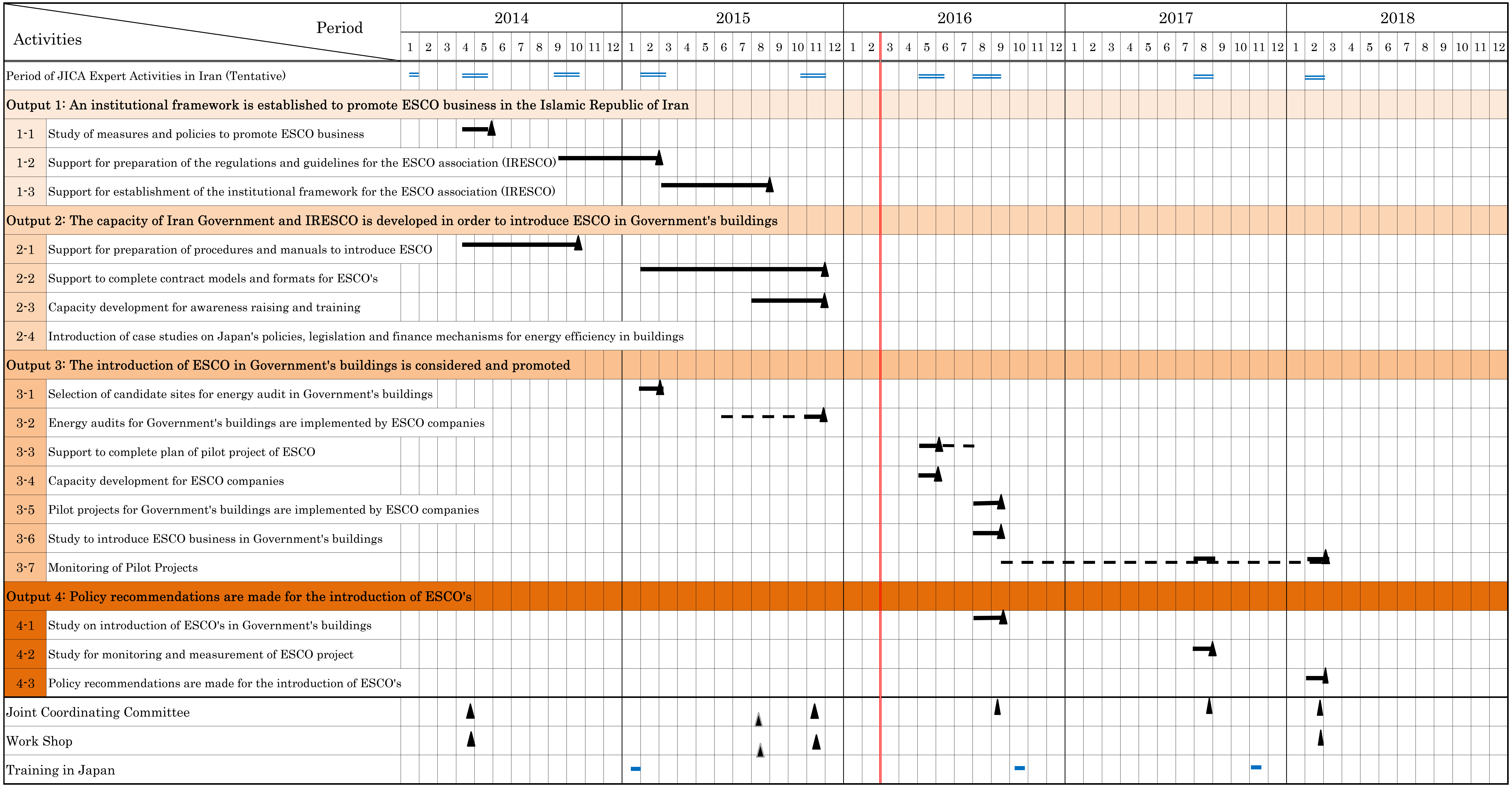
The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in Islamic Republic of Iran



Period of JICA Expert Activities in Iran (Tentative)	
Output 1: An institutional framework is established to promote ESCO business in the Islamic Republic of Iran	
1-1	Study of measures and policies to promote ESCO business
1-2	Support for preparation of the regulations and guidelines for the ESCO association (IRESCO)
1-3	Support for establishment of the institutional framework for the ESCO association (IRESCO)
Output 2: The capacity of Iran Government and IRESCO is developed in order to introduce ESCO in Government's buildings	
2-1	Support for preparation of procedures and manuals to introduce ESCO
2-2	Support to complete contract models and formats for ESCO's
2-3	Capacity development for awareness raising and training
2-4	Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in t
Output 3: The introduction of ESCO in Government's buildings is considered and promoted	
3-1	Selection of candidate sites for energy audit in Government's buildings
3-2	Energy audits for Government's buildings are implemented by ESCO companies
3-3	Support to complete plan of pilot project of ESCO
3-4	Capacity development for ESCO companies
3-5	Pilot projects for Government's buildings are implemented by ESCO companies
3-6	Study to introduce ESCO business in Government's buildings
3-7	Monitoring of Pilot Projects
Output 4: Policy recommendations are made for the introduction of ESCO's	
4-1	Study on introduction of ESCO's in Government's buildings
4-2	Study for monitoring and measurement of ESCO project
4-3	Policy recommendations are made for the introduction of ESCO's
Joint Coordinating Committee	
Work Shop	
Training in Japan	

Plan of Operation Rev.1

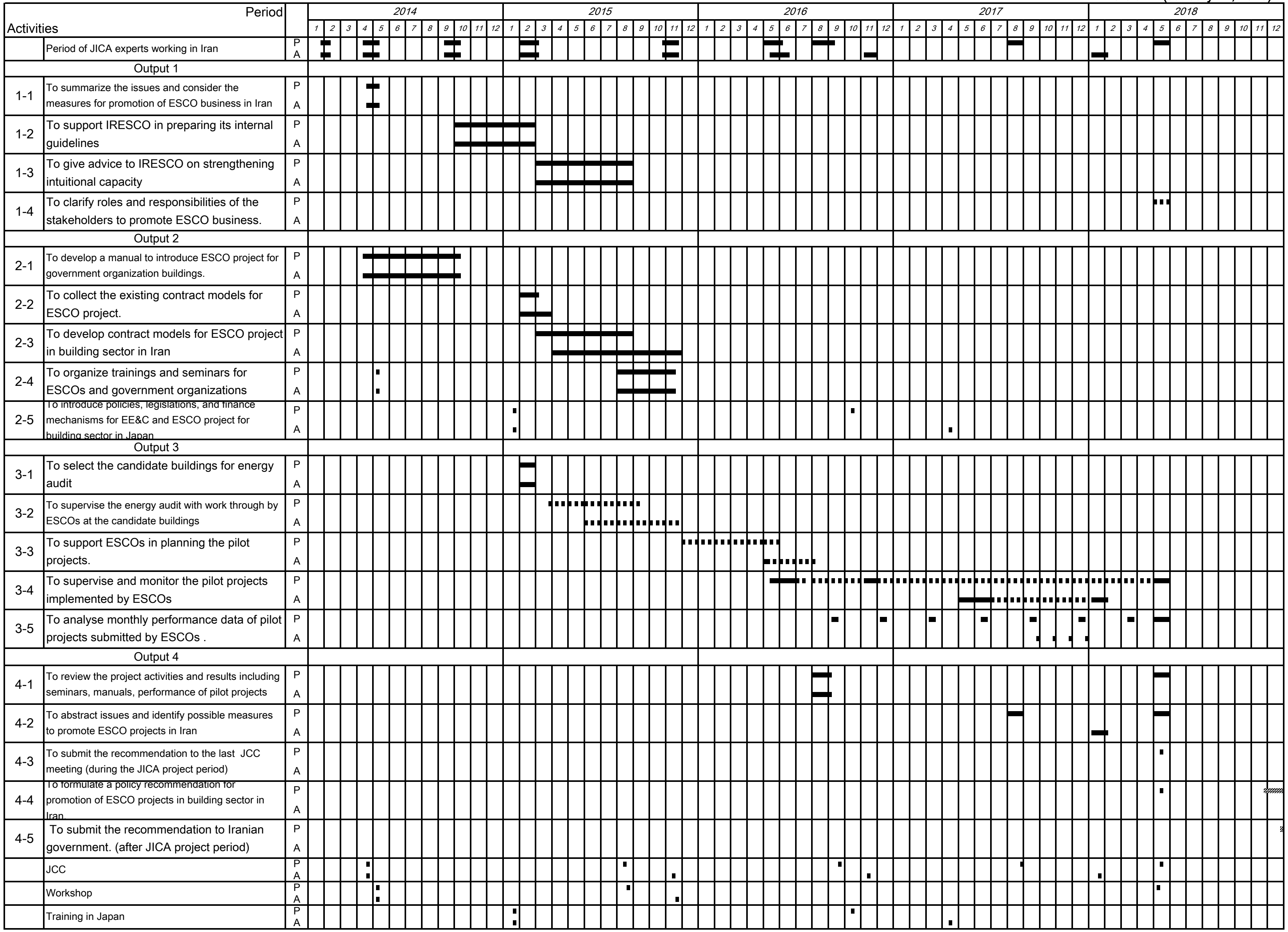
The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in Islamic Republic of Iran



Period of JICA Expert Activities in Iran (Tentative)	
Output 1: An institutional framework is established to promote ESCO business in the Islamic Republic of Iran	
1-1	Study of measures and policies to promote ESCO business
1-2	Support for preparation of the regulations and guidelines for the ESCO association (IRESCO)
1-3	Support for establishment of the institutional framework for the ESCO association (IRESCO)
Output 2: The capacity of Iran Government and IRESCO is developed in order to introduce ESCO in Government's buildings	
2-1	Support for preparation of procedures and manuals to introduce ESCO
2-2	Support to complete contract models and formats for ESCO's
2-3	Capacity development for awareness raising and training
2-4	Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in buildings
Output 3: The introduction of ESCO in Government's buildings is considered and promoted	
3-1	Selection of candidate sites for energy audit in Government's buildings
3-2	Energy audits for Government's buildings are implemented by ESCO companies
3-3	Support to complete plan of pilot project of ESCO
3-4	Capacity development for ESCO companies
3-5	Pilot projects for Government's buildings are implemented by ESCO companies
3-6	Study to introduce ESCO business in Government's buildings
3-7	Monitoring of Pilot Projects
Output 4: Policy recommendations are made for the introduction of ESCO's	
4-1	Study on introduction of ESCO's in Government's buildings
4-2	Study for monitoring and measurement of ESCO project
4-3	Policy recommendations are made for the introduction of ESCO's
Joint Coordinating Committee	
Work Shop	
Training in Japan	

Plan of Operation: The Project on Implementation of the Pilot Project to introduce ESCO to the Government's Buildings

Version 2 (January 22, 2018)



Activities		
	Period of JICA experts working in Iran	P A
	Output 1	
1-1	To summarize the issues and consider the measures for promotion of ESCO business in Iran	P A
1-2	To support IRESCO in preparing its internal guidelines	P A
1-3	To give advice to IRESCO on strengthening intuitional capacity	P A
1-4	To clarify roles and responsibilities of the stakeholders to promote ESCO business.	P A
	Output 2	
2-1	To develop a manual to introduce ESCO project for government organization buildings.	P A
2-2	To collect the existing contract models for ESCO project.	P A
2-3	To develop contract models for ESCO project in building sector in Iran	P A
2-4	To organize trainings and seminars for ESCOs and government organizations	P A
2-5	To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan	P A
	Output 3	
3-1	To select the candidate buildings for energy audit	P A
3-2	To supervise the energy audit with work through by ESCOs at the candidate buildings	P A
3-3	To support ESCOs in planning the pilot projects.	P A
3-4	To supervise and monitor the pilot projects implemented by ESCOs	P A
3-5	To analyse monthly performance data of pilot projects submitted by ESCOs .	P A
	Output 4	
4-1	To review the project activities and results including seminars, manuals, performance of pilot projects	P A
4-2	To abstract issues and identify possible measures to promote ESCO projects in Iran	P A
4-3	To submit the recommendation to the last JCC meeting (during the JICA project period)	P A
4-4	To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran	P A
4-5	To submit the recommendation to Iranian government. (after JICA project period)	P A
	JCC	P A
	Workshop	P A
	Training in Japan	P A

Attachment 3

Detailed Plan

(Work Plan of First Stage and second Stage)

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Work Plan of First stage

April 2014

NIPPON KOEI
Challenging mind, Changing dynamics

TABLE OF CONTENTS

1. Project Description

1.1 Background

The Islamic Republic of Iran produces approximately 4 million barrels per day and accounts for 10.9% of oil deposits in the entire world. But, in spite of depending largely on exports of oil for Iranian foreign currency earnings, general energy consumption occupies 44 % of general energy supply in the Islamic Republic Iran on fiscal year 2010, the amount of domestic consumption of oil has been increased. Energy consumption in the residential and commercial sector is the largest which accounts for 36%, followed by the transportation sector 26%, industrial sector 24%. Particularly, energy consumption of buildings classified as the residential and commercial sector have increased constantly. Promotion of Energy Efficiency & Conservation (EE & C) in the building sector is now the most immediate priority mission of Ministry of Energy in the Islamic Republic of Iran.

JICA implemented a development study for “Institutional Capacity Development on Energy Management in the Building Sector in the Islamic Republic of Iran” from 2010 to 2011 which supported the formulation of the roadmap and action plan to promote energy efficiency in buildings. In this study, it was identified that the ESCO framework is one of the effective measures for promoting EE &C in the building sector by a private sector by aprivate sector initiative. In addition, it was clarified that the policied and legistlations necessary to promote energy efficiency are being formulated such as the “Subsidy Reform Law” and the “Energy Consumption Pattern Reform Law” issued in Dec.2010 and Mar. 2011 respectively.

Under this circumstance, the Government of the Islamic Republic of Iran officially requested ”the Project on Implementation of Pilot Projects to introduce ESCO for Government’s buildings” to GOJ in July 2011. Under the support of JICA, this project is expected to provide knowledge and skills to promote ESCO system for Government’s buildings in the Islamic Repubilc of Iran.

1.2 Goal and Purpose of the Project

EE &C in the building sector will be promoted through the introduction of ESCO for Government’s buildings.

The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.

1.3 Outputs

Output 1: An institutional framework is established to promote ESCO business in the Islamic Republic of Iran.

Output 2: The capacity of the Government of the Islamic Republic of Iran and ESCO association is developed in order to introduce ESCO in Government’s buildings.

Output 3: The introduction of ESCO in Government’s buildings is considered and promoted.

Output 4: Policy recommendations are made for the introduction of ESCOs.

1.4 JICA Experts (Inputs)

The JICA Project Team (JICA experts) consists of the following three (3) experts:

Table 1-1 JICA Experts (JICA Project Team)

Name	Position
Tsutomu MORI	Team Leader, ESCO framework
Hideaki KUROKI	Energy audit engineer (Heat)
Yoichi KITA	Energy audit engineer (Electricity)

1.5 Implementation Schedule

The duration of the Project will be 48 months.

First stage:	From January 2014 to September 2015
Second stage:	From October 2015 to December 2017

The Plan of Operation of the overall Project is shown in Annex-1.

1.6 Implementation Structure

The project organization chart is as shown in Figure 1-1. The roles and assignments of related organizations are as follows;

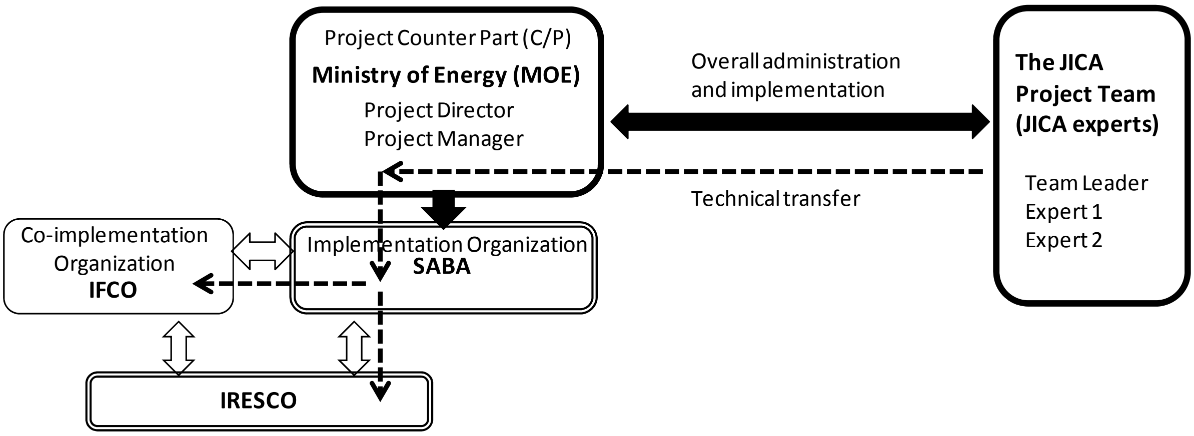


Figure 1-1 Project Organization Chart

(1) OIPEEE (Office for the Improvement of Productivity and Economy of Electricity and Energy) of MOE

OIPEEE will assign a Project Director to be responsible for overall administration and implementation of the Project.

OIPEEE will assign a Project Manager to be responsible to support managerial and technical issue of the Project.

(2) SABA(IEEO: Iran Energy Efficiency Organization)

SABA will be the implementation organization of the Project and assign a task team to work with JICA Project Team.

(3) IFCO (Iranian Fuel Conservation Organization)

IFCO will be the co-implementation organization of the Project and give necessary information in order to support the implementation of the Project.

(4) IRESCO (Association of Energy Service Companies of Iran)

IRESCO is fundamental for the success of the Project. IRESCO will cooperate in the implementation of the Project through SABA and IFCO.

(5) JICA Project Team (JICA Experts)

The JICA experts will give necessary technical guidance, advice and recommendations to MOE and SABA on any matters pertaining to the implementation of the Project.

1.7 Project Design Matrix (PDM)

The Project will be implemented joint work between JICA Project Team and SABA based on the project design matrix (PDM). The PDM of project index will be made agreement between JICA and MOE, and confirmed among the related organizations in Joint Coordinating Committee (hereinafter referred to as "JCC").

1.8 Joint Coordinating Committee (JCC)

JCC will be established in order to facilitate inter-organizational coordination. JCC will approve work plan, review overall progress, conduct monitoring and evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. The structure of JCC is as shown in Figure 1-2.

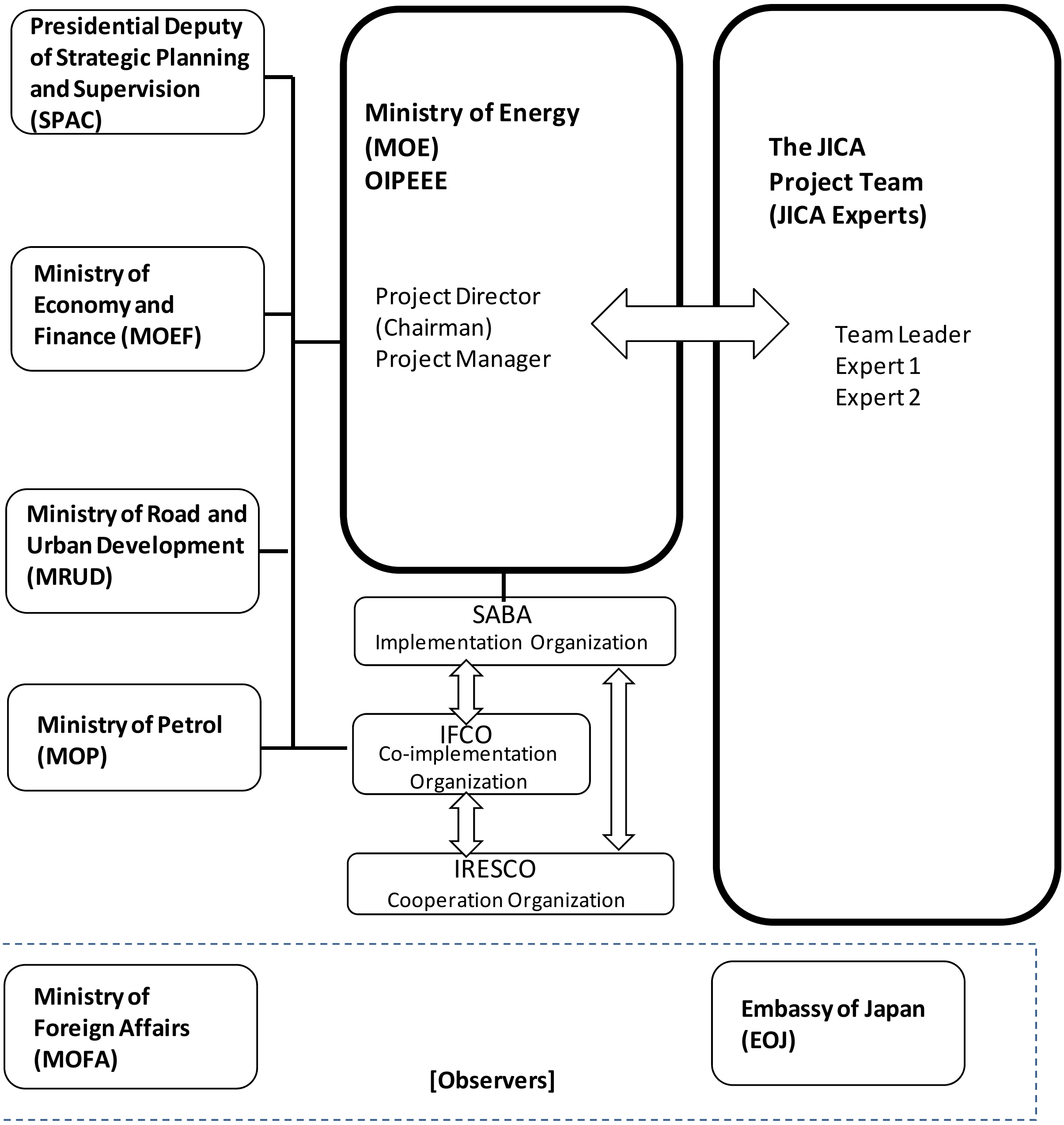


Figure 1-2 Structure of JCC

The schedule and agenda of JCC is as shown in Table 1-2.

Table 1-2 schedule and agenda of JCC

JCC	Time	Agenda
1st Committee	April 2014	- Agreement of Work Plan (First stage) - Confirmation of role of related organizations
2nd Committee	August 2015	- Report of output of the Work (First stage) - Candidate sites of ESCO pilot project - Budget of ESCO pilot project - Schedule and work plan of second stage
3rd Committee (At 2nd stage)	April 2016	- Agreement of Work Plan (Second stage) - ESCO pilot project
4th Committee (At 2nd stage)	May 2017	- Report of monitoring and verification of performance of the pilot project
5th Committee (At 2nd stage)	November 2017	- Report of output of the Work

2. Methodology for Implementation of Project

2.1 Activities for the Output 1

The schedule of activities for the output 1 is as shown in Figure 2-1.

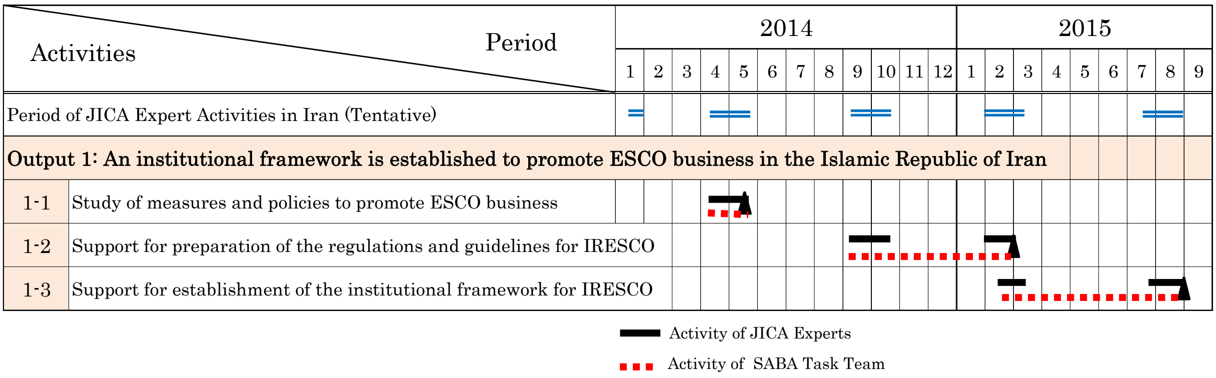


Figure 2-1 Schedule of activities for the output 1

(1) Activity 1-1: Study of measures and policies to promote ESCO business

The JICA Project Team will study measures and policies to promote ESCO business through interview survey for related organizations. The JICA Project Team will introduce the activities of ESCO association in Japan in the first work shop. The JICA Project Team will sort out priorities of IRESCO's activities under studying measures in Islamic Republic of Iran.

(2) Activity 1-2: Support for preparation of the regulations and guidelines for IRESCO

The regulations and guidelines of IRESCO are important for the activities to promote ESCO in Iran. The regulations and guidelines will be prepared by IRESCO with technical support by JICA Project Team.

(3) Activity 1-3: Support for establishment of the institutional framework for IRESCO

It is necessary and important to improve the system for promotion of ESCO in Iran. The JICA Project Team will support MOE, SABA and IRESCO to improve the system, policy and plan on the capacity development of the Project.

2.2 Activities for the Output 2

The schedule of activities for the output 2 is as shown in Figure 2-2.

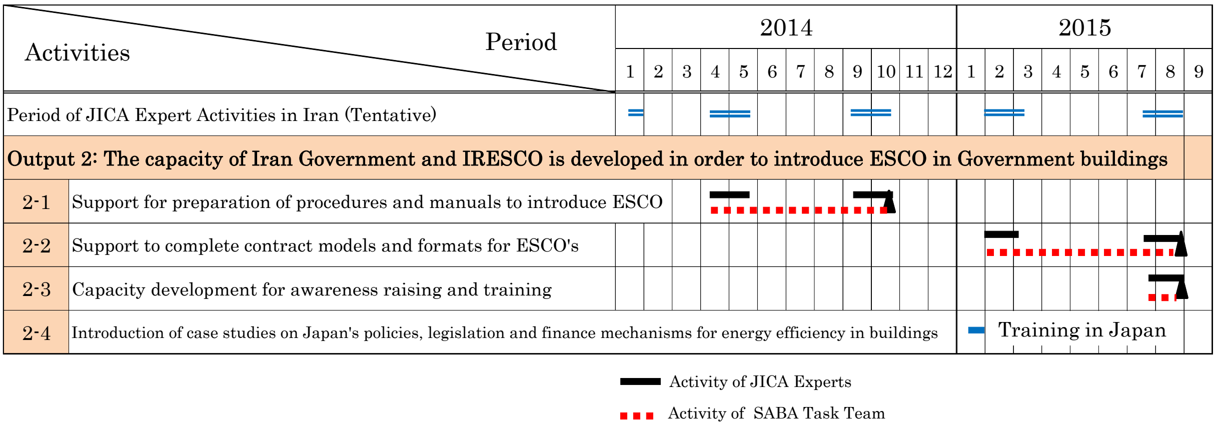


Figure 2-2 Schedule of activities for the output 2

(1) Activity 2-1: Support for preparation of procedures and manuals to introduce ESCO

The JICA Project Team will discuss with related organizations and the members of IRESCO about measures required promoting ESCO, and introducing experience and programs in Japan.

Two manuals to introduce ESCO in Iran will be prepared. One is a procedure on introduction ESCO for Government. Another is a procedure on implementation of ESCO for ESCO companies.

The manuals will be submitted to JICA as outputs of this activity at the end of the first stage.

ESCO manual prepared in this activity will be referred to implement the ESCO Pilot Projects, and revised through the implementation of the Pilot Projects.

(2) Activity 2-2: Support to complete contract models and formats for ESCO's

The JICA Project Team will support to prepare the ESCO's contract models and formats.

The ESCO's contract models will be submitted to JICA as outputs of this activity at the end of the first stage.

The ESCO's contract models prepared in this activity will be referred to implement the ESCO Pilot Projects, and revised through the implementation of the Pilot Projects.

(3) Activity 2-3: Capacity development for awareness raising and training

The ESCO manual and ESCO's contract models will be introduced for related organizations at the second work shop.

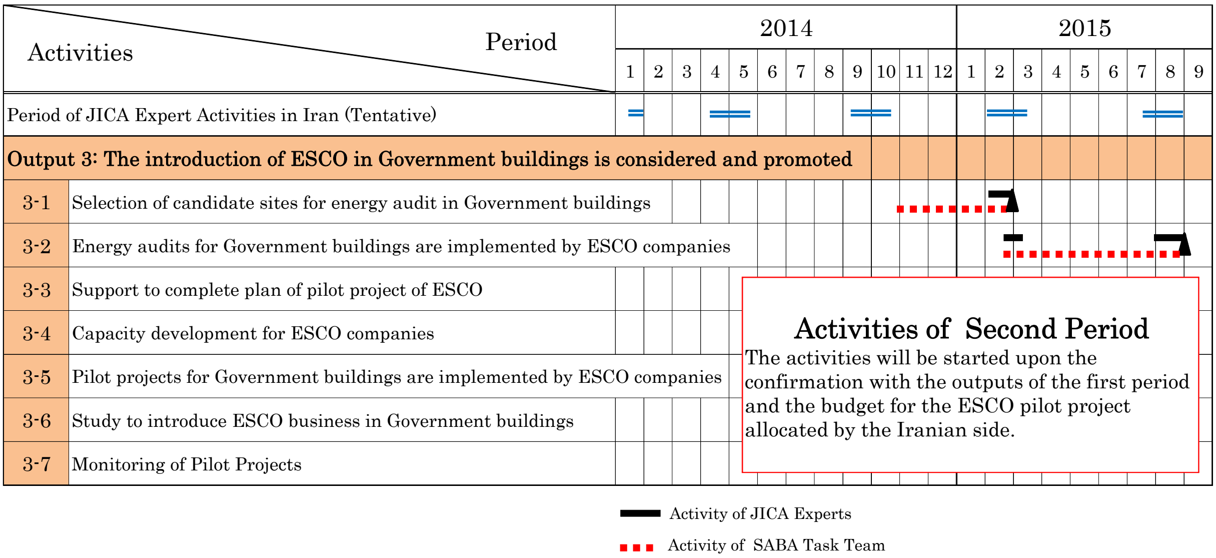
MOE and MOP will announce to owner of Government's buildings and municipalities. SABA and IRESCO will hold a seminar to develop capacity of ESCO companies.

(4) Activity 2-4: Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in buildings

The establishing finance incentive is important to introduce and to promote ESCO in Iran. However, the financing environment in Iran is unique compared to that of Japan. Therefore, the case studies of finance incentive schemes in Japan will be introduced in training course in Japan. The necessary technology transfer will be implemented mainly as the training course.

2.3 Activities for the Output 3

The schedule of activities for the output 3 is as shown in Figure 2-3.



The activities will be started upon the confirmation with the outputs of the first period and the budget for the ESCO pilot project allocated by the Iranian side.

Figure 2-3 Schedule of activities for the output 3

(1) Activity 3-1: Selection of candidate sites for energy audit in Government's buildings

MOE will prepare a long list of buildings for walk through as candidate sites of ESCO pilot projects. SABA will prepare necessary data for energy audit such as total floor area, building use, and major energy consumption equipments and monthly energy consumption data of the listed buildings.

Ten (10) buildings as candidate sites of ESCO pilot projects will be selected under discussion with MOE.

(2) Activity 3-2: Energy audits for Government's buildings are implemented by ESCO companies

ESCO companies will conduct the energy audit with walk through survey for ten (10) selected sites. The JICA Project Team will support the energy audit conducted by ESCO companies in order to transfer technology of the energy audit for ESCO planning.

The JICA Project Team will evaluate the feasibility of each building for ESCO project as collaborative work with ESCO companies for selecting three (3) buildings as ESCO candidate sites. The JICA Project Team and ESCO companies will estimate approximate cost for ESCO pilot projects.

The budget for ESCO pilot projects will be allocated by the Iranian side.

(3) Activity 3-3: Support to complete plan of pilot project of ESCO

The activity will be worked in the second stage.

(4) Activity 3-4: Support to complete plan of pilot project of ESCO

The activity will be worked in the second stage

(5) Activity 3-5: Pilot projects for Government's buildings are implemented by ESCO companies

The activity will be worked in the second stage

(6) Activity 3-6: Study to introduce ESCO business in Government's buildings

The activity will be worked in the second stage

(7) Activity 3-7: Monitoring of Pilot Projects

The activity will be worked in the second stage

2.4 Activities for the Output 4

The activities will be worked in the second stage with the monitoring of the ESCO pilot project.

3. Work Shop (W/S)

Total three (3) Work Shops will be hold in the Project. Outline of the work shop is as shown in Table 3-1. Two (2) W/Ss will be held in the first stage, and one (1) W/S will be held in the second stage.

Table 3-1 Outline of the work shop (Tentative)

Workshop	Time	Program
1st work shop	April 2014	- Legislation and finance support to promote ESCO in Japan - Activities and role of ESCO association in Japan
2nd work shop	August 2015	- ESCO manual and ESCO's contract models - Summary of energy audits for ten (10) sites - Monitoring and performance guarantee on ESCO
3rd work shop (At 2nd stage)	November 2017	- Results of monitoring on ESCO pilot projects - Policy recommendations for the introduction of ESCO's

4. Supporting from Iranian Side

Based on Record of Discussion that is agreed between Japan International Cooperation Agency (JICA) and the Islamic Republic of Iran on October 1st, 2013, the Iranian Government is kindly requested to provide the following supports to the JICA Project Team;

- Office room,
- Credentials or identification cards,
- Support in JICA Project Team travelling for site sruvey, and
- Other facilitation, if necessary.

5. Annex

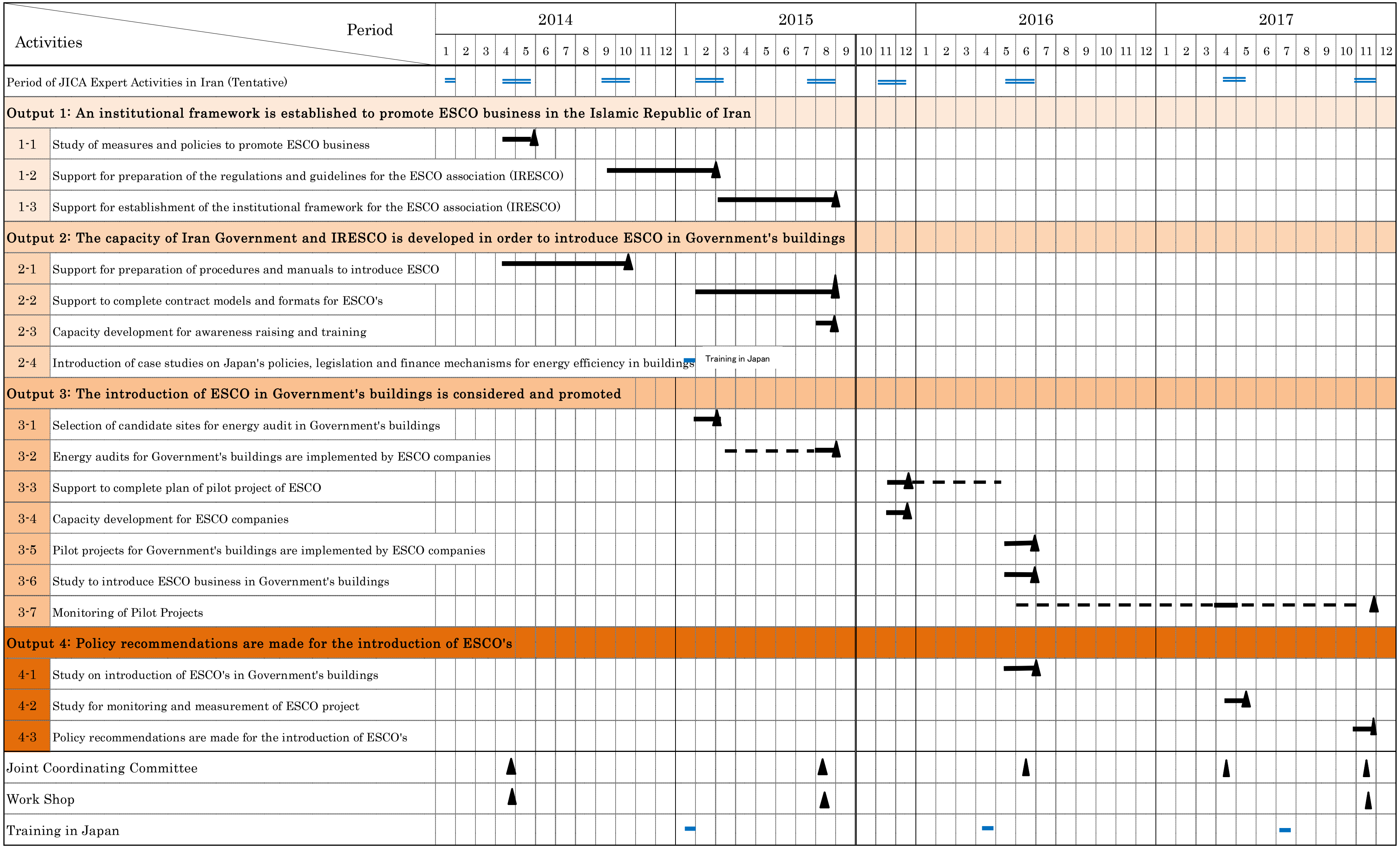
- Annex-1: Plan of Operation of the overall Project
- Annex-2: Manning Schedule
- Annex-3: Project Member List

Annex

Annex-1

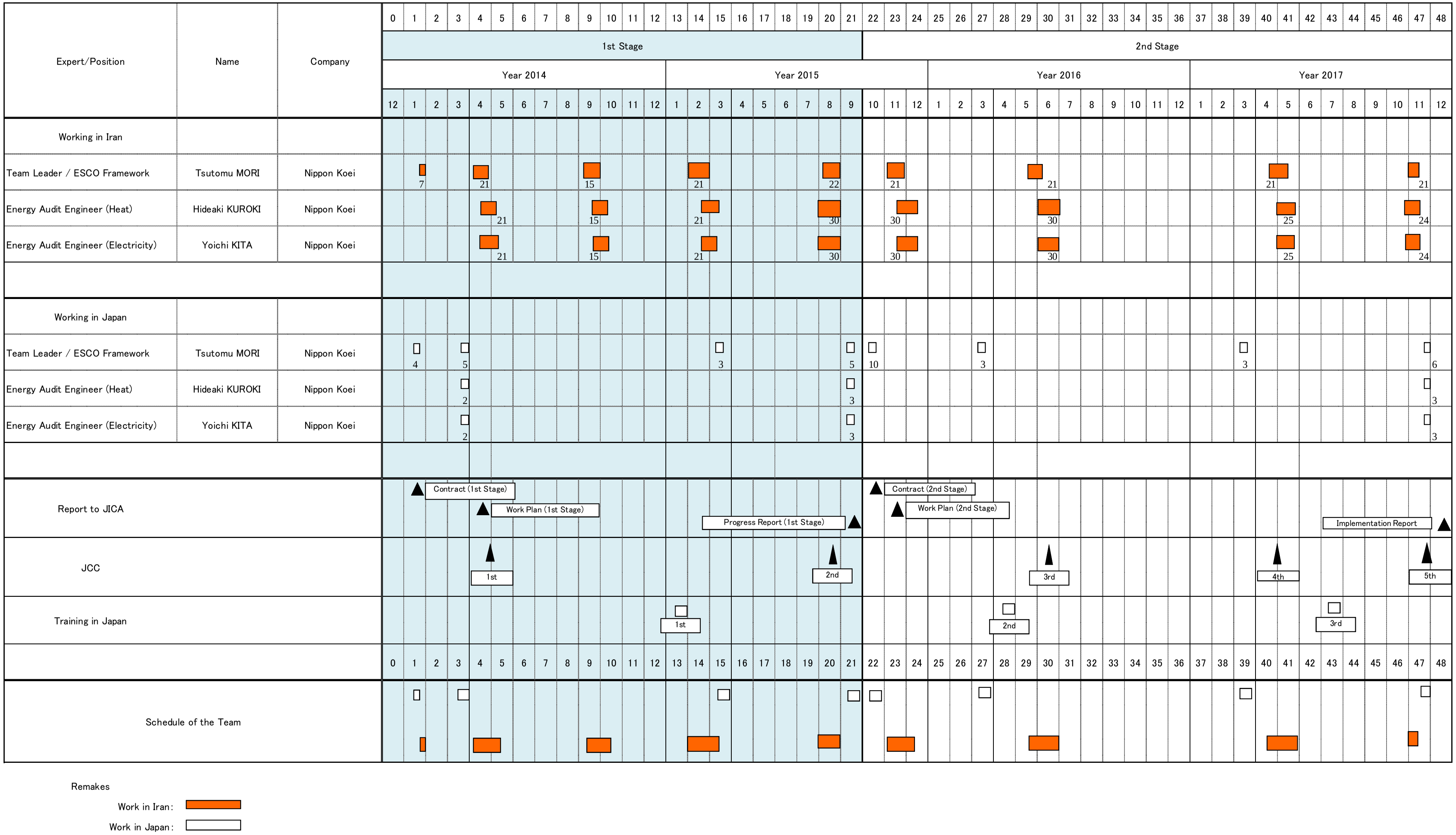
Plan of Operation

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in Islamic Republic of Iran



Activities	
Period of JICA Expert Activities in Iran (Tentative)	
Output 1: An institutional framework is established to promote ESCO business in the Islamic Republic of Iran	
1-1	Study of measures and policies to promote ESCO business
1-2	Support for preparation of the regulations and guidelines for the ESCO association (IRESCO)
1-3	Support for establishment of the institutional framework for the ESCO association (IRESCO)
Output 2: The capacity of Iran Government and IRESCO is developed in order to introduce ESCO in Government's buildings	
2-1	Support for preparation of procedures and manuals to introduce ESCO
2-2	Support to complete contract models and formats for ESCO's
2-3	Capacity development for awareness raising and training
2-4	Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in buildings
Output 3: The introduction of ESCO in Government's buildings is considered and promoted	
3-1	Selection of candidate sites for energy audit in Government's buildings
3-2	Energy audits for Government's buildings are implemented by ESCO companies
3-3	Support to complete plan of pilot project of ESCO
3-4	Capacity development for ESCO companies
3-5	Pilot projects for Government's buildings are implemented by ESCO companies
3-6	Study to introduce ESCO business in Government's buildings
3-7	Monitoring of Pilot Projects
Output 4: Policy recommendations are made for the introduction of ESCO's	
4-1	Study on introduction of ESCO's in Government's buildings
4-2	Study for monitoring and measurement of ESCO project
4-3	Policy recommendations are made for the introduction of ESCO's
Joint Coordinating Committee	
Work Shop	
Training in Japan	

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government' s Buildings in Islamic Rebublic of Iran



Project Member List

Name	Position of the Project	Organization
The JICA Project Team		
Tsutomu MORI	Team Leader / ESCO Framework	Nippon Koei Co., LTD.
Hideaki KUROKI	Energy Audit Engineer (Heat)	Nippon Koei Co., LTD.
Yoichi KITA	Energy Audit Engineer (Electricity)	Nippon Koei Co., LTD.
Behzad Yaghmaie	Assistant stuff	
MOE		
M. A. Shafiezadeh	Project Director	General Director of OIPEEE
A. Shirazi	Project Manger	Head of Awareness & Training, OIPEEE
SABA Project Team		
Amir Doudabi Nezhad	Project Responsible Person of SABA	Deputy of Demand Side Department
Mohammad Akbari	Team Leader	Manager of ESCO Department
Mahdi Hormozi	ESCO Expert	Engineer of ESCO Department
Ahmad R. Tavakkoli	Energy Saving Expert of Building	Engineer of Energy Conservation in Building Department
Mahdi Rafiei	Coordinator (Energy Saving Expert of Industry)	Engineer of Energy Conservation in Industries Department

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Work Plan of Second stage

April 2016

NIPPON KOEI
Challenging mind, Changing dynamics

TABLE OF CONTENTS

Annex-1: Plan of Operation of the overall Project Rev.1

Annex-2: Project Design Matrix (PDM) Version 1

Annex-3: Manning Schedule

Annex-4: ESCO manual

Annex-5: Model contract of ESCO

1. Project Description

1.1 Background

The Islamic Republic of Iran (Iran) produces approximately 4 million barrels per day and accounts for 10.9% of oil deposits in the entire world. But, in spite of depending largely on exports of oil for Iranian foreign currency earnings, general energy consumption occupies 44 % of general energy supply in the Islamic Republic Iran on fiscal year 2010, the amount of domestic consumption of oil has been increased. Energy consumption in the residential and commercial sector is the largest which accounts for 36%, followed by the transportation sector 26%, industrial sector 24%. Particularly, energy consumption of buildings classified as the residential and commercial sector have increased constantly. Promotion of Energy Efficiency & Conservation (EE & C) in the building sector is now the most immediate priority mission of Ministry of Energy (MOE) in Iran.

Japan International Cooperation Agency (JICA) implemented a development study for "Institutional Capacity Development on Energy Management in the Building Sector in the Islamic Republic of Iran" from 2010 to 2011 which supported the formulation of the roadmap and action plan to promote energy efficiency in buildings. In this study, it was identified that the Energy Service Company (ESCO) framework is one of the effective measures for promoting EE &C in the building sector by a private sector by aprivate sector initiative. In addition, it was clarified that the policied and legistlations necessary to promote energy efficiency are being formulated such as the "Subsidy Reform Law" and the "Energy Consumption Pattern Reform Law" issued in Dec.2010 and Mar. 2011 respectively.

Under this circumstance, the Government of Iran (GOI) officially requested "the Project on Implementation of Pilot Projects to introduce ESCO for Government's buildings" to the Government of Japan (GOJ) in July 2011. Under the support of JICA, this project is expected to provide knowledge and skills to promote ESCO system for Government's buildings in Iran.

1.2 Goal and Purpose of the Project

EE &C in the building sector will be promoted through the introduction of ESCO for Government's buildings.

The establishment of ESCO business model is promoted through the capacity development of the GOI and ESCO association to promote ESCO businesses.

1.3 Outputs

Output 1:	An institutional framework is established to promote ESCO business in Iran.
Output 2:	The capacity of the GOI and ESCO association is developed in order to introduce ESCO in Government's buildings.
Output 3:	The introduction of ESCO in Government's buildings is considered and promoted.
Output 4:	Policy recommendations are made for the introduction of ESCOs.

1.4 JICA Experts (Inputs)

The JICA Project Team (JICA experts) consists of the following three (3) experts:

Table 1-1 JICA Experts (JICA Project Team)

Name	Position
Tsutomu MORI	Team Leader, ESCO framework
Hideaki KUROKI	Energy audit engineer (Heat)
Morio SAKAI	Energy audit engineer (Electricity)

1.5 Implementation Schedule

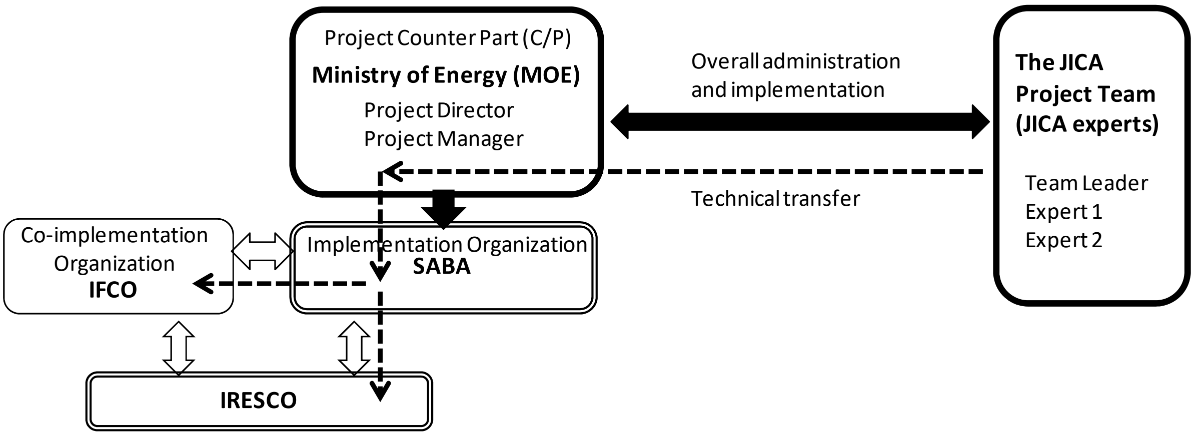
The duration of the Project will be 53 months.

First stage:	From January 2014 to February 2016 (Completed)
Second stage:	From April 2016 to May 2018 (This phase)

The Plan of Operation of the overall Project is shown in Annex-1.

1.6 Implementation Structure

The project organization chart is as shown in Figure 1-1. The roles and assignments of related organizations are as follows;



Source: Prepared by the JICA Project Team

Figure 1-1 Project Organization Chart

(1) OIPEEE (Office for the Improvement of Productivity and Economy of Electricity and Energy) of MOE

OIPEEE will assign a Project Director to be responsible for overall administration and implementation of the Project.

OIPEEE will assign a Project Manager to be responsible to support managerial and technical issue of the Project.

(2) SABA(IEEO: Iran Energy Efficiency Organization)

SABA will be the implementation organization of the Project and assign a task team to work with JICA Project Team.

(3) IFCO (Iranian Fuel Conservation Organization)

IFCO will be the co-implementation organization of the Project and give necessary information in order to support the implementation of the Project.

(4) IRESCO (Association of Energy Service Companies of Iran)

IRESCO is fundamental for the success of the Project. IRESCO will cooperate in the implementation of the Project through SABA and IFCO.

(5) JICA Project Team (JICA Experts)

The JICA experts will give necessary technical guidance, advice and recommendations to MOE and SABA on any matters pertaining to the implementation of the Project.

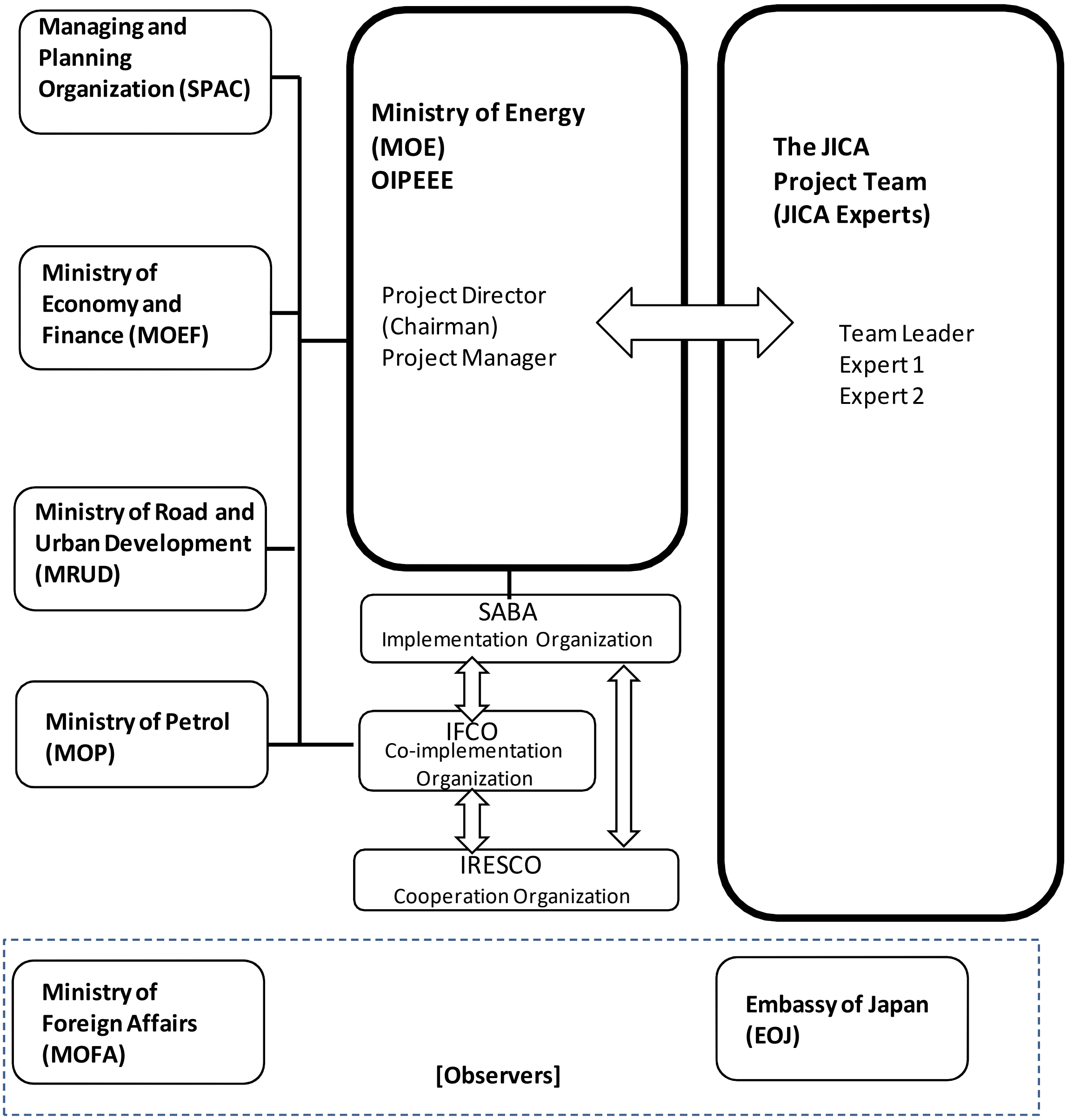
1.7 Project Design Matrix (PDM)

The Project will be implemented joint work between JICA Project Team and SABA based on the project design matrix (PDM). The original PDM of project index was made agreement between JICA and MOE in early time of the first stage, and confirmed among the related organizations in Joint Coordinating Committee (hereinafter referred to as "JCC") on 16th April, 2014.

Original PDM was amended on 14th November, 2015 as PDM version 1. PDM version 1 is shown in Annex-2.

1.8 Joint Coordinating Committee (JCC)

JCC was established in order to facilitate inter-organizational coordination in early time of the first stage. JCC may approve work plan, review overall progress, conduct monitoring and evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. The structure of JCC is as shown in Figure 1-2.



Source: Prepared by the JICA Project Team

Figure 1-2 Structure of JCC

The schedule and agenda of JCC is as shown in Table 1-2.

Table 1-2 schedule and agenda of JCC

JCC	Time	Agenda
1st Committee (At 1st stage)	April 2014 (Done)	- Agreement of Work Plan (First stage) - Confirmation of role of related organizations
2nd Committee (At 1st stage)	August 2015 (Done)	- Report of output of the Work (First stage) - Candidate sites of ESCO pilot project
3rd Committee	August 2016	- ESCO pilot project
4th Committee	August 2017	- Report of monitoring and verification of performance of the pilot project
5th Committee	November 2017	- Report of output of the Work

Source: Prepared by the JICA Project Team

2. Methodology for Implementation of Project

2.1 Activities for the Output 1

Activities for the Output 1 were already done in the first stage.

Items of activities for the Output 1 were shown as follows.

(1) Activity 1-1: Study of measures and policies to promote ESCO business

(2) Activity 1-2: Support for preparation of the regulations and guidelines for IRESCO

(3) Activity 1-3: Support for establishment of the institutional framework for IRESCO

2.2 Activities for the Output 2

Activities for the Output 2 were already done in the first stage.

Items of activities for the Output 2 were shown as follows.

(1) Activity 2-1: Support for preparation of procedures and manuals to introduce ESCO

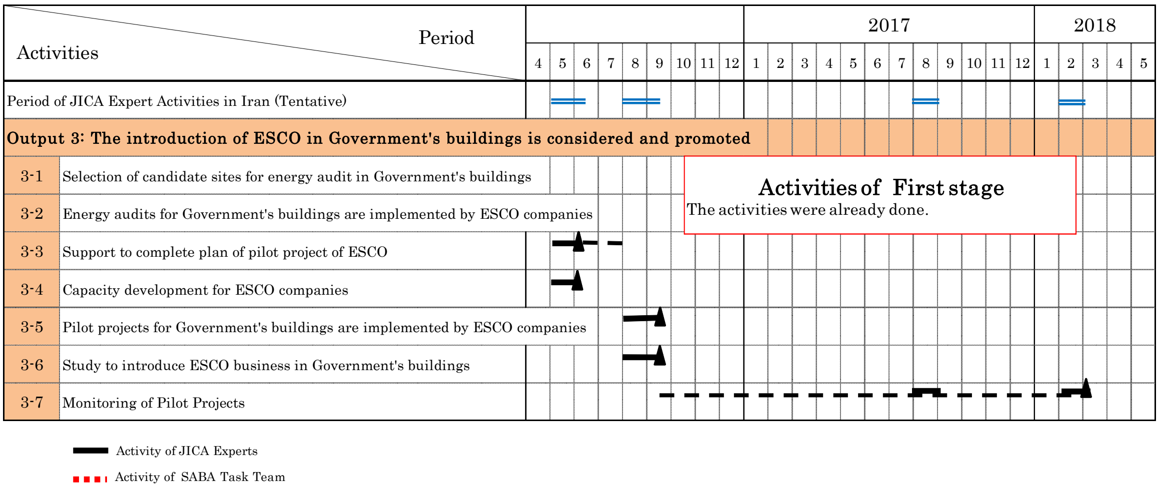
(2) Activity 2-2: Support to complete contract models and formats for ESCO's

(3) Activity 2-3: Capacity development for awareness raising and training

(4) Activity 2-4: Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in buildings

2.3 Activities for the Output 3

The schedule of activities for the output 3 is as shown in Figure 2-1.



Source: Prepared by the JICA Project Team

Figure 2-1 Schedule of activities for the output 3

(1) Activity 3-1: Selection of candidate sites for energy audit in Government's buildings

Activity 3-1 was already done in the first stage.

(2) Activity 3-2: Energy audits for Government's buildings are implemented by ESCO companies

Activity 3-2 was already done in the first stage.

(3) Activity 3-3: Support to complete plan of pilot project of ESCO

ESCO companies will conduct detailed audit to few selected buildings as ESCO candidate sites and will prepare specific plan for implementation of the ESCO projects on them, in collaboration with the JICA Project Team. Especially, the JICA Project Team will support on the formulation of specific policies on ESCO business, e.g. performance guarantee, methodology of Measurement and Verification (M&V) for monitoring the ESCO project.

(4) Activity 3-4: Capacity development for ESCO companies

ESCO companies will prepare the ESCO proposals based on the complete plans of pilot project of ESCO mentioned in activity 3-3. SABA and member of IRESCO will act main role on the preparation. All of ESCO proposal will be shared to member of IRECO, in order to develop their capacity. Further, all of them will be submitted to JICA and MOE as deliverables by counterpart organization.

(5) Activity 3-5: Pilot projects for Government's buildings are implemented by ESCO companies

ESCO companies will implement the ESCO pilot project based on the ESCO proposal mentioned in activity 3-4. ESCO companies will present detail of ESCO proposal to building owners in order to share adequately understanding of ESCO pilot project. Especially, main items of ESCO business, e.g. guarantee performance, methodology of M&V for monitoring the ESCO project, risk allocation and share of benefit of ESCO project, will be committed between both of ESCO company and building owner under mutual consultation on the respective ESCO projects. Limited to completion of mentioned commitment, both of ESCO company and building owner will sign ESCO agreement.

The JICA Project Team will support both of ESCO company and building owner on the process of contract until completion of signing the contract, clarify the issues of introduction of ESCO project.

(6) Activity 3-6: Study to introduce ESCO business in Government's buildings

In parallel of implementation of ESCO pilot project, the JICA Project Team will study countermeasure to introduce ESCO business in Government's buildings as follows.

・Estimation of potential and scale of ESCO business market in Tehran city wise and in entire Iran.

・Preparation of long list of feasible buildings on ESCO business.

・Preparation of master plan of promotion of ESCO business (Schedule, Budget).

(7) Activity 3-7: Monitoring of Pilot Projects

Monitoring will be carried out around first anniversary of commencement of ESCO pilot project. The M&V will be implemented under reference of ESCO proposal by ESCO company. The JICA Project Team will verify benefit by implementation of ESCO pilot project through monitoring, and will consider standard monitoring protocols of ESCO project in Iran. These protocols will be compiled as proposal regarding monitoring methodology of ESCO project in Ian. Finally, mentioned proposal will be submitted to MOE as deliverables.

In Japan, guideline of International Performance Measurement and Verification Protocol (IPMVP) of United States (US) is referred as standard of monitoring.

Categorization of M&V defined by IPMVP is shown in Table 2-1.

Statistical data does not exist, and no measurement instrument is installed in almost of buildings in Iran. In such cased, it is difficult to adopt Options C, D, because these options require track record in long term in order to consider E&C potential. Therefore, it is desirable to adopt Options A, B in many cases.

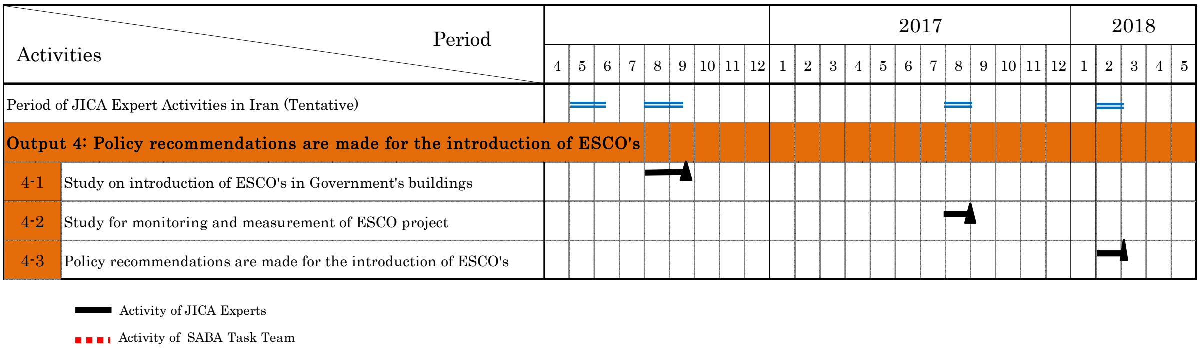
Table 2-1 Categorization of M&V defined by IPMVP

Scope	Option A (Retrofit Isolation with Key Parameter Measurement)	Option B (Retrofit Isolation with All Parameter Measurement)	Option C (Whole-Facility Measurement)	Option D (Calibrated Computer Simulation)
Baseline	Baseline will be set per each E&C counter measure. Option A can be applicable, limited to in case that all of following condition is met. ・load change of the system is not frequent. ・Operating time of the system is stable.	Baseline will be set per each E&C counter measure. Option B can be applicable in following cases ・load change of the system is not frequent. ・Operating time of the system is stable.	Baseline will be set as entire building. Formula to estimate should be developed through study of measurement record (almost three years) at prior to ESCO project.	Same as Option C or By computer simulation
Policy of M&V after introduction of E&C counter measures	By estimation, Operating hours multiples efficiency, e.g. catalog specification, measurement in short term.	Measurement of amount of energy consumption in each equipment in short term.	Baseline should be amended based on cause of variation and amount of energy saving should be evaluated by comparison between measured value and amended baseline. It means that imaginary energy consumption at prior to ESCO project as amended baseline will be calculated.	By computer simulation
Applicable E&C counter measures	・Replace to high efficiency lighting fixture ・Replace to CFL ・Introduction of lighting control system by moving sensor	・Introduction of pump and/or fan control system by VSD (Variable Speed Device) ・Replace to high efficiency distribution transformer ・Introduction of BEMS (Building Energy Management System) ・Introduction of CHP (Combined Heat and Power) ・Development of chilled and/or warm water system ・Development of HVAC control	・Introduction (affix) of heat insulation film on the window glaze ・Introduction of BEMS (Building Energy Management System) ・Introduction of control system of carbon dioxide concentration ・Development of HVAC control ・Development of heat source equipment control	・Change of HVAC system

Source : Prepared by the JICA Project Team

2.2 Activities for the Output 4

The schedule of activities for the output 4 is as shown in Figure 2-2.



Source: Prepared by the JICA Project Team

Figure 2-2 Schedule of activities for the output 4

(1) Activity 4-1: Study on introduction of ESCO's Government's buildings

The JICA Project Team will clarify the issues for the introduction of ESCO's Government's buildings in Iran and study countermeasures to dissolve them through experience of ESCO pilot project.

(2) Activity 4-2: Study for monitoring and measurement of ESCO project

The JICA Project Team will clarify the issues for monitoring and measurement of ESCO project in Iran, and study countermeasures to dissolve them through experience of ESCO pilot project.

(3) Activity 4-3: Policy recommendations are made for the introduction of ESCO's

The JICA Project Team will suggest policy recommendations are made for the introduction of ESCO's in Iran through experience of ESCO pilot project, some practices of ESCO project in Japan also.

3. Work Shop (W/S)

Total three (3) Work Shops will be hold in the Project. Outline of the work shop is as shown in Table 3-1. Two (2) W/Ss will be held in the first stage, and one (1) W/S will be held in the second stage.

Table 3-1 Outline of the work shop (Tentative)

Workshop	Time	Program
1st work shop (At 1st stage)	April 2014	- Legislation and finance support to promote ESCO in Japan - Activities and role of ESCO association in Japan
2nd work shop (At 1st stage)	November 2015	- Introduction of best practice of ESCO - Introduction of new ESCO scheme in Japan - Fund of ESCO business
3rd work shop	November 2017	- Results of monitoring on ESCO pilot projects

Source: Prepared by the JICA Project Team

4. Supporting from Iranian Side

Based on Record of Discussion that is agreed between Japan International Cooperation Agency (JICA) and the Islamic Republic of Iran on October 1st, 2013, the Iranian Government is kindly requested to provide the following supports to the JICA Project Team;

- Office room,
- Credentials or identification cards,
- Support in JICA Project Team travelling for site sruvey, and
- Other facilitation, if necessary.

5. Annex （omitted. all of hard copy of annexes are attached in attachment or deliverable.）

- Annex-1: Plan of Operation of the overall Project Rev.1
- Annex-2: Project Design Matrix (PDM) version 1
- Annex-3: Manning Schedule
- Annex-4: ESCO manual
- Annex-5: Model contract of ESCO

Attachment 4

Dispatching Record of Expertise

The project on Implementation of Pilot roject to Introduce ESCO for Government's Buildings in Islamid Republic of Iran

Expert/Position	Name	Company	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	M/M in first stage Iran	M/M in first stage Japan	M/M in second stage Iran	M/M in second stage Japan	total Iran	total Japan
Team Leader/ESCO Framework	Tsutomu MORI	Nippon Koei	1/24-30 (7)	4/4-24 (21) 9/12-26 (15) 2/7-27 (21)	11/6-27 (22)	5/13-31 (19) 6/1-2 (2) 11/6-26 (21)	12/1-15 (15) 1/12-31 (20) 2/1 (1)	6/26-30 (5) 7/1-13 (13)	2.87		3.20		6.07	
ESCO/Energy Audit Engineer (Heat)	Hideaki KUROKI	Nippon Koei		4/11-30 (20) 5/1 (1) 9/18-30 (13) 10/1-2 (2) 2/16-28 (13) 3/1-8 (8)	10/29-31 (3) 11/1-27 (27)	5/19-31 (13) 6/1-17 (17) 10/28-30 (4) 11/1-26 (26)		6/19-30 (12) 7/1-13 (13)	2.90		2.83		5.73	
ESCO/Energy Audit Engineer (Electricity)	Yoichi KITA/ Morio SAKAI	Nippon Koei		4/11-30 (20) 5/1 (1) 9/18-30 (13) 10/1-2 (2) 2/16-28 (13) 3/1-8 (8)	10/29-31 (3) 11/1-27 (27)	5/19-31 (13) 6/1-17 (17) 10/28-30 (4) 11/1-26 (26)	1/20-31 (12) 2/1-9 (9)	6/19-30 (12) 7/1-13 (13)	2.90		3.53		6.43	
									8.67		9.56		18.23	
Team Leader/ESCO Framework	Tsutomu MORI	Nippon Koei	1/20-23 (4) 3/20, 3/24-27 (5)	3/16, 3/24-25 (3)	12/3, 4 (2) 1/8, 14, 21 (3)	4/4-5, 7-8, 11-15, 18 (10) 10/26-27, 31 (3)		8/5 (1)		0.85		0.70		1.55
ESCO/Energy Audit Engineer (Heat)	Hideaki KUROKI	Nippon Koei	3/20, 25 (2)		1/8, 14, 21 (3)			6/6-8, 11-15 (8) 7/17-20 (4)		0.25		0.60		0.85
ESCO/Energy Audit Engineer (Electricity)	Yoichi KITA/ Morio SAKAI	Nippon Koei	3/20, 25 (2)		12/2-4 (3)			7/19-20, 26, 30 (4) 8/1-3, 6, 13-16 (8)		0.25		0.60		0.85
										1.35		1.90		3.25
Submission			▲ Contract (First Stage)	▲ Work Plan (First Stage)	Progress Report (First Stage) ▲	▲ Contract (Scond Stage) ▲ Work Plan (Sconfd Stage)		Completion REport ▲						
Total									8.67	1.35	9.56	1.90	18.23	3.25
									10.02		11.46		21.48	

Months 1–28: First Stage (2014–2015); months 29–61: Second Stage (2016–2018).

Legend:
Work in Iran: 🟧
Work in Japan: ☐

Attachment 5

Record of Training

(First Training and second Training)

Detailed Plan for Training in Japan (Actual Record)

Name of Training　Training on counter part, The project on Implementation of Pilot roject to Introduce ESCO for Government's Buildings in Islamid Republic of Iran

Period　2015/1/18 to　2015/1/24

Nos of Trainee　9　persons

Date	Time	Item of training	Lecturers and the person in charge			Lan.	Venue	Accom.
			Name	Organization or Company	Telephone			
18th, Jan, 2015	～	Arrival at Japan						JICA Tokyo
19th, Jan, 2015	10:00 ～ 11:30	Briefing				Eng.	JICA Tokyo	JICA Tokyo
	11:30 ～ 12:30	Orientation	Mr. Hiroshi SASAKI	JICA	03-5226-8069			
			Mr. Tsutomu MORI	Nippon Koei Co., Ltd.	03-5215-6889			
	14:00 ～ 17:00	Discussion with ESCO company（JAESCO）	Mr. Tetsuya MAEKAWA	International Affairs / Board, JAESCO	03-6371-2510	Jpn.	Nippon Koei	
20th, Jan, 2015	9:00 ～ 12:00	Discussion with ESCO Financer in Japan	Mr. Toshitaka NAGANO	Mitsubishi UFJ Lease & Finance	03-6865-3023	Jpn.	Nippon Koei	JICA Tokyo
	14:00 ～ 17:00	Policy and financial support for EE & C of building from MLIT	Mr. Harunobu MURAKAMI	Building Environment Office, Housing Bureau, Ministry of Land, Infrastructure, Transport and Tourism	03-5253-8940	Jpn.	Nippon Koei	
21st, Jan, 2015	9:00 ～ 12:00	The role what ECCJ has played in promoting ESCO in Japan, Discussion with ECCJ	Mr. Kazuhiko YOSHIDA	International Capacity Building Center for Energy Conservation, International Cooperation Division, The Energy Conservation Center, Japan	03-5439-9741	Jpn.	ECCJ	JICA Tokyo
	14:00 ～ 17:00	Policy and financial support for greenhouse gas reduction from MOE	Mr. Hiroki HATAKEYAMA	Ministry of the Environment	03-5521-8249	Jpn.	MOE	
22nd, Jan, 2015	10:00 ～ 12:00	Site visit	Mr. Tetsuya MAEKAWA	Yokohama City University Hospital	03-6371-2510	Jpn.	Site	JICA Tokyo
	14:00 ～ 17:00	Policy and financial support for promoting ESCO from Tokyo Metropolitan Government	Mr. Kenji YASUNO	Tokyo Metropolitan Government	03-5388-3501	Jpn.	Tokyo Metro.	
23rd, Jan, 2015	9:30 ～ 11:30	Wrap up meeting	Mr. Hiroshi SASAKI	JICA	03-5226-8069		JICA Tokyo	
			Mr. Tsutomu MORI	Nippon Koei Co., Ltd.	03-5215-6889			

Detailed Plan for Training in Japan (Actual Record)

Name of Training Training on counter part, The project on Implementation of Pilot roject to Introduce ESCO for Government's Buildings in Islamid Republic of Iran

Period 2017/4/16 to 2017/4/26

Nos of Trainee 11 persons

Date	Time			Item of training	Lecturers and the person in charge			Lan.	Venue	Accom.
					Name	Organization or Company	Telephone			
16th, Apr, 2017		～		Arrival at Japan						JICA Tokyo
17th, Apr, 2017	10:00	～	12:30	Briefing and Orientation				Eng.	JICA Tokyo	JICA Tokyo
	14:00	～	16:00	Lecture (M&V methodology)	Mr. Morio SAKAI	Nippon Koei Co., Ltd.	03-5215-6889	Jpn.		
18th, Apr, 2017	9:00	～	11:00	Discussion with ESCO Financer in Japan	Mr. Yukio FUSE	Japan Association of Energy Service Companies	03-3234-2228	Jpn.	JICA Tokyo	JICA Tokyo
	13:00	～	16:30	Factory tour	Mr. Tetsuya FUJITA	Azbil Corporation	03-6432-5114	Jpn.	Azbil Corporation	
19th, Apr, 2017	9:00	～	12:00	Discussion with JASE-W	Mr. Shigeru AMANO	Japanese Business Alliance Smart Energy Worldwide	03-5439-9765	Jpn.	Nippon Koei	JICA Tokyo
					Mr. Masaaki OKABE	Asahi Glass Co., LTD	050-3481-4370			
					Mr. Kazutoshi HATA	Kawasaki Heavy Industries, ltd.	03-3435-2579			
					Mr. Osamu SUZUKI	NIPPON STEEL & SUMIKIN ENGINEERING CO., LTD.	090-7214-5166			
	14:00	～	15:30	Discussion with METI	Mr. Kenji KATO	Ministry of Economy, Trade and Industry	03-3501-6289			
20th, Apr, 2017				Transfer from Tokyo to Osaka						Osaka Garden Palace
	14:00	～	16:00	Discussion with Osaka Prefecture	Mr. Naohisa TAKAYAMA	Osaka Prefecture	06-6210-9799	Jpn.	Osaka Prefecture	
21st, Apr, 2017	10:00	～	12:30	Site visit	Mr. Kiwamu INOUE	DAIKIN INDUSTRIES, Ltd.,	06-6359-2617	Jpn.	Site	Osaka Garden Palace
	14:00	～	16:30	Site visit	Mr. Naohisa TAKAYAMA	Osaka Prefecture	06-6210-9799	Jpn.	Site	
24th, Apr, 2017	10:00	～	12:00	Site visit	Mr. Kazuma FUJIMORI	Takasago Thermal Engineering Co., Ltd.	026-234-7117	Jpn.	Site	JICA Tokyo
	14:00	～	16:00	Lecture (Finance Mechanism)	Mr. Toshitaka NAGANO	Mitsubishi UFJ Lease & Finance Company Limited	03-6865-3023	Jpn.	Nippon Koei	
25th, Apr, 2017	9:20	～	11:00	Site visit	Mr. Tomo HOSHINO	Tokyo Gas Engineering Solutions Corporation	03-6452-8470	Jpn.	Site	JICA Tokyo
	13:30	～	15:00	Reporting and evaluation	Ms. Yukiko MAEDA	JICA	03-5226-6957	Jpn.	JICA Tokyo	
					Mr. Tsutomu MORI	Nippon Koei Co., Ltd.	03-5215-6889			

Attachment 6

JCC

(First JCC, second JCC, third JCC, fourth JCC,
and fifth JCC)

Agenda of 1st Joint Coordinating Committee

April 16, 2014 (1393/ 1 /27)
Conference room, 7th Floor, Ministry of Energy

1. Opening speech 9:00 - 9:10
   Mr. Yasuto Takeuchi, Chief representative,
   Japan International Cooperation Agency (JICA) Iran Office
2. Summary of the project 9:10 - 9:30
   Mr. Mohammad Ali Shafiezadeh, General Director,
   Office for the Improvement of Productivity and Economy of Electricity and Energy(OIPEEE), Ministry of Energy
3. ESCO (Energy Service COmpany) 9:30 - 9:50
   Mr. Tsutomu Mori, Team Leader, JICA project team
4. PDM (Project Design Matrix) of this project 9:50 - 10:00
   Mr. Tsutomu Mori, Team Leader, JICA project team
5. Work plan of First stage 10:00 - 10:20
   Mr. Hideaki Kuroki, Expert (heat), JICA project team
6. Question and Answer 10:20 - 10:30

Attendance list at 1st Joint Coordinating Committee which was held on April 16, 2014.

No	Organization	department	Occupation	Name
1	Ministry of Energy	OIPEEE	General Director, ESCO Project Director	M.Ali.Shafiezadeh
2	Ministry of Energy	OIPEEE	Head of International Collaboration, ESCO Project Manager	Alireza Shirazi
3	Ministry of Energy	OIPEEE	Assistant Stuff	M.Ebrahim. Sardari
4	SABA	Industry Factor	Manager of ESCO Dep.	Mohammad Akbari
5	SABA	Industry	Engineer of ESCO Dep.	Mehdi Hormozi
6	Ministry of Petroleum	Energy Planning office	Energy Efficiency Expert	Ali Nowruzi
7	IFCO	Industry	Senior Expert	Morteza Golzadeh
8	IFCO	Industry Sector	Director	Mehdi Sharif
9	IFCO		Leader & Contract	S.M.Lajevardi
10	MRUD	Building code	Manager of Building code	Mohammad Khorramabadi
11	IRESCO	Board	Member of board	Tooraj Bataie
12	IRESCO	Board	Secretary	Ali.M.Mirshams
13	ECEO	Energy	Manager	A. Shirazpour
14	JICA Iran Office		Chief Representative	Yasuto Takeuchi
15	JICA Iran Office		Project Formulator	Misuto Odashima
16	JICA Iran Office		Program Officer	Ramin Maleki
17	JICA Project Team	Team Leader / ESCO	Expert	Tsutomu Mori
18	JICA Project Team	Energy Audit Engineer	Heat Expert	Hideaki Kuroki
19	JICA Project Team	Energy Audit Engineer	Electrical Expert	Yoichi Kita
20	JICA Project Team		Assistant Stuff	Behzad Yaghmaie
21	JICA Project Team		Interpreter	Mehdi Goudarzy
22	Embassy of Japan	Economic Cooperation	Second Secretary	Tomohiko Sakamoto

MINUTES OF MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

MINISTORY OF ENERGY

ON

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS

TO INTRODUCE ESCO

FOR

GOVERNMENT'S BUILDINGS IN THE ISLAMIC REPUBLIC OF IRAN

Tehran, April 21, 2014

Mr. Yasuto TAKEUCHI
Chief Representative
Iran Office
Japan International Cooperation Agency

Mr. M. A. SHAFIEZADEH
General Director of OIPEEE
Ministry of ENERGY
The Islamic Republic of Iran

Mr. Tsutomu MORI
Leader of JICA project team
Nippon Koei Co. Ltd.

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings In the Islamic Republic of Iran (hereinafter referred to as "the Project") has been carried out based on the Record of Discussion (hereinafter referred to as "R/D") that was agreed between Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Energy of Islamic Republic of Iran (hereinafter referred to as "MOE") in October 1, 2013.

The first Joint Coordinating Committee (hereinafter referred to as "JCC") was held on April 16, 2014. The attendance list is attached in Attachment 1.

The following topics have been presented and discussed:

1) Introduction of the Project
2) Introduction of ESCO business scheme
3) Explanation of Project Design Matrix version 0 (hereinafter referred to as "PDM_0") and Work Plan of the First Stage

Main points of the discussion are summarized below.

1) Agreement on PDM_0
   Based on the Project frame work, which is stipulated on the R/D, PDM_0 was developed and both Japanese side and Iranian side agreed the PDM_0 as attached in Attachment 2.

2) Confirmation of Work Plan of the First Stage
   Based on the R/D and PDM_0, Work Plan of the First Stage has been developed and both Japanese side and Iranian side agreed to implement the project along with this Work Plan.

ATTACHMENT

1. Attendance list
2. Project Design Matrix version 0 (PDM_0)
3. Work Plan of First Stage

Attachment-1

Attendance list at 1st Joint Coordinating Committee which was held on April 16, 2014.

No	Organization	department	Occupation	Name
1	Ministry of Energy	OIPEEE	General Director, ESCO Project Director	M.Ali.Shafiezadeh
2	Ministry of Energy	OIPEEE	Head of International Collaboration, ESCO Project Manager	Alireza Shirazi
3	Ministry of Energy	OIPEEE	Assistant Stuff	M.Ebrahim. Sardari
4	SABA	Industry Factor	Manager of ESCO Dep.	Mohammad Akbari
5	SABA	Industry	Engineer of ESCO Dep.	Mehdi Hormozi
6	Ministry of Petroleum	Energy Planning office	Energy Efficiency Expert	Ali Nowruzi
7	IFCO	Industry	Senior Expert	Morteza Golzadeh
8	IFCO	Industry Sector	Director	Mehdi Sharif
9	IFCO		Leader & Contract	S.M.Lajevardi
10	MRUD	Building code	Manager of Building code	Mohammad Khorramabadi
11	IRESCO	Board	Member of board	Tooraj Bataie
12	IRESCO	Board	Secretary	Ali.M.Mirshams
13	ECEO	Energy	Manager	A. Shirazpour
14	JICA Iran Office		Chief Representative	Yasuto Takeuchi
15	JICA Iran Office		Project Formulator	Misuto Odashima
16	JICA Iran Office		Program Officer	Ramin Maleki
17	JICA Project Team	Team Leader / ESCO	Expert	Tsutomu Mori
18	JICA Project Team	Energy Audit Engineer	Heat Expert	Hideaki Kuroki
19	JICA Project Team	Energy Audit Engineer	Electrical Expert	Yoichi Kita
20	JICA Project Team		Assistant Stuff	Behzad Yaghmaie
21	JICA Project Team		Interpreter	Mehdi Goudarzy
22	Embassy of Japan	Economic Cooperation	Second Secretary	Tomohiko Sakamoto

Attachment-2

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Energy Efficiency Organization (IEEO/SABA), Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SABA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: 2014-2017 (4.0 years)

Version 0
April 16, 2014

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	- Implementation and planning of ESCO to Government buildings are prepared. - XX% of Energy consumption in the building sector is reduced.	- Performance records of ESCO for Government buildings. - Energy consumption data in the building sector.	Finance incentive for ESCO shall be prepared by Iranian side.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	- ESCO pilot projects to Government buildings are implemented. - ESCO business model in Iran through the ESCO pilot projects is established.	- Performance contract and implementation document of the ESCO pilot projects. (May 2016) - Reports of monitoring and verification of the ESCO pilot projects. (Apr. 2017)	The budget for the ESCO pilot projects shall be allocated by the Iranian side.
Outputs: 1. An institution framework is established to promote ESCO business in Iran.	- Regulations and guidelines for the IRESCO are completed. - Roles and responsibilities to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) are identified.	- Regulations and guidelines for the IRESCO. (Feb. 2015) - An institution framework and rule to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) (Feb. 2015)	
2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings.	- Procedures and manual of introduction of ESCO to Government buildings is completed. - Performance contract models for ESCO are prepared. - Seminar and training for capacity building are conducted for IRESCO members by SABA and IFCO.	- Procedures and manual of introduction of ESCO to Government buildings. (Aug. 2015) - Performance contract models for ESCO. (Aug. 2015) - Records of seminar and training. (Aug. 2015)	The case studies of finance incentive schemes in Japan will be introduced in training course in Japan
3. The introduction of ESCO in Government's buildings is considered and promoted.	- Candidate buildings for ESCO pilot projects are selected by Iranian side. - Energy audit of ESCO planning for the candidate buildings are conducted by members of IRESCO. - Proposal and implementation plan for ESCO pilot project are prepared. - ESCO pilot projects to Government buildings are implemented. - Results of monitoring and verification of the ESCO pilot projects are reported. - Implementation plans to introduce ESCO for Government buildings are prepared.	- Short list of candidate buildings for ESCO pilot projects. (Feb. 2015) - Reports of energy audits of the candidate buildings. (Aug. 2015) - Proposal and implementation plan for ESCO pilot project. (Dec. 2015) - Results of monitoring and verification of the ESCO pilot projects. (May 2016) - Implementation plans to introduce ESCO for Government buildings. (Apr. 2017)	SABA and IFCO will be responsible for the result of monitoring and verification of the ESCO pilot projects.
4. Policy recommendations are made for the introduction of ESCOs	- ESCO business model in Iran through the ESCO pilot projects is established. - Policy and action plan to promote ESCO in building sector are prepared by MOE.	- Policy and action plan to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) (Nov. 2017)	

Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1. An institution framework is established to promote ESCO business in Iran. 1-1 Preparation and support for the institutional framework, regulations and guidelines for the establishment of ESCO association 2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings. 2-1 Preparation of procedures and manuals for the introduction of ESCOs 2-2 Preparation of contract models and formats for ESCOs 2-3 Capacity development for awareness raising and training 2-4 Introduction of case studies on Japan's policies, legislations and finance mechanisms for energy efficiency in buildings 3. The introduction of ESCO in Government's buildings is considered and promoted. 3-1 Capacity development for ESCO companies 3-2 Energy audits for Government's buildings by ESCO companies 3-3 Pilot projects are implemented by ESCO companies in order to introduce ESCO for Government's buildings 3-4 Monitoring of Pilot Projects 4. Policy recommendations are made for the introduction of ESCOs 4-1 Policy recommendations for the introduction of ESCO's	**The Japanese Side** A. Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B. Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Non **The Iranian Side:** A. Ministry of Energy: Project Counter Part ・ Project Director: General Director, Office for the Improvement of Productivity and Economy of Electricity and Energy (OIPEEE) ・ Project Manager: Head of Awareness & Training, OIPEEE B. SABA: Implementation Organization ・ Deputy of Demand Side Department ・ ESCO Department C. IFCO: Co-Implementation Organization D. IRESCO: Cooperation Organization **Joint Coordinating Committee(JCC)** A. Chairperson: ・ General Director of OIPEEE B. Member of Iranian Side ・ MOE ・ Presidential Deputy of Strategic Planning and Supervision (SPAC) ・ Ministry of Economy and Finance (MOEF) ・ Ministry of Petrol (MOP) ・ Ministry of Road and Urban Development (MRUD) ・ SABA ・ IFCO ・ IRESCO C. Member of Japanese side ・ JICA Experts ・ Representatives from JICA IRAN Office ・ Other personnel concerned to be assigned by request of other members D. Observer ・ Ministry of Foreign Affairs (MOFA) ・ Embassy of Japan (EoJ)	

Attachment-3

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Work Plan of First stage

April 2014

NIPPON KOEI

Challenging mind, Changing dynamics

TABLE OF CONTENTS

1. Project Description

1.1 Background

The Islamic Republic of Iran produces approximately 4 million barrels per day and accounts for 10.9% of oil deposits in the entire world. But, in spite of depending largely on exports of oil for Iranian foreign currency earnings, general energy consumption occupies 44 % of general energy supply in the Islamic Republic Iran on fiscal year 2010, the amount of domestic consumption of oil has been increased. Energy consumption in the residential and commercial sector is the largest which accounts for 36%, followed by the transportation sector 26%, industrial sector 24%. Particularly, energy consumption of buildings classified as the residential and commercial sector have increased constantly. Promotion of Energy Efficiency & Conservation (EE & C) in the building sector is now the most immediate priority mission of Ministry of Energy in the Islamic Republic of Iran.

JICA implemented a development study for "Institutional Capacity Development on Energy Management in the Building Sector in the Islamic Republic of Iran" from 2010 to 2011 which supported the formulation of the roadmap and action plan to promote energy efficiency in buildings. In this study, it was identified that the ESCO framework is one of the effective measures for promoting EE &C in the building sector by a private sector by aprivate sector initiative. In addition, it was clarified that the policied and legistlations necessary to promote energy efficiency are being formulated such as the "Subsidy Reform Law" and the "Energy Consumption Pattern Reform Law" issued in Dec.2010 and Mar. 2011 respectively.

Under this circumstance, the Government of the Islamic Republic of Iran officially requested "the Project on Implementation of Pilot Projects to introduce ESCO for Government's buildings" to GOJ in July 2011. Under the support of JICA, this project is expected to provide knowledge and skills to promote ESCO system for Government's buildings in the Islamic Repubilc of Iran.

1.2 Goal and Purpose of the Project

EE &C in the building sector will be promoted through the introduction of ESCO for Government's buildings.

The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.

1.3 Outputs

Output 1:	An institutional framework is established to promote ESCO business in the Islamic Republic of Iran.
Output 2:	The capacity of the Government of the Islamic Republic of Iran and ESCO association is developed in order to introduce ESCO in Government's buildings.
Output 3:	The introduction of ESCO in Government's buildings is considered and promoted.
Output 4:	Policy recommendations are made for the introduction of ESCOs.

1.4 JICA Experts (Inputs)

The JICA Project Team (JICA experts) consists of the following three (3) experts:

Table 1-1 JICA Experts (JICA Project Team)

Name	Position
Tsutomu MORI	Team Leader, ESCO framework
Hideaki KUROKI	Energy audit engineer (Heat)
Yoichi KITA	Energy audit engineer (Electricity)

1.5 Implementation Schedule

The duration of the Project will be 48 months.

First stage:	From January 2014 to September 2015
Second stage:	From October 2015 to December 2017

The Plan of Operation of the overall Project is shown in Annex-1.

1.6 Implementation Structure

The project organization chart is as shown in Figure 1-1. The roles and assignments of related organizations are as follows;

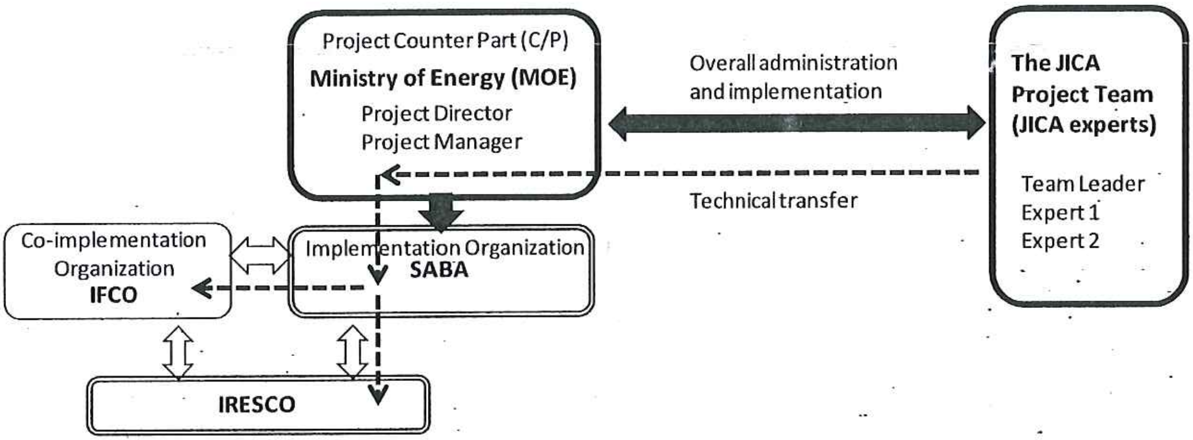


Figure 1-1 Project Organization Chart

(1) OIPEEE (Office for the Improvement of Productivity and Economy of Electricity and Energy) of MOE

OIPEEE will assign a Project Director to be responsible for overall administration and implementation of the Project.

OIPEEE will assign a Project Manager to be responsible to support managerial and technical issue of the Project.

(2) SABA(IEEO: Iran Energy Efficiency Organization)

SABA will be the implementation organization of the Project and assign a task team to work with JICA Project Team.

(3) IFCO (Iranian Fuel Conservation Organization)

IFCO will be the co-implementation organization of the Project and give necessary information in order to support the implementation of the Project.

(4) IRESCO (Association of Energy Service Companies of Iran)

IRESCO is fundamental for the success of the Project. IRESCO will cooperate in the implementation of the Project through SABA and IFCO.

(5) JICA Project Team (JICA Experts)

The JICA experts will give necessary technical guidance, advice and recommendations to MOE and SABA on any matters pertaining to the implementation of the Project.

1.7 Project Design Matrix (PDM)

The Project will be implemented joint work between JICA Project Team and SABA based on the project design matrix (PDM). The PDM of project index will be made agreement between JICA and MOE, and confirmed among the related organizations in Joint Coordinating Committee (hereinafter referred to as "JCC").

1.8 Joint Coordinating Committee (JCC)

JCC will be established in order to facilitate inter-organizational coordination. JCC will approve work plan, review overall progress, conduct monitoring and evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. The structure of JCC is as shown in Figure 1-2.

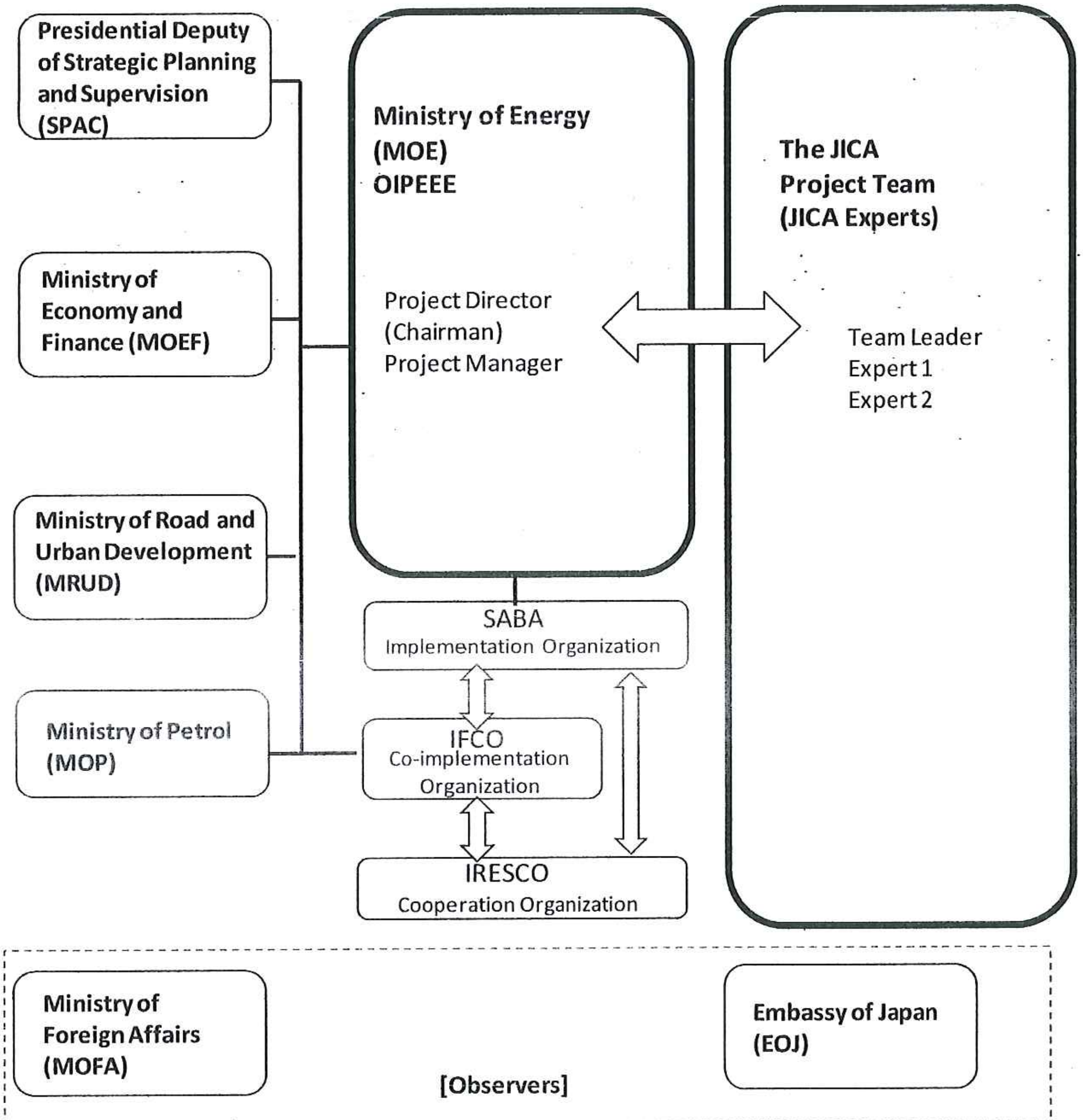


Figure 1-2 Structure of JCC

The schedule and agenda of JCC is as shown in Table 1-2.

Table 1-2 schedule and agenda of JCC

JCC	Time	Agenda
1st Committee	April 2014	- Agreement of Work Plan (First stage) - Confirmation of role of related organizations
2nd Committee	August 2015	- Report of output of the Work (First stage) - Candidate sites of ESCO pilot project - Budget of ESCO pilot project - Schedule and work plan of second stage
3rd Committee (At 2nd stage)	April 2016	- Agreement of Work Plan (Second stage) - ESCO pilot project
4th Committee (At 2nd stage)	May 2017	- Report of monitoring and verification of performance of the pilot project
5th Committee (At 2nd stage)	November 2017	- Report of output of the Work

2. Methodology for Implementation of Project

2.1 Activities for the Output 1

The schedule of activities for the output 1 is as shown in Figure 2-1.

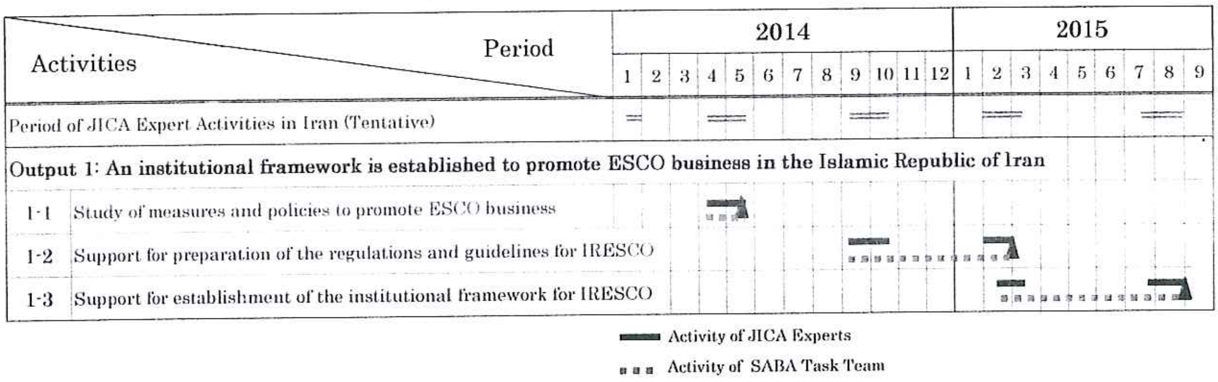


Figure 2-1 Schedule of activities for the output 1

(1) Activity 1-1: Study of measures and policies to promote ESCO business

The JICA Project Team will study measures and policies to promote ESCO business through interview survey for related organizations. The JICA Project Team will introduce the activities of ESCO association in Japan in the first work shop. The JICA Project Team will sort out priorities of IRESCO's activities under studying measures in Islamic Republic of Iran.

(2) Activity 1-2: Support for preparation of the regulations and guidelines for IRESCO

The regulations and guidelines of IRESCO are important for the activities to promote ESCO in Iran. The regulations and guidelines will be prepared by IRESCO with technical support by JICA Project Team.

(3) Activity 1-3: Support for establishment of the institutional framework for IRESCO

It is necessary and important to improve the system for promotion of ESCO in Iran. The JICA Project Team will support MOE, SABA and IRESCO to improve the system, policy and plan on the capacity development of the Project.

2.2 Activities for the Output 2

The schedule of activities for the output 2 is as shown in Figure 2-2.

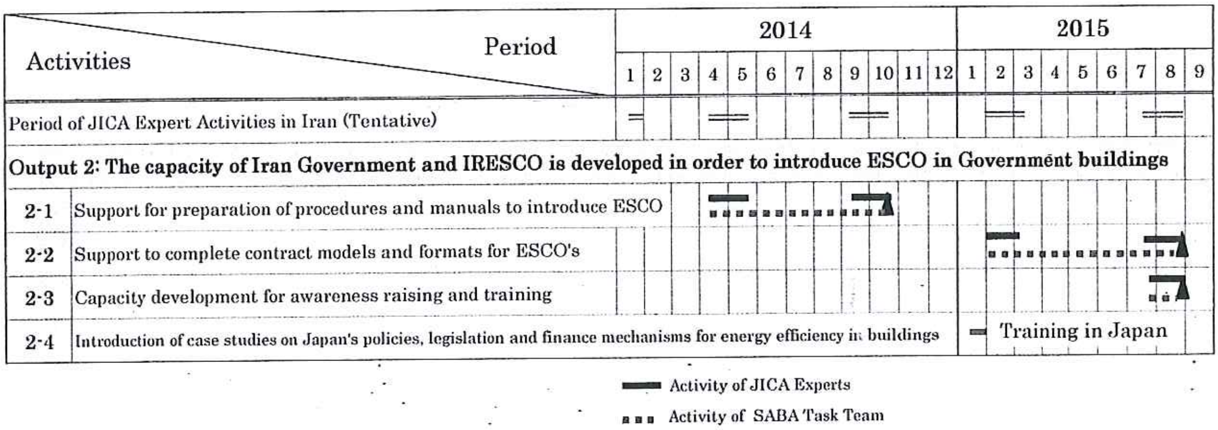


Figure 2-2 Schedule of activities for the output 2

(1) Activity 2-1: Support for preparation of procedures and manuals to introduce ESCO

The JICA Project Team will discuss with related organizations and the members of IRESCO about measures required promoting ESCO, and introducing experience and programs in Japan.

Two manuals to introduce ESCO in Iran will be prepared. One is a procedure on introduction ESCO for Government. Another is a procedure on implementation of ESCO for ESCO companies.

The manuals will be submitted to JICA as outputs of this activity at the end of the first stage.

ESCO manual prepared in this activity will be referred to implement the ESCO Pilot Projects, and revised through the implementation of the Pilot Projects.

(2) Activity 2-2: Support to complete contract models and formats for ESCO's

The JICA Project Team will support to prepare the ESCO's contract models and formats.

The ESCO's contract models will be submitted to JICA as outputs of this activity at the end of the first stage.

The ESCO's contract models prepared in this activity will be referred to implement the ESCO Pilot Projects, and revised through the implementation of the Pilot Projects.

(3) Activity 2-3: Capacity development for awareness raising and training

The ESCO manual and ESCO's contract models will be introduced for related organizations at the second work shop.

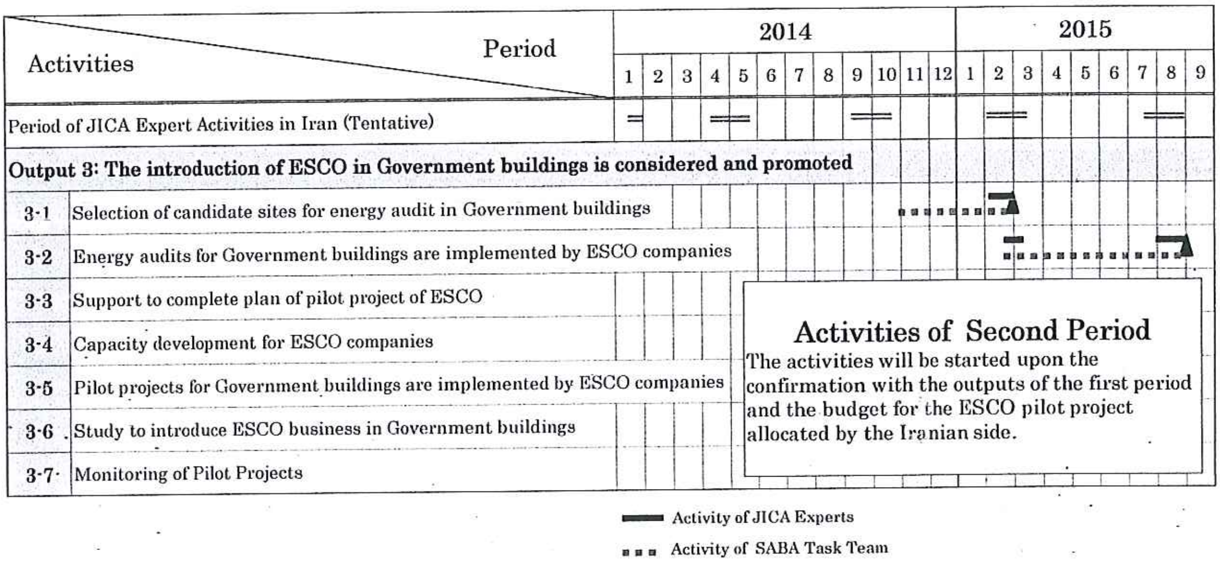
MOE and MOP will announce to owner of Government's buildings and municipalities. SABA and IRESCO will hold a seminar to develop capacity of ESCO companies.

(4) Activity 2-4: Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in buildings

The establishing finance incentive is important to introduce and to promote ESCO in Iran. However, the financing environment in Iran is unique compared to that of Japan. Therefore, the case studies of finance incentive schemes in Japan will be introduced in training course in Japan. The necessary technology transfer will be implemented mainly as the training course.

2.3 Activities for the Output 3

The schedule of activities for the output 3 is as shown in Figure 2-3.



The activities will be started upon the confirmation with the outputs of the first period and the budget for the ESCO pilot project allocated by the Iranian side.

Figure 2-3 Schedule of activities for the output 3

(1) Activity 3-1: Selection of candidate sites for energy audit in Government's buildings

MOE will prepare a long list of buildings for walk through as candidate sites of ESCO pilot projects. SABA will prepare necessary data for energy audit such as total floor area, building use, and major energy consumption equipments and monthly energy consumption data of the listed buildings.

Ten (10) buildings as candidate sites of ESCO pilot projects will be selected under discussion with MOE.

(2) Activity 3-2: Energy audits for Government's buildings are implemented by ESCO companies

ESCO companies will conduct the energy audit with walk through survey for ten (10) selected sites. The JICA Project Team will support the energy audit conducted by ESCO companies in order to transfer technology of the energy audit for ESCO planning.

The JICA Project Team will evaluate the feasibility of each building for ESCO project as collaborative work with ESCO companies for selecting three (3) buildings as ESCO candidate sites. The JICA Project Team and ESCO companies will estimate approximate cost for ESCO pilot projects.

The budget for ESCO pilot projects will be allocated by the Iranian side.

(3) Activity 3-3: Support to complete plan of pilot project of ESCO

The activity will be worked in the second stage.

(4) Activity 3-4: Support to complete plan of pilot project of ESCO

The activity will be worked in the second stage

(5) Activity 3-5: Pilot projects for Government's buildings are implemented by ESCO companies

The activity will be worked in the second stage

(6) Activity 3-6: Study to introduce ESCO business in Government's buildings

The activity will be worked in the second stage

(7) Activity 3-7: Monitoring of Pilot Projects

The activity will be worked in the second stage

2.4 Activities for the Output 4

The activities will be worked in the second stage with the monitoring of the ESCO pilot project.

3. Work Shop (W/S)

Total three (3) Work Shops will be hold in the Project. Outline of the work shop is as shown in Table 3-1. Two (2) W/Ss will be held in the first stage, and one (1) W/S will be held in the second stage.

Table 3-1 Outline of the work shop (Tentative)

Workshop	Time	Program
1st work shop	April 2014	- Legislation and finance support to promote ESCO in Japan - Activities and role of ESCO association in Japan
2nd work shop	August 2015	- ESCO manual and ESCO's contract models - Summary of energy audits for ten (10) sites - Monitoring and performance guarantee on ESCO
3rd work shop (At 2nd stage)	November 2017	- Results of monitoring on ESCO pilot projects - Policy recommendations for the introduction of ESCO's

4. Supporting from Iranian Side

Based on Record of Discussion that is agreed between Japan International Cooperation Agency (JICA) and the Islamic Republic of Iran on October 1st, 2013, the Iranian Government is kindly requested to provide the following supports to the JICA Project Team;

- Office room,
- Credentials or identification cards,
- Support in JICA Project Team travelling for site sruvey, and
- Other facilitation, if necessary.

5. Annex

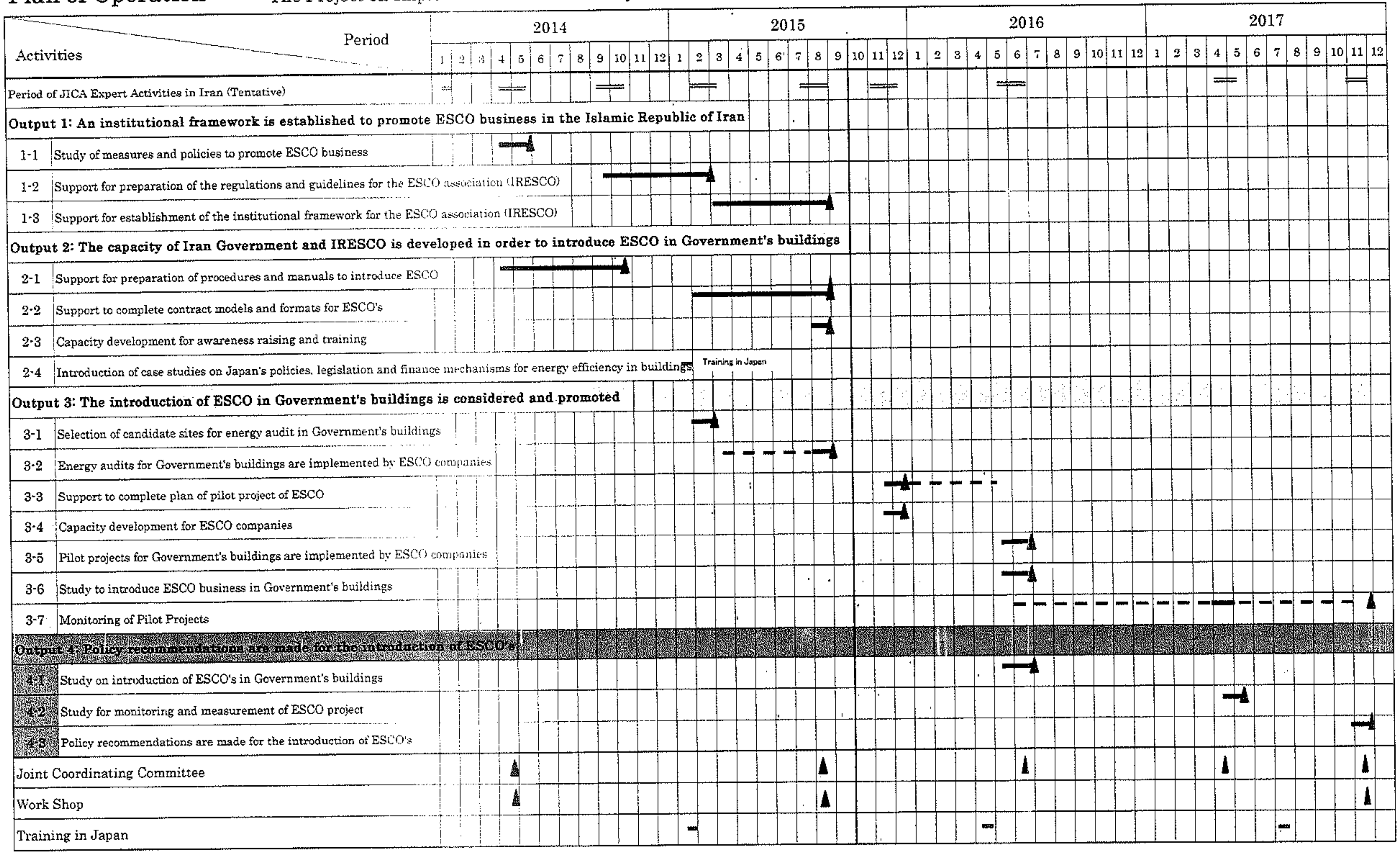
- Annex-1: Plan of Operation of the overall Project
- Annex-2: Manning Schedule
- Annex-3: Project Member List

Annex

Annex-1

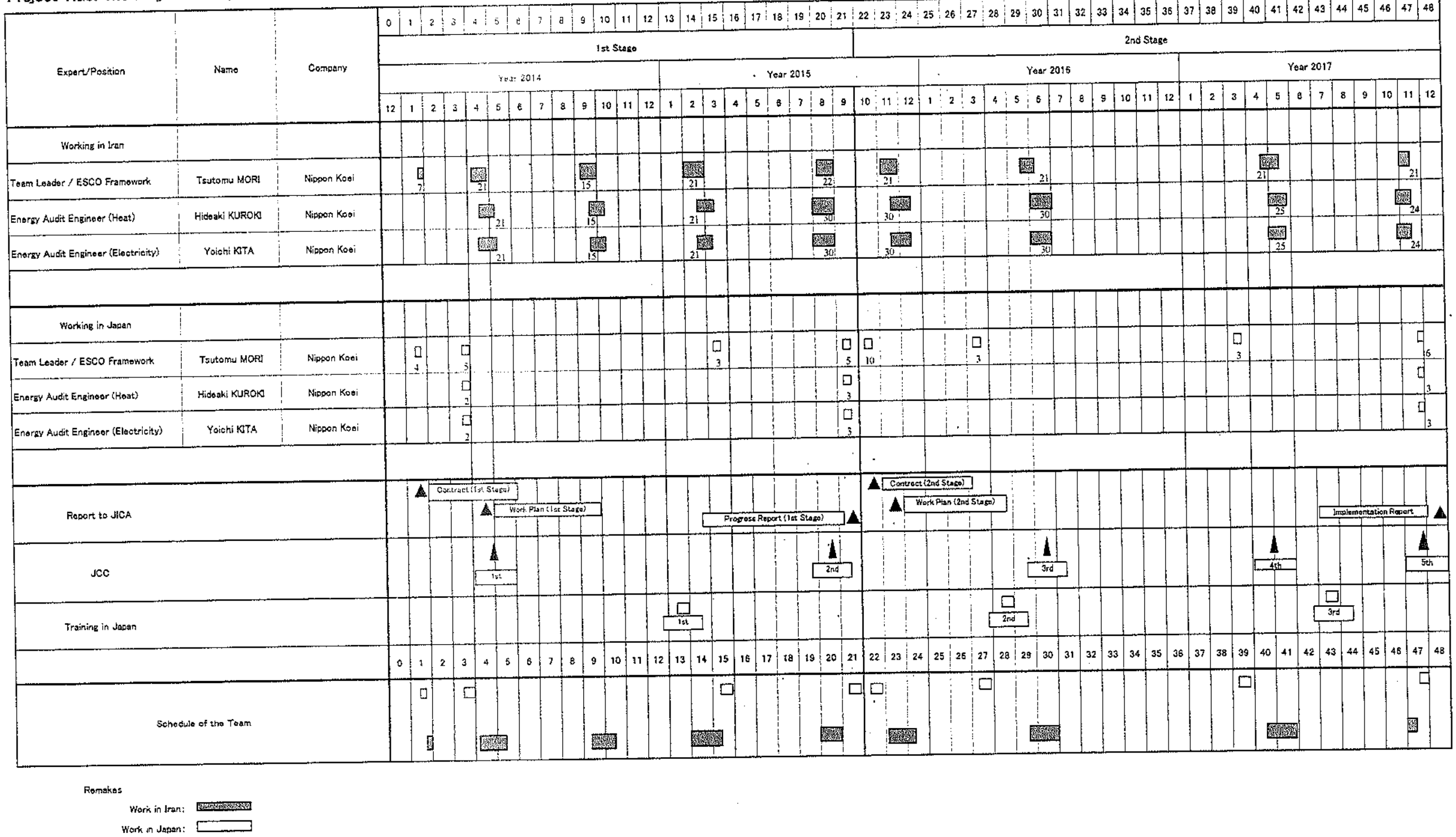
Plan of Operation

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in Islamic Republic of Iran



Annex-2

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government' s Buildings in Islamic Rebublic of Iran



Project Member List

Name	Position of the Project	Organization
The JICA Project Team		
Tsutomu MORI	Team Leader / ESCO Framework	Nippon Koei Co., LTD.
Hideaki KUROKI	Energy Audit Engineer (Heat)	Nippon Koei Co., LTD.
Yoichi KITA	Energy Audit Engineer (Electricity)	Nippon Koei Co., LTD.
Behzad Yaghmaie	Assistant stuff	
MOE		
M. A. Shafiezadeh	Project Director	General Director of OIPEEE
A. Shirazi	Project Manger	Head of Awareness & Training, OIPEEE
SABA Project Team		
Amir Doudabi Nezhad	Project Responsible Person of SABA	Deputy of Demand Side Department
Mohammad Akbari	Team Leader	Manager of ESCO Department
Mahdi Hormozi	ESCO Expert	Engineer of ESCO Department
Ahmad R. Tavakkoli	Energy Saving Expert of Building	Engineer of Energy Conservation in Building Department
Mahdi Rafiei	Coordinator (Energy Saving Expert of Industry)	Engineer of Energy Conservation in Industries Department

Agenda of 2nd Joint Coordinating Committee

Date: November 14, 2015 (1394/ 8 / 23)
Venue: 13th Floor Conference room, Ministry of Energy

1. Opening speech 8:30 - 8:40
   Mr. Kohei Sato, Chief representative,
   Japan International Cooperation Agency (JICA) Iran Office

2. Progress of the project 8:40 - 8:50
   Mr. Mohammad Ali Shafiezadeh, General Director,
   Office for the Improvement of Productivity and Economy of Electricity and Energy(OIPEEE), Ministry of Energy

3. Result of the first stage and Plan of the second stage 8:50 - 9:10
   Mr. Doodabi Nejad, Deputy of Demand side department, SABA

4. Finding of issues for promotion of ESCO projects 9:10 - 9:40
   Mr. Tsutomu Mori, Team Leader, JICA project team

5. Question and Answer 9:40 - 10:00

Attendance list at 2st Joint Coordinating Committee which was held on November 14, 2015. (Iranian : 1394/ 8 / 23)

No	Organization	Department	Occupation	Name
1	Ministry of Energy	OIPEEE	General Director, ESCO Project Director	M.Ali.Shafiezadeh
2	Ministry of Energy	OIPEEE	Head of International Collaboration, ESCO Project Manager	Alireza Shirazi
3	Ministry of Energy	OIPEEE	Assistant Stuff	M.Ebrahim. Sardari
4	Ministry of Energy	Efficiency and economy and energy supply	Deputy of Improvement Center	Reza Effatnejad
5	SABA		Deputy of Demand side department	Amir Doodabi Nejad
6	SABA	Industry Factor	Manager of ESCO Dep.	Mohammad Akbari
7	SABA	Industry	Engineer of ESCO Dep.	Mehdi Hormozi
8	Planning Organization	International Division		Ehsan Assadian
9	Ministry of Economic Affairs and Finance		Deputy	Alireza Gheibi
10	NIOC	Office of Energy Planning	Head of the review demand and optimization	Ahmad Navid
11	IFCO		Advisor to executive manager	Abolfazl Mobini
12	Engineering Organization		Chairman of the expert group power	Soleiman Shirzadi
13	IRESCO	Board	Chairman of the Board	Gholamali Najafi
14	IRESCO	Board	Member of board	Tooraj Bataie
15	IRESCO	Board	Secretary	Alimohammad Mirshams
16	Embassy of Japan	Economic Cooperation	Second Secretary	Akira Noroda
17	JICA Iran Office		Chief Representative	Kohei Sato
18	JICA Iran Office		Project Formulation Adviser	Hiroyuki Takeuchi
19	JICA Iran Office		Program Officer	Sadoughi Zeinab
20	JICA Project Team	Team Leader / ESCO	Expert	Tsutomu Mori
21	JICA Project Team	Energy Audit Engineer	Heat Expert	Hideaki Kuroki
22	JICA Project Team	Energy Audit Engineer	Electrical Expert	Yoichi Kita
23	JICA Project Team		Assistant Stuff	Behzad Yaghmaie
24	JICA Project Team		Interpreter	Mehdi Goudarzy

MINUTES OF MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

MINISTORY OF ENERGY

ON

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS

TO INTRODUCE ESCO

FOR

GOVERNMENT'S BUILDINGS IN THE ISLAMIC REPUBLIC OF IRAN

Tehran, November 14th, 2015

佐藤公平

Mr. Kohei SATO
Chief Representative
Iran Office
Japan International Cooperation Agency

Mr. M.A. SHAFIEZADEH
General Director of OIPEEE
Ministry of ENERGY
The Islamic Republic of Iran

Mr. Tsutomu MORI
Leader of JICA project team
Nippon Koei Co. Ltd.

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings In the Islamic Republic of Iran (hereinafter referred to as "the Project") has been carried out based on the Record of Discussion (hereinafter referred to as "R/D) that was agreed between Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Energy of Islamic Republic of Iran (hereinafter referred to as "MoE") in October 1, 2013.

The second JCC was held on November 14, 2015 as attached agenda. The attendance list is attached in Attachment 2.

The following topics have been presented and discussed:

1) Progress and result of the Project
2) Finding of Issues for Promotion of ESCO Project in Iran
3) Explanation of the Second Stage of the Project

Main points of the discussion are summarized below.

1) Agreement on PDM1
   Based on the PDM0 and change of situation, PDM1 was developed and both Japanese side and Iranian side agreed the PDM1 as attached in Attachment 3.

2) Confirmation of Plan of Operation of the overall Project rev. 1
   Based on the PDM1, Plan of Operation of the overall Project rev. 1 has been developed and both Japanese side and Iranian side agreed to implement the project along with Plan of Operation of the overall Project rev. 1.

ATTACHMENT

1. Agenda
2. Attendance list
3. Project Design Matrix version 1 (PDM1)
4. Plan of Operation of the overall Project rev.1

Attachment 1

Agenda of 2nd Joint Coordinating Committee

Date: November 14, 2015 (1394/ 8 / 23)
Venue: 13th Floor Conference room, Ministry of Energy

1. Opening speech 8:30 - 8:40
   Mr. Kohei Sato, Chief representative,
   Japan International Cooperation Agency (JICA) Iran Office

2. Progress of the project 8:40 - 8:50
   Mr. Mohammad Ali Shafiezadeh, General Director,
   Office for the Improvement of Productivity and Economy of Electricity and Energy(OIPEEE), Ministry of Energy

3. Result of the first stage and Plan of the second stage 8:50 - 9:10
   Mr. Doodabi Nejad, Deputy of Demand side department, SABA

4. Finding of issues for promotion of ESCO projects 9:10 - 9:40
   Mr. Tsutomu Mori, Team Leader, JICA project team

5. Question and Answer 9:40 - 10:00

Attachment 2

Attendance list at 2st Joint Coordinating Committee which was held on November 14, 2015. (Iranian : 1394/ 8 / 23)

No	Organization	Department	Occupation	Name
1	Ministry of Energy	OIPEEE	General Director, ESCO Project Director	M.Ali.Shafiezadeh
2	Ministry of Energy	OIPEEE	Head of International Collaboration, ESCO Project Manager	Alireza Shirazi
3	Ministry of Energy	OIPEEE	Assistant Stuff	M.Ebrahim. Sardari
4	Ministry of Energy	Efficiency and economy and energy supply	Deputy of Improvement Center	Reza Effatnejad
5	SABA		Deputy of Demand side department	Amir Doodabi Nejad
6	SABA	Industry Factor	Manager of ESCO Dep.	Mohammad Akbari
7	SABA	Industry	Engineer of ESCO Dep.	Mehdi Hormozi
8	Planning Organization	International Division		Ehsan Assadian
9	Ministry of Economic Affairs and Finance		Deputy	Alireza Gheibi
10	NIOC	Office of Energy Planning	Head of the review demand and optimization	Ahmad Navid
11	IFCO		Advisor to executive manager	Abolfazl Mobini
12	Engineering Organization		Chairman of the expert group power	Soleiman Shirzadi
13	IRESCO	Board	Chairman of the Board	Gholamali Najafi
14	IRESCO	Board	Member of board	Tooraj Bataie
15	IRESCO	Board	Secretary	Alimohammad Mirshams
16	Embassy of Japan	Economic Cooperation	Second Secretary	Akira Noroda
17	JICA Iran Office		Chief Representative	Kohei Sato
18	JICA Iran Office		Project Formulation Adviser	Hiroyuki Takeuchi
19	JICA Iran Office		Program Officer	Sadoughi Zeinab
20	JICA Project Team	Team Leader / ESCO	Expert	Tsutomu Mori
21	JICA Project Team	Energy Audit Engineer	Heat Expert	Hideaki Kuroki
22	JICA Project Team	Energy Audit Engineer	Electrical Expert	Yoichi Kita
23	JICA Project Team		Assistant Stuff	Behzad Yaghmaie
24	JICA Project Team		Interpreter	Mehdi Goudarzy

Attachment 3

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Energy Efficiency Organization (IEEO/SABA), Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SABA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: 2014-2018 (4.5 years)

Version 1
November 14, 2015

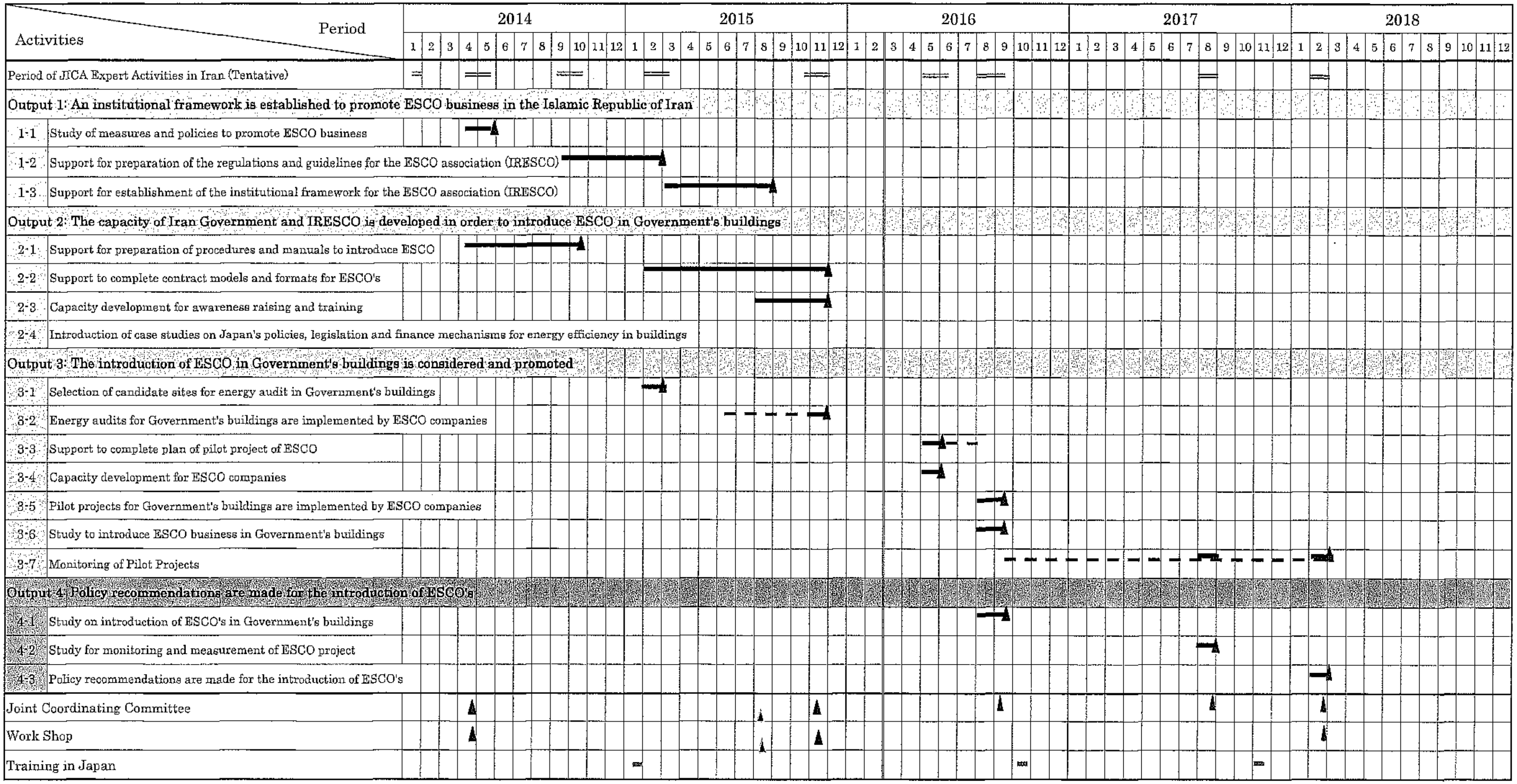
NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	- Implementation and planning of ESCO to Government buildings are prepared. - XX% of Energy consumption in the building sector is reduced.	- Performance records of ESCO for Government buildings. - Energy consumption data in the building sector.	Finance incentive for ESCO shall be prepared by Iranian side.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	- ESCO pilot projects to Government buildings are implemented. - ESCO business model in Iran through the ESCO pilot projects is established.	- Performance contract and implementation document of the ESCO pilot projects. - Reports of monitoring and verification of the ESCO pilot projects.	The budget for the ESCO pilot projects shall be allocated by the Iranian side.
Outputs: 1. An institution framework is established to promote ESCO business in Iran.	- Regulations and guidelines for the IRESCO are completed. - Roles and responsibilities to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) are identified.	- Regulations and guidelines for the IRESCO. (Feb. 2015) - An institution framework and rule to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO) (Feb. 2015)	
2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings.	- Procedures and manual of introduction of ESCO to Government buildings is completed. - Performance contract models for ESCO are prepared. - Seminar and training for capacity building are conducted for IRESCO members by SABA and IFCO.	- Procedures and manual of introduction of ESCO to Government buildings. (Jan. 2016) - Performance contract models for ESCO. (Jan. 2016) - Records of seminar and training. (Aug. 2015)	The case studies of finance incentive schemes in Japan will be introduced in training course in Japan
3. The introduction of ESCO in Government's buildings is considered and promoted.	- Candidate buildings for ESCO pilot projects are selected by Iranian side. - Energy audit of ESCO planning for the candidate buildings are conducted by members of IRESCO. - Proposal and implementation plan for ESCO pilot project are prepared. - ESCO pilot projects to Government buildings are implemented. - Results of monitoring and verification of the ESCO pilot projects are reported. - Implementation plans to introduce ESCO for Government buildings are prepared.	- Short list of candidate buildings for ESCO pilot projects. (Oct. 2015) - Reports of energy audits of the candidate buildings. (Jan. 2016) - Proposal and implementation plan for ESCO pilot project. (Jun 2016) - Results of monitoring and verification of the ESCO pilot projects. - Implementation plans to introduce ESCO for Government buildings.	SABA and IFCO will be responsible for the result of monitoring and verification of the ESCO pilot projects.
4. Policy recommendations are made for the introduction of ESCOs	- ESCO business model in Iran through the ESCO pilot projects is established. - Policy and action plan to promote ESCO in building sector are prepared by MOE.	- Policy and action plan to promote ESCO business in Iran (MOE, SABA, IFCO and IRESCO)	

Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1. An institution framework is established to promote ESCO business in Iran. 1-1 Preparation and support for the institutional framework, regulations and guidelines for the establishment of ESCO association 2. The capacity of the Iranian Government and ESCO association is developed in order to ESCO in Government's buildings. 2-1 Preparation of procedures and manuals for the introduction of ESCOs 2-2 Preparation of contract models and formats for ESCOs 2-3 Capacity development for awareness raising and training 2-4 Introduction of case studies on Japan's policies, legislations and finance mechanisms for energy efficiency in buildings 3. The introduction of ESCO in Government's buildings is considered and promoted. 3-1 Capacity development for ESCO companies 3-2 Energy audits for Government's buildings by ESCO companies 3-3 Pilot projects are implemented by ESCO companies in order to introduce ESCO for Government's buildings 3-4 Monitoring of Pilot Projects 4. Policy recommendations are made for the introduction of ESCOs 4-1 Policy recommendations for the introduction of ESCO's	**The Japanese Side** A. Experts · Team Leader (ESCO Expert) / ESCO Framework · Energy Audit Engineer (Heat) · Energy Audit Engineer (Electricity) B. Training in Japan · ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. · Non **The Iranian Side:** A. Ministry of Energy: Project Counter Part · Project Director: General Director, Office for the Improvement of Productivity and Economy of Electricity and Energy (OIPEEE) · Project Manager: Head of Awareness & Training, OIPEEE B. SABA: Implementation Organization · Deputy of Demand Side Department · ESCO Department C. IFCO: Co-Implementation Organization D. IRESCO: Cooperation Organization **Joint Coordinating Committee(JCC)** A. Chairperson: · General Director of OIPEEE B. Member of Iranian Side · MOE · Managing and Planning Organization (MPO) · Ministry of Economy and Finance (MOEF) · Ministry of Petrol (MOP) · Ministry of Road and Urban Development (MRUD) · SABA · IFCO · IRESCO C. Member of Japanese side · JICA Experts · Representatives from JICA IRAN Office · Other personnel concerned to be assigned by request of other members D. Observer · Ministry of Foreign Affairs (MOFA) · Embassy of Japan (EoJ)	

Attachment 4

Plan of Operation Rev.1

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in Islamic



Period of JICA Expert Activities in Iran (Tentative)	
Output 1: An institutional framework is established to promote ESCO business in the Islamic Republic of Iran	
1-1	Study of measures and policies to promote ESCO business
1-2	Support for preparation of the regulations and guidelines for the ESCO association (IRESCO)
1-3	Support for establishment of the institutional framework for the ESCO association (IRESCO)
Output 2: The capacity of Iran Government and IRESCO is developed in order to introduce ESCO in Government's buildings	
2-1	Support for preparation of procedures and manuals to introduce ESCO
2-2	Support to complete contract models and formats for ESCO's
2-3	Capacity development for awareness raising and training
2-4	Introduction of case studies on Japan's policies, legislation and finance mechanisms for energy efficiency in buildings
Output 3: The introduction of ESCO in Government's buildings is considered and promoted	
3-1	Selection of candidate sites for energy audit in Government's buildings
3-2	Energy audits for Government's buildings are implemented by ESCO companies
3-3	Support to complete plan of pilot project of ESCO
3-4	Capacity development for ESCO companies
3-5	Pilot projects for Government's buildings are implemented by ESCO companies
3-6	Study to introduce ESCO business in Government's buildings
3-7	Monitoring of Pilot Projects
Output 4: Policy recommendations are made for the introduction of ESCO's	
4-1	Study on introduction of ESCO's in Government's buildings
4-2	Study for monitoring and measurement of ESCO project
4-3	Policy recommendations are made for the introduction of ESCO's
Joint Coordinating Committee	
Work Shop	
Training in Japan	

Agenda of 3rd Joint Coordinating Committee (Tentative)

Date: November 8, 2016 (1395/ 8 / 18)
Venue: 11th Floor Conference room, Ministry of Energy

1. Opening speech from Japan side (10:30 to 10:35)
   Japan International Cooperation Agency (JICA) Iran Office
   Representative, Iran office, JICA will participate.

2. Opening speech from Iran side (10:35 to 10:40)
   RSEEO, Ministry of Energy

3. Progress of the project and Schedule from now (10:40 to 10:55)
   SABA

4. Challenge and difficulty of the ESCO Pilot Project on the Tehran Electric Distribution Company (10:55 to 11:10)
   Pishran Energy

5. Challenge and difficulty of the ESCO Pilot Project on the Ministry of Finance (11:10 to 11:25)
   ASIA Watt

6. (Finding of issues for promotion of ESCO projects)
   JICA project team

Attendance list at 3rd Joint Coordinating Committee which was held on November 8, 2016. (Iranian：1394/ 8 / 18)

No	Organization	Department	Occupation	Name
1	Ministry of Energy	RSEEO	Director General, ESCO Project Director	M.Ali.Shafiezadeh
2	Ditto	Ditto	Head of International Collaboration, ESCO Project Manager	Alireza Shirazi
3	Ditto	Ditto		M. Kazemi
4	SABA		Deputy of Energy Efficiency in Demand Side	Amir Doodabi Nejad
5	Ditto	Industry Factor	Manager of ESCO Department	Mohammad Akbari
6	Ditto	Ditto		Mehdi Rafi
7	IFCO	Building Section		Ali Nooroozmanesh
8	Building Engineering Organization	Energy Committee	Director General of Committee	Mohammadreza Ismaeili
9	Ditto	Ditto	Member of Committee, Engineer (Isfahan section)	Ahmadreza Taheriasl
10	Ditto	Electricity Committee	Member of Committee	Soleiman Shirzadeh
11	Ditto	Ditto	Member of Committee	Bahram Chavoshi
12	Ditto	Mechanical Committee	Member of Committee	Asghar Shirazpoor
13	Ditto	Ditto	Member of Committee	Rasoul Bagherzadeh
14	Tehran Electrical Distribution Company	Energy department	Technical advisor	Amir Yaghooti
15	IRESCO	Board	Board Member of IRESCO /Chairman of Pishrun Energy	Tooraj Bataie
16	Ditto	Ditto	Board Member of IRESCO /Managing Director of ASIA WATT	Alimohammad Mirshams
17	JICA Head quarter	Industrial Development and Public Policy Department	Director, Team1 of Energy and Mining Group	Fuyuki Sagara
18	JICA Iran Office		Chief Representative	Kohei Sato
19	Ditto		Project Formulation Adviser	Yoshiko Yamanaka
20	Ditto		Senior Program Officer	Vahid Kheirolomour
21	JICA Project Team		Team Leader of JICA project team/ ESCO	Tsutomu Mori
22	Ditto		Member of JICA project team /Electrical Expert	Morio Sakai
23	Ditto		Member of JICA project team /Heat Expert	Hideaki Kuroki
24	Ditto		Assistant Stuff	Behzad Yaghmaie
25	Ditto		Interpreter	Amin Karimi

MINUTES OF MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

MINISTRY OF ENERGY

ON

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS

TO INTRODUCE ESCO

FOR

GOVERNMENT'S BUILDINGS IN THE ISLAMIC REPUBLIC OF IRAN

Tehran, November 22nd, 2016

佐藤公平

Mr. Kohei SATO
Chief Representative
Iran Office
Japan International Cooperation Agency

Mr. M. A. SHAFIEZADEH
General Director of RSEEO
Ministry of ENERGY
The Islamic Republic of Iran

Mr. Tsutomu MORI
Leader of JICA project team
Nippon Koei Co. Ltd.

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings In the Islamic Republic of Iran (hereinafter referred to as "the Project") has been carried out based on the Record of Discussion (hereinafter referred to as "R/D) that was agreed between Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Energy of Islamic Republic of Iran (hereinafter referred to as "MoE") in October 1, 2013.

The third JCC was held on November 8, 2016 as attached agenda. The attendance list is attached in Attachment 2.

The following topics have been presented and discussed.

1) Progress of the Project
2) Two ESCO pilot projects
3) Necessity of support by government policy

Main points of the discussion are summarized below.

1) Progress of the Project
   SABA reported past achievements and progress of the Project.
   a. ESCO model contract and ESCO guideline were prepared by the efforts both of SABA and ESCO companies.
   b. Two buildings, i.e. Ministry of Economic Affairs and Finance and Tehran Electric Distribution Company, were selected as the candidate buildings of the ESCO pilot project.
   c. SABA has made discussion with a fund named as Power Energy Industry Research & Technology Fund on finance for the ESCO pilot project.

2) Two ESCO pilot projects
   a. The case of Tehran Electric Distribution Company
      Pishrun Energy has submitted Tehran Electric Distribution Company of ESCO proposal. Pishrun Energy and Tehran Electric Distribution Company are under the discussion in order to make ESCO contract. Some technical issues regarding the methodology of M&V remain. The contract will be made within this month.
   b. The case of Ministry of Economic Affairs and Finance (MoEF)
      ASIA WATT has submitted MoEF of the ESCO proposal. ASIA WATT and MoEF are under the discussion in order to make ESCO contract. Almost barrier cleared through series of discussion. The contract will be made within this month.

3) Necessity of support by government policy
   The financial scheme is necessary for promotion of ESCO projects. So, Government of Iran must consider to introduce financial supports for promotion of ESCO projects with advice from JICA project team.

ATTACHMENT

1. Agenda
2. Attendance list

Attachment 1

Agenda of 3rd Joint Coordinating Committee

Date: November 8, 2016 (1395/ 8 / 18)
Venue: 7th Floor Conference room, Ministry of Energy

1. Opening speech from Iran side (10:30 to 10:35)
   RSEEO, Ministry of Energy

2. Opening speech from Japan side (10:35 to 10:40)
   Japan International Cooperation Agency (JICA) Iran Office
   Representative, Iran office, JICA will participate.

3. Progress of the project and Schedule from now (10:40 to 10:55)
   SABA

4. Challenge and difficulty of the ESCO Pilot Project on the Tehran Electric Distribution Company (10:55 to 11:10)
   Pishrun Energy

5. Challenge and difficulty of the ESCO Pilot Project on the Ministry of Economic Affairs and Finance (11:10 to 11:25)
   ASIA WATT

6. Finding of issues for promotion of ESCO projects
   JICA project team

7. Comment from building owner and engineering organization
   Tehran Electric Distribution Company, Engineering organization

Attachment 2

Attendance list at 3rd Joint Coordinating Committee which was held on November 8, 2016. (Iranian : 1394/ 8 / 18)

No	Organization	Department	Occupation	Name
1	Ministry of Energy	RSEEO	Director General, ESCO Project Director	M.Ali.Shafiezadeh
2	Ditto	Ditto	Head of International Collaboration, ESCO Project Manager	Alireza Shirazi
3	Ditto	Ditto		M. Kazemi
4	SABA		Deputy of Energy Efficiency in Demand Side	Amir Doodabi Nejad
5	Ditto	Industry Factor	Manager of ESCO Department	Mohammad Akbari
6	Ditto	Ditto		Mehdi Rafi
7	IFCO	Building Section		Ali Nooroozmanesh
8	Building Engineering Organization	Energy Committee	Director General of Committee	Mohammadreza Ismaeili
9	Ditto	Ditto	Member of Committee, Engineer (Isfahan section)	Ahmadreza Taheriasl
10	Ditto	Electricity Committee	Member of Committee	Soleiman Shirzadeh
11	Ditto	Ditto	Member of Committee	Bahram Chavoshi
12	Ditto	Mechanical Committee	Member of Committee	Asghar Shirazpoor
13	Ditto	Ditto	Member of Committee	Rasoul Bagherzadeh
14	Tehran Electrical Distribution Company	Energy department	Technical advisor	Amir Yaghooti
15	IRESCO	Board	Board Member of IRESCO /Chairman of Pishrun Energy	Tooraj Bataie
16	Ditto	Ditto	Board Member of IRESCO /Managing Director of ASIA WATT	Alimohammad Mirshams
17	JICA Head quarter	Industrial Development and Public Policy Department	Director, Team1 of Energy and Mining Group	Fuyuki Sagara
18	JICA Iran Office		Chief Representative	Kohei Sato
19	Ditto		Project Formulation Adviser	Yoshiko Yamanaka
20	Ditto		Senior Program Officer	Vahid Kheirolomour
21	JICA Project Team		Team Leader of JICA project team/ ESCO	Tsutomu Mori
22	Ditto		Member of JICA project team /Electrical Expert	Morio Sakai
23	Ditto		Member of JICA project team /Heat Expert	Hideaki Kuroki
24	Ditto		Assistant Stuff	Behzad Yaghmaie
25	Ditto		Interpreter	Amin Karimi

Agenda of 4th Joint Coordinating Committee

Date: January 23, 2018 (1396/ 11 / 3) at 10:00 AM
Venue: 13th Floor Conference room, Ministry of Energy

1. Opening speech from Iran side (10:00 to 10:05)
   Director General of PEEEO, Ministry of Energy
   ESCO Project Director,

2. Opening speech from Japan side (10:05 to 10:10)
   Japan International Cooperation Agency (JICA) Iran Office
   Representative, Iran office, JICA will participate.

3. Progress of the Project (10:10 to 10:15)
   Ministry of Energy
   ESCO Project Manager,

4. Implementation of the Pilot Project (10:15 to 10:25)
   SATBA

5. Progress of the ESCO Pilot Project on the Tehran Electric Distribution Company (10:25 to 10:35)
   Pishrun Energy

6. Progress of the ESCO Pilot Project on the Ministry of Economic Affairs and Finance (10:35 to 10:45)
   ASIA WATT

7. Finding of issues of the Project (10:45 to 10:55)
   JICA project team

8. Evaluation of the Project (10:55 to 11:15)
   JICA evaluation team

9. Comment (Q&A) from participants (11:15 to 11:25)

4 th JCC

Time and Date: 10:00AM-11:05 AM, 23 January 2018 03 Bahman 1396 in Persian calender

Venue: Meeting room on 13th floor, MOE

List of Participants

#	Name	Organization	Position
1	Mohammad Ali Shafizadeh	MOE	Direcotor General, PEEEO
2	Alireza Shirazi	MOE	Head of International Cooperation, PEEEO
3	Kambiz Rezapour	MOE	Director of Planning and Monitoring Division
4	Mohammad Akbari Sayyar	SATBA	Head of Industrial Management
5	Mehdi Rafiei	SATBA	Expert
6	Tooraj Bathaie	Pishrun Energy Co.	Chairman
7	Alimohammad Mirshams	Asia Watt Eng.Co.	Managing Director
8	Seyed Mahdi Hosseini	PBO	Expert of Energy Department
9	Kamran Nazari	MOEF	Head of Installation Dep.
10	Yukiharu Kobayashi	JICA Iran Office	Chief Representative
11	Yoshiko Yamanaka	JICA Iran Office	Project Formulation Advisor
12	Vahid Kheirolomour	JICA Iran Office	Senior Program Officer
13	Tsutomu Mori	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Leader
14	Morio Sakai	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Expert
15	Behzad Yaghmaie	JICA ESCO Project team	Assistant of JICA ESCO Project Team
16	Saeidreza Ettehadi	JICA ESCO Project Team	Interpreter of JICA ESCO Project Team
17	Hiroshi Ogawa	JICA Evaluation Mission (Haruno ESWorks LLC)	Evaluator (Representative partner)

MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF ENERGY
ON
4th JOINT COORDINATION COMMITTEE
FOR
THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS TO INTRODUCE ESCO FOR GOVERNMENT'S BUILDINGS IN THE ISLAMIC REPUBLIC OF IRAN

"The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in the Islamic Republic of Iran" (hereinafter referred to as "the Project"), which is implemented under the collaboration between Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Government of Iran, has conducted the 4th Joint Coordination Committee (hereinafter referred to as "JCC") on 23 January, 2018 in Tehran, for the purpose of reviewing the progress of the Project, discussing necessary future activities for accelerating the Project, and confirming the result of terminal evaluation.

As a result of the discussion, the both sides agreed on the matters referred to the document annexed hereto.

Tehran, 23 January 2018

小林雪治.

Mr. Yukiharu KOBAYASHI
Chief Representative
JICA Iran Office

Mr. Mohammad Ali Shafizadeh,
General Director,
Planning and Economics of Electricity and Energy Office, Ministry of Energy,
The Islamic Republic of Iran

ANNEX

Implementation of the Terminal Evaluation

The Terminal Evaluation Team (hereinafter referred to as the "Team") jointly implemented the Terminal Evaluation Study from 13 to 22 January 2018. As a result of the study, the Team submitted the draft of Terminal Evaluation Report as Appendix 1. JICA and Iranian side confirm the content of the report, and the both sides agreed on the result of the Terminal Evaluation Study in principle. The report shall be finalized after approval of PBO (pending, to be determined)

The Team evaluated that the Project showed good performance in Relevance (High), in Effectiveness (Relatively High), in Impact (Average) and in Sustainability (Average), while it showed less Efficiency in implementation process (Relatively Low).

It was, therefore, concluded that the Project is likely to achieve its expected purpose without additional inputs form Japanese side and without extension of the project duration as authorized in the R/D amended by the M/M in February 2016.

In accordance with the recommendations made by the Team, the both sides understood and agreed as followed.

1. Modification of the Project Design Matrix (PDM) and Plan of Operation (PO)

Project Design Matrix (hereinafter referred to as "PDM") and Plan of Operation (hereinafter referred to as "PO") as Annex 2 and 3, are modified in order to make consistence with the actual situations, and clarify the Objectively Verifiable Indicators. Objective Verifiable Indicators and Means of Verification of the Overall Goal shall be discussed and agreed by the time of the final JCC.

2. Project Implementation Structure

SATBA shall take over the roles and responsibilities for the implementation of the Project shouldered by SABA. SATBA shall also have more active roles and wider responsibilities for day to day implementation of the project activities, while MOE shall concentrate on coordinating other ministries and organizations including JICA for overall implementation of the Project. When necessary, MOE shall conduct directly the project activities.

3. Project Period

The project period shall terminate on July 2018, in accordance with the Record of Discussions amended by the Minutes of Meeting dated 29 February, 2016. The Iranian side shall continuously implement the project activities even after project period, for the full completion of the project activities and for the achievement of the project purpose.

4. Remained Tasks

There are the remained tasks which shall be carried out for the completion of the Project and achievement of the Project Purpose including;

(1) Verification of performance of the pilot projects (in Output 3)

- This is the most important task to be carried out by Iranian organizations after the end of the project period.
- Therefore, Japanese experts should fully support the Iranian stakeholders including C/Ps, IRESCO, and ESCOs during the project period, which includes proposal of a verification protocol.

(2) Clarification of roles and responsibilities of the related organizations for promotion of ESCO projects (in Output 1)

- The clarification is one of the indispensable conditions for the effective promotion of ESCO project in building sector
- In particularly, roles and responsibilities of organizations after restructuring in MOE and SABA should be clarified, and work demarcation regarding promotion of ESCO project in building sector, among related organizations such as MOP/IFCO, MRUD, MOEF and IRESCO should be well considered.
- It is, therefore, suggested that official documents authorized by the Minister of Energy, which define the roles and responsibilities of every office/section in MOE and SATBA after organizational restructuring of each organization, should be shared by JCC for efficient and effective implementation of the Project.
- Financial roles and responsibilities should also be clarified. Therefore, possible financial source for ESCO project such as funds under MOE as well as other government organizations, and financial schemes in private banks possibly applicable for ESCO projects should be listed.

(3) Formulation of recommendation by the Project (in Output 4)

- It is expected that the recommendation should be useful for stakeholders in both of Iranian and Japanese sides in order to consider promotion of ESCO project as well as EE&C in building sector. Therefore, it should cover financial, institutional and technical issues for example;
    - ➢ Technical issues
        - ✧ Implementation of pilot project employing other saving solutions
    - ➢ Institutional issues
        - ✧ Action plan to development of qualified ESCOs though energy audits program which draft ESCO project proposal for all government buildings.
        - ✧ Awareness increasing programme (joint campaign by related authorities).
        - ✧ Continuous support for IRESCO to establish linkage to related authorities.
    - ➢ Financial issues
        - ✧ Financial incentive for ESCO and Building owner such as tax incentive
        - ✧ Establishment of ESCO funds
        - ✧ Interest subsidy to ESCO Project

- ✧ Incentives for ESCO companies through "Law for Removing the obstacles to competitive production and promoting the country's financial system"
- ✧ ESCO project awareness seminar for financial institutions including private banks

(4) Setting Objectively Verifiable Indicators at Overall Goal level in the PDM version 2.

- In order to evaluate further the Project after achievement of the Project Purpose, the Objective Verifiable Indicators should be set before the end of the project period.
- The indicators should be evaluable, which clearly describe quantity and/or quality of the status of EE&C in building sector with available data source.

5. Countermeasures to Accelerate the Project

The both sides agreed on the countermeasures to accelerate the Project during the remained project period as followed;

(1) Formulation of the list of detail activities for the remained tasks and reporting format

- In order to carry out the remained tasks, firstly, the Japanese experts and C/Ps should formulate the list of detail activities including names of C/Ps in charge and schedule for each activity. For this, JICA experts prepare a reporting format.

(2) Communication among the Project members

- In order to ensure to monitor the progress of activities until the end of project period, the Project members: MOE (project manager), SATBA (C/Ps team), JICA expert team should establish more effective and efficient ways of communication.
- SATBA should report progress of day to day operation through MOE at least weekly to JICA expert team until the end of project period when JICA experts are in Japan
- The progress of the two pilot projects is most important to be monitored for completion of the Project. The two ESCOs implementing pilot projects should have efficient communication channels to JICA experts when necessary

(3) Comprehensive support to ESCOs in the implementation of the pilot projects

- As nature of a pilot business project, two ESCOs have been facing with lot of difficulties. Not only engineering issue like verification methodology, but also other issues including recovery of payments, should be fully supported by JICA experts, C/Ps staff in MOE/SATBA and JCC members such as PBO.

END

Attachment 1: Joint Terminal Evaluation Report (draft)
Attachment 2: Agenda of 4th JCC
Attachment 3: Participants List of 4th JCC

JOINT TERMINAL EVALUATION REPORT

FOR

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS TO INTRODUCE ESCO FOR GOVERNMENT'S BUILDINGS IN ISLAMIC REPUBLIC OF IRAN

Ministry of Energy

and

Japan International Cooperation Agency

Tehran

Islamic Republic of Iran

23rd January 2018

小林雪治

Mr. Yukiharu KOBAYASHI
Leader of the Japanese Evaluation Team
Chief Representative,
JICA Iran Office

Mr. Mohammad Ali Shafizadeh,
General Director,
Planning and Economics of Electricity and Energy Office, Ministry of Energy,
The Islamic Republic of Iran

CONTENTS

Abbreviation

BHRC	Building and Housing Research Centre
C/P	Counterpart personnel
EE&C	Energy Efficiency and Conservation
ESCO	Energy Service Company
IFCO	Iran Fuel Conservation Company
IRR	Iranian Rial
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
kWh	Kilowatt hour
MM	Man Month
M/M	Minutes of Meeting
MOE	Ministry of Energy
MOEF	Ministry of Economy and Finance
MOP	Ministry of Petroleum
MPO	Management Planning Organization
MRUD	Ministry of Road and Urban Development
M&V	Measurement and Verification
NRI	Niroo Research Institute
OIPEEE	Office for the Improvement of Productivity and Economy of Electricity and Energy
OVI	Objectively Verifiable Indicator
PEEEO	Planning and Economics of Electricity and Energy Office (formerly OIPEEE)
PDM	Project Design Matrix
PO	Plan of Operation
PBO	Plan and Budget Organization (formerly MPO)
R/D	Record of Discussion
SABA	Iran Energy Efficiency Organization
SATBA	Iran Renewable Energy and Energy Efficiency Organization (formerly SABA)
SUNA	Iran Renewable Energy Organization

1. Introduction

1-1. Background of the Project

The Islamic Republic of Iran (hereafter referred to as the "Iran") is one of the world's most eminent oil-producing countries, producing four million barrels per day, which accounts for 10.9 percent of oil deposits in the entire world. However, general energy consumption occupies 44 percent of general energy supply in Iran. Efficient utilization of energy is becoming the key issue in terms of securing the volume of oil for export that brings economic growth to the country. The proportion of the energy consumption in residential sector is the largest, 33 percent, which is followed by 24 percent in transportation sector, 24 percent in industrial sector and eight percent in commercial sector. As the energy consumption in building sub-sector under residential and commercial sector has been increasing and reaches 40 percent of the total energy supply in Iran, Energy Efficiency and Conservation (hereafter referred to as "EE&C") in building sub-sector is now the most urgent issue tackled by Ministry of Energy.

JICA implemented Technical Cooperation Project: "Development study for institutional development on energy management sector in the Islamic Republic of Iran" (May 2010 – November 2011). That project developed the road map and the action plan for promotion of EE&C in building sub-sector, and concluded that the utilization ESCO could be feasible measure. Iran government strengthens EE&C promotion by setting series of laws and regulations such as Subsidy Rationalization Law (December 2011), Energy Consumption Pattern Reform Law (March 2011). Ministry of Energy, then, requested Japanese government for implementation of Technical Cooperation Project aiming capacity development for promotion of ESCO projects in government's buildings, and the record of discussion to launch the project was exchanged between JICA and Ministry of Energy in October 2013.

The project started at January 2014, and 3 Japanese experts have been dispatched to work together with Iranian counterpart personnel (hereafter referred to as "C/P") in order to assist the Iranian ESCO association, organize trainings and seminars for stakeholders in EE&C for building sector, implement ESCO pilot projects, and formulate policy recommendations for promotion of ESCO projects in Iran.

1-2. Objectives of the Terminal Evaluation

The Objectives of the Terminal Evaluation were as follows:

(1) To review the achievements and the implementation process of the Project, according to the Project Design Matrix (hereafter referred to as "PDM") and the Plan of Operation (hereafter referred to as "PO",

(2) To evaluate the overall performance of the Project according to the five evaluation criteria (Relevance, Effectiveness, Efficiency, Impacts and Sustainability),

(3) To provide/consider recommendation to the Project regarding the implementation plan and issues for the remaining project period, and

(4) To draw lessons learned from the Project to the similar type of project implemented in future.

1-3. Members of the Evaluation Team

1-3-1. Japanese side

Name	Designation	Title
Mr. Yukiharu KOBAYASHI	Leader	Chief Representative, JICA Iran office
Ms. Yoshiko YAMANAKA	Member (Evaluation Planning)	Project Formulation Advisor, JICA Iran office
Mr. Vahid Kheirolomour	Member (Evaluation Coordination)	Senior Program Officer, JICA Iran office
Mr. Hiroshi OGAWA	Member (Evaluation Analysis/EE&C)	Representative Partner, Haruno ESWorks LLC

1-3-2. Iranian side

Name	Designation	Title
Mahdi Husseini	Member	Energy Expert Plan and Budget Organization

1-4. Schedule of the Terminal Evaluation

The Study was conducted jointly from 13th January to 22nd January 2018. The detail schedule is shown Annex VI.

1-5. Methodology of the Terminal Evaluation

1-5-1. Process of the Terminal Evaluation

The Terminal Evaluation was conducted in two steps as follows:

(1) Step 1: Preliminary survey by members of Japanese side

The progress and achievement during the project period were preliminary surveyed. The members of Japanese side collected data and information through document reviews, questionnaires and interviews. Then, the Japanese members analysed performance of the Project.

(2) Step 2: Joint evaluation survey

Based on the results of the above step, the Evaluation team carried out further field investigation in the pilot building sites, and series of discussion for adequate evaluation of the Project. The team finally summarized the whole results in the Joint Evaluation Report (This report) for mutual understanding.

1-5-2. Evaluation Criteria

The Terminal Evaluation was conducted in accordance with the JICA's evaluation guideline which standardizes the Five Evaluation Criteria as follows:

(1) Relevance

Relevance refers to the validity of the Project Purpose and the Overall Goal in connection with the development policies of the Iranian government, assistance policy of the Japanese government and development needs of the beneficiaries.

(2) Effectiveness

Effectiveness refers to the extent to which the expected benefits of the Project have been achieved as planned. It also examines whether these benefits have been generated as a result of the Project.

(3) Efficiency

Efficiency refers to the productivity of the implementation process. It examines whether the Inputs of the Project have been efficiently converted into the Outputs of the Project.

(4) Impact

Impact refers to direct and indirect, positive and negative impacts caused by the implementation of the Project, including the extent to which the Overall Goal has been attained.

(5) Sustainability

Sustainability refers to the extent to which the Project can be further developed by the Iranian authorities, and the extent to which the benefit generated by the Project can be sustained under the national policies, technology, system and financial state.

2. Outline of the Project

The outline of the Project was formulated by the project formulation study in March 2013, and authorized in the Record of Discussion (hereafter referred to as "R/D") dated 1st October 2013. The initial PDM (version 0) was designed in the 1st Joint Coordination Committee (hereafter referred to as "JCC") meeting in April 2014. The revised PDM (version1) was developed in the 2nd JCC meeting in November 2015. The duration of the project period was amended to 54 months from 48 months by the Minutes of Meeting (hereafter referred to as "M/M") dated 29th February 2016. In order to clarify the Outputs and Activities, and to reflect the progress of the Project until December 2017, the PDM version 2 and PO version 2 for the terminal evaluation study were prepared of which outline is summarized below. (PDM version 2 and PO version 2 are attached in Annex I and II respectively.)

2-1. Overall Goals

Narrative summary
Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government building
Objective Verifiable Indicators
To be determined by the Project during JICA project period (by July 2018) *e.g. The ESCO projects are carried out at more than XX government buildings* ………… by 2023

2-2. Project Purpose

Narrative summary
The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.
Objective Verifiable Indicators
At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve

ESCO business.

2-3. Outputs and Activities

2-3-1. Output 1

Narrative summary

An institutional framework to promote ESCO business in Iran is strengthened.

Objective Verifiable Indicators

1.1. Regulations and guidelines in the IRESCO are upgraded.

1.2. Roles and responsibilities of the related organizations: MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.

Activities

1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran.

1-2. To support IRESCO in preparing its internal guidelines.

1-3. To give advice to IRESCO on strengthening intuitional capacity.

1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business.

2-3-2. Output 2

Narrative summary

The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.

Objective Verifiable Indicators

2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed.

2.2. Performance contract models for ESCO project are upgraded.

2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA.

Activities

2-1. To develop a manual to introduce ESCO project for government organization buildings.

2-2. To collect the existing contract models for ESCO project.

2-3. To develop contract models for ESCO project in building sector in Iran.

2-4. To organize trainings and seminars for ESCOs and government organizations.

2-5. To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan.

2-3-3. Output 3

Narrative summary

The ESCO pilot projects are implemented in government's buildings for development of ESCO business.

Objective Verifiable Indicators

3.1. More than 50 candidate buildings are selected by MOE/SATBA.

3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs.

3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA.

3.4. At least, 2 ESCO pilot projects are launched.

3.5 Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts). (* monthly performance data)

3.6. Performance reports including one-year performance activities are submitted for at least 2 pilot projects by ESCOs, and approved by MOE/SATBA. (after JICA project period.)

Activities

3-1. To select the candidate buildings for energy audit.

3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings.

3-3. To support ESCOs in planning the pilot projects.

3-4. To supervise and monitor the pilot projects implemented by ESCOs.

3-5. To analyse monthly performance data of pilot projects submitted by ESCOs.

2-3-4. Output 4

Narrative summary

Policy recommendation for the promotion of ESCO business is formulated.

Objective Verifiable Indicators

4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period).

Activities

4-1. To review the project activities and results including seminars, manuals, performance of pilot projects.

4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran.

4-3. To submit the recommendation to the last JCC meeting (during the JICA project period).

4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.

4-5. To submit the recommendation to Iranian government. (after JICA project period)

2-4. Assumptions and Pre-condition

Pre-conditions

- Subsidies for energy prices for building sector are eliminated as the Iranian government planed.
- Organizational restructuring in MOE and MOP does not affect adversely implementation of the Project.

Assumptions from Outputs to Project purpose

- Budget for pilot projects is secured and disbursed by MOE as planned.

Assumptions from Project purpose to Overall goals

- Recommendation formulated by the Project is reflected in energy policies and budget

allocation.
Assumptions for sustainability of Overall goals
- Policies on EE&C for the building sector are maintained.

3. Achievements and Implementation Process of the Project

3-1. Inputs to the Project

The Team has confirmed that the Project has provided the following inputs.

3-1-1. Inputs from the Japanese side

(1) Assignment of Japanese experts

The three (3) Japanese experts in charge of ESCO/ESCO policy, Energy audit engineer (Heat) and Energy audit engineer (Electricity) have been assigned by the time of the Terminal Evaluation of which total man-months (hereafter referred to as "MMs") is 16.56 MMs.

The total MMs of the Japanese expert working in Iran is 14.56MMs, which accounts for 30% of the total duration of the Project implementation up to December 2017.

Table 3-1-1-1. Assignment of Japanese experts

	Period	Planed MMs	Actual MMs
Work in Iran	The 1st period (Jan.2014 - Feb.2016)	8.66	8.66
	The 2nd period (Mar.2016 -May. 2018)	10.06	5.90 (as of Dec.2017)
	Sub-total	18.72	14.56 (as of Dec.2017)
Work in Japan	The 1st period (Jan.2014 - Feb.2016)	1.35	1.35
	The 2nd period (Mar.2016 -May. 2018)	1.40	0.65 (as of Dec.2017)
	Sub-total	2.75	2.00 (as of Dec.2017)
	Total	21.47	16.56 (as of Dec.2017)

(Source: Japanese expert team)

(2) Counterpart training in Japan

Two times of the training were completed. In total, 20 persons attended the training in Japan. The list of participants is attached in Annex IV

(3) Financial support for local costs

No financial support for local costs such as for organizing seminars was planned.

(4) Equipment

No equipment was planned to be provided.

3-1-2. Inputs from Iranian side

(1) Assignment of counterparts' personnel and administrative personnel

Two officials in Ministry of Energy have been assigned as a project director and a project manager respectively. Five officials in SATBA have been assigned as C/Ps. The list of the officials is attached in Annex III.

(2) Office space and facilities for the Project

Working space for Japanese experts was arranged in the building of SABA, and the utilities such as electricity, water, air conditioning, and foods for the experts were provided until organizational restructuring of SABA. As of December 2017, the arrangement was pending. MOE/SATBA was preparing such arrangement once again.

(3) Financial support to the Project.

From the beginning of the project period up to December 2017, in total, 150,000,000 Iranian Rial (hereafter referred to as "IRR") has been allocated and disbursed to the operation of the Project from the SATBA. Apart from for the operation of the Project, SABA/SATBA expensed 1,100,000,000 IRR for EE&C related activities including energy audits, organizing trainings and seminars. The detail is summarized the table below.

Table 3-1-2-1. Expenditure by SABA/SATBA to the Project and EE&C

Items	Amount (IRR)
For the operation of the Project	150,000,000
Organizing Workshops	40,000,000
Preparation of Pilot project (such as for energy audit)	30,000,000
Support for the experts	80,000,000
For other EE&C related activities	1,100,000,000
Energy audit, Trainings, etc (2014-2017)	-

(Source: SATBA)

3-2. Achievement of Outputs

The Project has implemented its activities as per the plan (stated in the PDM and PO version 2). The Team reviewed the progress of the Project activities and the achievement of the Outputs as followed.

3-2-1. Output 1

Status: Not yet achieved (likely to be achieved)

- Output1 was considered not yet to be achieved because one of the Objective Verifiable Indicator (hereafter referred to as "OVI") has not yet been realized.
- Although the activities 1-1, 1-2 and 1-3 were completed as planned, the activity 1-4 shown delay.

Narrative summary	Status
An institutional framework to promote ESCO business in Iran is strengthened.	Not yet achieved (likely to be achieved)

Objective Verifiable Indicators	Status
1.1. Regulations and guidelines in the IRESCO are upgraded.	Achieved
1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified	Not yet achieved (likely to be achieved)
Activities	**Status**
1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran	Completed
1-2. To support IRESCO in preparing its internal guidelines	Completed
1-3. To give advice to IRESCO on strengthening intuitional capacity	Completed
1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business.	Not yet completed (likely to be completed)

- According to the interviews to the executives in IRESCO, advices provided by JICA experts were useful for them to upgrade their regulations and to consider how to develop the association.
- The delay in the activity 1-4 was caused mainly because;
  - The organizational restructuring in MOE and SABA took place during project period, and
  - The activity was not clearly planed in PDM/PO version 0 and version 1.
- It was reported by C/Ps that the internal organizational structure in SATBA would be finalized before coming Iranian new year, i.e. the middle of March 2018.

3-2-2 Output 2

Status: Likely to be achieved

- Output 2 was considered to be likely to be achieved because two (2) OVIs have been realized and other is going to be achieved.
- The activities 2-1, 2-2、 2-3 and 2-5 were completed.
- Another workshop in the activity 2-4 is going to be organized before the end of the project period.

Narrative summary	Status
The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.	Likely to be achieved
Objective Verifiable Indicators	**Status**
2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed.	Achieved
2.2. Performance contract models for ESCO project are upgraded.	Achieved
2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA.	Likely to be achieved

Activities	Status
2-1. To develop a manual to introduce ESCO project for government organization buildings.	Completed
2-2. To collect the existing contract models for ESCO project.	Completed
2-3. To develop contract models for ESCO project in building sector in Iran.	Completed
2-4. To organize trainings and seminars for ESCOs and government organizations.	Not yet completed (on going likely to be completed)
2-5. To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan.	Completed

- The 30-page manual was developed, which explains, a type of services in ESCO project, contact types, meaning of performance-based contract, a way of measurement and verification, etc. (2-1)
- Four (4) examples of ESCO contract document were collected: 1) A standard ESCO contract model introduced by Ministry of Economy, Trade and Industry, Japan, 2) One used in ESCO business project in industrial sector in Iran, 3) One dealing with ESCO project in USA, and 4) One which IRESCO got from one of their member. After comparative analysis on these examples, C/Ps developed the contract model. (2-2, 2-3)
- As of December 2017, five (5) seminars/workshops were organized as listed below. The Project is going to organize one more seminar before the end of the project period.

Table 3-2-2-1. Seminar/Workshop organized during the Project period

	Date	Title	Number of participant	Remarks
1	15/03/2014	Workshop on JICA ESCO project	30	
2	22/04/2014	1st JICA workshop	55	90* including project staff
3	23/11/2015	2nd JICA workshop	80	Presented in Power system conference at SATBA
4	15/04/2016	Workshop on JICA ESCO project	15	
5	10/05/2017	ESCO fund seminar	60	

(Source: Project)

3-2-3. Output 3

Status: Not yet achieved (likely to be achieved)

- Output 3 was considered not yet to be achieved because two of the OVIs have not yet been realized.
- The activities 3-1, 3-2 and 3-3 were completed during the 1st half of the project implementation period.

- It was confirmed that activity 3-4 was completed at the timing of this evaluation study.
- The activity 3-5 is likely to be carried out after one year because the pilot projects have already started.

Narrative summary	Status
The ESCO pilot projects are implemented in government's buildings for development of ESCO business.	Not yet achieved
Objective Verifiable Indicators	**Status**
3.1. More than 50 candidate buildings are selected by MOE/SATBA	Achieved
3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs.	Achieved
3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA	Achieved
3.4. At least, 2 ESCO pilot projects are launched	Achieved
3.5 Monthly performance reports are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts)	Not yet achieved (likely to be achieved)
3.6. Performance reports including one-year performance activities are submitted for at least 2 pilot projects by ESCOs, and approved by MOE/SATBA (after JICA project period)	Not yet achieved (likely to be achieved)
Activities	**Status**
3-1. To select the candidate buildings for energy audit	Completed
3-2. To supervise the energy audit with work-through by ESCOs at the candidate buildings	Completed
3-3. To support ESCOs in planning the pilot projects.	Completed
3-4. To supervise and monitor the pilot projects implemented by ESCOs	Not yet completed (on going)
3-5. To analyse monthly performance data of pilot projects submitted by ESCOs.	Not yet completed (to be started)

- Firstly, C/Ps in SATBA gathered 100 buildings information, and made the long list. (3-1)
- Considering size, age, owner of buildings, about 15 building were selected as candidates for walk-through energy audit. Finally, C/Ps, Japanese experts and six (6) ESCOs conducted that energy audit at seven (7) buildings. (3-2)
- Four (4) ESCOs supported by C/Ps in SATBA, submitted ESCO proposals. Two (2) proposals out of four (4) were finally approved by SATBA.(3-3)
- At the timing of the Study, 2 pilot projects have already started and been monitored. (3-4)
- In pilot ESCO projects, the result of measurement of energy consumption is supposed to be reported. Japanese experts and C/Ps have been preparing for analysis of the data. (3-5)

3-2-4. Output 4

Status: Not yet achieved (likely to be achieved)

- Output 4 was considered not yet to be achieved because the OVI has not yet been realized.
- The activity 4-1 has been conducting, while the activities 4-2, 4-3 and 4-4 are going to be carried out.

Narrative summary	Status
Policy recommendation for the promotion of ESCO business is formulated.	Not yet achieved
Objective Verifiable Indicators	**Status**
Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	Not yet achieved
Activities	**Status**
4-1. To review the project activities and results including seminars, manuals, performance of pilot projects	Not yet completed (on going)
4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran	Not yet completed (on going)
4-3. To submit the recommendation to the last JCC meeting (during the JICA project period)	Not yet completed (to be started)
4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.	Not yet completed (to be started)
4-5. To submit the recommendation to Iranian government. (after JICA project period)	Not yet completed (to be started)

3-3. Achievement of the Project Purpose (Prospect)

Status: Not yet achieved (likely to be achieved)

- Project purpose was considered not yet to be achieved because the OVI has not yet been realized.
- It was considered, however, that the Project Purpose is going to be achieved because two pilot projects have already started.

Narrative summary	Status
The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	Not yet achieved (likely to be achieved)
Objective Verifiable Indicators	**Status**
At least 2 ESCO pilot projects demonstrate energy saving to ensure economic viability of ESCO business.	Not yet achieved (likely to be achieved)

3-4. Achievement of the Overall Goals (Prospect)

Status: (not evaluated by this study)

- It was considered that proper OVIs must be set up by the Project by June 2018.

Narrative summary	Status
Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	(not evaluated)
Objective Verifiable Indicators	**Status**
To be determined by the Project during JICA project period *e.g. The ESCO projects are carried out at more than XX government buildings ....* by 2023	(not evaluated)

3-5. Implementation Process

3-5-1. Joint Coordination Committee

The Joint Coordination Committee (hereafter referred to as "JCC") was established based on the R/D in October 2013. The JCC consists of 10 members: Ministry of Energy (hereafter referred to as "MOE"), Plan and Budget Organization (hereafter referred to as "PBO": formerly Management and Planning Office), Ministry of Economy and Finance (hereafter referred to as "MOEF"), Ministry of Petroleum (hereafter referred to as "MOP"), Ministry of Road and Urban Development (hereafter referred to as "MRUD"), Renewal Energy and Energy Efficiency Organization (hereafter referred to as "SATBA"; formerly Iran Energy Efficiency Organization (hereafter referred to as "SABA")), Iran Fuel Efficiency Organization (hereafter referred to as "IFCO"), Iran ESCO association (hereafter referred to as "IRESCO", JICA Iran office and JICA expert team.

The JCC meetings were organized three times for approval of annual work plan of the Project, monitoring and evaluation of the progress of the Project: the 1st JCC meeting was on 21st April 2014, the 2nd meeting was on 14th November 2015 and the 3rd meeting was on 22nd November 2016.

3-5-2. Communication among Iranian project members and stake holders

The Project Director and the Project Manager work in the office of Ministry of Energy, while other C/Ps are stationed in the office of SATBA, their own organization. Two offices are far each other, so the most of communication are done through mobile phone.

According to the interviews by the evaluation study team (hereafter referred to as the "Team") to the C/Ps in MOE and SATBA offices, they maintained to communicate each other at least weekly to share progress of the Project. They increased their communications such face-to-face meetings particularly when JICA experts came to work in Iran.

The team found that there were few regular communications between the project team members in MOE/SABA and other related organizations including IFCO, co-implementing organization of the Project, and PBO, a member of JCC, which has responsibilities for regulating procurement procedure of government organizations, and therefore, is highly related to introduction of ESCO project to government buildings.

3-5-3. Communication between Iranian project members and Japanese experts team

As summarized in 3-1-1, Japanese expert team had worked in Iran for 30% of the project duration. The Team interviewed both Japanese expert and Iranian project members respectively, how they communicated each other when Japanese experts were not in Iran.

The Team found that they communicated each other regularly, however, their assessments on efficiency to disclose and share information among members in SABA, MOE and Japanese experts, were different each other. That implied there could be some difficulties for timely information sharing in the project implementation process.

On the other, in order to remove language barrier among Persian-English-Japanese, a local staff who can manage both Persian and Japanese has been assigned by Japanese expert team. The Team observed that contributed to improvement of communications.

4. Evaluation based on Five Criteria

4-1. Relevance

Relevance of the Project is **High**

4-1-1. Relevance to Iranian policies

Energy consumption and improving energy intensity have been one of the top concerns in Iranian national policies. The 5th Five-year Development Plan, a national master development plan for Iranian government, clearly indicated nationalizing energy and electricity consumption in the Article 135. Energy Consumption Pattern Reform Law (2011) also mentioned that related authorities should approve regulations to support ESCOs in the Article 17. The Article 12 of the Law "Elimination of Competitive Production Barriers and Improvement of Financial System" mentioned to put one of the top priorities of energy efficiency on building sector.

4-1-2. Relevance to Japanese aid policy

The latest aid policy of Japanese government to Iran has three target areas: 1) Economic and social infrastructure development, 2) Sustainable development, and 3) Improvement of regional and international relationship with foreign countries. The Project is regarded as one of the interventions for global warming mitigation under the second area above.

4-1-3. Needs among stakeholders

According to the views suggested by the stakeholders of the Project including IRESCO and C/Ps, the planed components of the Project such as the ESCO introduction manual, the performance contract model met with their needs. The implementation of the pilot project provided indispensable experiences for all stakeholders to understand and promote ESCO business as well as ESCO project.

4-2. Effectiveness

Effectiveness of the Project is **Relatively High**

4-2-1. Important assumptions from Output level to Project Purpose level

There are two types of contract in an ESCO project; Guaranteed Savings (hereafter referred to as "GS") type, and Shared Savings (hereafter referred to as "SS") type. In GS type contract, a building owner is responsible for financing energy saving interventions such as an introduction of facilities and equipment, while in SS type contract, an ESCO is required to finance them. Consequently, a building owner should take risk when energy reduction does not take place as planed in GS type contract, while an ESCO should do it in SS type contract.

The important assumption "Budget for pilot projects is secured and disbursed by MOE as planed" was stated between the Output level to the Project Purpose level in PDM version 2. According to the interview to the Japanese expert, at the beginning of the project period, a contract type to be applied to the ESCO pilot project was thought to be a GS type, although there weren't deep discussion and clear consensus about it among the project members.

On the one hand, if GS type is applied to the pilot project, i.e. MOE, instead of a building owner, finances facilities and equipment as a pilot activity, it seems to be smooth in implementation of the Project, because stakeholders don't need to negotiate much about who prepare budget and share risks. This might be a one of the reasons GS type was considered to be applied to the pilot project at the beginning of the project period.

On the other hand, if SS type is taken for the pilot project, it seems to be challenging trial for real business because it attracts more building owners. It brings, however, harder implementation of the Project.

In fact, MOE/SATBA decided to apply SS type contract to the pilot projects, using the fund from Niroo Research Institute, which is one of the organization under MOE. The Team understood that the arrangement was not planed initially, however, it was worthy trial for the Project. This improved effectiveness of the Project, even it brought certain delay in the pilot project.

4-2-2. Hindering factors to the implementation of the pilot project

The Team also found the progress of the pilot projects was delayed by other reasons.

MOE/SABA selected two candidates of the pilot projects by the middle of 2016. A process until closing a contract between ESCO and building owner did not proceed as expected.

According to the information provided by the ESCOs, there were lot of issues they faced during that process, the main of which are summarized as follows.

(1) Frequent personnel replacement at the management level of the buildings.

As same as ESCO business practice in the world, in the pilot project, ESCOs needed to explain what ESCO business is and propose how much benefit is produced to several sections and different levels of decision makers in the client building such as the general affair department/contract department, and the section manager/director of departments. In both of the pilot projects, ESCOs faced frequent personnel replacement among the decision makers, and they had to repeat to explain and propose same things when such replacement took place. In fact, the decision maker in top management level was replaced three times in the building of MOEF which was one of the reasons why it took more than one year until closing the contract.

(2) Energy facility operation staffs in the pilot buildings who have poor energy saving knowledge

A building which is targeted as ESCO project usually has its own facility operation staffs. From the initial phase of ESCO project: to measure energy consumption on site for baseline information, to the actual project phase: to reduce energy consumption as contracted, an ESCO needs to get support and understanding from such staff. In the pilot buildings, there were facility staffs having long experience to operate and maintain facilities without professional knowledge on energy saving. It took longer time for the ESCOs, accordingly, to persuade the staffs to accept energy measurement and to operate properly as instructed by ESCOs.

(3) Incompatibility between the Iranian government procurement procedure and ESCO business

As commonly seen in many countries, procurement of products and services by government organizations should follow standardized procedure with standardized contract document. In Iran, such standard procedure and format are introduced to the government owned buildings including those of the pilot projects.

Firstly, competitive tendering is mandatory when government organization procures something from private company, which was incompatible for the pilot project. Because it was arranged that only one ESCO could submit proposal to the building owner.

In an ESCO business, a total amount paid from building owner to ESCO is changeable according to an amount of energy saved. Therefore, the total amount to be paid is unknown at the timing of closing the contract. Measurement and verification of energy consumption is also unique step to finalize the payable price in ESCO business. However, the existing procurement contract documents in Iran, which are designed and authorized by PBO, could not be able to clearly handle those figures. Therefore, the C/Ps in SATBA and the ESCO staffs modified the contract document again and again until getting consensus with the officials in charge in the pilot buildings.

The team understood these are the main issues which affected effectiveness of the Project. The first issue looked unavoidable to the ESCOs, so they can be excused for delay, while the second issue was considered as good opportunity for ESCOs to get familiar with handling such facility staff. The third issue was necessary steps to develop practical ESCO contract model which can accelerate promotion of ESCO project in Iran.

4-3. Efficiency

Efficiency of the Project is **Relatively Low (Less efficiency in the implementation process)**

The study team found some delay in the Project Activities comparing to the plan summarized in POs, which resulted in delay of the achievement of the Outputs. The Team understand there was less efficiency in the implementation process between the Inputs/Activity to the Outputs. The main reason is explained as follows.

4-3-1. Pre-conditions from Inputs/Activity level to Output level

Several organizational restructurings took place in Iranian government organizations since the Project started.

The pre-condition in the PDM versions 2 says "Organizational restructuring in MOE and MOP does not affect adversely implementation of the Project." In fact, this condition was not satisfied.

In 2016, MOE decided that SABA would be merged with Renewable Energy Organization (hereafter referred to as "SUNA"), one of the organization under MOE. The integration of the two organizations into the new organization, SATBA, was finally approved by the Iranian authority on 1st January 2017. As a result, as of December 2017, the internal organizational structure in SATBA has not yet finalized to manage ESCO project related activities. That significantly affected implementation in the second half of the Project.

Internal restructuring in MOE also took place during the project period. The Office for the Improvement of Productivity and Economy of Electricity and Energy (hereafter referred to as "OIPEEE"), which the Project Director and the Project Manager belonged to, was re-organized as the Planning and Economics of Electricity and Energy Office (hereafter referred to as "PEEEO"). Besides, MBO, one of the JCC members was restructured too, and it has become PBO.

The team concluded that these organizational restructuring in the government organizations caused less efficiency in the Project implementation. These were unavoidable events for the Project. The Team understood the Project can be excused for the delay.

4-4. Impact

Impact of the Project is **Average (provisional judgement)**

4-4-1. Prospect of achievement of Overall Goals

Although the establishment of the ESCO business model is highly expected to contribute to EE&C in the building sector in Iran, the Team could not evaluate that possible impact due to lack of data to analyse it properly.

4-4-2. Other impacts

According to the summary reports on the counterpart training in Japan, most of the participants expressed their high satisfaction with the trainings. However, the Team found that there wasn't any formal opportunity to share the data, information and experiences obtained during the trainings with other officials who did not attend the training.

Based on the above, the Team provisionally concluded the Impact of the Project is average.

4-5. Sustainability

Sustainability of the Project is **Average**

4-5-1. Technical aspects

As long as the two ESCOs implementing the pilot projects concerned, they have enough experiences of energy service for industrial/building sector. According to the views of Japanese experts, their engineering knowledge, technical skills for energy savings reach to the level to provide professional services. Through the site visit to the pilot project buildings, the Team observed the services provided by ESCOs, and confirmed the expert's view. At the timing of this evaluation study, they didn't have sufficient experience on the ESCO project in building sector, the Team judged the ESCOs will be gradually able to carry out necessary services, as they will be involved in the actual ESCO projects in building sector.

4-5-2. Organizational aspects

SABA was the implementing organization in the Project because it had the roles for trainings and energy audit programme for improvement of energy efficiency in both of industrial and building sectors. Assuming SATBA takes over those roles and secures similar budget allocation, the Team thought sustainability of organizational aspects could maintained. In fact, as summarized in the table 3-1-2-1, the total budget allocated to trainings and energy audits for energy service companies from 2014 to 2017 was 1,100,000,000 IRR which was more than 7 times as large as what was allocated to the Project.

4-5-3. Pre-condition as institutional aspects

As reported in the JICA study: "Development study for institutional development on energy management sector in the Islamic Republic of Iran (2010-2011)" market energy prices in Iran before 2010 was quite lower than other countries due to the subsidies. The Subsidy Rationalization Law, effective from December 2011, clearly mentioned that the subsidies in market energy prices including the electricity tariff should be eliminated. This is the reason that the pre-condition: "Subsidies for energy prices for building sector are eliminated as the Iranian government planed." was set in PDM version 2.

Elimination of the subsidies in electricity tariff is one of the crucial conditions to ensure sustainability of the effects of the Project, in short, the establishment of ESCO business in Iran. The data set on electricity tariff applied to the pilot project buildings was provided by SATBA, which is summarized in the table below.

Table 4-5-3-1. Electricity tariff applied to the pilot project building

Year	Base tariff (IRR/month)	Tariff based on consumption (IRR / kWh)	
2010	30,000	normal hours (07 : 00 - 19 : 00)	1,000.0
		peak hours (19 : 00 - 23 : 00)	2,000.0
		low load hours (23 : 00 - 7 : 00)	500.0
2011-12	30,000	normal hours (07 : 00 - 19 : 00)	1,100.0

		peak hours (19 : 00 - 23 : 00)	2,200.0
		low load hours (23 : 00 - 7 : 00)	550.0
2013-15	44,640	normal hours (07 : 00 - 19 : 00)	1,637.0
		peak hours (19 : 00 - 23 : 00)	3,274.0
		low load hours (23 : 00 - 7 : 00)	818.5
2016	49,104	normal hours (07 : 00 - 19 : 00)	1,801.0
		peak hours (19 : 00 - 23 : 00)	3,602.0
		low load hours (23 : 00 - 7 : 00)	900.0

(Source: SATBA)

Comparing the base tariff in 2010 and 2011-12, they were the same price, while it increased to 44,640 IRR in 2013-2015 and 49,104 in 2016. The tariff based on consumption showed also similar trend. For example, the tariff for the normal hours was 1,000 IRR in 2010, and in 2011-12 it slightly increased to 1,100 IRR. Then it went up to 1,637 IRR in 2013-15, and reached 1,801 IRR in 2016. The subsidy looks to be eliminated nominally.

However, once inflation is considered, it is difficult to judge the subsidy in electricity tariff has been eliminated as the law had mentioned.

The table below shows the inflation rate from 2010 to 2016. During this period, Iran faced serious inflation till 2014. As a result, the general market prices in 2016 increased by 235.1% from 2010, which was much higher than the increase of the electric tariff.

Table 4-5-3-2 inflation (GDP deflator) in Iran

	2010	2011	2012	2013	2014	2015	2016
Annual %	15.6	23.7	24.0	35.6	10.8	0.4	1.6
Aggregated % (Y2010=100)	100.0	123. 7	153. 4	208. 0	230. 5	231. 4	235. 1

(Source: the study team based on WB statistics: https://data.worldbank.org/indicator)

If the subsidy on the electricity tariff is not eliminated sufficiently, the potential of ESCO business in building sector in Iran definitely shrinks.

Based on the consideration above, the team concluded the Sustainability of the Project is average.

5. Conclusion

In conclusion, The Project showed good performance in Relevance <High>, in Effectiveness <Relatively High>, in Impact <Average> and in Sustainability <Average>, while it showed less efficiency in the implementation process (i.e. Efficiency is <Relatively Low>).

It was, therefore, concluded that the Project is likely to achieve its expected purpose without additional inputs form Japanese side and without extension of the project duration as authorized in the R/D amended by the M/M in February 2016.

6. Recommendation and Lessons learned

6-1. Recommendations

6-1-1. Project period and completion of the Project

- Both of Iranian and Japanese sides have agreed that the project period is going to end at July 2018, which had been authorized by the both sides in the R/D amended by the M/M in February 2016.
- Both of Iranian and Japanese sides have fully understood and agreed that the Project activities must be continuously implemented by the Iranian side even after the end of the project period, until all of the tasks remained are completed.
- Both of Iranian and Japanese sides have fully understood that the Project shall complete when the completion of the project activities is reported to the related organizations which belong to JCC.
- As for the activities that JICA planned to conduct after the completion of the pilot projects, described in Plan of Operation Rev. 1 (authorized by the 2nd JCC on 18th November 2015), JICA shall not conduct those activities before the end of the project period which was agreed by the M/M on 29th February 2016.
- After termination of the project period in July 2018, MOE shall ensure to conduct all remained activities including supporting ESCOs in implementation of the two pilot projects in order to achieve the Project Purpose.
- After completion of the two pilot projects, MOE shall compile and validate the data collected from the two pilot projects, and make the completion report.
- After receiving the completion report, JICA shall inspect it in serious and sincere manner.
- Based on the result of the inspection, JICA shall consider further cooperation when MOE requests it.

6-1-2. Clarification of the Project implementation structure for completion of the Project

- SATBA should take over the roles and responsibilities for the implementation of the Project shouldered by SABA.
- SATBA should also have more active roles and wider responsibilities for day to day implementation of the project activities, while MOE should concentrate on coordinating other ministries and organizations including JICA for overall implementation of the Project.
- It is suggested that official documents, authorized by the Minister of Energy, which define the roles and responsibilities of every office/section in MOE and SATBA after organizational restructuring of each organization, should be shared by JCC for efficient and effective implementation of the Project.
- It is expected that other organization such as IFCO, MOEP, PBO and IRESCO should be more involved to the implementation of the Project, particularly in formulation of the policy recommendation.

6-1-3. Tasks remained

- Both of Iranian and Japanese sides have fully understood and agreed that there are the tasks remained for the completion of the Project and achievement of the Project purpose, which include;

(1) Verification of performance of the pilot projects (in Output 3)

- This is the most important task to be carried out by Iranian organizations after the end of the project period.
- Therefore, Japanese experts should fully support the Iranian stakeholders including C/Ps, IRESCO, ESCOs during the project period, which includes a proposal of a verification protocol.

(2) Clarification of roles and responsibilities of the related organizations for promotion of ESCO projects (in Output 1)

- The clarification is one of the indispensable conditions for the effective promotion of ESCO project in building sector.
- In particularly, roles and responsibilities of organizations after restructuring in MOE and SABA should be clarified, and work demarcation regarding promotion of ESCO project in building sector, among related organizations such as MOP/IFCO, MRUD, MOEP and IRESCO should be well considered.
- Financial roles and responsibilities should also be clarified. Therefore, possible financial source for ESCO project such as funds under MOE as well as other government organizations, and financial schemes in private banks applicable for ESCO projects should be listed.

(3) Formulation of recommendation by the Project (in Output 4)

- It is expected that the recommendation should be useful for stakeholders in both of Iranian and Japanese sides in order to consider promotion of ESCO project as well as EE&C in building sector.
- Therefore, it should cover financial, institutional and technical issues for example;
  - ➢ Technical issue
    - ✧ Implementation of pilot project employing other saving solutions
  - ➢ Institutional issues
    - ✧ Action plan to development of qualified ESCOs though energy audits program which draft ESCO project proposal for all government buildings.
    - ✧ Awareness increasing programme (joint campaign by related authorities).
    - ✧ Continuous support for IRESCO to establish linkage to related authorities.
  - ➢ Financial issues
    - ✧ Financial incentive for ESCO and Building owner such as tax incentive.
    - ✧ Establishment of ESCO funds
    - ✧ Interest subsidy to ESCO Project
    - ✧ Incentives for ESCO companies through "Law for Removing the obstacles to competitive production and promoting the country's financial system"
    - ✧ ESCO project awareness seminar for financial institutions including private banks

6-1-4. Formulation of the list of detail activities for the remained tasks and reporting format

- In order to carry out the remained tasks, firstly, the Japanese experts and C/Ps should formulate the list of detail activities including names of C/Ps in charge and schedule for each activity. For this JICA experts prepare a reporting format.

6-1-5. Communication among the Project members

- In order to ensure to monitor the progress of activities until the end of the project period, the Project members: MOE (project manager), SATBA (C/Ps team), JICA expert team should establish more effective and efficient ways of communication.
- SATBA should report progress of day to day operation directly and at least weekly to JICA expert team until the end of project period when JICA experts are in Japan.
- The progress of the two pilot projects is most important to be monitored for completion of the Project. The two ESCOs implementing pilot projects should have efficient communication channels to JICA experts when necessary.

6-2. Lessons Learned

6-2-1. Project Implementation Structure/Organizing Project Team (for Iranian side)

- For smooth implementation of a cooperation project, it is ideal that a project director, a project manager and other C/Ps should be appointed from a single organization.
- When such an arrangement is difficult, alternatively, each member of a project team should be clearly assigned with role and responsibility to carry out project activities by every organization to which the member belongs.
- It is expected that a sense of ownership of a project should be developed through such organizational and personnel arrangement.

6-2-2. Coordination among ministries (for Iranian side)

- In order to ensure efficient and effective implementation and maximize benefit generated by a cooperation project, related ministries and organizations should cooperate more. For that purpose, a coordination mechanism such as JCC should be established and utilized actively.

6-2-3. Information sharing in stakeholders after training in Japan (for Iranian side)

- In order to increase impact from C/P training in Japan, information, knowledge and experiences obtained through the training by participants should be shared among Iranian stake holders.
- It is, therefore, expected that a workshop should be organized by Iranian organizations to present the results of the trainings by participants after they come back from Japan.

Title of the Project : **The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings**
Implementing Agencies : **Ministry of Energy(MOE), Iran Renewable Energy and Energy Efficiency Organization (SATBA), Iran Fuel Conservation Organization (IFCO)**
Target Groups : **Staff of MOE, SATBA, IFCO and members of Iran ESCO association (IRESCO)**
Target Area : **The Islamic Republic of Iran**
Project Period : **25.01.2014 -24.07.2018 (54 months: JICA project period)**

January 22,2018 version 2

Summary	Objective Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goals: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	-XXX.XXXX by 2023 *(to be determined by the Project)*	-XXX.XXXX *(to be determined by the Project)*	- Policies on EE&C for the building sector are maintained.
Project Purpose The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	1. At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve ESCO business.	1.Project completion report including the verification report of the pilot project. (by MOE/SATBA)	- Recommendation formulated by the Project is reflected in energy policies and budget allocation
Outputs 1. An institutional framework to promote ESCO business in Iran is strengthened.	1.1. Regulations and guidelines in the IRESCO are upgraded. 1.2. Roles and responsibilities of the related	1.1. Project documents (Regulations and guidelines) 1.2. Project documents	

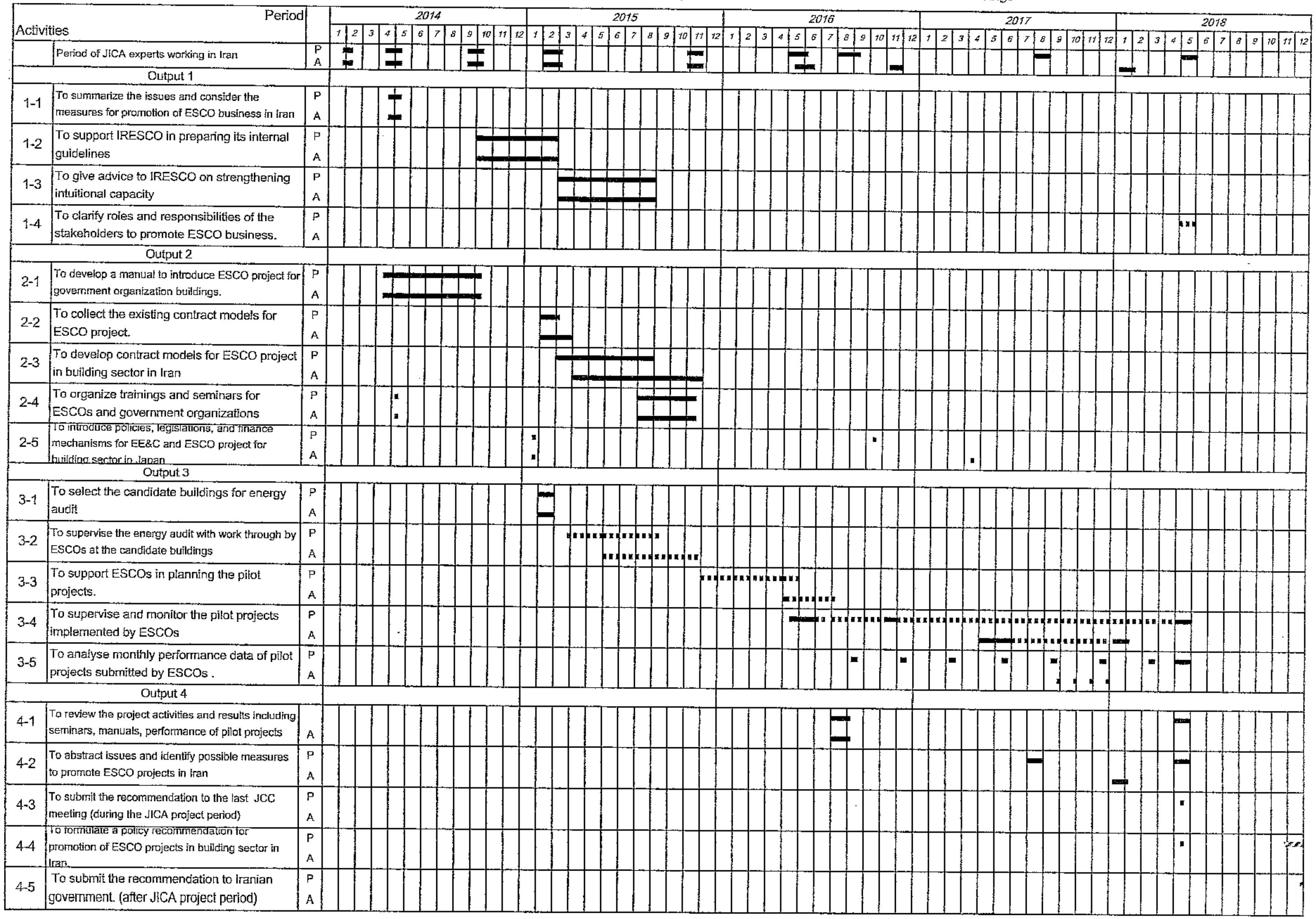
	organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.	(*for example: demarcation table describing roles and responsibilities among organizations, after organizational restructuring)	
2. The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.	2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed 2.2. Performance contract models for ESCO project are upgraded 2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA	2.1. Project document (the manual) 2.2. Project document (the contract models) 2.3 Project documents (records of the trainings and seminars)	
3. The ESCO pilot projects are implemented in government's buildings for development of ESCO business.	3.1. More than 50 candidate buildings are selected by MOE/SATBA 3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs. 3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA 3.4. At least, 2 ESCO pilot projects are launched 3.5. Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts) (*monthly performance data) 3.6. Performance reports including one-year	3.1. Project documents (for example: progress report of pilot projects) 3.2. Project documents (ditto) 3.3. Project documents (ditto) 3.4. Project documents (ditto) 3.5. Project documents (ditto) 3.6. Project documents	- Budget for pilot projects is secured and disbursed by MOE as planed

	performance activities are submitted by ESCOs for at least 2 pilot projects, and approved by MOE/SATBA (after JICA project period)	(completion report)	
4. Policy recommendation for the promotion of ESCO business is formulated.	4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	4.1. Project Documents (for example: policy proposal paper)	

Activities: 1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran 1-2. To support IRESCO in preparing its internal guidelines 1-3. To give advice to IRESCO on strengthening intuitional capacity 1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business. 2-1. To develop a manual to introduce ESCO project for government organization buildings. 2-2. To collect the existing contract models for ESCO project. 2-3. To develop contract models for ESCO project in building sector in Iran 2-4. To organize trainings and seminars for ESCOs and government organizations 2.5. To introduce policies, legislations and finance mechanisms for EE&C and ESCO project for building	**Inputs** **Japanese Side:** A.Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B.Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Nill **Iranian Side:** A.Ministry of Energy(MOE): Project Counterpart ・Project Director: General Director, Planning and Economics of Electricity and Energy Office (PEEEO) ・ Project Manager: Head of International cooperation of PEEEO B.SATBA: Implementation Organization	**Pre-conditions** - Subsidies for energy prices for building sector are eliminated as the Iranian government planed. - Organizational restructuring in MOE and MOP does not affect adversely implementation of the Project.

sector in Japan 3-1. To select the candidate buildings for energy audit 3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings 3-3. To support ESCOs in planning the pilot projects. 3-4. To supervise and monitor the pilot projects implemented by ESCOs 3-5. To analyse monthly performance data of pilot projects submitted by ESCOs. 4-1. To review the project activities and results including seminars, manuals, performance of pilot projects 4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran 4-3. To submit the recommendation to the last JCC meeting (during the JICA project period) 4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran. 4-5. To submit the recommendation to Iranian government for decision making.	• (Deputy of Demand Side Department*) • (ESCO Department*) **name of department, position are provisional* C.IFCO: Co-Implementation Organization D.(IRESCO: Cooperation Organization) **<u>Joint Coordinating Committee(JCC)</u>** A. Chairperson: • General Director of PEEEO B. Member of Iranian Side • MOE • Plan and Budget Organization (PBO) • Ministry of Economy and Finance (MOEF) • Ministry of Petroleum (MOP) • Ministry of Road and Urban Development (MRUD) • SATBA • IFCO • IRESCO C. Member of Japanese side • JICA Experts • Representatives from JICA Iran Office • Other personnel concerned to be assigned by request of other members D. Observer • Ministry of Foreign Affairs (MOFA) • Embassy of Japan (EoJ)	

Plan of Operation version 2: The Project on Implementation of the Pilot Project to introduce ESCO to the Government's Buildings



	Activities	Period
	Period of JICA experts working in Iran	P A
	Output 1	
1-1	To summarize the issues and consider the measures for promotion of ESCO business in Iran	P A
1-2	To support IRESCO in preparing its internal guidelines	P A
1-3	To give advice to IRESCO on strengthening intuitional capacity	P A
1-4	To clarify roles and responsibilities of the stakeholders to promote ESCO business.	P A
	Output 2	
2-1	To develop a manual to introduce ESCO project for government organization buildings.	P A
2-2	To collect the existing contract models for ESCO project.	P A
2-3	To develop contract models for ESCO project in building sector in Iran	P A
2-4	To organize trainings and seminars for ESCOs and government organizations	P A
2-5	To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan	P A
	Output 3	
3-1	To select the candidate buildings for energy audit	P A
3-2	To supervise the energy audit with work through by ESCOs at the candidate buildings	P A
3-3	To support ESCOs in planning the pilot projects.	P A
3-4	To supervise and monitor the pilot projects implemented by ESCOs	P A
3-5	To analyse monthly performance data of pilot projects submitted by ESCOs .	P A
	Output 4	
4-1	To review the project activities and results including seminars, manuals, performance of pilot projects	A
4-2	To abstract issues and identify possible measures to promote ESCO projects in Iran	P A
4-3	To submit the recommendation to the last JCC meeting (during the JICA project period)	P A
4-4	To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.	P A
4-5	To submit the recommendation to Iranian government. (after JICA project period)	P A

Iranian Counterpart personnel

	Name	Position in the Project	Organization
	M. A. Shafiezadeh	Project Director	General Director of OIPEEE, MOE* General Director of PEEEO, MOE
	A. Shirazi	Project Manger	Head of Awareness & Training, OIPEEE, MOE* Head of International Cooperation, PEEEO, MOE
	Amir Doudabi Nezhad	Project Responsible Person	Deputy of Demand Side Department, SABA (----------,-----------, SATBA)**
	Mohammad Akbari	Iraian Team Leader	Manager of ESCO Department, SABA (----------,-----------, SATBA)**
	Mahdi Hormozi	ESCO Expert	Engineer of ESCO Department, SABA (----------,-----------, SATBA)**
	Ahmad R. Tavakkoli	Energy Saving Expert of Building	Energy Conservation in Building Department, SABA (----------,-----------, SATBA)**
	Mahdi Rafiei	Coordinator / Energy Saving Expert of Industry	Energy Conservation in Industries Department, SABA (----------,-----------, SATBA)**

* The initial title and organization are in upper line. Those after organizational restructuring are stated in lower line

* The internal organizational structure in SATBA has not yet been finalized after organizational restructuring (As of December 2017)

Japanese Expert

	Name	Position in the Project	Organization
	Tsutomu MORI	Team leader/ESCO Promotion	Nippon Koei Co.,LTD
	Morio SAKAI	Energy Audit Expert (Electricity Engineer)	Nippon Koei Co.,LTD
	Hedeaki KUROKI	Energy Audit Expert (Heat Enginner)	Nippon Koei Co.,LTD

The first training in Japan (19.01.2015-24.01.2015)

	Name	Position	Organization
1	Mr. Effatnejad Reza	Deputy of General Director Electricity and Energy Affair	MOE
2	Mr. Akbari Hamid	Master expert of energy efficiency in demand sector (Building& industry)	MOE
3	Ms. Bigdeli Somayeh	Expert	MOE
4	Mr. Akbarisayar Mohammad	Manager Electricity and Energy Affair	SABA
5	Mr. Sadeghi Nourbakhsh	Manager	SABA
6	Ms. Paknejad Soodabeh	Councilor of Distributed Coordination Deputy in D.S.M	Tavanir
7	Mr. Peyman Karimifard	Manager of Power System Analysis	Tavanir
8	Mr. Assadianahmadabad Ehesan	Expert	MPO
9	Mr. Mahmoud Hafezian	General Manager	MOEF

The second training in Japan (16.04.2016-26.04.2016)

	Name	Position	Organization
1	Mr. Mohammad Shafiezadeh	General Director, Electricity and Energy Affaires	MOE
2	Mr. Rahim Azimi	Deputy of General Manager, Finane and Building	MOEF
3	Mr. Alireza Abdollah Shirazi	Manager of ESCO Project, Electricity and Energy Affaires	MOE
4	Mr. Mojtaba Gorbani	Expert of Economic Evaluation of Projects Electricity and Energy Affaires	MOE
5	Mr. Mohammad Khezeli	Expert of Projects Electricity and Energy Affaires	MOE
6	Mr. Saeed Amani	Office Manager of Energy Conservation in Building Department	SABA
7	Mr. Amir Doudabinezhad	Deputy of Education and Energy Consumption Optimization	SABA
8	Mr. Ehsan Assadian Ahmadabad	Expert of International Affairs	PBO
9	Ms. Maryam Namjoobaghini	Manager Energy consumption management	GT EPDC
10	Mr. Tooraj Bathaie	Managing Director	Pishrun Energy Co.
11	Mr. Alimohmmad Mirshams	Managing Director	ASIA WATT Eng. Co.

Schedule of Joint Terminal Evaluation Study

			AM	PM	Remarks
1	13/1/2018	Sat	Data analysis	Kick off team meeging at JICA office, interview IRESCO	
2	14/1/2018	Sun	Kick off team meeging with stakeholders at MOE	Interview SATBA (at MOE) Interview MOE	PBO joined
3	15/1/2018	Mon	Meeting with MOE (PDM revision)	Data analysis JICA office	
4	16/1/2018	Tue	Meeting with MOE (PDM revision)	Interview SATBA/ESCOs	PBO joined at SATBA
5	17/1/2018	Wed	Data collection at SATBA	Meeting with BCRC	
6	18/1/2018	Thu	Data analysis	Data analysis	
7	19/1/2018	Fri	Report writing	Report writing	
8	20/1/2018	Sat	TEDC pilot site	Meeting with IFCO	PBO joined at TEDC
9	21/1/2018	Sun	MOEF pilot site	Report writing	PBO joined at MOEF
10	22/1/2018	Mon	Report writing	Meeting with MOE & data collection	
11	23/1/2018	Tue	(Report at JCC)	(Report writing)	

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 13, 2018 time: 14:00-17:00, Venue: IRESCO

#	Name	Position	Organization
1	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
2	Amir Jamali Moghaddam	Member of Board	Asia Watt Eng.Co.
3	Ali Mohammad Mirshams	Managing Director	Asia Watt Eng.Co.
4	Tooraj Bathaei	Managing Director	Pishrun Energy Co.
5	Gholamali Najafi	Chief of Board	IRESCO
6	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
7	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
8	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
9	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 14, 2018 time: 9:00-11:00, Venue: MOE

#	Name	Position	Organization
1	Hamed Houri Jafari	Energy Manager	IFCO
2	Alireza Moradi	Energy Expert Engineer	IFCO
3	Anahita Karimi	Energy Expert Engineer	TEDC
4	Shahab Alborzi	Energy Expert Engineer	TEDC
5	Mahdi Hosseini	Energy Expert	PBO
6	Alimohammad Mirshams	Managing Director	Asia Watt Eng.Co.
7	Kamran Nazari Radsani	Head of Installation Dep.	MOEF
8	Rahim Azimi	Installation Manager	MOEF
9	Mehdi Rafiei	Expert	SATBA
10	Mohammad Akbari	Head of Industrial Management	SATBA
11	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
12	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
13	Dr. Kari Behrouz	Head of Energy Dept.	BHRC
14	Tooraj Bathaei	Managing Director	Pishrun Energy
15	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
16	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
17	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
18	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
19	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 14, 2018 time: 12:00-13:00, Venue: MOE

#	Name	Position	Organization
1	Mohammad Akbari	Head of Industrial Management	SATBA
2	Mehdi Rafiei	Expert	SATBA
3	Hiroshi OGAWA	Presentative Partner	Haruno ESWorks LLC
4	Behzad Yagmaie	Translator	AJTC

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 14, 2018 time: 14:00-15:00, Venue: MOE

#	Name	Position	Organization
1	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
4	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
5	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 15, 2018 time: 9:00-11:00 Venue: MOE

#	Name	Position	Organization
1	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
4	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
5	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
6	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
7	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 16, 2018 time: 9:00-11:00 Venue: MOE

#	Name	Position	Organization
1	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
4	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
5	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
6	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
7	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 16, 2018 time: 14:00-15:30 Venue: SATBA

#	Name	Position	Organization
1	Ali Mohammad Mirshams	Managing Director	Asia Watt Eng.Co.
2	Tooraj Bathaei	Managing Director	Pishrun Energy Co.
3	Maryam Shekari	M&V monitoring manager	Pishrun Energy Co.
4	Mehdi Rafiei	Expert	SATBA
5	Mohammad Akbari	Head of Industrial Management	SATBA
6	Mahdi Hosseini	Energy Expert	PBO
7	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
8	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
9	Behzad Yagmaie	Translator	AJTC

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 17, 2018 time: 10:00-12:00 Venue: SATBA

#	Name	Position	Organization
1	Mohammad Akbari	Head of Industrial Management	SATBA
2	Mehdi Rafiei	Expert	SATBA
3	Hiroshi OGAWA	Presentative Partner	Haruno ESWorks LLC
4	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
5	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 17, 2018 time: 14:00-14:40 Venue: BHRC

#	Name	Position	Organization
1	Dr. Kari Behrouz	Head of Energy Dept.	BHRC
2	Mahdieh Abravesh	expert	BHRC
3	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
4	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
5	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 20, 2018 time: 9:00-12:00 Venue: TEDC

#	Name	Position	Organization
1	Tooraj Bathaei	Managing Director	Pishrun Energy Co.
2	Maryam Shekari	M&V monitoring manager	Pishrun Energy Co.
3	Meysam Parvarese	Mechanical engineer	Pishrun Energy Co.
4	Amir Navidi	Engineer	TEDC
5	Benhoor Sahari	Master of DSM	TEDC
6	Ensieh Rostami	Master of DSM	TEDC
7	Anahita Karimi	Energy Expert Engineer	TEDC
8	Hosjatollah Pouyafar	Maneger of HC	TEDC
9	Shahab Alborzi	Energy Expert Engineer	TEDC
10	Masoud Azizi	Depty of Customer service	TEDC
11	A.A. Yaghooti	Deputy director of engineering	TEDC
12	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
13	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
14	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
15	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 20, 2018 time: 14:00-15:00 Venue: IFCO

#	Name	Position	Organization
1	Mohsen Mohammadi	Planning head	IFCO
2	Hamed HourinJafari	Energy manager	IFCO
3	M.R.Khattati	Director, Industrial section	IFCO
4	Mortteza Golzadeh	Assistant of vice president	IFCO
5	Alireza Moradi	Expert energy engineer	IFCO
6	Mohammad.Mirzaei	Manager deputy of Energy Conservation in building sector	IFCO
7	Youssefi Passandy	Consultor	IFCO
8	Aghil barati	Senior Expert, R&D	IFCO
9	M.R.Eslamii	Senior Expert, building	IFCO
10	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
11	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
12	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 21, 2018 time: 9:30-11:45 Venue: MOEF

#	Name	Position	Organization
1	Ali Mohammad Mirshams	Managing Director	Asia Watt Eng.Co.
2	Pooria Orouji	R&D manager	Asia Watt Eng.Co.
3	S.M.Hosseini	Mechanical Engineer	MOEF
4	Vahid Tahmuseri	Engineer	MOEF
5	Salmani Zabiholah	Director general, personnel service & supporting	MOEF
6	Rahim Azimi	Installation Manager	MOEF
7	Kamran Nazari Radsani	Head of Installation Dep.	MOEF
8	Mahdi Hosseini	Energy Expert	PBO
9	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
10	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
11	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
12	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
13	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 22, 2018 time: 15:30- 18:00 Venue: MOE

#	Name	Position	Organization
1	M.A. Shafiezadeh	General Director PEEEO	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
4	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
5	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
6	Morio SAKAI	ESCO Project Expert	Nippon Koei Co.,LTD
7	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
8	Behzad Yagmaie	ESCO Project Assistant	AJTC

Agenda of 4th Joint Coordinating Committee

Date: January 23, 2018 (1396/ 11 / 3) at 10:00 AM
Venue: 13th Floor Conference room, Ministry of Energy

1. Opening speech from Iran side (10:00 to 10:05)
    Director General of PEEEO, Ministry of Energy
    ESCO Project Director,
2. Opening speech from Japan side (10:05 to 10:10)
    Japan International Cooperation Agency (JICA) Iran Office
    Representative, Iran office, JICA will participate.
3. Progress of the Project (10:10 to 10:15)
    Ministry of Energy
    ESCO Project Manager,
4. Implementation of the Pilot Project (10:15 to 10:25)
    SATBA
5. Progress of the ESCO Pilot Project on the Tehran Electric Distribution Company (10:25 to 10:35)
    Pishrun Energy
6. Progress of the ESCO Pilot Project on the Ministry of Economic Affairs and Finance (10:35 to 10:45)
    ASIA WATT
7. Finding of issues of the Project (10:45 to 10:55)
    JICA project team
8. Evaluation of the Project (10:55 to 11:15)
    JICA evaluation team
9. Comment (Q&A) from participants (11:15 to 11:25)

4 th JCC

Time and Date: 10:00AM-11:05 AM, 23 January 2018 03 Bahman 1396 in Persian calender

Venue: Meeting room on 13th floor, MOE

List of Participants

#	Name	Organization	Position
1	Mohammad Ali Shafizadeh	MOE	Direcotor General, PEEEO
2	Alireza Shirazi	MOE	Head of International Cooperation, PEEEO
3	Kambiz Rezapour	MOE	Director of Planning and Monitoring Division
4	Mohammad Akbari Sayyar	SATBA	Head of Industrial Management
5	Mehdi Rafiei	SATBA	Expert
6	Tooraj Bathaie	Pishrun Energy Co.	Chairman
7	Alimohammad Mirshams	Asia Watt Eng.Co.	Managing Director
8	Seyed Mahdi Hosseini	PBO	Expert of Energy Department
9	Kamran Nazari	MOEF	Head of Installation Dep.
10	Yukiharu Kobayashi	JICA Iran Office	Chief Representative
11	Yoshiko Yamanaka	JICA Iran Office	Project Formulation Advisor
12	Vahid Kheirolomour	JICA Iran Office	Senior Program Officer
13	Tsutomu Mori	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Leader
14	Morio Sakai	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Expert
15	Behzad Yaghmaie	JICA ESCO Project team	Assistant of JICA ESCO Project Team
16	Saeidreza Ettehadi	JICA ESCO Project team	Interpreter of JICA ESCO Project Team
17	Hiroshi Ogawa	JICA Evaluation Mission (Haruno ESWorks LLC)	Evaluator (Representative partner)

Agenda of 5th Joint Coordinating Committee

Date: Tuesday, 10 July 2018

Venue: 13th Floor Conference Room, Ministry of Energy

10:00 – 10:05	Opening Speech from Iranian side (Mr. M. Shafiezadeh, General Director, Ministry of Energy)
10:05 – 10:10	Opening Speech from Japanese side (Mr. Y. Kobayashi, Chief Representative, JICA)
10:10 – 10:30	Progress and achievement of the project (representative, SATBA) *Issue and countermeasure through experience of pilot project*
10:30 – 10:45	Opinion from ESCO company side against entire project (Representative, IRESCO)
10:45 – 11:05	Achievement of PDM and promotion for ESCO business by Government of Iran in the future (representative, MoE) *Policy, target, schedule, responsibility for ESCO promotion*
11:05 – 11:20	Role of promotion for ESCO business (Representative, PBO) *Financial support, standard contract document, mitigation of restriction on government body*
11:20 – 11:35	Recommendation from Japan experience (Mr. T. Mori, JICA Expert Team)
11:35 – 11:45	Wrap up of project (Mr. M. Shafiezadeh, General Director, Ministry of Energy)

5th JCC

Time and Date: 10:00AM-12:00AM, 10 July 2018

Venue: Meeting room on 13th floor, MOE

List of Participants

#	Name	Organization	Position
1	Mohammad Ali Shafizadeh	MOE	Direcotor General, PEEEO
2	Alireza Shirazi	MOE	Head of International Cooperation, PEEEO
3	Kambiz Rezapour	MOE	Director of Planning and Monitoring Division
4	Mohammad Akbari Sayyar	SATBA	Head of Industrial Management
5	Gholamali NAJAFI	IRESCO	Chairman of the board
6	Tooraj Bathaie	Pishrun Energy Co.	Chairman
7	Alimohammad Mirshams	Asia Watt Eng.Co.	Managing Director
8	Seyed Mahdi Hosseini	PBO	Expert of Energy Department
9	Ehsan Assadian Ahmadabad	PBO	Expert of International Affairs
10	Yukiharu Kobayashi	JICA Iran Office	Chief Representative
11	Yoshiko Yamanaka	JICA Iran Office	Project Formulation Advisor
12	Vahid Kheirolomour	JICA Iran Office	Senior Program Officer
13	Tsutomu Mori	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Leader
14	Morio Sakai	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Expert
15	Kuroki Hideaki	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Expert
16	Behzad Yaghmaie	JICA ESCO Project team	Assistant of JICA ESCO Project Team
17	Saeidreza Ettehadi	JICA ESCO Project Team	Interpreter of JICA ESCO Project Team

MINUTES OF MEETINGS

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

MINISTRY OF ENERGY

ON

5th JOINT COORDINATION COMMITTEE

FOR

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS TO INTRODUCE ESCO FOR GOVERNMENT'S BUILDINGS IN THE ISLAMIC REPUBLIC OF IRAN

"The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings in the Islamic Republic of Iran" (hereinafter referred to as "the Project"), which has been implemented under the collaboration between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Government of Iran, has conducted the 5th and the final Joint Coordination Committee (hereinafter referred to as "JCC") on 10th July, 2018 in Tehran. The purpose of JCC is to review final achievement throughout the Project, and to discuss necessary future actions for sustainable expansion of ESCO service in Iran.

As a result of the discussion, the both sides agreed on the matters referred to the document annexed hereto.

Tehran, 2018

Mr. Yukiharu KOBAYASHI Chief Representative Iran Office Japan International Cooperation Agency	**Mr. M. A. SHAFIEZADEH** General Director of RSEEO Ministry of ENERGY The Islamic Republic of Iran

Mr. Tsutomu MORI
Leader of JICA project team
Nippon Koei Co. Ltd.

ANNEX

1. Request form Japan Side

JICA and JICA experts strongly requested Iran side as follows. MOE agreed to them.

- To carry out all of task remained as per agreement on fourth (4th) JCC
- To monitor two pilot projects at least one year after termination of the Project
- To support ESCOs and building owners for solving problems in two pilot projects respectively
- To report progress and situation of the two of pilot projects to JICA periodically
- To share information to stakeholders of the Project, e.g. IFCO, MOEAF

2. Confirmation of Achievement of the Project

(1) Overall Goal of the Project

MOE and JICA confirmed that "Objectively Verifiable Indicators" at Overall Goal level is set as follows.

- ESCO for government buildings will be officially introduced from 2020.
- Building where is implemented ESCO will be reduced energy consumption at least 10%.

(2) Follow up of Terminal Evaluation

The terminal evaluation was conducted upon both JICA and Iranian side in January 2018. The evaluation report show in Attachment 5 pointed out remained tasks to be carried out for the completion of the Project and achievement of the Project Purpose as follows;

1) Verification of performance of the pilot projects (in Output 3)

   This is the most important task to be carried out by Iranian organizations after termination of the Project. MOE and SATBA should monitor the pilot projects continuously at least one year. ESCOs should report the performance of the pilot project to building owner, MOE and SATBA on regular basis. MOE and SATBA should analyze and evaluate the report, and share with stakeholders of the Projects.

2) Clarification of roles and responsibilities of the related organizations for promotion of ESCO projects (in Output 1)

   Roles and responsibilities of the related organizations for promotion of ESCO projects has not been clarified. Overall structure for promotion of ESCO business is under consideration. MOE recognized necessity of involvement of PBO as legal institution coordinator though the Project. MOE, SATBA and PBO will discuss with other related organizations in Energy Council and take necessary measures based on the decision of Council.

3) Formulation of recommendation by the Project (in Output 4)

   Stakeholders of the Project shared issues and proposed recommendation found through the Project at third (3rd) Work Shop and fifth (5th) JCC. MOE and SATBA will formulate institution for

ESCO promotion based on the recommendation mentioned below 6.

4) Setting Objectively Verifiable Indicators at Overall Goal level in the PDM version 2.
MOE set the objectively verifiable Indicators" at Overall Goal level. Stakeholders of the Project confirmed the indicators and approved the revised PDM as version 3.

3. Actions to be Implemented by MOE after Termination of the Project

MOE and JICA confirmed the achievement of the Project and remained task to be implemented after the Project termination as Attachment 6. MOE agreed that MOE and SATBA would carry out monitoring after termination of the Project to ensure that all the activities shall be completed, and report to JICA and share with related organizations.

4. Confirmation of the Implementation Structure after Termination of the Project

MOE and JICA confirmed that MOE, SATBA and PBO are all responsible to manage, execute all activities of promotion of ESCO project. MOE, SATBA and PBO will discuss with other related organizations in Energy Council.

5. Barrier to implementing ESCO Project in Iran

Some barriers for implementation of ESCO project in Iran were found through the process of ESCO pilot projects as follows.

(1) Procedure to ESCO contract signing

The pilot projects had taken a long time since submitting the proposal to signing of ESCO. The reasons for taking time were as follows.

- ESCO companies were required to explain the ESCO business, their ESCO proposal and ESCO contract to staffs of several sections in the client building. The staffs had poor understanding about ESCO and the key person had been moved during the contract negotiation period.
- In general, service contracts between ESCO and governmental bodied must use standard contract authorized by PBO. While the model contract for the pilot projects has been prepared by SATBA and IRESCO in the first stage of the Project, it has not authorized by PBO.

(2) Restriction on contract amount limit

In the pilot project, ESCO companies were selected under the negotiated contract, not open bidding procedure. In the case of the pilot project conducted in MOEAF building, the ESCO contract had to be divided into two contracts due to the issue of the restriction on contract amount limitation according to the regulation on the negotiated contract.

(3) Verification of ESCO performance

ESCO company is obliged to measure the amount of energy saving reduced by ESCO and periodically report it. Also, since its energy saving is guaranteed by ESCO company, it is necessary to verify the amount of energy saving. In the case of MOEAF building, they ask the third-party consultant to verify the report of ESCO company. Meanwhile, the distribution company building does not ask a third-party consultant, and it is doing its own verification. Therefore, it takes time to verify. The ESCO company has not received payment of the ESCO service fee yet. If building owner cannot accept the result performed by ESCO company, it is required that a third-party judgement.

Measure and verification (M&V) protocol for ESCO is very important to implement ESCO. Regarding the problem of verification of ESCO performance in the case of the distribution company building, JICA experts made discussion with IRESCO and ESCO company on the problem of M&V during this site survey. At that time, JICA experts provided the examples of M&V in Japan that responded to similar problems and advised the countermeasures for the problems of M&V of the pilot projects. JICA experts have advised IRESCO to propose the M&V protocol suitable for Iran ESCO to SATBA based on the discussion.

6. Recommendation for Further Promotion of ESCO Project in Iran

Recommendation for further promotion of ESCO project in Iran is presented by the presentation of MOE, PBO, IRESCO and JICA experts as follows.

(1) Recommendation from Iran side

- The government should establish a mechanism to evaluate and certify the ESCO company.
- PBO should approve ESCO model contract.
  PBO has already formed a working group with all Iranian stakeholders such as MOE, PBO, MOP, SATBA, IFCO, IRESCO and relevant organizations to review all existing contracts including the contract that has been prepared in ESCO project, in order to be provided a unique contract for approval.
- PBO should establish ESCO fund for finance support to ESCO.
- SATBA should conduct awareness of ESCO scheme to related organizations.
- The government should support IRESCO.
- A working group for promotion ESCO should be established in the government.
- IRESCO has an intention to implement a joint ESCO project with JAESCO.
- MOE would like to request additional technical cooperation project from JICA for continuous support.

(2) Recommendation from Japan side

- Awareness of ESCO scheme for government and government's building owner
- Authorization by a legal institution for ESCO scheme
- Study of ESCO potential of Government's buildings
- Provision of financial support to ESCO

Detail of recommendation is described in attachment 4.

END

Attachment 1: Agenda of 5th Joint Coordinating Committee
Attachment 2: List of Participants (5th Joint Coordination Committee)
Attachment 3: PDM version 3
Attachment 4: Recommendation for Further Promotion of ESCO Project in Iran by JICA experts
Attachment 5: Terminal Evaluation Report
Attachment 6: Confirmation of Achievement of PDM

Attachment 1

Agenda of 5th Joint Coordinating Committee

Date: Tuesday, 10 July 2018

Venue: 13th Floor Conference Room, Ministry of Energy

10:00 – 10:05	Opening Speech from Iranian side (Mr. M. Shafiezadeh, General Director, Ministry of Energy)
10:05 – 10:10	Opening Speech from Japanese side (Mr. Y. Kobayashi, Chief Representative, JICA)
10:10 – 10:30	Progress and achievement of the project (representative, SATBA) *Issue and countermeasure through experience of pilot project*
10:30 – 10:45	Opinion from ESCO company side against entire project (Representative, IRESCO)
10:45 – 11:05	Achievement of PDM and promotion for ESCO business by Government of Iran in the future (representative, MoE) *Policy, target, schedule, responsibility for ESCO promotion*
11:05 – 11:20	Role of promotion for ESCO business (Representative, PBO) *Financial support, standard contract document, mitigation of restriction on government body*
11:20 – 11:35	Recommendation from Japan experience (Mr. T. Mori, JICA Expert Team)
11:35 – 11:45	Wrap up of project (Mr. M. Shafiezadeh, General Director, Ministry of Energy)

5th JCC

Time and Date: 10:00AM-12:00AM, 10 July 2018
Venue: Meeting room on 13th floor, MOE

List of Participants

#	Name	Organization	Position
1	Mohammad Ali Shafizadeh	MOE	Direcotor General, PEEEO
2	Alireza Shirazi	MOE	Head of International Cooperation, PEEEO
3	Kambiz Rezapour	MOE	Director of Planning and Monitoring Division
4	Mohammad Akbari Sayyar	SATBA	Head of Industrial Management
5	Gholamali NAJAFI	IRESCO	Chairman of the board
6	Tooraj Bathaie	Pishrun Energy Co.	Chairman
7	Alimohammad Mirshams	Asia Watt Eng.Co.	Managing Director
8	Seyed Mahdi Hosseini	PBO	Expert of Energy Department
9	Ehsan Assadian Ahmadabad	PBO	Expert of International Affairs
10	Yukiharu Kobayashi	JICA Iran Office	Chief Representative
11	Yoshiko Yamanaka	JICA Iran Office	Project Formulation Advisor
12	Vahid Kheirolomour	JICA Iran Office	Senior Program Officer
13	Tsutomu Mori	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Leader
14	Morio Sakai	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Expert
15	Kuroki Hideaki	JICA ESCO Project team (Nippon Koei. Co.,LTD)	ESCO Project Expert
16	Behzad Yaghmaie	JICA ESCO Project team	Assistant of JICA ESCO Project Team
17	Saeidreza Ettehadi	JICA ESCO Project Team	Interpreter of JICA ESCO Project Team

Attachment-3

Project Title: The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings
Implementing Agency: Ministry of Energy (MOE), Iran Renewable Energy and Energy Efficiency Organization (SATBA),
Iranian Fuel Conservation Organization (IFCO)
Target Group: Staff of MOE, SATBA, and IFCO, and Members of Iran ESCO Association (IRESCO)
Project Site: The Islamic Republic of Iran
Project Period: January 25, 2014-July 24, 2018 (54 months: JICA project period)

Version 3
July 10, 2018

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	ESCO for government buildings will be officially introduced from 2020. Building where is implemented ESCO will be reduced energy consumption at least 10%.	Implementation of ESCO for Government building Evaluate of performance of ESCO	Policies on EE&C for the building sector are maintained. Authorization by a legal institution for ESCO Scheme.
Project Purpose: The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve ESCO business.	Project completion report including the verification report of the pilot project. (by MOE/SATBA)	Recommendation formulated by the Project is reflected in energy policies and budget allocation.
Outputs: 1. An institutional framework to promote ESCO business in Iran is strengthened.	1.1. Regulations and guidelines in the IRESCO are upgraded. 1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.	1.1. Project documents (Regulations and guidelines) 1.2. Project documents (*for example: demarcation table describing roles and responsibilities among organizations, after organizational restructuring)	
2. The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened..	2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed 2.2. Performance contract models for ESCO project are upgraded 2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA	2.1. Project document (the manual) 2.2. Project document (the contract models) 2.3 Project documents (records of the trainings and seminars)	
3. The ESCO pilot projects are implemented in government's buildings for development of ESCO business..	3.1. More than 50 candidate buildings are selected by MOE/SATBA 3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs. 3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA 3.4. At least, 2 ESCO pilot projects are launched 3.5. Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts) (*monthly performance data) 3.6. Performance reports including one-year performance activities are submitted by ESCOs for at least 2 pilot projects, and approved by MOE/SATBA (after JICA project period)	3.1. Project documents (for example: progress report of pilot projects) 3.2. Project documents (ditto) 3.3. Project documents (ditto) 3.4. Project documents (ditto) 3.5. Project documents (ditto) 3.6. Project documents (completion report)	Budget for pilot projects is secured and disbursed by MOE as planed
4. Policy recommendation for the promotion of ESCO business is formulated.	4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	4.1. Project Documents (for example: policy proposal paper)	

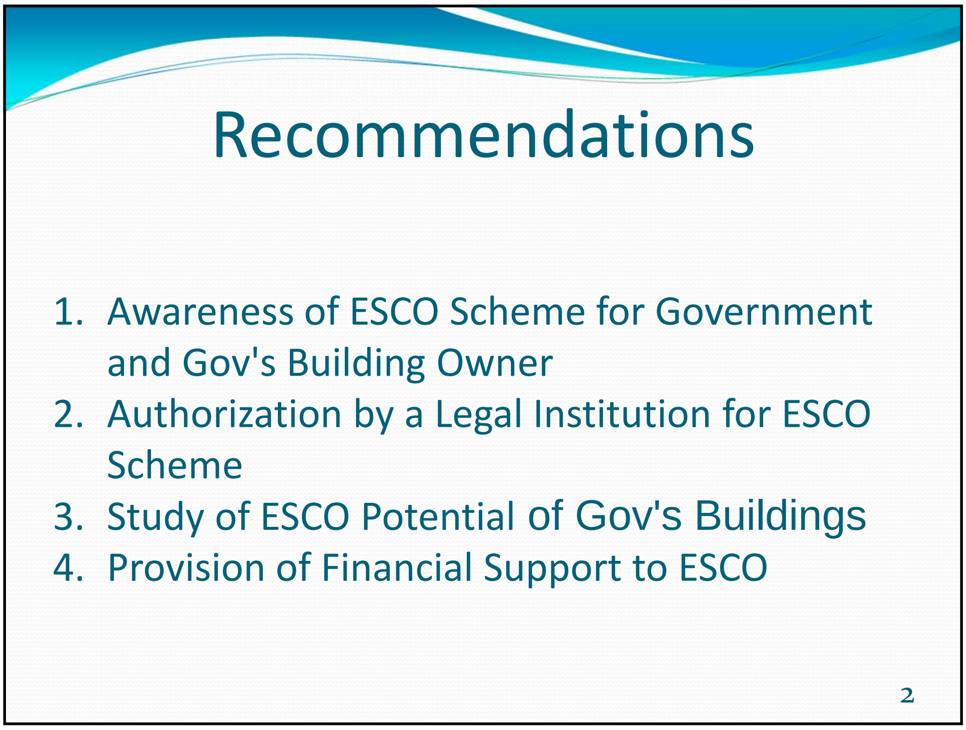
Activities:	**Inputs (Means and Cost)**	**Pre-conditions**
1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran 1-2. To support IRESCO in preparing its internal guidelines 1-3. To give advice to IRESCO on strengthening intuitional capacity 1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business. 2-1. To develop a manual to introduce ESCO project for government organization buildings. 2-2. To collect the existing contract models for ESCO project. 2-3. To develop contract models for ESCO project in building sector in Iran 2-4. To organize trainings and seminars for ESCOs and government organizations 2.5. To introduce policies, legislations and finance mechanisms for EE&C and ESCO project for building sector in Japan 3-1. To select the candidate buildings for energy audit 3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings 3-3. To support ESCOs in planning the pilot projects. 3-4. To supervise and monitor the pilot projects implemented by ESCOs 3-5. To analyse monthly performance data of pilot projects submitted by ESCOs. 4-1. To review the project activities and results including seminars, manuals, performance of pilot projects 4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran 4-3. To submit the recommendation to the last JCC meeting (during the JICA project period) 4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran. 4-5. To submit the recommendation to Iranian government for decision making.	**The Japanese Side** A. Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B. Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Nill **The Iranian Side:** A. Ministry of Energy: Project Counterpart ・ Project Director: General Director, General Director, Planning and Economics of Electricity and Energy Office (PEEEO) ・ Project Manager: Head of International cooperation of PEEEO B. SATBA: Implementation Organization ・ (Deputy of Demand Side Department*) ・ (ESCO Department*) *name of department, position are provisional C. IFCO: Co-Implementation Organization D. (IRESCO: Cooperation Organization) **Joint Coordinating Committee(JCC)** A. Chairperson: ・ General Director of PEEEO B. Member of Iranian Side ・ MOE ・ Plan and Budget Organization (PBO) ・ Ministry of Economy and Finance (MOEF) ・ Ministry of Petrol (MOP) ・ Ministry of Road and Urban Development (MRUD) ・ SATBA ・ IFCO ・ IRESCO C. Member of Japanese side ・ JICA Experts ・ Representatives from JICA Iran Office ・ Other personnel concerned to be assigned by request of other members D. Observer ・ Ministry of Foreign Affairs (MOFA) ・ Embassy of Japan (EoJ)	

Attachment 4

The Project on Implementation of Pilot Projects to Introduce ESCO for Government’s Buildings In the Islamic Republic of Iran

Recommendation for Further Promotion of ESCO Project in Iran

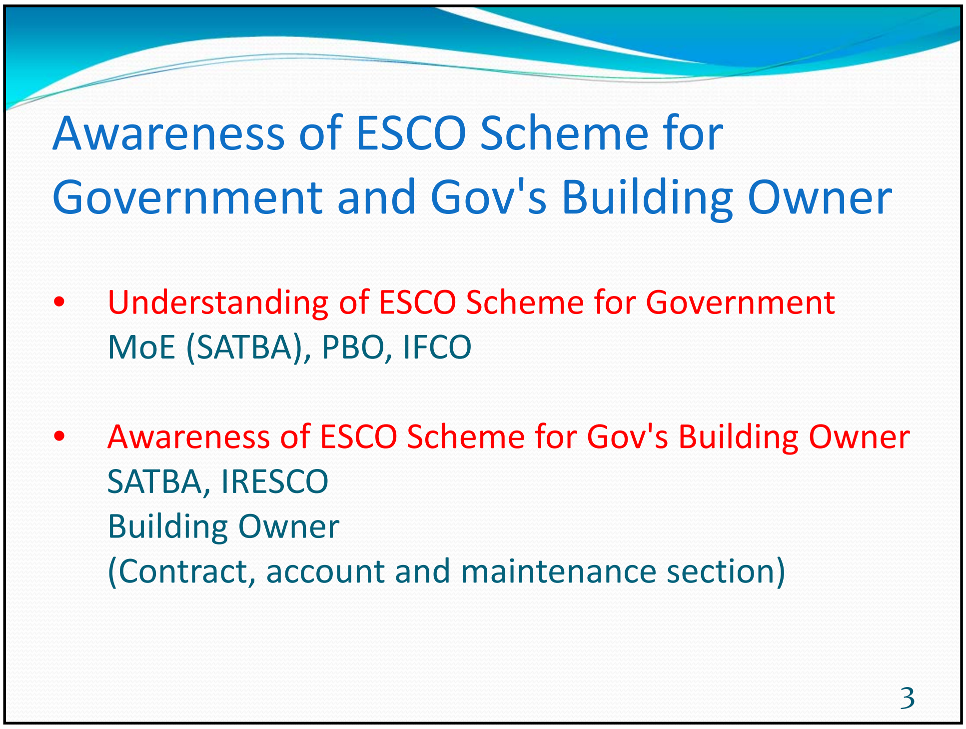
July 10, 2014
JICA Project Team



Recommendations

1. Awareness of ESCO Scheme for Government and Gov's Building Owner
2. Authorization by a Legal Institution for ESCO Scheme
3. Study of ESCO Potential of Gov's Buildings
4. Provision of Financial Support to ESCO

Attachment 4



Awareness of ESCO Scheme for Government and Gov's Building Owner

- Understanding of ESCO Scheme for Government
  MoE (SATBA), PBO, IFCO

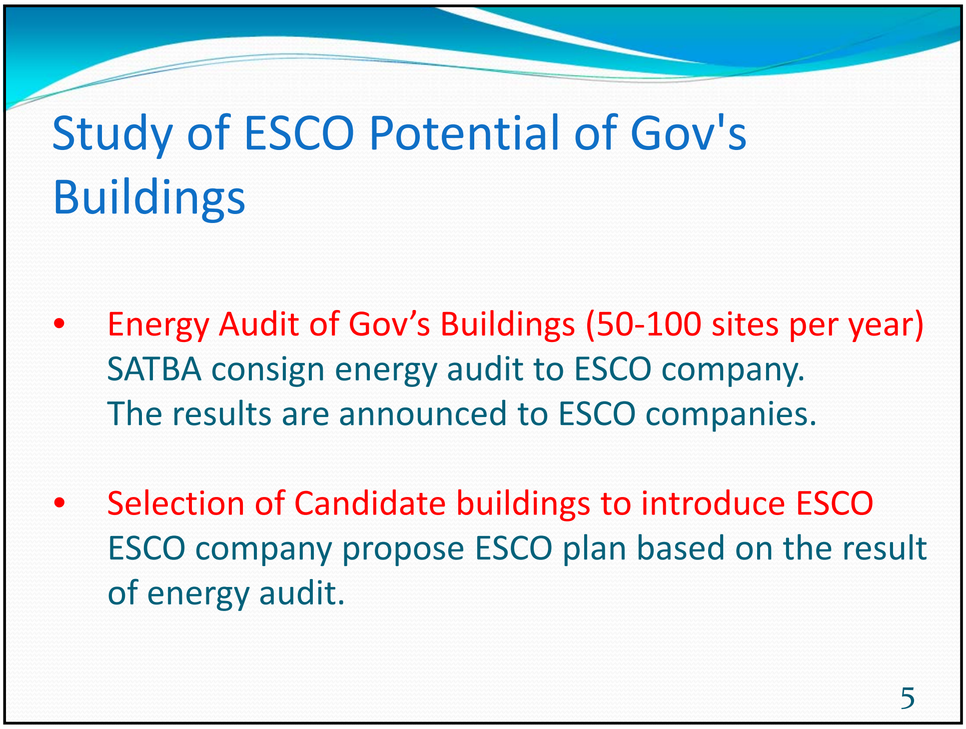
- Awareness of ESCO Scheme for Gov's Building Owner
  SATBA, IRESCO
  Building Owner
  (Contract, account and maintenance section)

Authorization by a Legal Institution for ESCO Scheme

- Authorization of Model Contract for ESCO by PBO
  The model contract has been published on the website of SATBA.

- Change of Contract Procedure of ESCO
  Tendering system
  Restricted contract price
  Long term contract

Attachment 4



Study of ESCO Potential of Gov's Buildings

- Energy Audit of Gov's Buildings (50-100 sites per year)
  SATBA consign energy audit to ESCO company.
  The results are announced to ESCO companies.

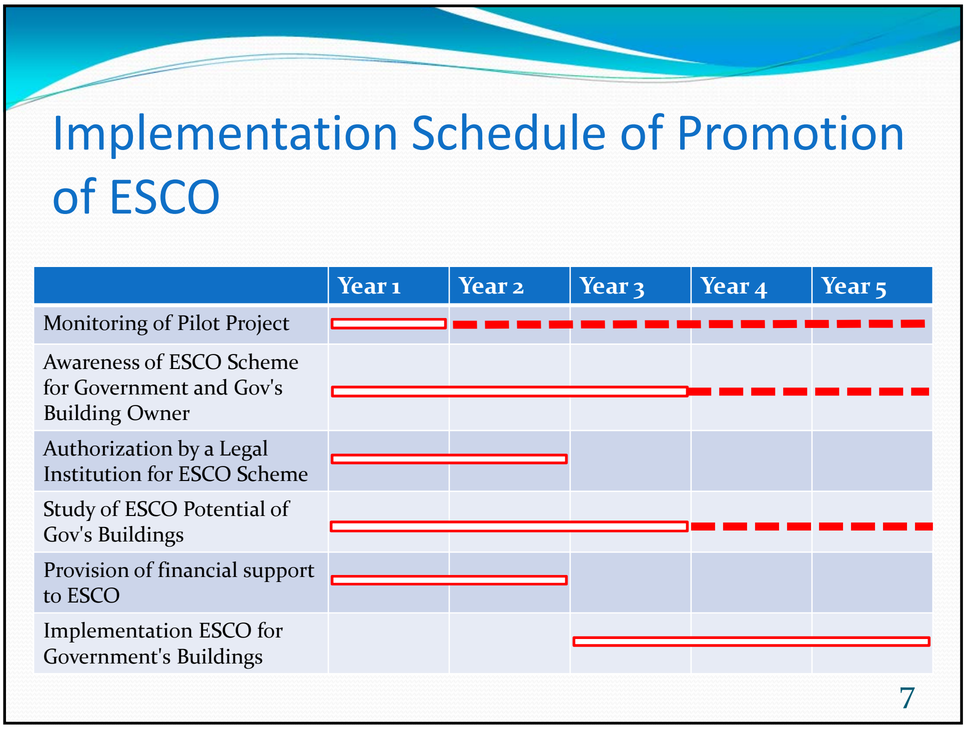
- Selection of Candidate buildings to introduce ESCO
  ESCO company propose ESCO plan based on the result of energy audit.

Provision of Financial Support to ESCO

- Effective Use of Reformed Subsidy to Energy Price
  Investment to energy efficiency and conservation (EE&C) in Iran
  - Promotion of ESCO

- Provision of financial support to ESCO
  Establishment of ESCO fund (low interest loan)
  Subsidy to ESCO project (no-repayment)
  Reimbursement of interest to ESCO company

Attachment 4



Implementation Schedule of Promotion of ESCO

	Year 1	Year 2	Year 3	Year 4	Year 5
Monitoring of Pilot Project	▭	╍	╍	╍	╍
Awareness of ESCO Scheme for Government and Gov's Building Owner	▭	▭	▭	╍	╍
Authorization by a Legal Institution for ESCO Scheme	▭	▭			
Study of ESCO Potential of Gov's Buildings	▭	▭	▭	╍	╍
Provision of financial support to ESCO	▭	▭			
Implementation ESCO for Government's Buildings			▭	▭	▭

Attachment 5

JOINT TERMINAL EVALUATION REPORT

FOR

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS TO INTRODUCE ESCO FOR GOVERNMENT'S BUILDINGS IN ISLAMIC REPUBLIC OF IRAN

Ministry of Energy

and

Japan International Cooperation Agency

Tehran

Islamic Republic of Iran

23rd January 2018

小林雪治

Mr. Yukiharu KOBAYASHI
Leader of the Japanese Evaluation Team
Chief Representative,
JICA Iran Office

Mr. Mohammad Ali Shafizadeh,
General Director,
Planning and Economics of Electricity and Energy Office, Ministry of Energy,
The Islamic Republic of Iran

CONTENTS

Abbreviation

BHRC	Building and Housing Research Centre
C/P	Counterpart personnel
EE&C	Energy Efficiency and Conservation
ESCO	Energy Service Company
IFCO	Iran Fuel Conservation Company
IRR	Iranian Rial
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
kWh	Kilowatt hour
MM	Man Month
M/M	Minutes of Meeting
MOE	Ministry of Energy
MOEF	Ministry of Economy and Finance
MOP	Ministry of Petroleum
MPO	Management Planning Organization
MRUD	Ministry of Road and Urban Development
M&V	Measurement and Verification
NRI	Niroo Research Institute
OIPEEE	Office for the Improvement of Productivity and Economy of Electricity and Energy
OVI	Objectively Verifiable Indicator
PEEEO	Planning and Economics of Electricity and Energy Office (formerly OIPEEE)
PDM	Project Design Matrix
PO	Plan of Operation
PBO	Plan and Budget Organization (formerly MPO)
R/D	Record of Discussion
SABA	Iran Energy Efficiency Organization
SATBA	Iran Renewable Energy and Energy Efficiency Organization (formerly SABA)
SUNA	Iran Renewable Energy Organization

Attachment 5

1. Introduction

1-1. Background of the Project

The Islamic Republic of Iran (hereafter referred to as the "Iran") is one of the world's most eminent oil-producing countries, producing four million barrels per day, which accounts for 10.9 percent of oil deposits in the entire world. However, general energy consumption occupies 44 percent of general energy supply in Iran. Efficient utilization of energy is becoming the key issue in terms of securing the volume of oil for export that brings economic growth to the country. The proportion of the energy consumption in residential sector is the largest, 33 percent, which is followed by 24 percent in transportation sector, 24 percent in industrial sector and eight percent in commercial sector. As the energy consumption in building sub-sector under residential and commercial sector has been increasing and reaches 40 percent of the total energy supply in Iran, Energy Efficiency and Conservation (hereafter referred to as "EE&C") in building sub-sector is now the most urgent issue tackled by Ministry of Energy.

JICA implemented Technical Cooperation Project: "Development study for institutional development on energy management sector in the Islamic Republic of Iran" (May 2010 – November 2011). That project developed the road map and the action plan for promotion of EE&C in building sub-sector, and concluded that the utilization ESCO could be feasible measure. Iran government strengthens EE&C promotion by setting series of laws and regulations such as Subsidy Rationalization Law (December 2011), Energy Consumption Pattern Reform Law (March 2011). Ministry of Energy, then, requested Japanese government for implementation of Technical Cooperation Project aiming capacity development for promotion of ESCO projects in government's buildings, and the record of discussion to launch the project was exchanged between JICA and Ministry of Energy in October 2013.

The project started at January 2014, and 3 Japanese experts have been dispatched to work together with Iranian counterpart personnel (hereafter referred to as "C/P") in order to assist the Iranian ESCO association, organize trainings and seminars for stakeholders in EE&C for building sector, implement ESCO pilot projects, and formulate policy recommendations for promotion of ESCO projects in Iran.

1-2. Objectives of the Terminal Evaluation

The Objectives of the Terminal Evaluation were as follows:

(1) To review the achievements and the implementation process of the Project, according to the Project Design Matrix (hereafter referred to as "PDM") and the Plan of Operation (hereafter referred to as "PO",

(2) To evaluate the overall performance of the Project according to the five evaluation criteria (Relevance, Effectiveness, Efficiency, Impacts and Sustainability),

(3) To provide/consider recommendation to the Project regarding the implementation plan and issues for the remaining project period, and

(4) To draw lessons learned from the Project to the similar type of project implemented in future.

1-3. Members of the Evaluation Team

1-3-1. Japanese side

Name	Designation	Title
Mr. Yukiharu KOBAYASHI	Leader	Chief Representative, JICA Iran office
Ms. Yoshiko YAMANAKA	Member (Evaluation Planning)	Project Formulation Advisor, JICA Iran office
Mr. Vahid Kheirolomour	Member (Evaluation Coordination)	Senior Program Officer, JICA Iran office
Mr. Hiroshi OGAWA	Member (Evaluation Analysis/EE&C)	Representative Partner, Haruno ESWorks LLC

1-3-2. Iranian side

Name	Designation	Title
Mahdi Husseini	Member	Energy Expert Plan and Budget Organization

1-4. Schedule of the Terminal Evaluation

The Study was conducted jointly from 13th January to 22nd January 2018. The detail schedule is shown Annex VI.

1-5. Methodology of the Terminal Evaluation

1-5-1. Process of the Terminal Evaluation

The Terminal Evaluation was conducted in two steps as follows:

(1) Step 1: Preliminary survey by members of Japanese side

The progress and achievement during the project period were preliminary surveyed. The members of Japanese side collected data and information through document reviews, questionnaires and interviews. Then, the Japanese members analysed performance of the Project.

(2) Step 2: Joint evaluation survey

Based on the results of the above step, the Evaluation team carried out further field investigation in the pilot building sites, and series of discussion for adequate evaluation of the Project. The team finally summarized the whole results in the Joint Evaluation Report (This report) for mutual understanding.

1-5-2. Evaluation Criteria

The Terminal Evaluation was conducted in accordance with the JICA's evaluation guideline which standardizes the Five Evaluation Criteria as follows:

(1) Relevance

Relevance refers to the validity of the Project Purpose and the Overall Goal in connection with the development policies of the Iranian government, assistance policy of the Japanese government and development needs of the beneficiaries.

(2) Effectiveness

Effectiveness refers to the extent to which the expected benefits of the Project have been achieved as planned. It also examines whether these benefits have been generated as a result of the Project.

(3) Efficiency

Efficiency refers to the productivity of the implementation process. It examines whether the Inputs of the Project have been efficiently converted into the Outputs of the Project.

(4) Impact

Impact refers to direct and indirect, positive and negative impacts caused by the implementation of the Project, including the extent to which the Overall Goal has been attained.

(5) Sustainability

Sustainability refers to the extent to which the Project can be further developed by the Iranian authorities, and the extent to which the benefit generated by the Project can be sustained under the national policies, technology, system and financial state.

2. Outline of the Project

The outline of the Project was formulated by the project formulation study in March 2013, and authorized in the Record of Discussion (hereafter referred to as "R/D") dated 1st October 2013. The initial PDM (version 0) was designed in the 1st Joint Coordination Committee (hereafter referred to as "JCC") meeting in April 2014. The revised PDM (version1) was developed in the 2nd JCC meeting in November 2015. The duration of the project period was amended to 54 months from 48 months by the Minutes of Meeting (hereafter referred to as "M/M") dated 29th February 2016. In order to clarify the Outputs and Activities, and to reflect the progress of the Project until December 2017, the PDM version 2 and PO version 2 for the terminal evaluation study were prepared of which outline is summarized below. (PDM version 2 and PO version 2 are attached in Annex I and II respectively.)

2-1. Overall Goals

Narrative summary
Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government building
Objective Verifiable Indicators
To be determined by the Project during JICA project period (by July 2018) *e.g. The ESCO projects are carried out at more than XX government buildings* ………… by 2023

2-2. Project Purpose

Narrative summary
The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.
Objective Verifiable Indicators
At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve

ESCO business.

2-3. Outputs and Activities

2-3-1. Output 1

Narrative summary

An institutional framework to promote ESCO business in Iran is strengthened.

Objective Verifiable Indicators

1.1. Regulations and guidelines in the IRESCO are upgraded.
1.2. Roles and responsibilities of the related organizations: MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.

Activities

1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran.
1-2. To support IRESCO in preparing its internal guidelines.
1-3. To give advice to IRESCO on strengthening intuitional capacity.
1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business.

2-3-2. Output 2

Narrative summary

The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.

Objective Verifiable Indicators

2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed.
2.2. Performance contract models for ESCO project are upgraded.
2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA.

Activities

2-1. To develop a manual to introduce ESCO project for government organization buildings.
2-2. To collect the existing contract models for ESCO project.
2-3. To develop contract models for ESCO project in building sector in Iran.
2-4. To organize trainings and seminars for ESCOs and government organizations.
2-5. To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan.

2-3-3. Output 3

Narrative summary

The ESCO pilot projects are implemented in government's buildings for development of ESCO business.

Objective Verifiable Indicators

3.1. More than 50 candidate buildings are selected by MOE/SATBA.

3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs.

3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA.

3.4. At least, 2 ESCO pilot projects are launched.

3.5 Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts). (* monthly performance data)

3.6. Performance reports including one-year performance activities are submitted for at least 2 pilot projects by ESCOs, and approved by MOE/SATBA. (after JICA project period.)

Activities

3-1. To select the candidate buildings for energy audit.

3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings.

3-3. To support ESCOs in planning the pilot projects.

3-4. To supervise and monitor the pilot projects implemented by ESCOs.

3-5. To analyse monthly performance data of pilot projects submitted by ESCOs.

2-3-4. Output 4

Narrative summary

Policy recommendation for the promotion of ESCO business is formulated.

Objective Verifiable Indicators

4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period).

Activities

4-1. To review the project activities and results including seminars, manuals, performance of pilot projects.

4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran.

4-3. To submit the recommendation to the last JCC meeting (during the JICA project period).

4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.

4-5. To submit the recommendation to Iranian government. (after JICA project period)

2-4. Assumptions and Pre-condition

Pre-conditions

- Subsidies for energy prices for building sector are eliminated as the Iranian government planed.
- Organizational restructuring in MOE and MOP does not affect adversely implementation of the Project.

Assumptions from Outputs to Project purpose

- Budget for pilot projects is secured and disbursed by MOE as planned.

Assumptions from Project purpose to Overall goals

- Recommendation formulated by the Project is reflected in energy policies and budget

allocation.
Assumptions for sustainability of Overall goals
- Policies on EE&C for the building sector are maintained.

3. Achievements and Implementation Process of the Project

3-1. Inputs to the Project

The Team has confirmed that the Project has provided the following inputs.

3-1-1. Inputs from the Japanese side

(1) Assignment of Japanese experts

The three (3) Japanese experts in charge of ESCO/ESCO policy, Energy audit engineer (Heat) and Energy audit engineer (Electricity) have been assigned by the time of the Terminal Evaluation of which total man-months (hereafter referred to as "MMs") is 16.56 MMs.

The total MMs of the Japanese expert working in Iran is 14.56MMs, which accounts for 30% of the total duration of the Project implementation up to December 2017.

Table 3-1-1-1. Assignment of Japanese experts

	Period	Planed MMs	Actual MMs
Work in Iran	The 1st period (Jan.2014 - Feb.2016)	8.66	8.66
	The 2nd period (Mar.2016 -May. 2018)	10.06	5.90 (as of Dec.2017)
	Sub-total	18.72	14.56 (as of Dec.2017)
Work in Japan	The 1st period (Jan.2014 - Feb.2016)	1.35	1.35
	The 2nd period (Mar.2016 -May. 2018)	1.40	0.65 (as of Dec.2017)
	Sub-total	2.75	2.00 (as of Dec.2017)
	Total	21.47	16.56 (as of Dec.2017)

(Source: Japanese expert team)

(2) Counterpart training in Japan

Two times of the training were completed. In total, 20 persons attended the training in Japan. The list of participants is attached in Annex IV

(3) Financial support for local costs

No financial support for local costs such as for organizing seminars was planned.

(4) Equipment

No equipment was planned to be provided.

3-1-2. Inputs from Iranian side

(1) Assignment of counterparts' personnel and administrative personnel

Two officials in Ministry of Energy have been assigned as a project director and a project manager respectively. Five officials in SATBA have been assigned as C/Ps. The list of the officials is attached in Annex III.

(2) Office space and facilities for the Project

Working space for Japanese experts was arranged in the building of SABA, and the utilities such as electricity, water, air conditioning, and foods for the experts were provided until organizational restructuring of SABA. As of December 2017, the arrangement was pending. MOE/SATBA was preparing such arrangement once again.

(3) Financial support to the Project.

From the beginning of the project period up to December 2017, in total, 150,000,000 Iranian Rial (hereafter referred to as "IRR") has been allocated and disbursed to the operation of the Project from the SATBA. Apart from for the operation of the Project, SABA/SATBA expensed 1,100,000,000 IRR for EE&C related activities including energy audits, organizing trainings and seminars. The detail is summarized the table below.

Table 3-1-2-1. Expenditure by SABA/SATBA to the Project and EE&C

Items	Amount (IRR)
For the operation of the Project	150,000,000
Organizing Workshops	40,000,000
Preparation of Pilot project (such as for energy audit)	30,000,000
Support for the experts	80,000,000
For other EE&C related activities	1,100,000,000
Energy audit, Trainings, etc (2014-2017)	-

(Source: SATBA)

3-2. Achievement of Outputs

The Project has implemented its activities as per the plan (stated in the PDM and PO version 2). The Team reviewed the progress of the Project activities and the achievement of the Outputs as followed.

3-2-1. Output 1

Status: Not yet achieved (likely to be achieved)

- Output1 was considered not yet to be achieved because one of the Objective Verifiable Indicator (hereafter referred to as "OVI") has not yet been realized.
- Although the activities 1-1, 1-2 and 1-3 were completed as planned, the activity 1-4 shown delay.

Narrative summary	Status
An institutional framework to promote ESCO business in Iran is strengthened.	Not yet achieved (likely to be achieved)

Objective Verifiable Indicators	Status
1.1. Regulations and guidelines in the IRESCO are upgraded.	Achieved
1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified	Not yet achieved (likely to be achieved)
Activities	**Status**
1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran	Completed
1-2. To support IRESCO in preparing its internal guidelines	Completed
1-3. To give advice to IRESCO on strengthening intuitional capacity	Completed
1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business.	Not yet completed (likely to be completed)

- According to the interviews to the executives in IRESCO, advices provided by JICA experts were useful for them to upgrade their regulations and to consider how to develop the association.
- The delay in the activity 1-4 was caused mainly because;
  - The organizational restructuring in MOE and SABA took place during project period, and
  - The activity was not clearly planed in PDM/PO version 0 and version 1.
- It was reported by C/Ps that the internal organizational structure in SATBA would be finalized before coming Iranian new year, i.e. the middle of March 2018.

3-2-2 Output 2

Status: Likely to be achieved

- Output 2 was considered to be likely to be achieved because two (2) OVIs have been realized and other is going to be achieved.
- The activities 2-1, 2-2、 2-3 and 2-5 were completed.
- Another workshop in the activity 2-4 is going to be organized before the end of the project period.

Narrative summary	Status
The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.	Likely to be achieved
Objective Verifiable Indicators	**Status**
2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed.	Achieved
2.2. Performance contract models for ESCO project are upgraded.	Achieved
2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA.	Likely to be achieved

Activities	Status
2-1. To develop a manual to introduce ESCO project for government organization buildings.	Completed
2-2. To collect the existing contract models for ESCO project.	Completed
2-3. To develop contract models for ESCO project in building sector in Iran.	Completed
2-4. To organize trainings and seminars for ESCOs and government organizations.	Not yet completed (on going likely to be completed)
2-5. To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan.	Completed

- The 30-page manual was developed, which explains, a type of services in ESCO project, contact types, meaning of performance-based contract, a way of measurement and verification, etc. (2-1)
- Four (4) examples of ESCO contract document were collected: 1) A standard ESCO contract model introduced by Ministry of Economy, Trade and Industry, Japan, 2) One used in ESCO business project in industrial sector in Iran, 3) One dealing with ESCO project in USA, and 4) One which IRESCO got from one of their member. After comparative analysis on these examples, C/Ps developed the contract model. (2-2, 2-3)
- As of December 2017, five (5) seminars/workshops were organized as listed below. The Project is going to organize one more seminar before the end of the project period.

Table 3-2-2-1. Seminar/Workshop organized during the Project period

	Date	Title	Number of participant	Remarks
1	15/03/2014	Workshop on JICA ESCO project	30	
2	22/04/2014	1st JICA workshop	55	90* including project staff
3	23/11/2015	2nd JICA workshop	80	Presented in Power system conference at SATBA
4	15/04/2016	Workshop on JICA ESCO project	15	
5	10/05/2017	ESCO fund seminar	60	

(Source: Project)

3-2-3. Output 3

Status: Not yet achieved (likely to be achieved)

- Output 3 was considered not yet to be achieved because two of the OVIs have not yet been realized.
- The activities 3-1, 3-2 and 3-3 were completed during the 1st half of the project implementation period.

- It was confirmed that activity 3-4 was completed at the timing of this evaluation study.
- The activity 3-5 is likely to be carried out after one year because the pilot projects have already started.

Narrative summary	Status
The ESCO pilot projects are implemented in government's buildings for development of ESCO business.	Not yet achieved
Objective Verifiable Indicators	**Status**
3.1. More than 50 candidate buildings are selected by MOE/SATBA	Achieved
3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs.	Achieved
3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA	Achieved
3.4. At least, 2 ESCO pilot projects are launched	Achieved
3.5 Monthly performance reports are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts)	Not yet achieved (likely to be achieved)
3.6. Performance reports including one-year performance activities are submitted for at least 2 pilot projects by ESCOs, and approved by MOE/SATBA (after JICA project period)	Not yet achieved (likely to be achieved)
Activities	**Status**
3-1. To select the candidate buildings for energy audit	Completed
3-2. To supervise the energy audit with work-through by ESCOs at the candidate buildings	Completed
3-3. To support ESCOs in planning the pilot projects.	Completed
3-4. To supervise and monitor the pilot projects implemented by ESCOs	Not yet completed (on going)
3-5. To analyse monthly performance data of pilot projects submitted by ESCOs.	Not yet completed (to be started)

- Firstly, C/Ps in SATBA gathered 100 buildings information, and made the long list. (3-1)
- Considering size, age, owner of buildings, about 15 building were selected as candidates for walk-through energy audit. Finally, C/Ps, Japanese experts and six (6) ESCOs conducted that energy audit at seven (7) buildings. (3-2)
- Four (4) ESCOs supported by C/Ps in SATBA, submitted ESCO proposals. Two (2) proposals out of four (4) were finally approved by SATBA.(3-3)
- At the timing of the Study, 2 pilot projects have already started and been monitored. (3-4)
- In pilot ESCO projects, the result of measurement of energy consumption is supposed to be reported. Japanese experts and C/Ps have been preparing for analysis of the data. (3-5)

3-2-4. Output 4

Status: Not yet achieved (likely to be achieved)

- Output 4 was considered not yet to be achieved because the OVI has not yet been realized.
- The activity 4-1 has been conducting, while the activities 4-2, 4-3 and 4-4 are going to be carried out.

Narrative summary	Status
Policy recommendation for the promotion of ESCO business is formulated.	Not yet achieved
Objective Verifiable Indicators	**Status**
Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	Not yet achieved
Activities	**Status**
4-1. To review the project activities and results including seminars, manuals, performance of pilot projects	Not yet completed (on going)
4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran	Not yet completed (on going)
4-3. To submit the recommendation to the last JCC meeting (during the JICA project period)	Not yet completed (to be started)
4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.	Not yet completed (to be started)
4-5. To submit the recommendation to Iranian government. (after JICA project period)	Not yet completed (to be started)

3-3. Achievement of the Project Purpose (Prospect)

Status: Not yet achieved (likely to be achieved)

- Project purpose was considered not yet to be achieved because the OVI has not yet been realized.
- It was considered, however, that the Project Purpose is going to be achieved because two pilot projects have already started.

Narrative summary	Status
The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	Not yet achieved (likely to be achieved)
Objective Verifiable Indicators	**Status**
At least 2 ESCO pilot projects demonstrate energy saving to ensure economic viability of ESCO business.	Not yet achieved (likely to be achieved)

3-4. Achievement of the Overall Goals (Prospect)

Status: (not evaluated by this study)

- It was considered that proper OVIs must be set up by the Project by June 2018.

Narrative summary	Status
Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	(not evaluated)
Objective Verifiable Indicators	**Status**
To be determined by the Project during JICA project period *e.g. The ESCO projects are carried out at more than XX government buildings* ………… by 2023	(not evaluated)

3-5. Implementation Process

3-5-1. Joint Coordination Committee

The Joint Coordination Committee (hereafter referred to as "JCC") was established based on the R/D in October 2013. The JCC consists of 10 members: Ministry of Energy (hereafter referred to as "MOE"), Plan and Budget Organization (hereafter referred to as "PBO": formerly Management and Planning Office), Ministry of Economy and Finance (hereafter referred to as "MOEF"), Ministry of Petroleum (hereafter referred to as "MOP"), Ministry of Road and Urban Development (hereafter referred to as "MRUD"), Renewal Energy and Energy Efficiency Organization (hereafter referred to as "SATBA"; formerly Iran Energy Efficiency Organization (hereafter referred to as "SABA")), Iran Fuel Efficiency Organization (hereafter referred to as "IFCO"), Iran ESCO association (hereafter referred to as "IRESCO", JICA Iran office and JICA expert team.

The JCC meetings were organized three times for approval of annual work plan of the Project, monitoring and evaluation of the progress of the Project: the 1st JCC meeting was on 21st April 2014, the 2nd meeting was on 14th November 2015 and the 3rd meeting was on 22nd November 2016.

3-5-2. Communication among Iranian project members and stake holders

The Project Director and the Project Manager work in the office of Ministry of Energy, while other C/Ps are stationed in the office of SATBA, their own organization. Two offices are far each other, so the most of communication are done through mobile phone.

According to the interviews by the evaluation study team (hereafter referred to as the "Team") to the C/Ps in MOE and SATBA offices, they maintained to communicate each other at least weekly to share progress of the Project. They increased their communications such face-to-face meetings particularly when JICA experts came to work in Iran.

The team found that there were few regular communications between the project team members in MOE/SABA and other related organizations including IFCO, co-implementing organization of the Project, and PBO, a member of JCC, which has responsibilities for regulating procurement procedure of government organizations, and therefore, is highly related to introduction of ESCO project to government buildings.

3-5-3. Communication between Iranian project members and Japanese experts team

As summarized in 3-1-1, Japanese expert team had worked in Iran for 30% of the project duration. The Team interviewed both Japanese expert and Iranian project members respectively, how they communicated each other when Japanese experts were not in Iran.

The Team found that they communicated each other regularly, however, their assessments on efficiency to disclose and share information among members in SABA, MOE and Japanese experts, were different each other. That implied there could be some difficulties for timely information sharing in the project implementation process.

On the other, in order to remove language barrier among Persian-English-Japanese, a local staff who can manage both Persian and Japanese has been assigned by Japanese expert team. The Team observed that contributed to improvement of communications.

4. Evaluation based on Five Criteria

4-1. Relevance

Relevance of the Project is **High**

4-1-1. Relevance to Iranian policies

Energy consumption and improving energy intensity have been one of the top concerns in Iranian national policies. The 5th Five-year Development Plan, a national master development plan for Iranian government, clearly indicated nationalizing energy and electricity consumption in the Article 135. Energy Consumption Pattern Reform Law (2011) also mentioned that related authorities should approve regulations to support ESCOs in the Article 17. The Article 12 of the Law "Elimination of Competitive Production Barriers and Improvement of Financial System" mentioned to put one of the top priorities of energy efficiency on building sector.

4-1-2. Relevance to Japanese aid policy

The latest aid policy of Japanese government to Iran has three target areas: 1) Economic and social infrastructure development, 2) Sustainable development, and 3) Improvement of regional and international relationship with foreign countries. The Project is regarded as one of the interventions for global warming mitigation under the second area above.

4-1-3. Needs among stakeholders

According to the views suggested by the stakeholders of the Project including IRESCO and C/Ps, the planed components of the Project such as the ESCO introduction manual, the performance contract model met with their needs. The implementation of the pilot project provided indispensable experiences for all stakeholders to understand and promote ESCO business as well as ESCO project.

4-2. Effectiveness

Effectiveness of the Project is **Relatively High**

4-2-1. Important assumptions from Output level to Project Purpose level

There are two types of contract in an ESCO project; Guaranteed Savings (hereafter referred to as "GS") type, and Shared Savings (hereafter referred to as "SS") type. In GS type contract, a building owner is responsible for financing energy saving interventions such as an introduction of facilities and equipment, while in SS type contract, an ESCO is required to finance them. Consequently, a building owner should take risk when energy reduction does not take place as planed in GS type contract, while an ESCO should do it in SS type contract.

The important assumption "Budget for pilot projects is secured and disbursed by MOE as planed" was stated between the Output level to the Project Purpose level in PDM version 2. According to the interview to the Japanese expert, at the beginning of the project period, a contract type to be applied to the ESCO pilot project was thought to be a GS type, although there weren't deep discussion and clear consensus about it among the project members.

On the one hand, if GS type is applied to the pilot project, i.e. MOE, instead of a building owner, finances facilities and equipment as a pilot activity, it seems to be smooth in implementation of the Project, because stakeholders don't need to negotiate much about who prepare budget and share risks. This might be a one of the reasons GS type was considered to be applied to the pilot project at the beginning of the project period.

On the other hand, if SS type is taken for the pilot project, it seems to be challenging trial for real business because it attracts more building owners. It brings, however, harder implementation of the Project.

In fact, MOE/SATBA decided to apply SS type contract to the pilot projects, using the fund from Niroo Research Institute, which is one of the organization under MOE. The Team understood that the arrangement was not planed initially, however, it was worthy trial for the Project. This improved effectiveness of the Project, even it brought certain delay in the pilot project.

4-2-2. Hindering factors to the implementation of the pilot project

The Team also found the progress of the pilot projects was delayed by other reasons.

MOE/SABA selected two candidates of the pilot projects by the middle of 2016. A process until closing a contract between ESCO and building owner did not proceed as expected.

According to the information provided by the ESCOs, there were lot of issues they faced during that process, the main of which are summarized as follows.

(1) Frequent personnel replacement at the management level of the buildings.

As same as ESCO business practice in the world, in the pilot project, ESCOs needed to explain what ESCO business is and propose how much benefit is produced to several sections and different levels of decision makers in the client building such as the general affair department/contract department, and the section manager/director of departments. In both of the pilot projects, ESCOs faced frequent personnel replacement among the decision makers, and they had to repeat to explain and propose same things when such replacement took place. In fact, the decision maker in top management level was replaced three times in the building of MOEF which was one of the reasons why it took more than one year until closing the contract.

(2) Energy facility operation staffs in the pilot buildings who have poor energy saving knowledge

A building which is targeted as ESCO project usually has its own facility operation staffs. From the initial phase of ESCO project: to measure energy consumption on site for baseline information, to the actual project phase: to reduce energy consumption as contracted, an ESCO needs to get support and understanding from such staff. In the pilot buildings, there were facility staffs having long experience to operate and maintain facilities without professional knowledge on energy saving. It took longer time for the ESCOs, accordingly, to persuade the staffs to accept energy measurement and to operate properly as instructed by ESCOs.

(3) Incompatibility between the Iranian government procurement procedure and ESCO business

As commonly seen in many countries, procurement of products and services by government organizations should follow standardized procedure with standardized contract document. In Iran, such standard procedure and format are introduced to the government owned buildings including those of the pilot projects.

Firstly, competitive tendering is mandatory when government organization procures something from private company, which was incompatible for the pilot project. Because it was arranged that only one ESCO could submit proposal to the building owner.

In an ESCO business, a total amount paid from building owner to ESCO is changeable according to an amount of energy saved. Therefore, the total amount to be paid is unknown at the timing of closing the contract. Measurement and verification of energy consumption is also unique step to finalize the payable price in ESCO business. However, the existing procurement contract documents in Iran, which are designed and authorized by PBO, could not be able to clearly handle those figures. Therefore, the C/Ps in SATBA and the ESCO staffs modified the contract document again and again until getting consensus with the officials in charge in the pilot buildings.

The team understood these are the main issues which affected effectiveness of the Project. The first issue looked unavoidable to the ESCOs, so they can be excused for delay, while the second issue was considered as good opportunity for ESCOs to get familiar with handling such facility staff. The third issue was necessary steps to develop practical ESCO contract model which can accelerate promotion of ESCO project in Iran.

4-3. Efficiency

Efficiency of the Project is **Relatively Low (Less efficiency in the implementation process)**

The study team found some delay in the Project Activities comparing to the plan summarized in POs, which resulted in delay of the achievement of the Outputs. The Team understand there was less efficiency in the implementation process between the Inputs/Activity to the Outputs. The main reason is explained as follows.

4-3-1. Pre-conditions from Inputs/Activity level to Output level

Several organizational restructurings took place in Iranian government organizations since the Project started.

The pre-condition in the PDM versions 2 says "Organizational restructuring in MOE and MOP does not affect adversely implementation of the Project." In fact, this condition was not satisfied.

In 2016, MOE decided that SABA would be merged with Renewable Energy Organization (hereafter referred to as "SUNA"), one of the organization under MOE. The integration of the two organizations into the new organization, SATBA, was finally approved by the Iranian authority on 1st January 2017. As a result, as of December 2017, the internal organizational structure in SATBA has not yet finalized to manage ESCO project related activities. That significantly affected implementation in the second half of the Project.

Internal restructuring in MOE also took place during the project period. The Office for the Improvement of Productivity and Economy of Electricity and Energy (hereafter referred to as "OIPEEE"), which the Project Director and the Project Manager belonged to, was re-organized as the Planning and Economics of Electricity and Energy Office (hereafter referred to as "PEEEO"). Besides, MBO, one of the JCC members was restructured too, and it has become PBO.

The team concluded that these organizational restructuring in the government organizations caused less efficiency in the Project implementation. These were unavoidable events for the Project. The Team understood the Project can be excused for the delay.

4-4. Impact

Impact of the Project is **Average (provisional judgement)**

4-4-1. Prospect of achievement of Overall Goals

Although the establishment of the ESCO business model is highly expected to contribute to EE&C in the building sector in Iran, the Team could not evaluate that possible impact due to lack of data to analyse it properly.

4-4-2. Other impacts

According to the summary reports on the counterpart training in Japan, most of the participants expressed their high satisfaction with the trainings. However, the Team found that there wasn't any formal opportunity to share the data, information and experiences obtained during the trainings with other officials who did not attend the training.

Based on the above, the Team provisionally concluded the Impact of the Project is average.

4-5. Sustainability

Sustainability of the Project is **Average**

4-5-1. Technical aspects

As long as the two ESCOs implementing the pilot projects concerned, they have enough experiences of energy service for industrial/building sector. According to the views of Japanese experts, their engineering knowledge, technical skills for energy savings reach to the level to provide professional services. Through the site visit to the pilot project buildings, the Team observed the services provided by ESCOs, and confirmed the expert's view. At the timing of this evaluation study, they didn't have sufficient experience on the ESCO project in building sector, the Team judged the ESCOs will be gradually able to carry out necessary services, as they will be involved in the actual ESCO projects in building sector.

4-5-2. Organizational aspects

SABA was the implementing organization in the Project because it had the roles for trainings and energy audit programme for improvement of energy efficiency in both of industrial and building sectors. Assuming SATBA takes over those roles and secures similar budget allocation, the Team thought sustainability of organizational aspects could maintained. In fact, as summarized in the table 3-1-2-1, the total budget allocated to trainings and energy audits for energy service companies from 2014 to 2017 was 1,100,000,000 IRR which was more than 7 times as large as what was allocated to the Project.

4-5-3. Pre-condition as institutional aspects

As reported in the JICA study: "Development study for institutional development on energy management sector in the Islamic Republic of Iran (2010-2011)" market energy prices in Iran before 2010 was quite lower than other countries due to the subsidies. The Subsidy Rationalization Law, effective from December 2011, clearly mentioned that the subsidies in market energy prices including the electricity tariff should be eliminated. This is the reason that the pre-condition: "Subsidies for energy prices for building sector are eliminated as the Iranian government planed." was set in PDM version 2.

Elimination of the subsidies in electricity tariff is one of the crucial conditions to ensure sustainability of the effects of the Project, in short, the establishment of ESCO business in Iran. The data set on electricity tariff applied to the pilot project buildings was provided by SATBA, which is summarized in the table below.

Table 4-5-3-1. Electricity tariff applied to the pilot project building

Year	Base tariff (IRR/month)	Tariff based on consumption (IRR / kWh)	
2010	30,000	normal hours (07 : 00 - 19 : 00)	1,000.0
		peak hours (19 : 00 - 23 : 00)	2,000.0
		low load hours (23 : 00 - 7 : 00)	500.0
2011-12	30,000	normal hours (07 : 00 - 19 : 00)	1,100.0

		peak hours (19 : 00 - 23 : 00)	2,200.0
		low load hours (23 : 00 - 7 : 00)	550.0
2013-15	44,640	normal hours (07 : 00 - 19 : 00)	1,637.0
		peak hours (19 : 00 - 23 : 00)	3,274.0
		low load hours (23 : 00 - 7 : 00)	818.5
2016	49,104	normal hours (07 : 00 - 19 : 00)	1,801.0
		peak hours (19 : 00 - 23 : 00)	3,602.0
		low load hours (23 : 00 - 7 : 00)	900.0

(Source: SATBA)

Comparing the base tariff in 2010 and 2011-12, they were the same price, while it increased to 44,640 IRR in 2013-2015 and 49,104 in 2016. The tariff based on consumption showed also similar trend. For example, the tariff for the normal hours was 1,000 IRR in 2010, and in 2011-12 it slightly increased to 1,100 IRR. Then it went up to 1,637 IRR in 2013-15, and reached 1,801 IRR in 2016. The subsidy looks to be eliminated nominally.

However, once inflation is considered, it is difficult to judge the subsidy in electricity tariff has been eliminated as the law had mentioned.

The table below shows the inflation rate from 2010 to 2016. During this period, Iran faced serious inflation till 2014. As a result, the general market prices in 2016 increased by 235.1% from 2010, which was much higher than the increase of the electric tariff.

Table 4-5-3-2 inflation (GDP deflator) in Iran

	2010	2011	2012	2013	2014	2015	2016
Annual %	15.6	23.7	24.0	35.6	10.8	0.4	1.6
Aggregated % (Y2010=100)	100.0	123. 7	153. 4	208. 0	230. 5	231. 4	235. 1

(Source: the study team based on WB statistics: https://data.worldbank.org/indicator)

If the subsidy on the electricity tariff is not eliminated sufficiently, the potential of ESCO business in building sector in Iran definitely shrinks.

Based on the consideration above, the team concluded the Sustainability of the Project is average.

5. Conclusion

In conclusion, The Project showed good performance in Relevance <High>, in Effectiveness <Relatively High>, in Impact <Average> and in Sustainability <Average>, while it showed less efficiency in the implementation process (i.e. Efficiency is <Relatively Low>).

It was, therefore, concluded that the Project is likely to achieve its expected purpose without additional inputs form Japanese side and without extension of the project duration as authorized in the R/D amended by the M/M in February 2016.

6. Recommendation and Lessons learned

6-1. Recommendations

6-1-1. Project period and completion of the Project

- Both of Iranian and Japanese sides have agreed that the project period is going to end at July 2018, which had been authorized by the both sides in the R/D amended by the M/M in February 2016.
- Both of Iranian and Japanese sides have fully understood and agreed that the Project activities must be continuously implemented by the Iranian side even after the end of the project period, until all of the tasks remained are completed.
- Both of Iranian and Japanese sides have fully understood that the Project shall complete when the completion of the project activities is reported to the related organizations which belong to JCC.
- As for the activities that JICA planned to conduct after the completion of the pilot projects, described in Plan of Operation Rev. 1 (authorized by the 2nd JCC on 18th November 2015), JICA shall not conduct those activities before the end of the project period which was agreed by the M/M on 29th February 2016.
- After termination of the project period in July 2018, MOE shall ensure to conduct all remained activities including supporting ESCOs in implementation of the two pilot projects in order to achieve the Project Purpose.
- After completion of the two pilot projects, MOE shall compile and validate the data collected from the two pilot projects, and make the completion report.
- After receiving the completion report, JICA shall inspect it in serious and sincere manner.
- Based on the result of the inspection, JICA shall consider further cooperation when MOE requests it.

6-1-2. Clarification of the Project implementation structure for completion of the Project

- SATBA should take over the roles and responsibilities for the implementation of the Project shouldered by SABA.
- SATBA should also have more active roles and wider responsibilities for day to day implementation of the project activities, while MOE should concentrate on coordinating other ministries and organizations including JICA for overall implementation of the Project.
- It is suggested that official documents, authorized by the Minister of Energy, which define the roles and responsibilities of every office/section in MOE and SATBA after organizational restructuring of each organization, should be shared by JCC for efficient and effective implementation of the Project.
- It is expected that other organization such as IFCO, MOEP, PBO and IRESCO should be more involved to the implementation of the Project, particularly in formulation of the policy recommendation.

6-1-3. Tasks remained

- Both of Iranian and Japanese sides have fully understood and agreed that there are the tasks remained for the completion of the Project and achievement of the Project purpose, which include;

(1) Verification of performance of the pilot projects (in Output 3)

- This is the most important task to be carried out by Iranian organizations after the end of the project period.
- Therefore, Japanese experts should fully support the Iranian stakeholders including C/Ps, IRESCO, ESCOs during the project period, which includes a proposal of a verification protocol.

(2) Clarification of roles and responsibilities of the related organizations for promotion of ESCO projects (in Output 1)

- The clarification is one of the indispensable conditions for the effective promotion of ESCO project in building sector.
- In particularly, roles and responsibilities of organizations after restructuring in MOE and SABA should be clarified, and work demarcation regarding promotion of ESCO project in building sector, among related organizations such as MOP/IFCO, MRUD, MOEP and IRESCO should be well considered.
- Financial roles and responsibilities should also be clarified. Therefore, possible financial source for ESCO project such as funds under MOE as well as other government organizations, and financial schemes in private banks applicable for ESCO projects should be listed.

(3) Formulation of recommendation by the Project (in Output 4)

- It is expected that the recommendation should be useful for stakeholders in both of Iranian and Japanese sides in order to consider promotion of ESCO project as well as EE&C in building sector.
- Therefore, it should cover financial, institutional and technical issues for example;
  - ➢ Technical issue
    - ✧ Implementation of pilot project employing other saving solutions
  - ➢ Institutional issues
    - ✧ Action plan to development of qualified ESCOs though energy audits program which draft ESCO project proposal for all government buildings.
    - ✧ Awareness increasing programme (joint campaign by related authorities).
    - ✧ Continuous support for IRESCO to establish linkage to related authorities.
  - ➢ Financial issues
    - ✧ Financial incentive for ESCO and Building owner such as tax incentive.
    - ✧ Establishment of ESCO funds
    - ✧ Interest subsidy to ESCO Project
    - ✧ Incentives for ESCO companies through “Law for Removing the obstacles to competitive production and promoting the country’s financial system”
    - ✧ ESCO project awareness seminar for financial institutions including private banks

6-1-4. Formulation of the list of detail activities for the remained tasks and reporting format

- In order to carry out the remained tasks, firstly, the Japanese experts and C/Ps should formulate the list of detail activities including names of C/Ps in charge and schedule for each activity. For this JICA experts prepare a reporting format.

6-1-5. Communication among the Project members

- In order to ensure to monitor the progress of activities until the end of the project period, the Project members: MOE (project manager), SATBA (C/Ps team), JICA expert team should establish more effective and efficient ways of communication.
- SATBA should report progress of day to day operation directly and at least weekly to JICA expert team until the end of project period when JICA experts are in Japan.
- The progress of the two pilot projects is most important to be monitored for completion of the Project. The two ESCOs implementing pilot projects should have efficient communication channels to JICA experts when necessary.

6-2. Lessons Learned

6-2-1. Project Implementation Structure/Organizing Project Team (for Iranian side)

- For smooth implementation of a cooperation project, it is ideal that a project director, a project manager and other C/Ps should be appointed from a single organization.
- When such an arrangement is difficult, alternatively, each member of a project team should be clearly assigned with role and responsibility to carry out project activities by every organization to which the member belongs.
- It is expected that a sense of ownership of a project should be developed through such organizational and personnel arrangement.

6-2-2. Coordination among ministries (for Iranian side)

- In order to ensure efficient and effective implementation and maximize benefit generated by a cooperation project, related ministries and organizations should cooperate more. For that purpose, a coordination mechanism such as JCC should be established and utilized actively.

6-2-3. Information sharing in stakeholders after training in Japan (for Iranian side)

- In order to increase impact from C/P training in Japan, information, knowledge and experiences obtained through the training by participants should be shared among Iranian stake holders.
- It is, therefore, expected that a workshop should be organized by Iranian organizations to present the results of the trainings by participants after they come back from Japan.

⑥

Joint Terminal Evaluation Report Annex I: Project Design Matrix

Title of the Project : **The Project on Implementation of Pilot Project to Introduce ESCO for Government's Buildings**
Implementing Agencies : **Ministry of Energy(MOE), Iran Renewable Energy and Energy Efficiency Organization (SATBA), Iran Fuel Conservation Organization (IFCO)**
Target Groups : **Staff of MOE, SATBA, IFCO and members of Iran ESCO association (IRESCO)**
Target Area : **The Islamic Republic of Iran**
Project Period : **25.01.2014 -24.07.2018 (54 months: JICA project period)**

January 22,2018 version 2

Summary	Objective Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goals: Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government buildings.	-XXX.XXXX by 2023 *(to be determined by the Project)*	-XXX.XXXX *(to be determined by the Project)*	- Policies on EE&C for the building sector are maintained.
Project Purpose The establishment of ESCO business model is promoted through the capacity development of the Government of the Islamic Republic of Iran and ESCO association to promote ESCO businesses.	1. At least 2 ESCO pilot projects demonstrate energy saving and energy efficiency to achieve ESCO business.	1.Project completion report including the verification report of the pilot project. (by MOE/SATBA)	- Recommendation formulated by the Project is reflected in energy policies and budget allocation
Outputs 1. An institutional framework to promote ESCO business in Iran is strengthened.	1.1. Regulations and guidelines in the IRESCO are upgraded. 1.2. Roles and responsibilities of the related	1.1. Project documents (Regulations and guidelines) 1.2. Project documents	

	organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified.	(*for example: demarcation table describing roles and responsibilities among organizations, after organizational restructuring)	
2. The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.	2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed 2.2. Performance contract models for ESCO project are upgraded 2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA	2.1. Project document (the manual) 2.2. Project document (the contract models) 2.3 Project documents (records of the trainings and seminars)	
3. The ESCO pilot projects are implemented in government's buildings for development of ESCO business.	3.1. More than 50 candidate buildings are selected by MOE/SATBA 3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs. 3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA 3.4. At least, 2 ESCO pilot projects are launched 3.5. Monthly performance reports* are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts) (*monthly performance data) 3.6. Performance reports including one-year	3.1. Project documents (for example: progress report of pilot projects) 3.2. Project documents (ditto) 3.3. Project documents (ditto) 3.4. Project documents (ditto) 3.5. Project documents (ditto) 3.6. Project documents	- Budget for pilot projects is secured and disbursed by MOE as planed

	performance activities are submitted by ESCOs for at least 2 pilot projects, and approved by MOE/SATBA (after JICA project period)	(completion report)	
4. Policy recommendation for the promotion of ESCO business is formulated.	4.1. Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	4.1. Project Documents (for example: policy proposal paper)	

Activities: 1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran 1-2. To support IRESCO in preparing its internal guidelines 1-3. To give advice to IRESCO on strengthening intuitional capacity 1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business. 2-1. To develop a manual to introduce ESCO project for government organization buildings. 2-2. To collect the existing contract models for ESCO project. 2-3. To develop contract models for ESCO project in building sector in Iran 2-4. To organize trainings and seminars for ESCOs and government organizations 2.5. To introduce policies, legislations and finance mechanisms for EE&C and ESCO project for building	**Inputs** **Japanese Side:** A.Experts ・ Team Leader (ESCO Expert) / ESCO Framework ・ Energy Audit Engineer (Heat) ・ Energy Audit Engineer (Electricity) B.Training in Japan ・ ESCO Framework (policies, legislations and finance mechanisms) C. Equipment etc. ・ Nill **Iranian Side:** A.Ministry of Energy(MOE): Project Counterpart ・Project Director: General Director, Planning and Economics of Electricity and Energy Office (PEEEO) ・ Project Manager: Head of International cooperation of PEEEO B.SATBA: Implementation Organization	**Pre-conditions** - Subsidies for energy prices for building sector are eliminated as the Iranian government planed. - Organizational restructuring in MOE and MOP does not affect adversely implementation of the Project.

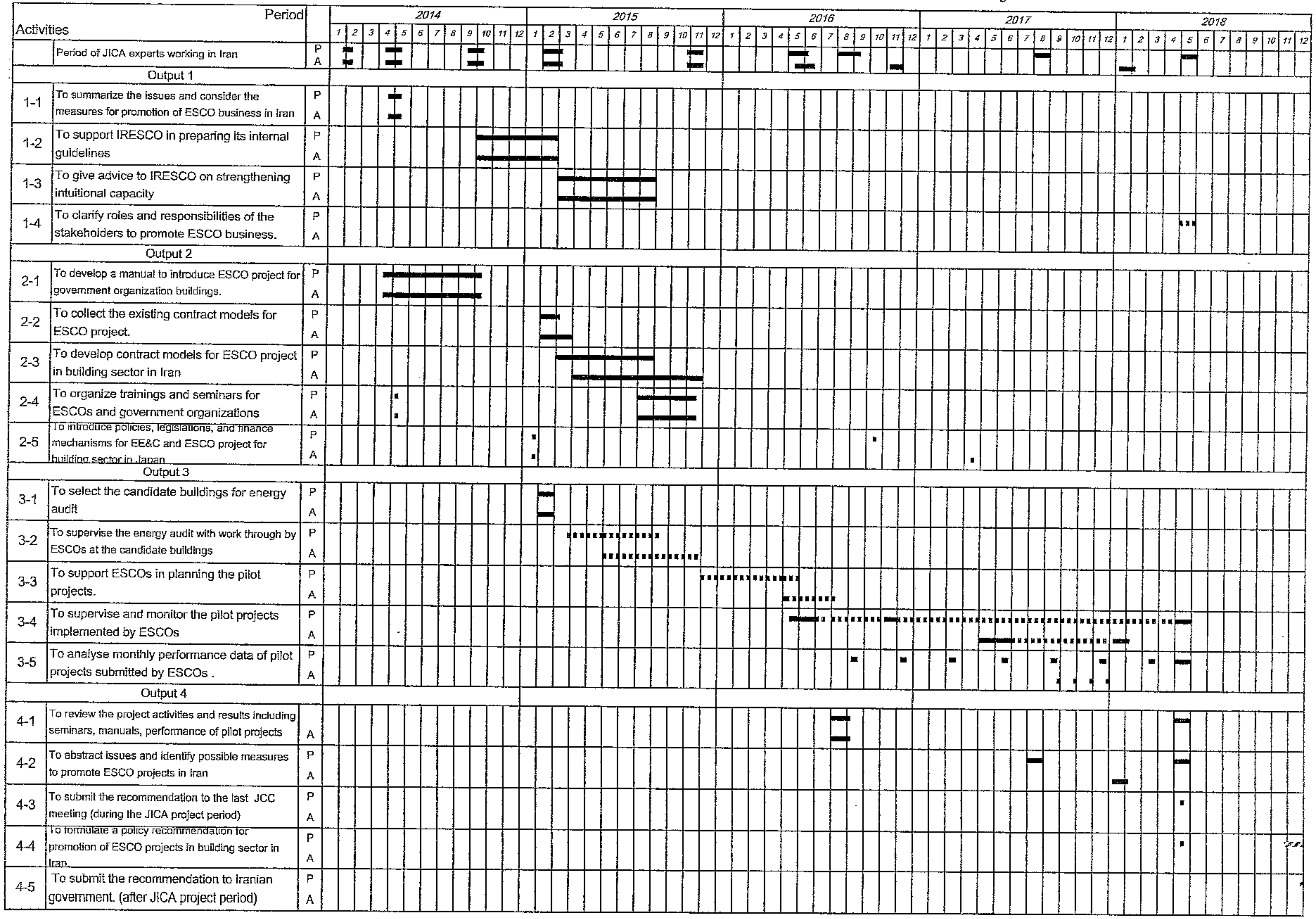
Attachment 5

sector in Japan 3-1. To select the candidate buildings for energy audit 3-2. To supervise the energy audit with work through by ESCOs at the candidate buildings 3-3. To support ESCOs in planning the pilot projects. 3-4. To supervise and monitor the pilot projects implemented by ESCOs 3-5. To analyse monthly performance data of pilot projects submitted by ESCOs. 4-1. To review the project activities and results including seminars, manuals, performance of pilot projects 4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran 4-3. To submit the recommendation to the last JCC meeting (during the JICA project period) 4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran. 4-5. To submit the recommendation to Iranian government for decision making.	• (Deputy of Demand Side Department*) • (ESCO Department*) **name of department, position are provisional* C.IFCO: Co-Implementation Organization D.(IRESCO: Cooperation Organization) **<u>Joint Coordinating Committee(JCC)</u>** A. Chairperson: • General Director of PEEEO B. Member of Iranian Side • MOE • Plan and Budget Organization (PBO) • Ministry of Economy and Finance (MOEF) • Ministry of Petroleum (MOP) • Ministry of Road and Urban Development (MRUD) • SATBA • IFCO • IRESCO C. Member of Japanese side • JICA Experts • Representatives from JICA Iran Office • Other personnel concerned to be assigned by request of other members D. Observer • Ministry of Foreign Affairs (MOFA) • Embassy of Japan (EoJ)	

Attachment 5

Joint Terminal Evaluation Report Annex 2

Plan of Operation version 2: The Project on Implementation of the Pilot Project to introduce ESCO to the Government's Buildings



Activities		Period
	Period of JICA experts working in Iran	P A
Output 1		
1-1	To summarize the issues and consider the measures for promotion of ESCO business in Iran	P A
1-2	To support IRESCO in preparing its internal guidelines	P A
1-3	To give advice to IRESCO on strengthening intuitional capacity	P A
1-4	To clarify roles and responsibilities of the stakeholders to promote ESCO business.	P A
Output 2		
2-1	To develop a manual to introduce ESCO project for government organization buildings.	P A
2-2	To collect the existing contract models for ESCO project.	P A
2-3	To develop contract models for ESCO project in building sector in Iran	P A
2-4	To organize trainings and seminars for ESCOs and government organizations	P A
2-5	To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan	P A
Output 3		
3-1	To select the candidate buildings for energy audit	P A
3-2	To supervise the energy audit with work through by ESCOs at the candidate buildings	P A
3-3	To support ESCOs in planning the pilot projects.	P A
3-4	To supervise and monitor the pilot projects implemented by ESCOs	P A
3-5	To analyse monthly performance data of pilot projects submitted by ESCOs .	P A
Output 4		
4-1	To review the project activities and results including seminars, manuals, performance of pilot projects	A
4-2	To abstract issues and identify possible measures to promote ESCO projects in Iran	P A
4-3	To submit the recommendation to the last JCC meeting (during the JICA project period)	P A
4-4	To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.	P A
4-5	To submit the recommendation to Iranian government. (after JICA project period)	P A

Joint Terminal Evaluation Report Annex III : List of counterpart personnel and Japanese experts

Iranian Counterpart personnel

	Name	Position in the Project	Organization
	M. A. Shafiezadeh	Project Director	General Director of OIPEEE, MOE* General Director of PEEEO, MOE
	A. Shirazi	Project Manger	Head of Awareness & Training, OIPEEE, MOE* Head of International Cooperation, PEEEO, MOE
	Amir Doudabi Nezhad	Project Responsible Person	Deputy of Demand Side Department, SABA (----------,-----------, SATBA)**
	Mohammad Akbari	Iraian Team Leader	Manager of ESCO Department, SABA (----------,-----------, SATBA)**
	Mahdi Hormozi	ESCO Expert	Engineer of ESCO Department, SABA (----------,-----------, SATBA)**
	Ahmad R. Tavakkoli	Energy Saving Expert of Building	Energy Conservation in Building Department, SABA (----------,-----------, SATBA)**
	Mahdi Rafiei	Coordinator / Energy Saving Expert of Industry	Energy Conservation in Industries Department, SABA (----------,-----------, SATBA)**

* The initial title and organization are in upper line. Those after organizational restructuring are stated in lower line

* The internal organizational structure in SATBA has not yet been finalized after organizational restructuring (As of December 2017)

Japanese Expert

	Name	Position in the Project	Organization
	Tsutomu MORI	Team leader/ESCO Promotion	Nippon Koei Co.,LTD
	Morio SAKAI	Energy Audit Expert (Electricity Engineer)	Nippon Koei Co.,LTD
	Hedeaki KUROKI	Energy Audit Expert (Heat Enginner)	Nippon Koei Co.,LTD

Joint Terminal Evaluation Report Annex IV : List of participant, C/P training in Japan

The first training in Japan (19.01.2015-24.01.2015)

	Name	Position	Organization
1	Mr. Effatnejad Reza	Deputy of General Director Electricity and Energy Affair	MOE
2	Mr. Akbari Hamid	Master expert of energy efficiency in demand sector (Building& industry)	MOE
3	Ms. Bigdeli Somayeh	Expert	MOE
4	Mr. Akbarisayar Mohammad	Manager Electricity and Energy Affair	SABA
5	Mr. Sadeghi Nourbakhsh	Manager	SABA
6	Ms. Paknejad Soodabeh	Councilor of Distributed Coordination Deputy in D.S.M	Tavanir
7	Mr. Peyman Karimifard	Manager of Power System Analysis	Tavanir
8	Mr. Assadianahmadabad Ehesan	Expert	MPO
9	Mr. Mahmoud Hafezian	General Manager	MOEF

The second training in Japan (16.04.2016-26.04.2016)

	Name	Position	Organization
1	Mr. Mohammad Shafiezadeh	General Director, Electricity and Energy Affaires	MOE
2	Mr. Rahim Azimi	Deputy of General Manager, Finane and Building	MOEF
3	Mr. Alireza Abdollah Shirazi	Manager of ESCO Project, Electricity and Energy Affaires	MOE
4	Mr. Mojtaba Gorbani	Expert of Economic Evaluation of Projects Electricity and Energy Affaires	MOE
5	Mr. Mohammad Khezeli	Expert of Projects Electricity and Energy Affaires	MOE
6	Mr. Saeed Amani	Office Manager of Energy Conservation in Building Department	SABA
7	Mr. Amir Doudabinezhad	Deputy of Education and Energy Consumption Optimization	SABA
8	Mr. Ehsan Assadian Ahmadabad	Expert of International Affairs	PBO
9	Ms. Maryam Namjoobaghini	Manager Energy consumption management	GT EPDC
10	Mr. Tooraj Bathaie	Managing Director	Pishrun Energy Co.
11	Mr. Alimohmmad Mirshams	Managing Director	ASIA WATT Eng. Co.

Schedule of Joint Terminal Evaluation Study

			AM	PM	Remarks
1	13/1/2018	Sat	Data analysis	Kick off team meeging at JICA office, interview IRESCO	
2	14/1/2018	Sun	Kick off team meeging with stakeholders at MOE	Interview SATBA (at MOE) Interview MOE	PBO joined
3	15/1/2018	Mon	Meeting with MOE (PDM revision)	Data analysis JICA office	
4	16/1/2018	Tue	Meeting with MOE (PDM revision)	Interview SATBA/ESCOs	PBO joined at SATBA
5	17/1/2018	Wed	Data collection at SATBA	Meeting with BCRC	
6	18/1/2018	Thu	Data analysis	Data analysis	
7	19/1/2018	Fri	Report writing	Report writing	
8	20/1/2018	Sat	TEDC pilot site	Meeting with IFCO	PBO joined at TEDC
9	21/1/2018	Sun	MOEF pilot site	Report writing	PBO joined at MOEF
10	22/1/2018	Mon	Report writing	Meeting with MOE & data collection	
11	23/1/2018	Tue	(Report at JCC)	(Report writing)	

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 13, 2018 time: 14:00-17:00, Venue: IRESCO

#	Name	Position	Organization
1	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
2	Amir Jamali Moghaddam	Member of Board	Asia Watt Eng.Co.
3	Ali Mohammad Mirshams	Managing Director	Asia Watt Eng.Co.
4	Tooraj Bathaei	Managing Director	Pishrun Energy Co.
5	Gholamali Najafi	Chief of Board	IRESCO
6	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
7	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
8	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
9	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 14, 2018 time: 9:00-11:00, Venue: MOE

#	Name	Position	Organization
1	Hamed Houri Jafari	Energy Manager	IFCO
2	Alireza Moradi	Energy Expert Engineer	IFCO
3	Anahita Karimi	Energy Expert Engineer	TEDC
4	Shahab Alborzi	Energy Expert Engineer	TEDC
5	Mahdi Hosseini	Energy Expert	PBO
6	Alimohammad Mirshams	Managing Director	Asia Watt Eng.Co.
7	Kamran Nazari Radsani	Head of Installation Dep.	MOEF
8	Rahim Azimi	Installation Manager	MOEF
9	Mehdi Rafiei	Expert	SATBA
10	Mohammad Akbari	Head of Industrial Management	SATBA
11	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
12	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
13	Dr. Kari Behrouz	Head of Energy Dept.	BHRC
14	Tooraj Bathaei	Managing Director	Pishrun Energy
15	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
16	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
17	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
18	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
19	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 14, 2018 time: 12:00-13:00, Venue: MOE

#	Name	Position	Organization
1	Mohammad Akbari	Head of Industrial Management	SATBA
2	Mehdi Rafiei	Expert	SATBA
3	Hiroshi OGAWA	Presentative Partner	Haruno ESWorks LLC
4	Behzad Yagmaie	Translator	AJTC

Attachment 5

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 14, 2018 time: 14:00-15:00, Venue: MOE

#	Name	Position	Organization
1	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
4	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
5	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 15, 2018 time: 9:00-11:00 Venue: MOE

#	Name	Position	Organization
1	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
4	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
5	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
6	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
7	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 16, 2018 time: 9:00-11:00 Venue: MOE

#	Name	Position	Organization
1	Kambiz Rezapour	Director of Planning and Monitoring Division	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
4	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
5	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
6	Tetsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
7	Behzad Yagmaie	Translator	AJTC

List of Participants/ Interviewees date: Jan 16, 2018 time: 14:00-15:30 Venue: SATBA

#	Name	Position	Organization
1	Ali Mohammad Mirshams	Managing Director	Asia Watt Eng.Co.
2	Tooraj Bathaei	Managing Director	Pishrun Energy Co.
3	Maryam Shekari	M&V monitoring manager	Pishrun Energy Co.
4	Mehdi Rafiei	Expert	SATBA
5	Mohammad Akbari	Head of Industrial Management	SATBA
6	Mahdi Hosseini	Energy Expert	PBO
7	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
8	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
9	Behzad Yagmaie	Translator	AJTC

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 17, 2018 time: 10:00-12:00 Venue: SATBA

#	Name	Position	Organization
1	Mohammad Akbari	Head of Industrial Management	SATBA
2	Mehdi Rafiei	Expert	SATBA
3	Hiroshi OGAWA	Presentative Partner	Haruno ESWorks LLC
4	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
5	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 17, 2018 time: 14:00-14:40 Venue: BHRC

#	Name	Position	Organization
1	Dr. Kari Behrouz	Head of Energy Dept.	BHRC
2	Mahdieh Abravesh	expert	BHRC
3	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
4	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
5	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 20, 2018 time: 9:00-12:00 Venue: TEDC

#	Name	Position	Organization
1	Tooraj Bathaei	Managing Director	Pishrun Energy Co.
2	Maryam Shekari	M&V monitoring manager	Pishrun Energy Co.
3	Meysam Parvarese	Mechanical engineer	Pishrun Energy Co.
4	Amir Navidi	Engineer	TEDC
5	Benhoor Sahari	Master of DSM	TEDC
6	Ensieh Rostami	Master of DSM	TEDC
7	Anahita Karimi	Energy Expert Engineer	TEDC
8	Hosjatollah Pouyafar	Maneger of HC	TEDC
9	Shahab Alborzi	Energy Expert Engineer	TEDC
10	Masoud Azizi	Depty of Customer service	TEDC
11	A.A. Yaghooti	Deputy director of engineering	TEDC
12	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
13	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
14	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
15	Behzad Yagmaie	ESCO Project Assistant	AJTC

Joint Terminal Evaluation Report Annex VI :List of meeting participant/interviewee during study

List of Participants/ Interviewees date: Jan 20, 2018 time: 14:00-15:00 Venue: IFCO

#	Name	Position	Organization
1	Mohsen Mohammadi	Planning head	IFCO
2	Hamed HourinJafari	Energy manager	IFCO
3	M.R.Khattati	Director, Industrial section	IFCO
4	Mortteza Golzadeh	Assistant of vice president	IFCO
5	Alireza Moradi	Expert energy engineer	IFCO
6	Mohammad.Mirzaei	Manager deputy of Energy Conservation in building sector	IFCO
7	Youssefi Passandy	Consultor	IFCO
8	Aghil barati	Senior Expert, R&D	IFCO
9	M.R.Eslamii	Senior Expert, building	IFCO
10	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
11	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
12	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 21, 2018 time: 9:30-11:45 Venue: MOEF

#	Name	Position	Organization
1	Ali Mohammad Mirshams	Managing Director	Asia Watt Eng.Co.
2	Pooria Orouji	R&D manager	Asia Watt Eng.Co.
3	S.M.Hosseini	Mechanical Engineer	MOEF
4	Vahid Tahmuseri	Engineer	MOEF
5	Salmani Zabiholah	Director general, personnel service & supporting	MOEF
6	Rahim Azimi	Installation Manager	MOEF
7	Kamran Nazari Radsani	Head of Installation Dep.	MOEF
8	Mahdi Hosseini	Energy Expert	PBO
9	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
10	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
11	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
12	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
13	Behzad Yagmaie	ESCO Project Assistant	AJTC

List of Participants/ Interviewees date: Jan 22, 2018 time: 15:30- 18:00 Venue: MOE

#	Name	Position	Organization
1	M.A. Shafiezadeh	General Director PEEEO	MOE
2	Alireza Shirazi	Head of International Cooperation, PEEEO	MOE
3	Yoshiko Yamanaka	Project Formulation Advisor	JICA Iran Office
4	Vahid Kheirolomour	Senior Program Officer	JICA Iran Office
5	Tsutomu MORI	ESCO Project Leader	Nippon Koei Co.,LTD
6	Morio SAKAI	ESCO Project Expert	Nippon Koei Co.,LTD
7	Hiroshi OGAWA	Representative Partner	Haruno ESWorks LLC
8	Behzad Yagmaie	ESCO Project Assistant	AJTC

THE PROJECT ON IMPLEMENTATION OF PILOT PROJECTS TO INTRODUCE ESCO FOR GOVERNMENT'S BUILDINGS IN ISLAMIC REPUBLIC OF IRAN

Achievements and Implementation Process of the Project

The Team reviewed the progress of the Project activities and the achievement of the Outputs as followed.

Overall Goals

Narrative summary
Energy Efficiency and Conservation in the building sector will be promoted through the introduction of ESCO for Government building
Objective Verifiable Indicators
・ ESCO for government buildings will be officially introduced from 2020. ・ Building where is implemented ESCO will be reduced energy consumption at least 10%.

10% of reduction target was set based on two pilot projects.

Output 1

Narrative summary	Status
An institutional framework to promote ESCO business in Iran is strengthened.	Likely to be achieved
Objective Verifiable Indicators	Status
1.1. Regulations and guidelines in the IRESCO are upgraded.	Achieved
1.2. Roles and responsibilities of the related organizations MOE/SATBA, MOP/IFCO, MRUD/BHRC, IRESCO, MOEF, PBO, financial institutions, to promote ESCO project in building sector are clarified	Not achieved MOE/SATBA and PBO will discuss with other related organizations in Energy Council.
Activities	**Status**
1-1. To summarize the issues and consider the measures for promotion of ESCO business in Iran	Completed
1-2. To support IRESCO in preparing its internal guidelines	Completed
1-3. To give advice to IRESCO on strengthening intuitional capacity	Completed
1-4. To clarify roles and responsibilities of the stakeholders to promote ESCO business.	Not clarified MOE/SATBA and PBO will discuss with other related organizations in Energy Council.

Output 2

Narrative summary	Status
The knowledge and capacity of the government organizations including local authorities and IRESCO for introduction of ESCO projects are strengthened.	Likely to be achieved
Objective Verifiable Indicators	**Status**
2.1. A manual for introduction of ESCO project for government organizations and local authorities is developed	Achieved
2.2. Performance contract models for ESCO project are upgraded.	Achieved
2.3. More than 5 trainings and seminars regarding ESCO project are organized by MOE/SATBA	Achieved
Activities	**Status**
2-1. To develop a manual to introduce ESCO project for government organization buildings.	Completed
2-2. To collect the existing contract models for ESCO project.	Completed
2-3. To develop contract models for ESCO project in building sector in Iran	Completed
2-4. To organize trainings and seminars for ESCOs and government organizations	Completed and to be continued by SATBA SATBA will be responsible for training for government organizations
2-5. To introduce policies, legislations, and finance mechanisms for EE&C and ESCO project for building sector in Japan	Completed

Table 3-2-2-1. Seminar/Workshop organized during the Project period

	Date	Title	Number of participant	Remarks
1	15/03/2014	Workshop on JICA ESCO project	30	
2	22/04/2014	1st JICA workshop	55	90* including project staff
3	23/11/2015	2nd JICA workshop	80	Presented in Power system conference at SATBA
4	15/04/2016	Workshop on JICA ESCO project	15	
5	10/05/2017	ESCO fund seminar	60	
6	03/07/2018	3rd JICA workshop	50	Report of performance of ESCO pilot projects

Output 3

Narrative summary	Status
The ESCO pilot projects are implemented in government’s buildings for development of ESCO business.	Likely to be achieved
Objective Verifiable Indicators	**Status**
3.1. More than 50 candidate buildings are selected by MOE/SATBA	Achieved
3.2. Energy Audit with walk-through is conducted at more than 5 candidate buildings by more than 5 ESCOs.	Achieved
3.3. Proposals of ESCO pilot project are submitted by at least 4 ESCOs and at least 2 are approved by MOE/SATBA	Achieved
3.4. At least, 2 ESCO pilot projects are launched	Achieved
3.5 Monthly performance reports are submitted at least 3 times by ESCO, and analyzed by MOE/SATBA (supported by JICA experts)	Likely to be achieved ESCO submitted monthly performance report. MOE/SATBA will review the report.
3.6. Performance reports including one-year performance activities are submitted for at least 2 pilot projects by ESCOs, and approved by MOE/SATBA (after JICA project period)	Not achieved ESCO will prepare the report of one-year performance activities. MOE/SATBA will approve the report after verification.
Activities	**Status**
3-1. To select the candidate buildings for energy audit	Completed
3-2. To supervise the energy audit with work-through by ESCOs at the candidate buildings	Completed
3-3. To support ESCOs in planning the pilot projects.	Completed
3-4. To supervise and monitor the pilot projects implemented by ESCOs	On-going MOE/SATBA should monitor the pilot projects continuously at least one year.
3-5. To analyse monthly performance data of pilot projects submitted by ESCOs.	Not completed MOE and SATBA should analyze and evaluate the report, and share with stakeholders of the Projects.

Output 4

Narrative summary	Status
Policy recommendation for the promotion of ESCO business is formulated.	Not Achieved MoE and PBO will discuss with other related organizations in energy council.
Objective Verifiable Indicators	**Status**
Policy recommendation and ESCO business model submitted by MOE/SATBA to Iranian government for decision making (after JICA project period)	Not Achieved MOE/SATBA and PBO will discuss with other related organizations in Energy Council.
Activities	**Status**
4-1. To review the project activities and results including seminars, manuals,_performance of pilot projects	Implemented at 3rd WS MOE and SATBA should monitor the pilot projects continuously at least one year.
4-2. To abstract issues and identify possible measures to promote ESCO projects in Iran	Recommended by MOE/SATBA and JICA experts at WS and JCC.
4-3. To submit the recommendation to the last JCC meeting (during the JICA project period)	Recommended by MOE/SATBA and JICA experts at WS and JCC.
4-4. To formulate a policy recommendation for promotion of ESCO projects in building sector in Iran.	Recommended by MOE/SATBA MOE/SATBA and PBO will discuss with other related organizations in Energy Council.
4-5. To submit the recommendation to Iranian government. (after JICA project period)	MOE will make policy recommendations to Iranian government in the future.

Attachment 7

Work Shop

(First Work shop, second Work shop, and third Work shop)

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings In the Islamic Republic of Iran

Outline of the Project

ESCO Business Promotion in Japan

April 22, 2014
JICA Project Team

Outline of the Project

The Project on Implementation of Pilot Projects to Introduce ESCO for Government's Buildings In the Islamic Republic of Iran

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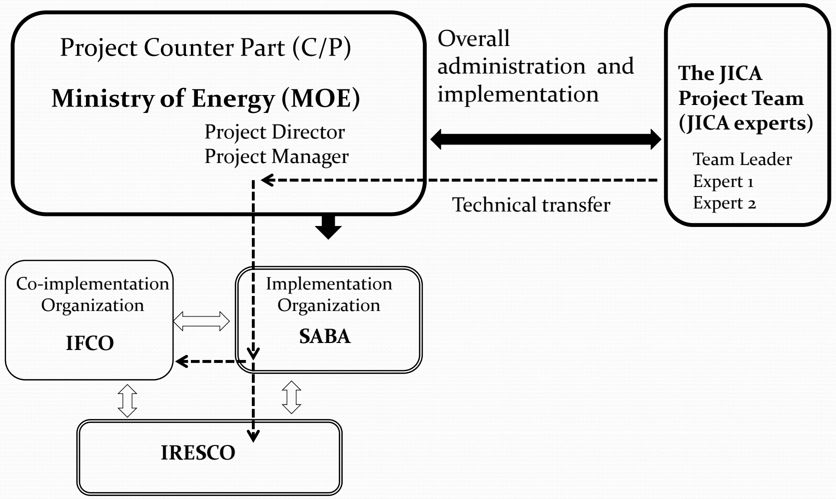
Goal of the Project

EE&C in the building sector will be promoted through the introduction of ESCO for Government buildings.

Organization of the Project Operation



Project Counter Part (C/P)

Ministry of Energy (MOE)

Project Director
Project Manager

Overall administration and implementation

The JICA Project Team (JICA experts)

Team Leader
Expert 1
Expert 2

Technical transfer

Co-implementation Organization

IFCO

Implementation Organization

SABA

IRESCO

JICA Experts

Name	Position
Tsutomu MORI	Team Leader, ESCO framework
Hideaki KUROKI	Energy audit engineer (Heat)
Yoichi KITA	Energy audit engineer (Electricity)

Activities of the Project

- Implementation of pilot ESCO projects for Government's buildings

- ESCO model contracts
- Manuals and procedures to introduce ESCO
- Capacity development

Recommendations to promote ESCO business in Iran

ESCO Business Promotion in Japan

Background of ESCO business in Japan

1996	Start of study on ESCO business at ESCO committee in EECJ under METI
1998	Preparation of ESCO model contract
1999	Developing a guideline of measuring, verification for monitoring of ESCO
1999	Establishment of Japan ESCO Association by 16 members
2001	1st ESCO Project for Government's facility in Osaka

Background of ESCO business in Japan

2001	ESCO promotion plan in National Energy Efficiency and Conservation Policy
2003	Start of subsidy program for ESCO PJT by Energy Authority (1/3 of total PJT cost)
2004	Preparation of ESCO implementation guideline for government sector
2006	Start of awards program for good practice ESCO PJTs

Action Plan for ESCO Promotion in Japan

I. Policy and Action Plan

II. Support for developing ESCO market

III. Establishment of ESCO Association

IV. Capacity development

V. Promotion and awareness campaign

VI. ESCO implementation for government's buildings

Action Plan for ESCO Promotion in Japan

I. Policy and Action Plan

(Cabinet, METI, Resources and Energy Agency)

- Act on Promotion of Global Warming Countermeasures
- Act on Relational Use of Energy
- Action Plan for Energy Efficiency and Conservation (EE&C)
- Target of ESCO promotion in (EE&C)

Action Plan for ESCO Promotion in Japan

II. Support for developing ESCO market

(METI, Resources and Energy Agency, EECJ)

- Study of the market of ESCO business
- Feasibility Study of ESCO
- Supporting Programs for ESCO Promotion
- Implementation of the Pilot Project

Action Plan for ESCO Promotion in Japan

III. Establishment of ESCO Association

(METI, Resources and Energy Agency)

- Japan Association of ESCO(JAESCO)
- Advancement of ESCO Association

Action Plan for ESCO Promotion in Japan

IV. Capacity development

(METI, Resources and Energy Agency)

- Developing a guideline of measuring and verification for monitoring of ESCO PJT
- Preparation of ESCO model contract

Action Plan for ESCO Promotion in Japan

V. Promotion and awareness campaign

(ECCJ, JAESCO)

- Seminar of ESCO business for facility owner
- Presentation at Exhibitions
- Awards program for good practice ESCO PJTs

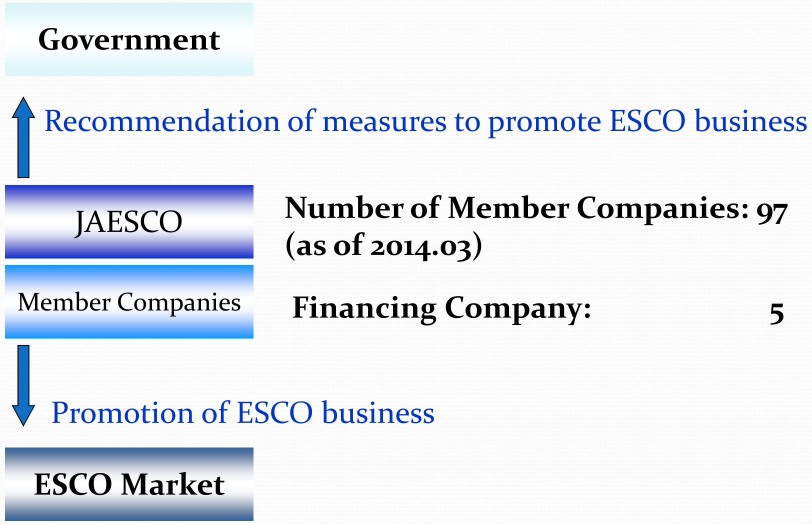
Action Plan for ESCO Promotion in Japan

VI. ESCO implementation for government's buildings

(METI, MLIT, Municipality)

- Preparation of ESCO implementation guideline for government sector
- Feasibility Study for ESCO in government sector
- Amendment of public procurement law

Japan Association of ESCO (JAESCO)



Government

Recommendation of measures to promote ESCO business

JAESCO

Member Companies

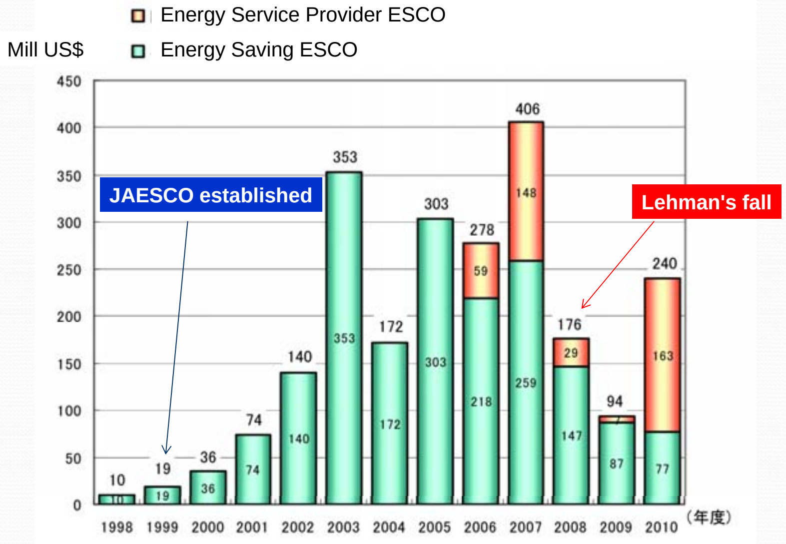
Number of Member Companies: 97 (as of 2014.03)

Financing Company: 5

Promotion of ESCO business

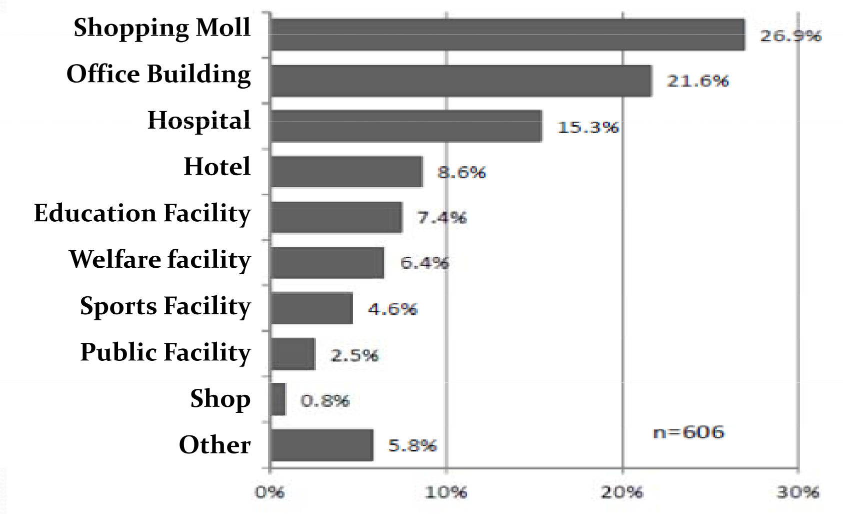
ESCO Market

ESCO Market in Japan (1998-2010)



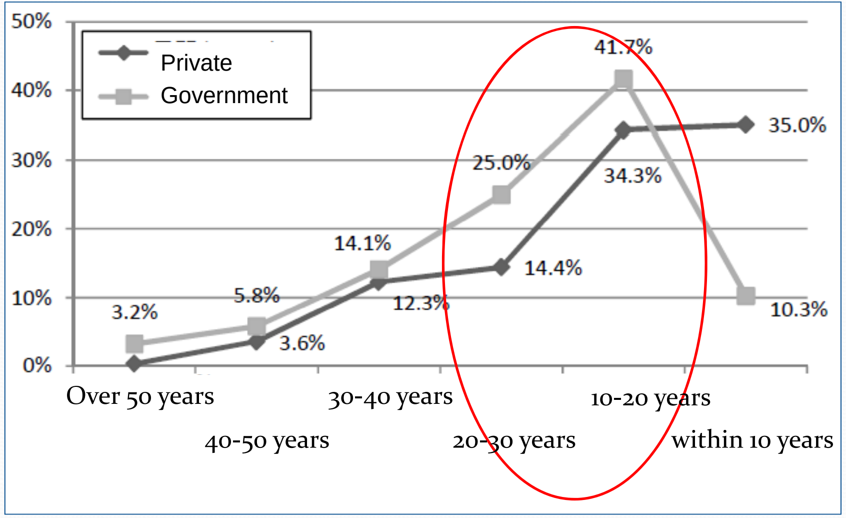
ESCO Market in Japan (2010)

Building Sector



ESCO Market in Japan (2010)

Building Sector



Next Presentations

Supporting Program related ESCO and EE&C in Japan

By Mr. Kita

Introduction of Practices related ESCO in Japan

By Mr. Kuroki

Supporting Program related ESCO and EE&C in Japan

ESCO Support

→（Legal framework）
→（Financial support）
→（Others）

Basic Act on Energy Policy（1/2）

- Formula of a basic plan on energy supply and demand
- To promote measures on energy supply and demand on a long-term, comprehensive and systematic basis by laying down the basic policy

---

Basic Act on Energy Policy（2/2）

1. Securing of stable supply
2. Environmental suitability
3. Utilization of market mechanisms
4. Responsibilities of the State
5. Responsibilities of local public entities
6. Responsibilities of business operators
7. Role of citizens
8. Mutual cooperation
9. Basic Energy Plan
10. Promotion of international cooperation
11. Dissemination of knowledge regarding energy

Development of the Strategic Energy Plan （1/2）

- Strategic Energy Plan is formulated in order to promote measures on energy supply and demand on a long-term, comprehensive and systematic basis.
- Strategic Energy Plan is based on “Basic Act on Energy Policy” Article 12 concluded in June, 2002

1. Basic policy about the measures
2. The measure that it is long-term and should take generally and premeditatedly
3. Research and development
4. Others

Development of the Basic Energy Plan（2/2）

2. Measures that should be taken in relation to energy supply and demand on a long-term, comprehensive and systematic basis

（1）Promotion of measures for Energy Demand

- **〔1〕Promotion of energy-saving measures and Formation of the economy, the social structure of the resources saving type**
  - （a）**Measures for** business operations and civilian sectors
    - **Energy demand management by using “Act on the Rational Use of Energy” and/or ESCO business**
  - （b） Measures in the transportation sector
  - （c） Measures in the industrial sector
  - （d） **cross-sectional** sector
- **〔2〕**Load leveling measures

Environmental consideration contract law （1/3）

The Law concerning the Promotion of Contracts Considering Reduction of Emissions of Greenhouse Gases and Others by the State and Other Entities

Contracts for procurement of products and services lessen the environmental impact

Green Contract law was established in 2007 to promote a green contract.

Environmental consideration contract law （2/3）

Article 5 (basic policy)

2. Basic policy defines the following matters

3) Energy efficiency improving project（ESCO services promise the performance of recovery of the cost for investment for EE&C project by savings of electricity, fuel etc.

Environmental consideration contract law（2/3）

[Main point of contract for Energy efficiency improving project]

1. Introduction of ESCO projects
（1）Need for Energy efficiency improving project
（2）how to use this commentary document
（3）ESCO project
2. Introduction planning
（1）Introduction procedure for ESCO projects（Planning stage）
（2）Long-term operation plan
（3）Feasibility study of ESCO project
（4）Judgment of the propriety of the ESCO projects
（5）Procedure for budget for ESCO projects
（6）Bidding plan for ESCO project
3. Selection of ESCO Business Operator

ESCO Support（Financial support）

→ Subsidy
→ Loans (long-term, low-interest)
→ Interest subsidies
→ Tax break system by Depreciation, etc.

Support for ESCO business in 2003

●Energy use rationalization company Subsidy program [12,300 million yen]

●House, building high efficiency energy system introduction promotion Subsidy program [13,400 million yen]

Energy use rationalization company Subsidy program

Control: Ministry of Economy, Trade and Industry
Budget: 31 billion yen (2013)
Object: Industry, latest energy saving facilities introduction assistance rate, the supporting range of the field of duties: Within 1/3, the facilities cost of construction (facilities repair costs, measurement costs)
Ceiling: 5 billion yen/
A target company: The building masters who perform energy saving repair business (including an ESCO company, a lease company, the energy service company)

Building energy saving promotion subsidy program

Control: Ministry of Land, Infrastructure and Transport
Object: Building (non-house)
Assistance rate: Within 1/3, the construction cost of construction (skeleton repair costs, facilities repair costs, measurement costs)
Ceiling: The company which is targeted for 50 million yen (as for the expense required for house facilities to 25 million yen): As for the building masters performing energy saving repair business, it is requirements of the business (including an ESCO company, a lease company, the energy service company)
Requirements：①～⑤

Loans (long term, low interest)

Financing system name: Environment and Energy measures fund
Enforcer: Japan Finance Corporation
Target project：Energy efficient facilities introduction PJ. (including the person to lease the facilities concerned by ESCO business, and to rent):
Interest rate: 1.0% - 2.0% a year up to 270 million yen
1.65% - 2.65% a year of more than 270 million yen

Interest subsidies

◆Target business

Energy use rationalization–related specific facilities including the fund interest supply money (the 510 million yen (H21) year)

(1) Target business

I supply it with Toshiko to assume the financing for the following energy–saving measures allied enterprises a low interest.

①Energy saving measures business

・Business to affect the energy saving of the building which is necessary for achievement of plan that the installers such as an office building, a department store, the hotel make based on the energy saving method

②Energy saving promotion business according to the industrial section

・Business (things identified for energy use efficiency 10% improvement or an approval business plan) that reduction of energy equivalent to than 100 kl of annual crude oil conversion is enabled

③Building energy saving promotion business

・Repair business to contribute to an energy saving performance gain (limited to ESCO business, ESP business.)

(2) Supporting target person, private company

Interest supply rate, 1.0%

Tax break system by Depreciation, etc.

[corporation tax / income tax]
When I do the acquisition of energy saving facilities and offer it for one of business, I apply the special measurement of repayment (special depreciation) or 5% of tax credit immediately (as for the building, 3% of constructs)

Resources for the energy saving

→ Structure of special account for Energy
(Accounts for supply and demand of energy)
527 billion yen（2010）

→ Structure of special account for Energy
(Accounts for promotion of power)
346 billion yen（2010）

The Project on Implementation of Pilot Projects
to Introduce ESCO for Government's Buildings
In the Islamic Republic of Iran

Introduction of experience related ESCO implementation in Japan

April 22, 2014
JICA Project Team

Agenda

1. Best Practice in ESCO Gov's Bldg. in Japan
2. Difference between Gov and Private
3. Procedure of ESCO for Gov's Bldgs. in Japan
4. Manual in ESCO for Gov's Bldgs. in Japan

Best Practice in ESCO for Gov's Bldg. in Japan

- **Name of Building:** Osaka medical center and Research Institute for Matemal and Child Health
- **Construction year:** October, 1981
- **ESCO Implementation year:** April, 2002
- **Summary of building:**

Building Usage	Hospital
Number of bed	363 beds
Number of Stuff	634 persons
Floor area	36,000m2

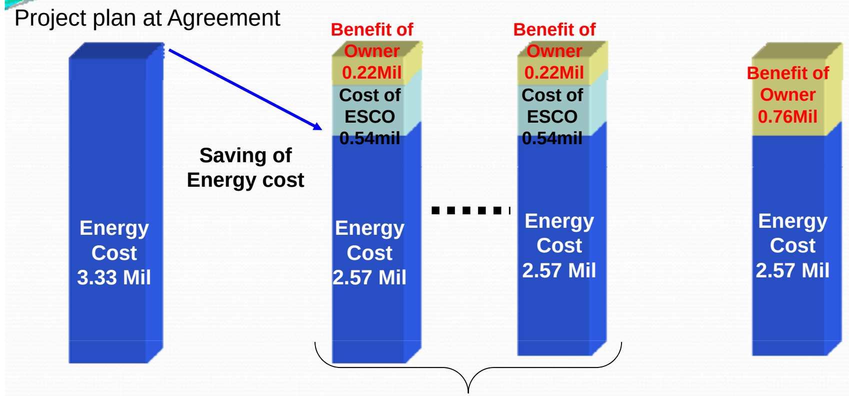
- **Energy consumption:**

Electric	10,698,000kWh(annual)
Natural Gas	2,113,000Nm3(annual)
Water	159,000m3(annual)

(in average during 3 years from FY1998 to FY 2000)

- **Energy cost:** 3.3 3million USD (1USD=100JPY)

Best Practice in ESCO for Gov's Bldg. in Japan



Target Cost Reduction	0.76Mil USD annual
Actual Cost Reduction	0.94Mil USD annual (average until 11th years) 10.3Mil USD total(until 11th years)
Target Energy reduction	24.8%
Actual Energy reduction	20.6%

Best Practice in ESCO for Gov's Bldg. in Japan

Their challenge;

1. No experience
   - (1)New business model,
   - (2)In addition, biding framework on governmental body
2. Existing law and act
   - (1)Construction industry Act,
   - (2)Circular Notice (prohibition for progressive payment to governmental body)

Best Practice in ESCO for Gov's Bldg. in Japan

Their fruits;

1. Existing law and act

   Clarification of Legal interpretation,

   "ESCO is Service business"
2. Manual

   Guideline (Procedure)

   Standard Contract

Difference between Gov and Private

At First Government, Then Private;

In order to develop new business model, through implementation of pilot project, obtaining knowledge about measures.

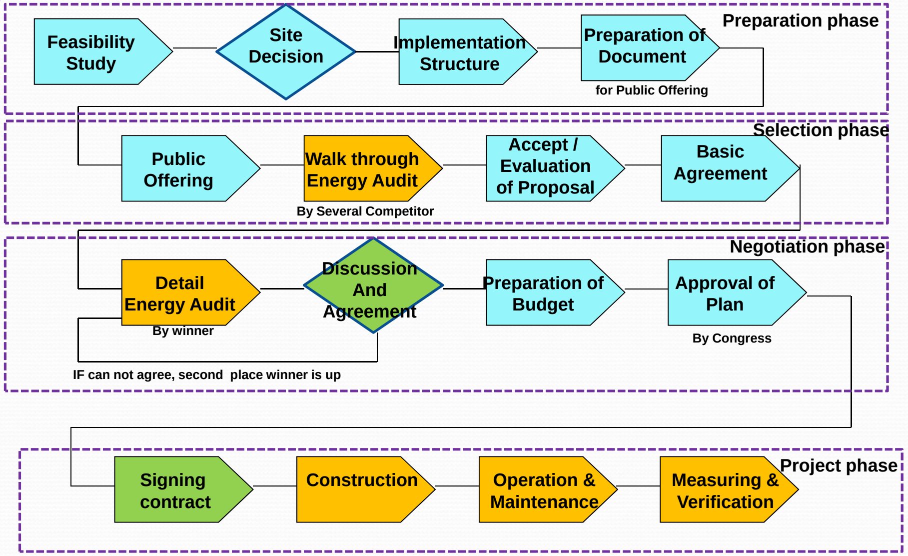
Advantage of Gov.	Disadvantage of Gov.
1.Risk acceptable 2.Sharing knowledge	1.Cumbersome procedure

Procedure of ESCO for Gov's Bldgs. in Japan

Public offering Proposal, as alternative to bid;

	Proposal in Japan	Bidding in Japan
Participate	Submitting proposal according to field finding on walk through	Submitting bid value according to bid document
Evaluation Policy	Evaluating entire proposal	Evaluating just cost
EE & C Design	Doing design after proposal competition	Done
Budget	Promised procurement	Prepared due to design
Advantage	The most desirable proposal is acceptable. It is possible to modify proposal due to field finding.	Easy procedure, because it is conventional method.
Disadvantage	Cumbersome procedure	Limitation by budget It is impossible to modify bidding value . Difficult Energy Performance Contract

Procedure in ESCO for Gov's Bldgs. in Japan



Preparation phase

Feasibility Study

Site Decision

Implementation Structure

Preparation of Document

for Public Offering

Selection phase

Public Offering

Walk through Energy Audit

By Several Competitor

Accept / Evaluation of Proposal

Basic Agreement

Negotiation phase

Detail Energy Audit

By winner

Discussion And Agreement

Preparation of Budget

Approval of Plan

By Congress

IF can not agree, second place winner is up

Project phase

Signing contract

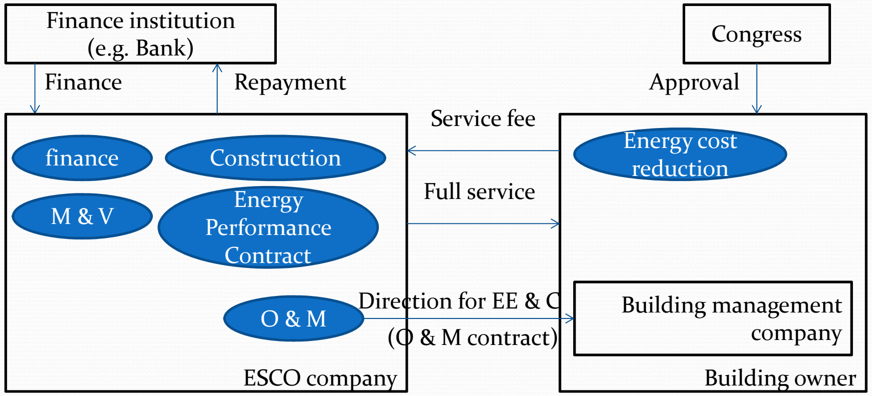
Construction

Operation & Maintenance

Measuring & Verification

Procedure in ESCO for Gov's Bldgs. in Japan

Basic Scheme



Finance institution (e.g. Bank)

Finance

Repayment

Congress

Approval

Service fee

Full service

finance

Construction

M & V

Energy Performance Contract

O & M

Energy cost reduction

Direction for EE & C

(O & M contract)

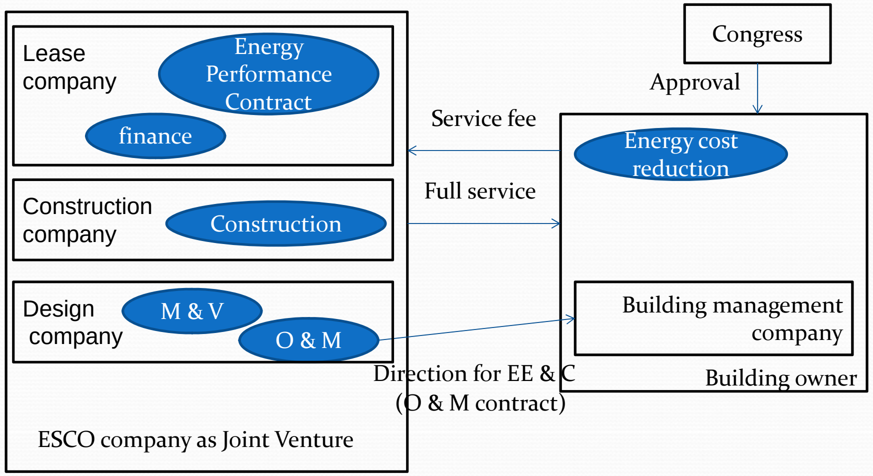
Building management company

ESCO company

Building owner

Procedure in ESCO for Gov's Bldgs. in Japan

Example scheme



Lease company

Energy Performance Contract

finance

Construction company

Construction

Design company

M & V

O & M

ESCO company as Joint Venture

Congress

Approval

Service fee

Full service

Energy cost reduction

Building management company

Building owner

Direction for EE & C

(O & M contract)

Procedure in ESCO for Gov's Bldgs. in Japan

Evaluation of Proposal

Not only cost, evaluating proposal from multiple points

Item (abstract for sample)	Evaluation value(example)	Weight coefficient
Energy Reduction	Scored 5 point to best proposal, then scored proportional value to others	5
CO2 Reduction	Ditto	5
Sum of owner's gain during life cycle of ESCO equipment	Ditto	5
Feasibility of using building during construction period	Scored on a 1 to 5 basis, and scored 5 point to excellent proposal	4
Reliability to financial plan	Ditto	4
Reliability to technical view	Ditto	4
Attention to safety	Ditto	4

⋮

Sub-score in each item =Evaluation value x Weight coefficient

Procedure in ESCO Gov's for Bldgs. in Japan

Risk allocation

At each period during ESCO service, variable risk occur

Period	Item (abstract for sample)	Case	Owner	ESCO
Common	Shortage of ESCO performance	Shortage of agreed ESCO performance in contract		a
	Stop or Postpone of Project	By owner side reason	a	
		By ESCO side reason		a
	Alteration of social institution	Law and Act, Approval, Tax	a	a
Design	Force Majeure	Disaster	a	b
	Price alteration	Deflation and inflation rapidly	a	a
	Design alteration	By owner side reason	a	
		By ESCO side reason		a
Construction	Restitution to a third party	Incident, Invading right and possession		a
	Construction postpone	By owner side reason	a	
		By ESCO side reason		a

⋮

a: duty taker, b: partially duty taker

Manual in ESCO for Gov's Bldgs. in Japan

Guideline (document of reviewed procedure)

1. What is ESCO?
2. Difference between ESCO and conventional construction
3. Procedure
4. ESCO scheme
5. Subsidy
6. Risk allocation

Manual in ESCO for Gov's Bldgs. in Japan

Standard contract

1. Summary of contract
2. Obligation both owner and contractor
3. Baseline, Modification of Baseline
4. Effect of ESCO implementation
5. Account methodology of ESCO fee
6. Invoice and Payment
7. Possession transfer
8. Limitation and Prohibition, Rescission

Manual in ESCO Gov's for Bldgs. in Japan

Energy management plan (attached contract)

Special instruction, as different condition at Each project

Item	Main contents
1. ESCO equipment	Install location, Specification, Number
2. Baseline	Building usage, Floor area, Person in number, Operation hour, Operation season, Operation temperature
3. Methodology of O & M	Scope, Operation hour, Operation season, Operation temperature, Maintenance cycle, Case of out of order
4. Methodology of M & V	Measuring point, methodology, amendment

Thank you, Your attention！

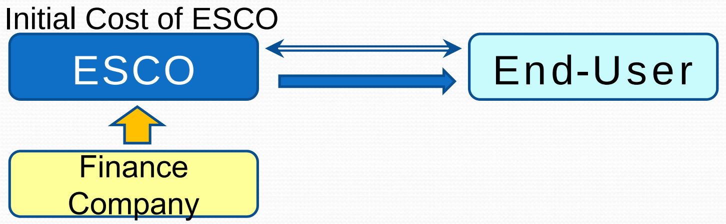
The Project on Implementation of Pilot Projects
to Introduce ESCO for Government's Buildings
In the Islamic Republic of Iran

ESCO Finance Scheme in Japan

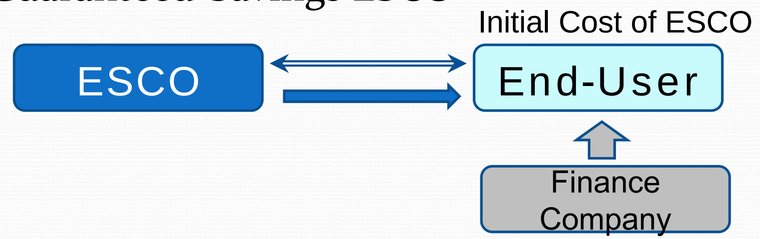
November 23, 2015
JICA Project Team

ESCO

Shared-Savings ESCO


Initial Cost of ESCO

Guaranteed-Savings ESCO


Initial Cost of ESCO

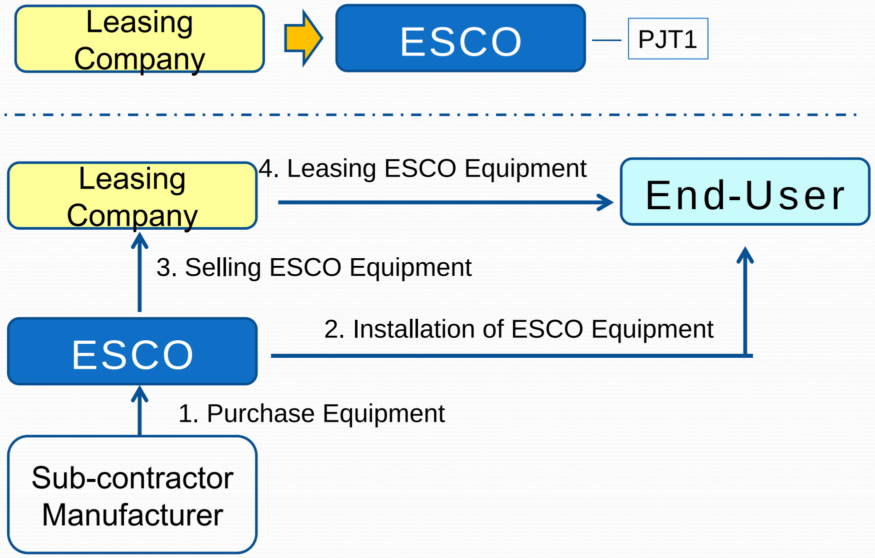
Finance for ESCO

1. Corporate Finance

2. Project Finance

3. Leasing

Finance for ESCO (Leasing Scheme)



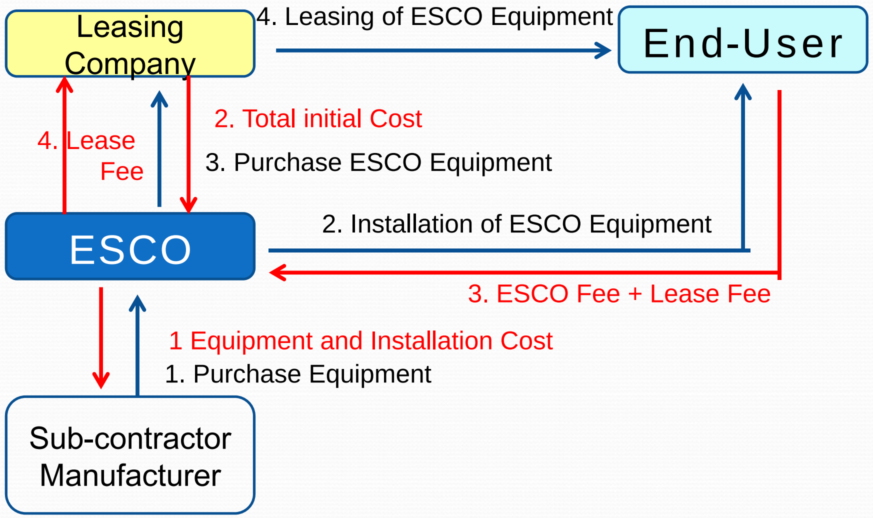
4. Leasing ESCO Equipment

3. Selling ESCO Equipment

2. Installation of ESCO Equipment

1. Purchase Equipment

Finance for ESCO (Leasing Scheme)



Leasing Company

4. Leasing of ESCO Equipment

End-User

4. Lease Fee

2. Total initial Cost

3. Purchase ESCO Equipment

ESCO

2. Installation of ESCO Equipment

3. ESCO Fee + Lease Fee

1 Equipment and Installation Cost

1. Purchase Equipment

Sub-contractor Manufacturer

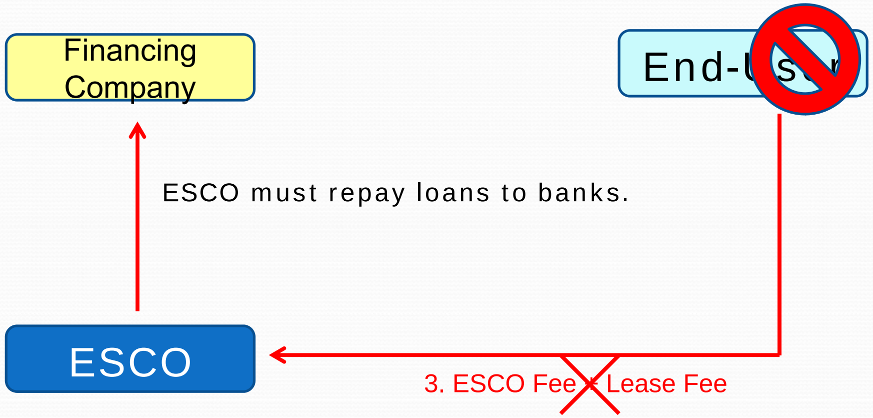
Finance for ESCO

	Project Finance	Corporate Finance	Leasing
Interest	3-4%	2-3%	4-6%
Period	5-20 years		3-10 years
Budget	over 10 mil. US$		Under 5 mil. US$
Credit decisions	Feasibility of the Project	ESCO	ESCO End-User
Owner of ESCO Equipment	ESCO	ESCO	Leasing Company (*)

(*) Property tax and machine insurance are including in lease fee.

Key Point of Leasing Scheme

Business failure of End-User
(Financing Scheme)



Financing Company

End-User

ESCO must repay loans to banks.

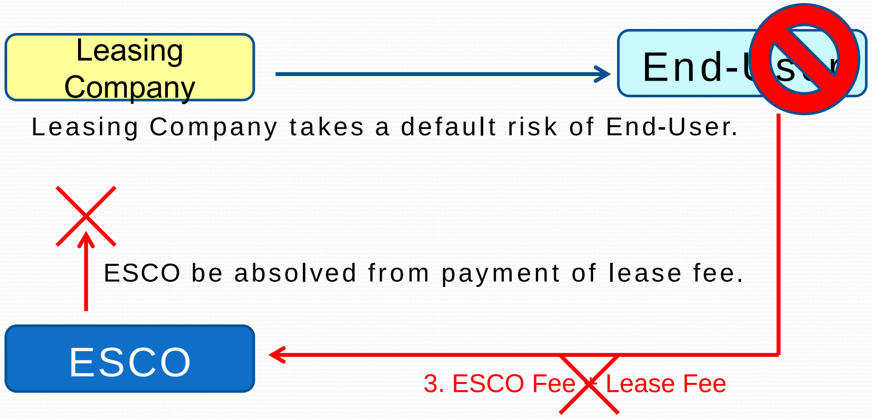
ESCO

3. ESCO Fee + Lease Fee

ESCO takes a failure risk of End-User.

Key Point of Leasing Scheme

Business failure of End-User
(Leasing Scheme)



Leasing Company

End-User

Leasing Company takes a default risk of End-User.

ESCO be absolved from payment of lease fee.

ESCO

3. ESCO Fee + Lease Fee

ESCO of Leasing Scheme (1)

ESCO

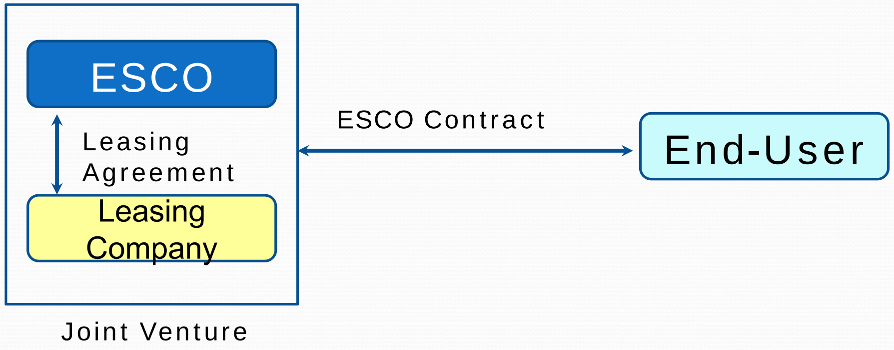
ESCO Contract

End-User

Leasing Agreement

Leasing Company

ESCO of Leasing Scheme (2)



ESCO

Leasing Agreement

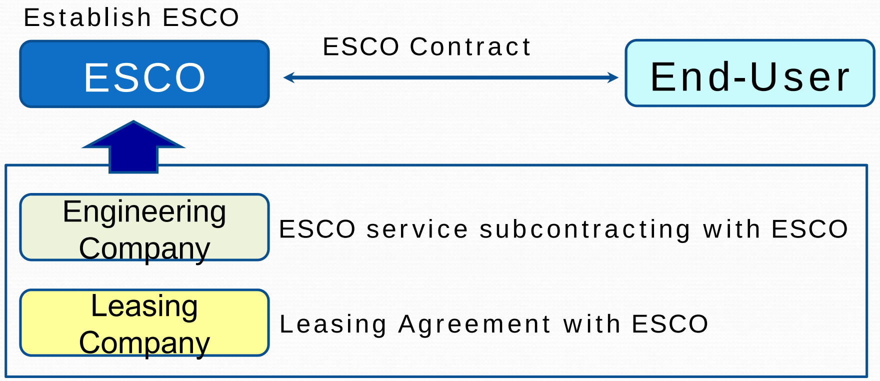
Leasing Company

ESCO Contract

End-User

Joint Venture

ESCO of Leasing Scheme (3)



Establish ESCO

ESCO

ESCO Contract

End-User

Engineering Company

ESCO service subcontracting with ESCO

Leasing Company

Leasing Agreement with ESCO

Japan Association of ESCO (JAESCO)

Government

Recommendation of measures to promote ESCO business

JAESCO

Member Companies

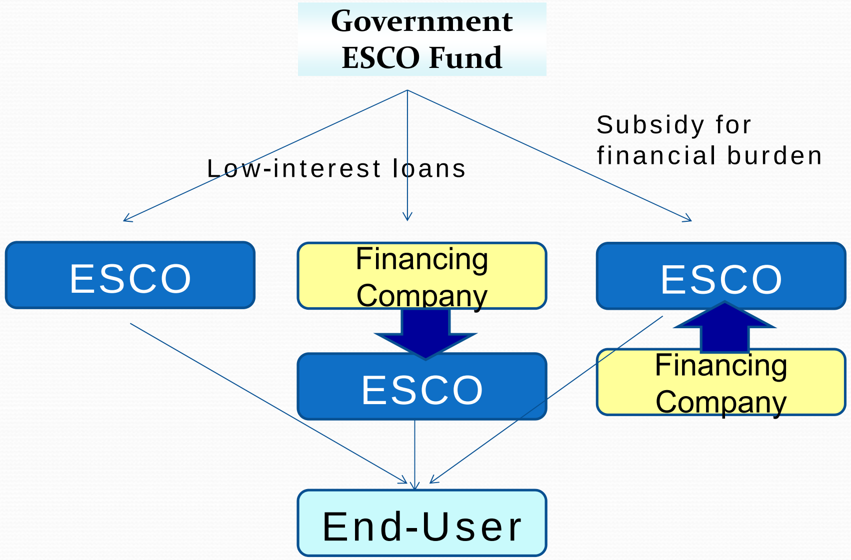
Number of Member Companies: 83
(as of 2015.03)

Financing Company: 5

Promotion of ESCO business

ESCO Market

ESCO Fund



Government ESCO Fund

Low-interest loans

Subsidy for financial burden

ESCO

Financing Company

ESCO

ESCO

Financing Company

End-User

END

Thank you for your attention.

JICA Study Team

The Project on Implementation of Pilot Projects
to Introduce ESCO for Government's Buildings
In the Islamic Republic of Iran

Introduction of success practice and new ESCO scheme in Japan

November 23, 2015
JICA Project Team

Agenda

1. Success Practice

2. New ESCO scheme

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1. Success Practice

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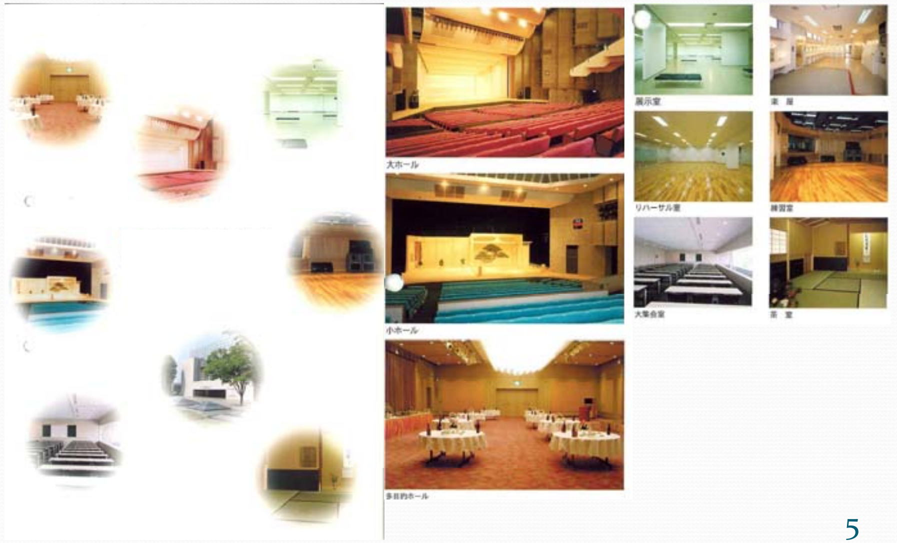
1. Success Practice – Building Summary

Basic information

Building usage: Cultural (Theater, convention)
Floor area: 20,873m2
Operation day: 305 days (non-working: Monday)
Construction year: 21 years after completion
Energy consumption:
  Electric power, approx. 2,400,000 kWh/annual
  Gas, approx. 123,000m3/annual
  Water, approx. 19,000m3/annual
Main user: Citizen (by application)
Contract type: Guaranteed type

1. Success Practice – Building summary

Picture of building



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1. Success Practice – Technical proposal

Summary of optimized EE&C

Summary - 1

a. Table of opted EE&C technique (1USD=120JPY)

Item	Current amount of consumption of Electric power, Gas, Oil, Water		Energy consumption		CO2 Emission		Estimated Energy fee USD/Annual (A)	Investment USD (B)	Pay Back Period Year (B/A)
	Type	Reduction (Unit)	Reduction MJ/Annual	Rate %	Reduction kg-CO$_2$/Annual	Rate %			
Replace the heat source from absorption chiller to heat pump chiller.	Electric	-182,872kWh	3,039,353	10.9%	183,361	15.2%	50,692	687,925	13.6
	Gas	112,034m3							
	Water	2,408 m3							
Introduction of VSD and number control of pumps	Electric	21,772 kWh	212,495	0.8%	7,381	0.6%	2,025	27,042	13.4
Introduction of VSD and number control of fans	Electric	141,805 kWh	1,384,017	4.9%	48,072	4.0%	13,208	197,492	15.0
Introduction of On/Off control of machine room fan	Electric	7,826kWh	76,382	0.3%	2,653	0.2%	725	6,300	8.7
Replace to emergency exit lighting with high efficiency	Electric	44,245 kWh	431,831	1.5%	14,999	1.2%	4,117	82,950	20.1
Replace to CFL lamp	Electric	98,437 kWh	960,745	3.4%	33,370	2.8%	9,167	5,867	0.6
Introduction of electric type ballast	Electric	34,055 kWh	332,377	1.2%	11,545	1.0%	3,175	60,900	19.2
Introduction of On/Off control by moving sensor	Electric	12,511 kWh	122,107	0.4%	4,241	0.4%	1,167	5,692	4.9
Introduction of water saving bulb	Water	1,691 m3	-	-	-	-	10,025	30,625	-
Sum	—	-	6,559,307	23.5%	305,622	25.3%	94,300	1,104,775	11.7

Remark) ESCO competition participant must not mention reduction of energy, CO2 emission, in case that they will optimize proposal for water reduction.

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1. Success Practice – Financial estimation

Financial plan (Construction year to termination year of ESCO project)

	FY Year	1388 Construction	1389 1st	1390 2nd	1391 3rd	1392 4th	1393 5th	1394 6th	1395 7th
In - come	A=I+II	0	94,300	94,300	94,300	94,300	94,300	94,300	94,300
Guaranteed reduction of energy cost	I	-	94,300	94,300	94,300	94,300	94,300	94,300	94,300
Prospected reduction of energy cost	II	-	-	-	-	-	-	-	-
Subsidy	III	-	-	-	-	-	-	-	-
Out - go	B=IV+V+VI	1,137,150	20,283	20,283	20,283	20,283	20,283	20,283	20,283
ESCO service fee I (Design & Construction)	IV	1,137,150	0	0	0	0	0	0	0
Detailed audit	a	5,250	-	-	-	-	-	-	-
Design fee	b	4,375	-	-	-	-	-	-	-
Construction cost	c	1,104,775	-	-	-	-	-	-	-
M&V instrument install cost	d	0	-	-	-	-	-	-	-
Supervisory cost	e	22,750	-	-	-	-	-	-	-
The other	f	0	-	-	-	-	-	-	-
ESCO service fee II (M&V, O&M)	V	0	20,283	20,283	20,283	20,283	20,283	20,283	20,283
Maintenance cost	g	-	12,100	12,100	12,100	12,100	12,100	12,100	12,100
M&V cost	h	-	2,517	2,517	2,517	2,517	2,517	2,517	2,517
Operation cost	i	-	417	417	417	417	417	417	417
The other	j	-	5,250	5,250	5,250	5,250	5,250	5,250	5,250
Payment for O&M by municipality	VI	0	0	0	0	0	0	0	0
O&M		-	-	-	-	-	-	-	-
The other		-	-	-	-	-	-	-	-
Guaranteed benefit of building owner	C=A-B	-1,137,150	74,017	74,017	74,017	74,017	74,017	74,017	74,017

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1. Success Practice – Financial estimation

Financial plan (after termination year of ESCO project)

	FY Year	1396 8th	1397 9th	1398 10th	1399 11th	1400 12th	1401 13th	1402 14th	1403 15th	Total
In - come	A=I+II	94,300	94,300	94,300	94,300	94,300	94,300	94,300	94,300	1,414,500
Guaranteed reduction of energy cost	I	-	-	-	-	-	-	-	-	660,100
Prospected reduction of energy cost	II	94,300	94,300	94,300	94,300	94,300	94,300	94,300	94,300	754,400
Subsidy	III	-	-	-	-	-	-	-	-	
Out - go	B=IV+V+VI	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	1,414,217
ESCO service fee I (Design & Construction)	IV	0	0	0	0	0	0	0	0	1,137,150
Detailed audit	a	-	-	-	-	-	-	-	-	5,250
Design fee	b	-	-	-	-	-	-	-	-	4,375
Construction cost	c	-	-	-	-	-	-	-	-	1,104,775
M&V instrument install cost	d	-	-	-	-	-	-	-	-	0
Supervisory cost	e	-	-	-	-	-	-	-	-	22,750
The other	f	-	-	-	-	-	-	-	-	0
ESCO service fee II (M&V, O&M)	V	0	0	0	0	0	0	0	0	141,983
Maintenance cost	g	-	-	-	-	-	-	-	-	84,700
M&V cost	h	-	-	-	-	-	-	-	-	17,617
Operation cost	i	-	-	-	-	-	-	-	-	2,917
The other	j	-	-	-	-	-	-	-	-	36,750
Payment for O&M by municipality	VI	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	135,083
O&M		19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	135,083
The other		-	-	-	-	-	-	-	-	0
Guaranteed benefit of building owner	C=A-B	74,633	87,300	30,633	87,300	77,550	87,300	87,300	87,300	283

Total building owner (in this case, municipality) could pay back the cost regarding ESCO project.

1. Success Practice – Technical proposal

Summary of ESCO project

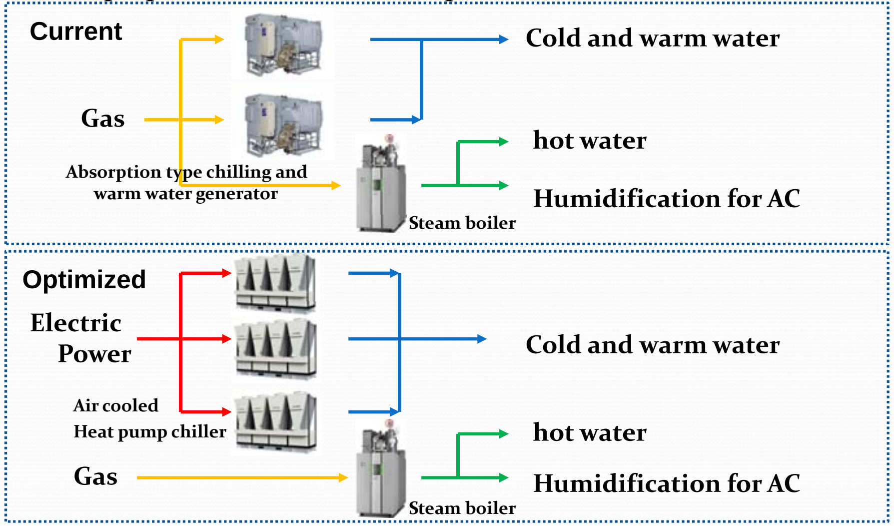
Summary - 2 (Without Subsidy)

ESCO competition participant shall mention Summary of project estimation in entire ESCO project period.

I	Initial ESCO service fee	1,137,150 USD	
II	Presided energy fee reduction	94,300 USD/Annual	
III	Guaranteed energy fee reduction	94,300 USD/Annual	
IV	Annual ESCO service fee	20,283 USD/Annual	
V	Annual Owner share of Guaranteed energy fee reduction	74,017 USD/Annual	III-IV
VI	ESCO service duration	7 years	
VII	Owner share of Guaranteed energy fee reduction in ESCO service duration	518,117 USD	V x VI
VIII	Balance of owner in ESCO service duration	Minus 619,033 USD	I- VII
IX	O&M cost from the date of termination of ESCO contract onward	135,083 USD	
X	Balance of owner from the date of termination of ESCO contract onward	619,317 USD	II x V
XI	Sum of Building owners benefit	284 USD	IV x V

1. Success Practice – Technical proposal

Technical proposal – EE&C method (replace the heat source, as reference)



1. Success Practice – Maintenance

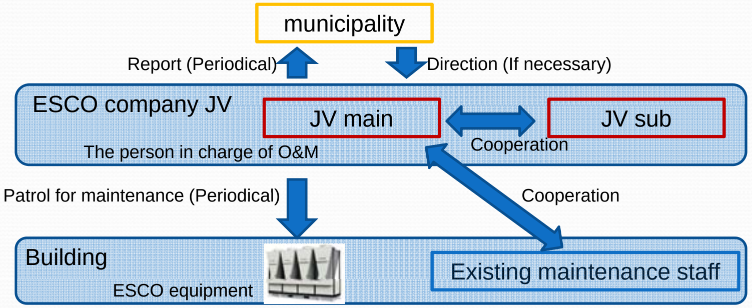
Maintenance proposal

(1) Policy

The person in charge of maintenance who is assigned from ESCO company would make plan.

The appliance with good workability in maintenance would be introduced.

(2) Maintenance organization



1. Success Practice – O&M

Maintenance proposal

(3) Making sure of Maintenance work

Phase	Proposal
At commencement of ESCO project	maintenance management plan (including check list) would be prepared with support of Maintenance expert.
During ESCO project	ESCO company would carry out Maintenance work due to check list.
At termination of ESCO project	ESCO company would carry out audit, then prepare mid-long term Maintenance plan.

(4) Item of Maintenance work

Item	Frequency, specification
Patrol	Freq.: 4 times per annual. (only at initial year, 12 times per annual) Spec.: Periodical check by check list.
heat source	Freq.: 4 times per annual. (2 times before season-in, 2 times under season) Spec.: checking of abnormalities in the heat source record of value at indicator, appearance checking change of chilling/warm operation check of fan and compressor of heat source Especially, compressor overhaul 1 time per 10 year Fan overhaul 1 time per 8 year are recommended. (after termination of ESCO project)

1. Success Practice – O&M

Maintenance proposal

(4) Item of Maintenance work (continued)

Item	Frequency, specification
VSD for pump	Freq.: 4 times per annual. Spec.: checking of abnormalities in the VSD record of value at indicator, appearance checking Especially, exchange of cooling fan for VSD panel 1 time per 4 year exchange of condenser of VSD panel 1 time per 10 are recommended.
VSD for fan and CO2 control	Freq.: 4 times per annual. Spec.: checking of abnormalities in the VSD record of value at indicator, appearance checking Especially, exchange of cooling fan for VSD panel 1 time per 4 year exchange of condenser of VSD panel 1 time per 10 are recommended.
On/Off control of machine room fan	Freq.: 4 times per annual. Spec.: checking of abnormalities in the controller record of value at indicator, appearance checking
Lighting appliance (electronic ballast, CFL, emergency exit lighting)	Freq.: 4 times per annual. Spec.: checking of abnormalities in the mounting situation of lighting appearance checking by On/Off

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1. Success Practice – O&M

Maintenance proposal

(4) Item of Maintenance work (continued)

Item	Frequency, specification
Moving sensor	Freq.: 4 times per annual. Spec.: checking of abnormalities in the mounting situation of lighting appearance checking by On/Off
Water saving bulb	Freq.: 4 times per annual. Spec.: appearance checking

(5) Annual Maintenance cost (During ESCO project)

Item	Cost
Patrol	2,350 USD per annual
Heat source	9,083 USD per annual
VSD	417 USD per annual
Lighting(electronic ballast, CFL, emergency exit lighting)	250 USD per annual
Total	12,100 USD per annual

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1. Success Practice – O&M

Maintenance proposal

(6) Maintenance cost (after termination of ESCO project)

year	Cost
8th year	19,667 USD
9th year	7,000 USD
10th year	63,667 USD
11th year	7,000 USD
12th year	16,750 USD
13th year	7,000 USD
14th year	7,000 USD
15ht year	7,000 USD

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1. Success Practice – O&M

Operation proposal

(1) Item of Operation work

Item	Frequency, specification
heat source	Freq.: 1 time per month Spec.: Record of current value, temperature of chilling & warm water and pressure, checking of abnormalities in the heat source by sounds and smell.
VSD for pump	Freq.: 1 time per month Spec.: Record of current value and pressure, checking of abnormalities in the heat source by sounds and smell.
VSD for fan and CO2 control	Freq.: 1 time per month Spec.: Record of current value and pressure, checking of abnormalities in the heat source by sounds and smell.
On/Off control of machine room fan	Freq.: 1 time per month Spec.: Record of current value and pressure, checking of abnormalities in the heat source by sounds and smell.
The other	Freq.: 4 times per annual Spec.: appearance checking

(2) Annual Operation cost (During ESCO project)

Item	Cost
Operation work	417 USD per annual (ESCO company would entrust to operation work)

1. Success Practice – M&V

Measurement and Verification proposal

(1) Item of Measurement and Verification

Item	Frequency, specification
Heat source	Measurement item: integrated watt hour, operation time of heat source Instruments: ESCO company would install permanently Frequency: periodical within ESCO contract duration
VSD for pump	Measurement item: integrated watt hour, operation time of pumps Instruments: ESCO company would install permanently Frequency: periodical within ESCO contract duration
VSD for fan and CO2 control	Measurement item: integrated watt hour, operation time of fans Instruments: ESCO company would install permanently Frequency: periodical within ESCO contract duration
On/Off control of machine room fan	Measurement item: operation time of fans by data logger of current Instruments: temporary Frequency: first half year only
Lighting appliance (electronic ballast, CFL, emergency exit lighting)	Measurement item: integrated watt hour on the typical point Instruments: ESCO company would install permanently Frequency: only once, at early time of ESCO project
Moving sensor	Measurement item: operation time of fans by data logger of current Instruments: temporary Frequency: first half year only
Water saving bulb	By water consumption notification by water supply company

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1. Success Practice – M&V

Measurement and Verification proposal

(2) Needed instruments and number of them

Instruments type	Number
Integrated watt hour meter	23 (included construction work and cost)
Time meter	20 (included construction work and cost)
data logger of current	6

(3) Annual M&V cost (During ESCO project)

Item	Cost
M&V work	2517 USD per annual

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1. Success Practice – Financial estimation

Financial plan (Construction year to termination year of ESCO project)

	FY	1388	1389	1390	1391	1392	1393	1394	1395
	Year	Construction	1st	2nd	3rd	4th	5th	6th	7th
In - come	A=I+II	0	94,300	94,300	94,300	94,300	94,300	94,300	94,300
Guaranteed reduction of energy cost	I	-	94,300	94,300	94,300	94,300	94,300	94,300	94,300
Prospected reduction of energy cost	II	-	-	-	-	-	-	-	-
Subsidy	III	-	-	-	-	-	-	-	-
Out - go	B=IV+V+VI	1,137,150	20,283	20,283	20,283	20,283	20,283	20,283	20,283
ESCO service fee I (Design & Construction)	IV	1,137,150	0	0	0	0	0	0	0
Detailed audit	a	5,250	-	-	-	-	-	-	-
Design fee	b	4,375	-	-	-	-	-	-	-
Construction cost	c	1,104,775	-	-	-	-	-	-	-
M&V instrument install cost	d	0	-	-	-	-	-	-	-
Supervisory cost	e	22,750	-	-	-	-	-	-	-
The other	f	0	-	-	-	-	-	-	-
ESCO service fee II (M&V, O&M)	V	0	20,283	20,283	20,283	20,283	20,283	20,283	20,283
Maintenance cost	g	-	12,100	12,100	12,100	12,100	12,100	12,100	12,100
M&V cost	h	-	2,517	2,517	2,517	2,517	2,517	2,517	2,517
Operation cost	i	-	417	417	417	417	417	417	417
The other	j	-	5,250	5,250	5,250	5,250	5,250	5,250	5,250
Payment for O&M by municipality	VI	0	0	0	0	0	0	0	0
O&M		-	-	-	-	-	-	-	-
The other		-	-	-	-	-	-	-	-
Guaranteed benefit of building owner	C=A-B	-1,137,150	74,017	74,017	74,017	74,017	74,017	74,017	74,017

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1. Success Practice – for reference (subsidy)

Subsidy case (1/3 of construction cost, will come construction year)

Total building owner would get subsidy. in this case, one third of construction cost.

	FY	1388	1389	1390	1391	1392	1393	1394	1395
	Year	Construction	1st	2nd	3rd	4th	5th	6th	7th
In - come	A=I+II	341,000	94,300	94,300	94,300	94,300	94,300	94,300	94,300
Guaranteed reduction of energy cost	I	-	94,300	94,300	94,300	94,300	94,300	94,300	94,300
Prospected reduction of energy cost	II	-	-	-	-	-	-	-	-
Subsidy	III	341,000	-	-	-	-	-	-	-
Out - go	B=IV+V+VI	1,137,150	20,283	20,283	20,283	20,283	20,283	20,283	20,283
ESCO service fee I (Design & Construction)	IV	1,137,150	0	0	0	0	0	0	0
Detailed audit	a	5,250	-	-	-	-	-	-	-
Design fee	b	4,375	-	-	-	-	-	-	-
Construction cost	c	1,104,775	-	-	-	-	-	-	-
M&V instrument install cost	d	0	-	-	-	-	-	-	-
Supervisory cost	e	22,750	-	-	-	-	-	-	-
The other	f	0	-	-	-	-	-	-	-
ESCO service fee II (M&V, O&M)	V	0	20,283	20,283	20,283	20,283	20,283	20,283	20,283
Maintenance cost	g	-	12,100	12,100	12,100	12,100	12,100	12,100	12,100
M&V cost	h	-	2,517	2,517	2,517	2,517	2,517	2,517	2,517
Operation cost	i	-	417	417	417	417	417	417	417
The other	j	-	5,250	5,250	5,250	5,250	5,250	5,250	5,250
Payment for O&M by municipality	VI	0	0	0	0	0	0	0	0
O&M		-	-	-	-	-	-	-	-
The other		-	-	-	-	-	-	-	-
Guaranteed benefit of building owner	C=A-B	-796,150	74,017	74,017	74,017	74,017	74,017	74,017	74,017

1. Success Practice – for reference (subsidy)

Subsidy case (1/3 of construction cost, will come construction year)

	FY	1396	1397	1398	1399	1400	1401	1402	1403	Total
	Year	8th	9th	10th	11th	12th	13th	14th	15th	
In - come	A=I+II	94,300	94,300	94,300	94,300	94,300	94,300	94,300	94,300	1,755,500
Guaranteed reduction of energy cost	I	-	-	-	-	-	-	-	-	660,100
Prospected reduction of energy cost	II	94,300	94,300	94,300	94,300	94,300	94,300	94,300	94,300	754,400
Subsidy	III	-	-	-	-	-	-	-	-	
Out - go	B=IV+V+VI	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	1,414,217
ESCO service fee I (Design & Construction)	IV	0	0	0	0	0	0	0	0	1,137,150
Detailed audit	a	-	-	-	-	-	-	-	-	5,250
Design fee	b	-	-	-	-	-	-	-	-	4,375
Construction cost	c	-	-	-	-	-	-	-	-	1,104,775
M&V instrument install cost	d	-	-	-	-	-	-	-	-	0
Supervisory cost	e	-	-	-	-	-	-	-	-	22,750
The other	f	-	-	-	-	-	-	-	-	0
ESCO service fee II (M&V, O&M)	V	0	0	0	0	0	0	0	0	141,983
Maintenance cost	g	-	-	-	-	-	-	-	-	84,700
M&V cost	h	-	-	-	-	-	-	-	-	17,617
Operation cost	i	-	-	-	-	-	-	-	-	2,917
The other	j	-	-	-	-	-	-	-	-	36,750
Payment for O&M by municipality	VI	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	135,083
O&M		19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	135,083
The other		-	-	-	-	-	-	-	-	0
Guaranteed benefit of building owner	C=A-B	74,633	87,300	30,633	87,300	77,550	87,300	87,300	87,300	341,283

Total building owner (in this case, municipality) could pay back the cost regarding ESCO project, and obtain much amount of benefit.

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1. Success Practice – for reference (shared)

shared case (ratio of share, ESCO : building owner = 95%:5%)

		ESCO	Owner
Reduction	94,300	89,585	4,715
		95%	5%

	FY	1388	1389	1390	1391	1392	1393	1394	1395
	Year	Construction	1st	2nd	3rd	4th	5th	6th	7th
In - come	A=I+II	0	89,585	89,585	89,585	89,585	89,585	89,585	89,585
ESCO service fee	I	-	89,585	89,585	89,585	89,585	89,585	89,585	89,585
Subsidy	II	-	-	-	-	-	-	-	-
Out - go	B	1,137,150	20,283	20,283	20,283	20,283	20,283	20,283	20,283
Detailed audit	a	5,250	-	-	-	-	-	-	-
Design fee	b	4,375	-	-	-	-	-	-	-
Construction cost	c	1,104,775	-	-	-	-	-	-	-
M&V instrument install cost	d	0	-	-	-	-	-	-	-
Supervisory cost	e	22,750	-	-	-	-	-	-	-
The other	f	0	-	-	-	-	-	-	-
Maintenance cost	g	-	12,100	12,100	12,100	12,100	12,100	12,100	12,100
M&V cost	h	-	2,517	2,517	2,517	2,517	2,517	2,517	2,517
Operation cost	i	-	417	417	417	417	417	417	417
The other	j	-	5,250	5,250	5,250	5,250	5,250	5,250	5,250
benefit (balance) of ESCO company	C=A-B	-1,137,150	69,302	69,302	69,302	69,302	69,302	69,302	69,302

---

1. Success Practice – for reference (shared)

shared case (ratio of share, ESCO : building owner = 95%:5%)

	1396	1397	1398	1399	1400	1401	1402	1403	Total
	8th	9th	10th	11th	12th	13th	14th	15th	
In - come	89,585	89,585	89,585	89,585	89,585	89,585	89,585	89,585	1,343,775
ESCO service fee	89,585	89,585	89,585	89,585	89,585	89,585	89,585	89,585	1,343,775
Subsidy	-	-	-	-	-	-	-	-	
Out - go	27,850	15,183	71,850	15,183	24,933	15,183	15,183	15,183	1,479,683
Detailed audit	-	-	-	-	-	-	-	-	5,250
Design fee	-	-	-	-	-	-	-	-	4,375
Construction cost	-	-	-	-	-	-	-	-	1,104,775
M&V instrument install cost	-	-	-	-	-	-	-	-	0
Supervisory cost	-	-	-	-	-	-	-	-	22,750
The other	-	-	-	-	-	-	-	-	0
Maintenance cost	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	219,783
M&V cost	2,517	2,517	2,517	2,517	2,517	2,517	2,517	2,517	37,750
Operation cost	417	417	417	417	417	417	417	417	6,250
The other	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	78,750
benefit (balance) of ESCO company	61,735	74,402	17,735	74,402	64,652	74,402	74,402	74,402	-135,908

Actually, interest should be imposed.

Total ESCO company could not pay back the cost regarding ESCO project.

---

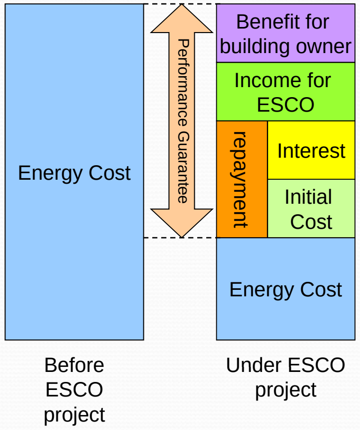
2. New ESCO scheme

New ESCO scheme– Back ground

Old scheme (Conventional ESCO)

One window service, in principal

- All cost should be paid by energy cost reduction
- Performance guarantee
- Comprehensive support
- Measure & Verification



New ESCO scheme– Back ground

New scheme

Flexible combination from 8 services

- EE &C proposal based on energy audit
- Design and/or construction for EE&C
- Operation and Maintenance for EE&C equipment
- Arrangement for optimize energy supply
- Fund purchase for introduction of EE&C equipment
- Performance guarantee of EE&C
- Measurement and Verification for EE&C equipment
- Additional EE&C suggestion based on M&V

New ESCO scheme– Back ground

Why ESCO scheme was changed?

ESCO project of ESCO company viewpoint

- Low ratio of conclusion of contract
- Low contract amount against efforts
- Low benefit, despite implementation of project
- High risk of performance guarantee

Release from original ESCO scheme

- Departure from ESCO under international definition
- To Japanese type ESCO

New ESCO scheme– Replacement type ESCO

Replacement as special requirement from building owner

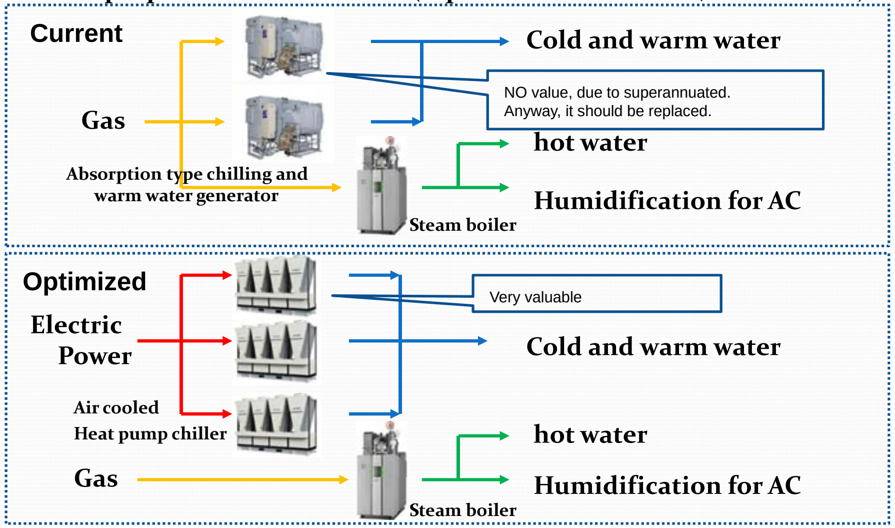
It is unconvinced idea to burden finance risk for replacement of superannuated equipment.

- Whether ESCO company would replace the equipment or not, because of its superannuated, it should be replaced.
- In case that ESCO company would replace as per request from building owner, building owner would get new equipment without their own risk.

As opinion of ESCO company, in case of replacement of superannuated equipment, building owner should burden the cost.

1. Success Practice – Technical proposal

Technical proposal – EE&C method (replace the heat source, as reference)



Current

Gas

Absorption type chilling and warm water generator

Cold and warm water

NO value, due to superannuated.
Anyway, it should be replaced.

hot water

Humidification for AC

Steam boiler

Optimized

Electric Power

Air cooled Heat pump chiller

Very valuable

Cold and warm water

hot water

Humidification for AC

Gas

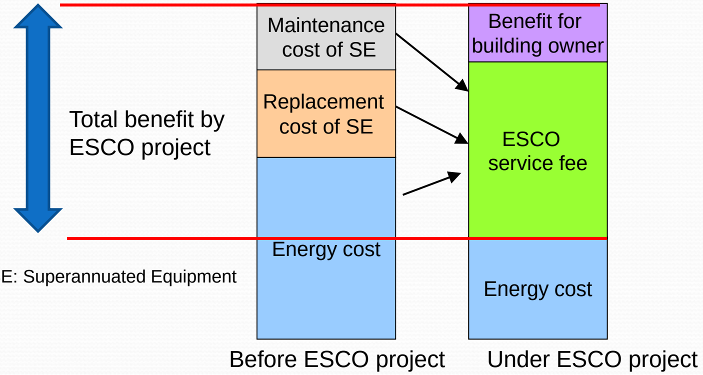
Steam boiler

New ESCO scheme– Replacement type ESCO

Changing Idea against benefit by ESCO project

Source of benefit by ESCO project

- Cost reduction by introduction of EE&C method
- Replacement cost of superannuated equipment
- Maintenance cost of superannuated equipment



Total benefit by ESCO project

Maintenance cost of SE

Replacement cost of SE

Energy cost

Benefit for building owner

ESCO service fee

Energy cost

SE: Superannuated Equipment

Before ESCO project

Under ESCO project

New ESCO scheme– Replacement type ESCO

Sample estimation on the almost same condition of mentioned case

Heat source is NO value, due to superannuated.
Anyway, it should be replaced. Whether ESCO project would carry out or not.

	FY Year	1388 Construction	1389 1st	1390 2nd	1391 3rd	1392 4th	1393 5th	1394 6th	1395 7th
In - come	A=I+II+III+IV+V	0	782,225	94,300	94,300	94,300	94,300	94,300	94,300
Guaranteed reduction of energy cost	I	-	94,300	94,300	94,300	-	-	-	-
Prospected reduction of energy cost	II	-	-	-	-	94,300	94,300	94,300	94,300
Reduction of construction cost for superannuated equipment	III	-	687,925	-	-	-	-	-	-
Reduction of maintenance cost for superannuated equipment	IV	-	-	-	-	-	-	-	-
Subsidy	V	-	-	-	-	-	-	-	-
Out - go	B=VI+VII+VIII	1,137,150	20,283	20,283	20,283	12,100	12,100	12,100	12,100
ESCO service fee I (Design & Construction)	VI	1,137,150	0	0	0	0	0	0	0
Detailed audit	a	5,250	-	-	-	-	-	-	-
Design fee	b	4,375	-	-	-	-	-	-	-
Construction cost	c	1,104,775	-	-	-	-	-	-	-
M&V instrument install cost	d	0	-	-	-	-	-	-	-
Supervisory cost	e	22,750	-	-	-	-	-	-	-
The other	f	0	-	-	-	-	-	-	-
ESCO service fee II (M&V, O&M)	VII	0	20,283	20,283	20,283	0	0	0	0
Maintenance cost	g	-	12,100	12,100	12,100	-	-	-	-
M&V cost	h	-	2,517	2,517	2,517	-	-	-	-
Operation cost	i	-	417	417	417	-	-	-	-
The other	j	-	5,250	5,250	5,250	-	-	-	-
Payment for O&M by municipality	VIII	0	0	0	0	12,100	12,100	12,100	12,100
O&M		-	-	-	-	12,100	12,100	12,100	12,100
The other		-	-	-	-	-	-	-	-
Guaranteed benefit of building owner	C=A-B	-1,137,150	761,942	74,017	74,017	82,200	82,200	82,200	82,200

New ESCO scheme– Replacement type ESCO

Sample estimation on the almost same condition of mentioned case

Anyway, heat source should be maintained periodically in order to keep their capacity. Whether ESCO project would carry out or not.

	FY Year	1388 Construction	1396 8th	1397 9th	1398 10th	1399 11th	1400 12th	1401 13th	1402 14th	1403 15th	Total
In - come	A=I+II+III+IV+V	0	94,300	94,300	94,300	135,967	94,300	94,300	94,300	94,300	2,144,092
Guaranteed reduction of energy cost	I	-	-	-	-	-	-	-	-	-	282,900
Prospected reduction of energy cost	II	-	94,300	94,300	94,300	94,300	94,300	94,300	94,300	94,300	1,131,600
Reduction of construction cost for superannuated equipment	III	-	-	-	-	-	-	-	-	-	
Reduction of maintenance cost for superannuated equipment	IV	-	-	-	-	41,667	-	-	-	-	
Subsidy	V	-	-	-	-	-	-	-	-	-	
Out - go	B=VI+VII+VIII	1,137,150	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	1,381,483
ESCO service fee I (Design & Construction)	VI	1,137,150	0	0	0	0	0	0	0	0	1,137,150
Detailed audit	a	5,250	-	-	-	-	-	-	-	-	5,250
Design fee	b	4,375	-	-	-	-	-	-	-	-	4,375
Construction cost	c	1,104,775	-	-	-	-	-	-	-	-	1,104,775
M&V instrument install cost	d	0	-	-	-	-	-	-	-	-	0
Supervisory cost	e	22,750	-	-	-	-	-	-	-	-	22,750
The other	f	0	-	-	-	-	-	-	-	-	0
ESCO service fee II (M&V, O&M)	VII	0	0	0	0	0	0	0	0	0	60,850
Maintenance cost	g	-	-	-	-	-	-	-	-	-	36,300
M&V cost	h	-	-	-	-	-	-	-	-	-	7,550
Operation cost	i	-	-	-	-	-	-	-	-	-	1,250
The other	j	-	-	-	-	-	-	-	-	-	15,750
Payment for O&M by municipality	VIII	0	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	183,483
O&M		-	19,667	7,000	63,667	7,000	16,750	7,000	7,000	7,000	183,483
The other		-	-	-	-	-	-	-	-	-	0
Guaranteed benefit of building owner	C=A-B	-1,137,150	74,633	87,300	30,633	128,967	77,550	87,300	87,300	87,300	762,608

New ESCO scheme– issue in Iran

Prospected issues

- Fund purchases. (in case of shared type)
- High ratio of interest. (in case of shared type)
- Maintenance of high quality equipment

⬇

Counter measure

- Rising in position of ESCO company
- Fund establishment for ESCO project
- Interest subsidy establishment for ESCO project
- Sharing Maintenance and operation knowledge

New ESCO scheme– Who make scheme

To fruitful ESCO for ESCO company

- For Sustainable,

  ESCO company must obtain appropriate benefit through ESCO project.

ESCO association should act main role

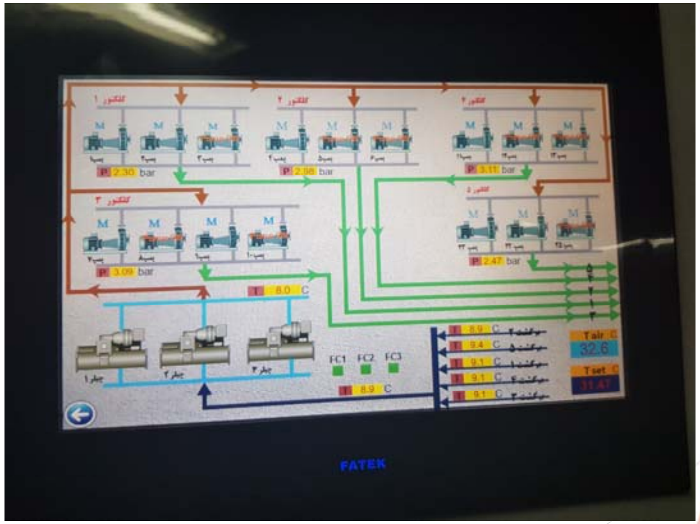
- In Japan experience, JAESCO requested support for promotion of ESCO to government, Government replied opinion from JAESCO.

Khaste nabashi, kheili mamnoon!

ESCO Project at Ministry of Economy Affairs and Finance Building

شرکت مهندسی آسیاوات

جمهوری اسلامی ایران
وزارت امور اقتصادی و دارایی



Electricity Saving at Powerhouse Smart Function Control

1st Report Period	Start date	End date	CDD (C.day)	day	Real Consumption (kWh)	Consumption in Baseline period (kWh)	Saving (kWh)	Saved Amount (IRR)
Bill 1	2017.6.5	2017.7.10	287.1	35	724,000	810,675.2	86,675.19	228,748,226.3
Bill 2	2017.7.10	2017.7.31	171.6	21	448,000	485,414.6	37,414.55	110,707,186.7
Bill 3	2017.7.31	2017.8.30	218.2	30	680,000	Not measured because of approach implementation		
Total	-	-	-	-	1,172,000	1,296,089.7	124,089.7	339,455,413

CDD: Cooling Degree Day. Degree days are based on the assumption that when the outside temperature is 65°F. If the temperature mean is above 65°F, we subtract 65 from the mean and the result is Cooling Degree Days.

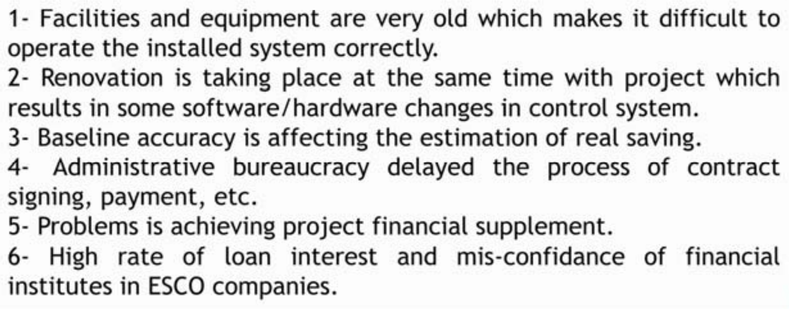
2nd & 3rd Report Period	Start Date	End Date	CDD	Day	Real Consumption (kWh)	Consumption in Baseline Period (kWh)	Saving (kWh)	Saved Amount (IRR)
Bill 2-2	17.10.25	17.11.25	7.3	32	264,000	358,184.69	94,184.69	260,044,672.69
Bill 3-2	17.11.26	17.12.19	0	24	288,000	260,421.36	-27,578.64	-70,356,989.27
Bill 1-3	17.12.20	18.01.17	0	29	324,000	314,675.81	-9,324.19	-24,149,525.5
Bill 2-3	18.01.18	18.02.12	0.2	26	272,000	282,423.31	10,423.31	27,140,240.79
Bill 3-3	18.02.13	18.04.10	10.5	57	524,000	634,259.66	110,259.66	294,652,148.95
Total	-	-	18	168	1,672,000	18,499,643.82	177,964.82	487,330,547.65

Gas Saving at Powerhouse Smart function Control

2nd & 3rd Report Period	Start Date	End Date	CDD	HDD	Real Consumption (m^3)	Consumption in Baseline Period (m^3)	Saving (m^3)	Saved Amount (IRR)
Bill 1-2	17.10.28	17.11.25	7.3	123.3	27,660	48,443.44	20,783.44	60,651,481.61
Bill 2-2	17.11.26	17.12.24	0	424.4	145,714	139,092.27	-6,621.73	-12,378,330.98
Bill 3-2	17.12.25	18.01.21	0	375.5	134,882	123,801.05	-11,080.95	-19,713,565.79
Bill 1-3	18.01.22	18.02.19	0.2	423.3	156,988	138,844.36	-18,143.64	-32,278,435.22
Bill 2-3	18.02.20	18.03.17	0	203.2	70,067	69,922.14	-144.85	-257,695.75
Bill 3-3	18.03.18	18.04.21	10.5	148	25,669	57,704.24	32,035.24	83,045,936.08
Total	-	-	18	168	560,980	577,807.5	16,827.5	79,069,389.95

HDD: Heating Degree Day. If the temperature mean is below 65°F, we subtract the mean from 65 and the result is Heating Degree Days.

Issues and Problems



1- Facilities and equipment are very old which makes it difficult to operate the installed system correctly.
2- Renovation is taking place at the same time with project which results in some software/hardware changes in control system.
3- Baseline accuracy is affecting the estimation of real saving.
4- Administrative bureaucracy delayed the process of contract signing, payment, etc.
5- Problems is achieving project financial supplement.
6- High rate of loan interest and mis-confidance of financial institutes in ESCO companies.

با تشکر

شركت مهندسي آسياوات

A Review on Achievements and Challenges of ESCO Project

In Building of Tehran Power Distribution Company

Energy Service
PISHRUN ENERGY

General Information

Daily working hours: 9 hours	Tehran power distribution Co.
Years from construction of building: 30 years	Usage: administrative
Years from construction of facilities: Cooling, more than 20 years/ heating 3 years,	
Cooling system: 2 compressor chillers (160 ton)	
Heating system: 2 steel boilers (500,000 kcal/h)	
3 floors	Floor area: 6,400 m^2
Heating system: 5.5 months	Cooling system: 4 months
Position: 4 sided	Window type: Single chamber metal
Holiday: system is on 24 hours	Powerhouse: 24 hour working for 121 system and dispatching

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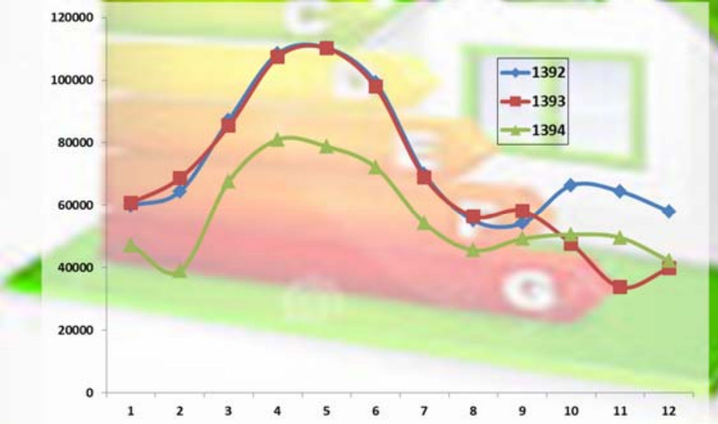
Power consumption status



Basic consumption
(Baseline energy consumption of ?)
63%

Significant decrease in year 1394

Recommended saving approaches

Recommended approaches for energy consumption optimization:

- Separating cooling and heating in 24/7 spaces
- Utilizing smart control system for cooling powerhouse
- Utilizing smart control system for heating powerhouse
- Utilizing radio control for blowing terminals
- Utilizing online monitoring system
- Utilizing inverter and control system on chilled water pump (and building heating)
- Utilizing control system on cooling tower pumps
- Utilizing inverter and control system on cooling tower fan
- Cultural activities

Estimated saving of Energy

Percentage of saving	
Electricity	22% of annual consumption
Gas	40% of annual consumption
Water	666 m^3 of annual consumption

Estimated saving amount based on 3 years average		
Electricity	176,000	kWh
Gas	49,170	m^3

Payback period : 67 months

Main activities & strength points

Measuring average temperature of rooms in 15 critical points average set on: 26.7 C

Utilizing monitoring system for:

- Analysis of quantitative information and providing thermal comfort
- Exploring problems of powerhouse
- Analyzing performance of facilities and providing solution
- Preventing change of control system setting

Implementation phases

Operation

Beginning: 2017.Aug

- Exploring power house's problems & report to client
- Submitting progress reports
- Submitting 2 statement report

Implementation

Beginning: 2017. Jun

- Installing equipment
- Operating solutions
- Exploring optimized setting

End: 2017. Aug

Verification & agreement

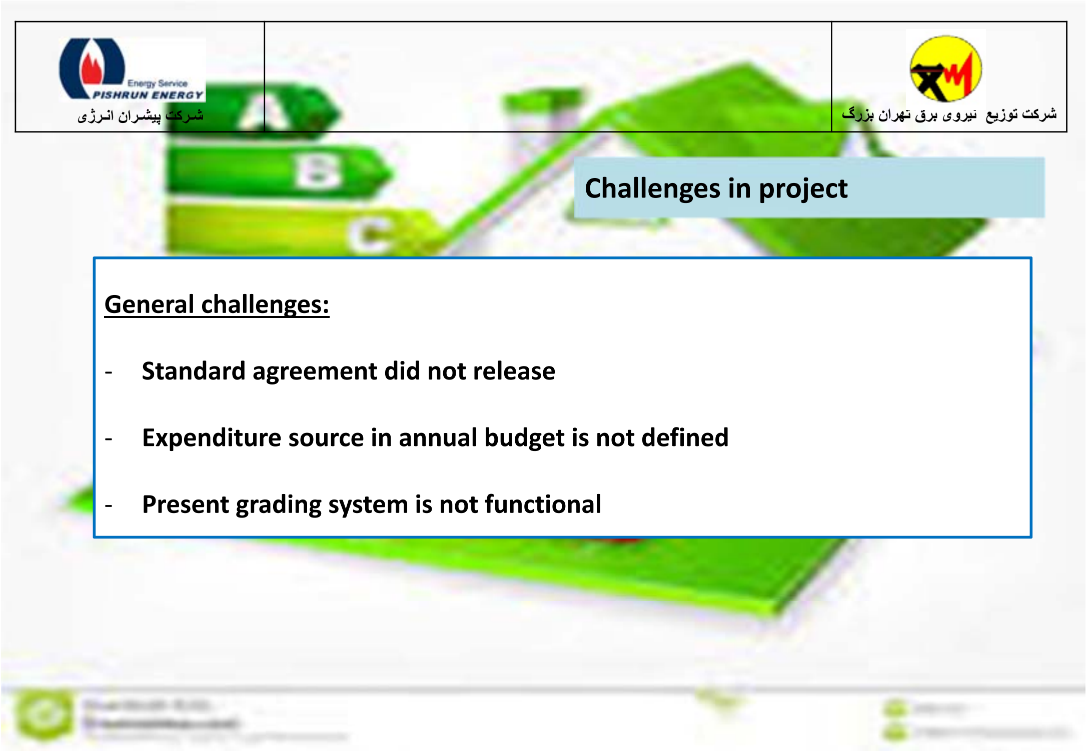
Beginning: 2016. Jun

- Measurements
- Information analysis
- Providing solutions
- Holding technical meetings
- Holding M&V meetings
- Holding legal issue

Challenges in Project

Challenges in agreement:

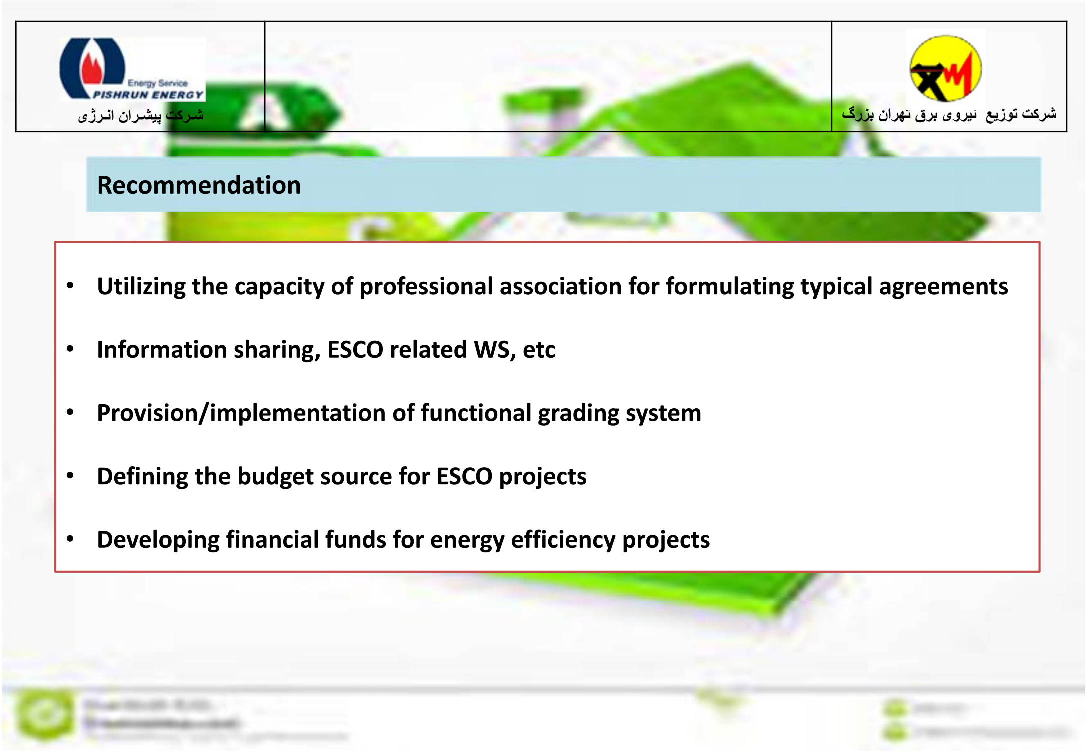
- Technical problems with contractor
- Various bureaus of the organization(financial, etc) were not familiar with ESCO
- Absence of M&V supervisor (third party)
- High consumption rate of basis energy and inability in controlling newly installing energy consuming equipment



Challenges in project

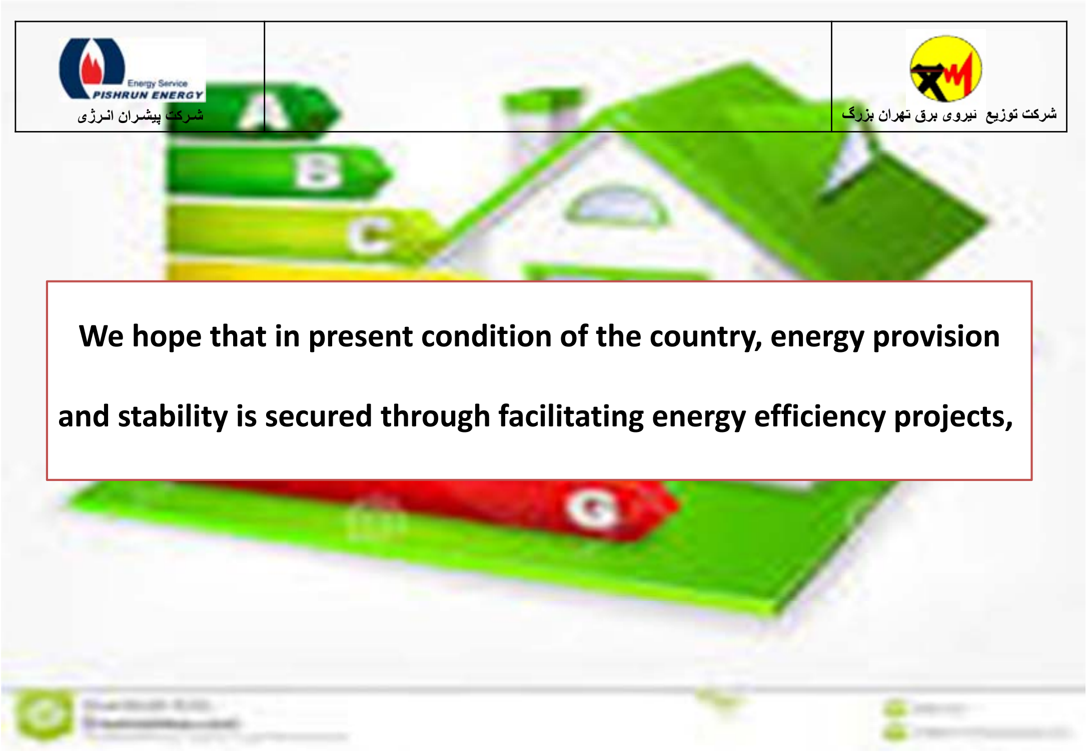
General challenges:

- Standard agreement did not release
- Expenditure source in annual budget is not defined
- Present grading system is not functional



Recommendation

- Utilizing the capacity of professional association for formulating typical agreements
- Information sharing, ESCO related WS, etc
- Provision/implementation of functional grading system
- Defining the budget source for ESCO projects
- Developing financial funds for energy efficiency projects



We hope that in present condition of the country, energy provision and stability is secured through facilitating energy efficiency projects,

The Project on Implementation of Pilot Projects
to Introduce ESCO for Government's Buildings
In the Islamic Republic of Iran

Recommendation for Improvement of ESCO scheme in Iran (through finding on two pilot projects)

July 3, 2018
JICA Project Team

Agenda

1. Barrier on ESCO project
2. Recommendation

Barrier on ESCO project 1

Shortage of public relation activities

Already (knowing ESCO)		NOT yet
MOE, SATBA, ESCO company	⇔	Building owner, financer

heavy gap

In Japan,
Authorized organization (ECCJ*) supports

1. To prepare PR document for ESCO
2. To authorize knowledge regarding ESCO

ECCJ*: Energy Efficiency and Conversation, Japan. Affiliated organization of Ministry of Economic, Trade, and Industry (METI).

Barrier on ESCO project 2

Lack of authorized ESCO contract

Building owner is fear to use new contract that he does not know well.

In Japan,
ECCJ* and METI support preparation of standard ESCO contract and publicize it.

Barrier on ESCO project 3

Restriction of contract procedure

Some barrier is in conventional legal institution. For example, when in not-bidding, its contract amount should be within limited value (low).

In Japan,

Government staff carried out

1. Sort of barrier from legal institution
2. Clarification in official letter
3. Some act was amended

Barrier on ESCO project 4

Lack of financial support

Interests of existing governmental fund is too high to utilize on ESCO project.

In Japan,

Central government provide

1. Low interests loan scheme
2. Subsidy (no-repayment)

with ESCO company.

Recommendation

Item	Recommendation
Acknowledge and understanding	MOE, SATBA, and ESCO companies understand ESCO business, however building owner and financer has not understood yet. Nobody can participate on unknown business. It is necessity to provide legal basis. 1. Formulation of regal institution for ESCO 2. Issue of PR documentation by authority 3. Preparation of guideline for ESCO on governmental building
Contract document	Model contract for ESCO had already prepared by IRESCO. 1. Any appropriate authority should issue it. (on going)
Contract procedure	Contract procedure is one of barrier for promotion of ESCO 1. Change of restriction term or legal interpretation
Finance	1. Preparation of subsidy for ESCO business 2. Preparation of low interests fund for ESCO busineess

Deliverable on technical cooperation activities

1. ESCO manual

2. Model contract of ESCO

3. Brief report based on pre-walk through at candidate building

4. ESCO proposal for pilot project implementation

5. The proposal regarding monitoring method of pilot project on government building

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Completion Report (ANNEX)

Deliverables on technical cooperation activities

ESCO manual

December 2018

Nippon Koei Co., Ltd

Iran Energy Efficiency Organization
(IEEO – SABA)

Energy Service Companies (ESCO) Manual
(Performance-based Contract Guideline)

Studies and Optimization of
Energy Efficiency Industry Office

Deputy of Training and Optimizing Energy Consumption
Fall 2014

Contents

1. Abstract

As a general definition, “ESCO is a company manages and coordinates all phases of an energy project and provides variety of services”. Another definition has been produced by Joint Research Center of European Commission is that “ESCO is a real person or legal entity conducting either energy services or providing solutions for improving energy efficiency and taking certain portion of the project financial risk”. It is also found out by World Energy Council that there are different definitions for Energy Service Companies in different countries”. Among from companies like Consulting Engineers, Equipment and Contractors’ Suppliers those provide energy services or implement efficiency solutions, ESCO companies are differentiated by the concepts of Performance-based contract. It means that the ESCO’s service remuneration is directly related to the energy savings.

The services providing by Energy Consulting Engineers Companies may include energy auditing, energy management, purchasing devices and supporting services such as space heating. ESCOs may propose different and similar services along with different mechanisms as Energy Service Providing Companies (ESCOs). These companies are to:

- Guarantee energy saving and their rewards are related and appropriate to energy efficiency of the project,
- Support or coordinate financial resources required,
- Provide variety of services, including:
    - Conducting feasibility studies (engineering and economic) to improve energy efficiency projects,
    - Basic and detailed design
    - Financial Support
    - Establishing and providing repair and maintenance services for equipment with high efficiency,
    - Verifying energy saving projects,
    - Monitoring and measuring,
    - Conducting Risk Analysis and also,
    - Accepting a certain portion of project technical and economic risks,

The table below shows a comparison between ESCOs’ supportable services and other suppliers; services shown in Table 1 and the ESCOs’ work basis provided in Figure 1.

Table 1 Comparison between ESCOs' Supportable Services and other Suppliers

Type of services	ESCOs	Sellers	Contractors	Engineering Companies	Consulting Services Companies
Energy Auditing	*		*	*	*
Design	*		*	*	*
Equipment installation	*	*	*	*	*
Project Management	*		*	*	
Supervision on Performance	*				*
Performance guarantee	*				
Repairing and commissioning	*	*	*	*	
Financial Support	*	*			
Coordination	*	*			

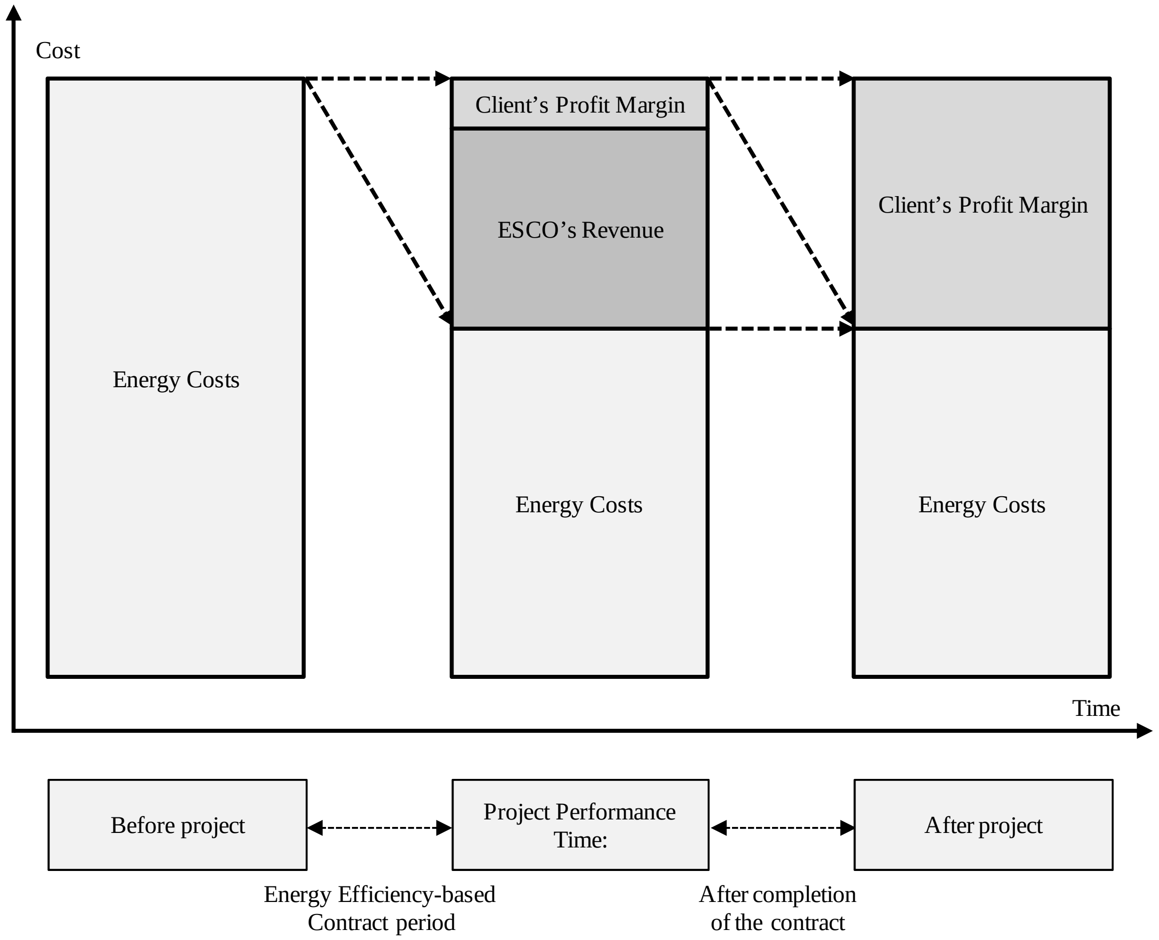


Figure 1 ESCOs' Work Basis

2. Energy Efficiency-based Contract

Energy Efficiency-based Contracts are a comprehensive set including Energy Productivity Promoting Services, Renewable Energy Utilization and DG Projects Implementation. In these contracts, the value of savings derived from implementation of the project, will be sufficient for supporting the project investment costs. Energy Service Company may procure its required services for completion of project through an Energy Efficiency-based Contract. These services include:

- Energy Auditing
- Engineering Design and Development for Energy Efficiency Projects
- Structure Management
- Financial Support to Energy Consuming Optimization Projects
- Commissioning
- Implementation and Maintenance and
- Measurement, Supervision and Verification of energy savings made in project

In an Energy Efficiency-based Contract, the energy service company forms a group of comprehensive measures to satisfy the clients' needs. These measures include:

- Optimization of Lighting Systems,
- Installations, Heating and Air Conditioning,
- Control Systems,
- Improving building roofing (Isolation, roofs, windows and ….),
- Multiple and simultaneous production of heat and power,
- Control or reduction of energy demand
- Using of Renewable Energies and Biomass Projects
- Measuring and reducing consumption in Water and Wastewater Systems

The concept of Energy Efficiency-based Contracts is provided in Figure 2:

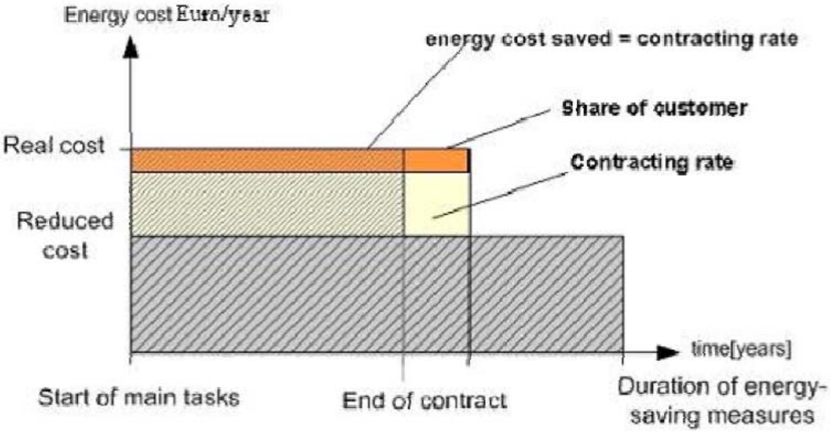


Figure 2 A diagram of concept of Energy Efficiency-based Contract

Energy service companies are the Energy Performance Contracting (EPC). The Implementation process of a project by ESCOs has been outlined in Figure 3:

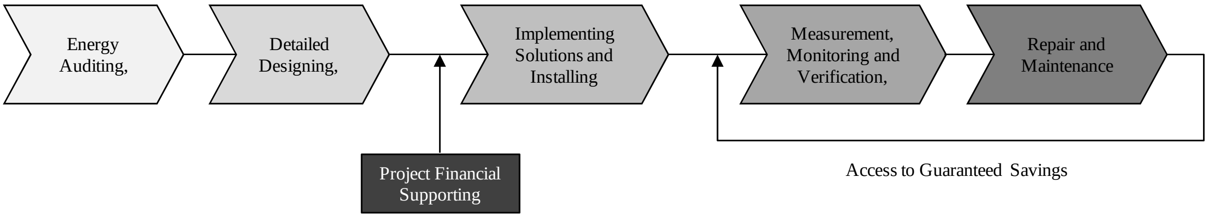


Figure 3 Steps process of an Energy Service Project

Implementation of an energy service project is initially started by conducting an energy auditing within the applicant unit. By energy auditing, the way the unit uses of energy is specified; accordingly, it will be possible to provide and prioritize cost-effective energy saving solutions. Basic and detailed design of the nominated project is developed and the project feasibility studies (engineering and economic) studied in full. Having been consulted with financial and credit institutions, the project financial support provided, then, project implementation process starts and equipment are installed. By monitoring energy consumption and verification of the savings by a neutral organization, the amendment shall be applied on implemented system, if any. In this stage, the guaranteed savings could be examined. Subsequently, having regard to the concluded contract, both parties, ESCO and the Client, will be the beneficiary of the savings made.

ESCOs in response to the demands, are capable to include new measures simultaneously to the project. These companies and their clients behave fairly conservative in selecting technologies for Projects, because the costs and expenses involved in projects have been paid from saving resources and they are almost secured by letter of guarantees. Projects almost financed by long-term debentures / lease contract. Though, some clients can pay, wholly or partially, the costs and expenses of projects contracted under the Energy Efficiency-based Contract from its capital budgeting. In the early prevalence of these contracts credit and financial institutions did not have an accurate understanding of these contracts, and they were not willing to finance the projects, so ESCOs undertook both engineering services and projects financing. Some of ESCOs, due to lacking interests in ordinary distributors to invest in Modern High-efficiency Technologies, are acting as the distributors of High-efficiency products.

The main deference between Energy Service Companies and Energy Services Providers Companies, is the type of financial support provided to an optimization project. Most of the projects include guarantee letters offered by ESCO to the clients in which project saving covers costs and expenses of a long-term project. Form of guarantees varies in different projects because the guarantees designed for clients’ particular requirements as well as countries’ law and regulations.

3. Financing of Energy Efficiency-based Contracts

In general term, Energy Service Projects shall be financed in three forms as described in brief in below:

1. Financing by ESCO which referred to investment by ESCO’s domestic budget using its own capital or funding through bond issue or lease contract. For financing, ESCOs rarely use of shares, because this option limited their capabilities for implementation of projects on a sustainable basis.

2. Financing by client or end user, usually consists of investment by client's internal fund which returned by ESCO's guaranteed energy saving. (eg. A university may use of an Endowment Funds for financing an Energy Project where energy optimization shall be guaranteed by an ESCO).
3. Third party's Finance. In this way, financing shall be conducted in the way of loaning from credit and financial institutions. There are two overall differences in arrangement and regulations of this model with Energy Efficiency-based Contract. The Key difference between them is that which part proceeds to loan: ESCO or its client?
   - The first option: ESCO loans financial resources required for implementation of the project.
   - The second option: Client takes out loan from financial institution and by an Energy Efficiency Guarantee Agreement with Energy Service Company refunds the money. The aim of Efficiency Guarantee is to show to bank that the project for which client took out loan has a positive liquid value. It means that from savings produced by the optimization project the loan repayment is covered. Therefore, energy saving guarantee reduces bank risk which affects the interest rate applied to financial support.

The loaning cost is extremely affected by the borrower's credit size and profile. These two states are presented in Figure 4 and 5.

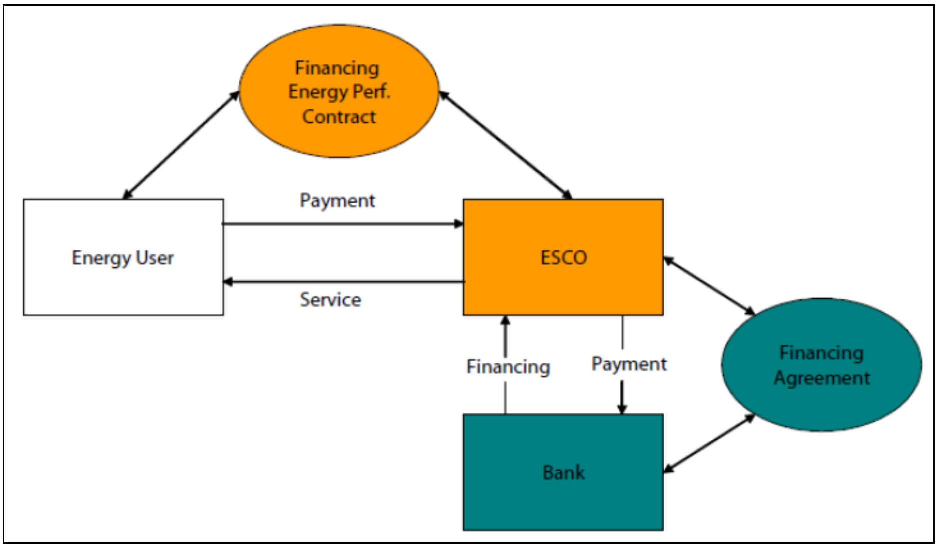


Figure 4 Third party's financial support while ESCO is the borrower

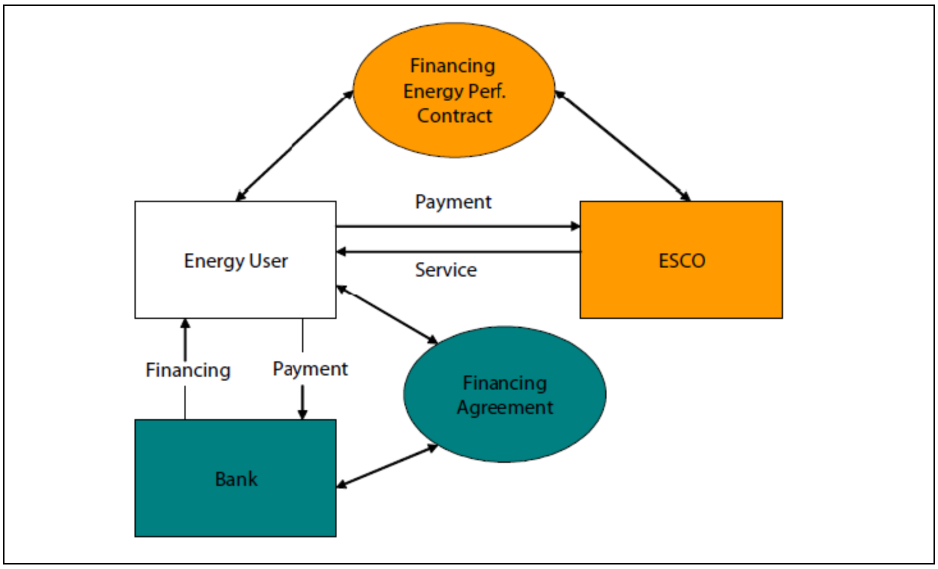


Figure 5 Third party's financial support while the client or the loan end user is the borrower

When ESCO is the borrower, the client protected from financial risks involved in the project technical performance. In this case, savings guarantee provided by ESCO derived from the project value or calculated from ESCO's balance sheet; Therefore, the debt sits on other entity's balance sheet (ESCO or Financial Institutions). Both public and private sector clients benefit from lack of such a financing in their balance sheets, because loaning service considered as an executive expenditure rather than capital liability. Countries apply various terms. For much stronger companies, it is important that liabilities do not represent in balance sheet as loan, it means that the company's capacity for loaning is not filled. Otherwise, financial support terms and conditions are automatically considered as the investment liability.

Large scale ESCO project with high capital and credit rating would prefer rather third party's financing. Because costs and expenses involved in their investment and financing often exceeded than the cost of capital lease in financial markets. Also, if an ESCO takes advantage of a third party's financing, the involved risk will be lower. Energy Efficiency-based Contract needs a Risk Management System and effective ESCOs learns how to use of projects financial structure for risk management.

4. Types of Contract and Project Services

ESCO's contract types and project services are divided in three major categories:

1. Performance-based Agreements (Performance)
2. Non-performance-based Agreements (Non-performance)
3. Consulting Services

In the next pages, each one of these contracts is discussed:

5. Performance-based contracts (Performance),

In the performance-based contract, the project's executor depends on the performances yield from the project. Types of this contract include: Shared savings, Guaranteed savings, and pay-from-savings.

A) Shared Savings Contract

ESCO's contract in big dimensions, are mostly of Performance type in Shared Savings form and these type of contract in ESCO markets, are highly regarded. Figure 6 represents process flow of this type of contract. In this way, the value derived from savings in a certain period of time and predetermined ratio is divided between ESCO and the client.

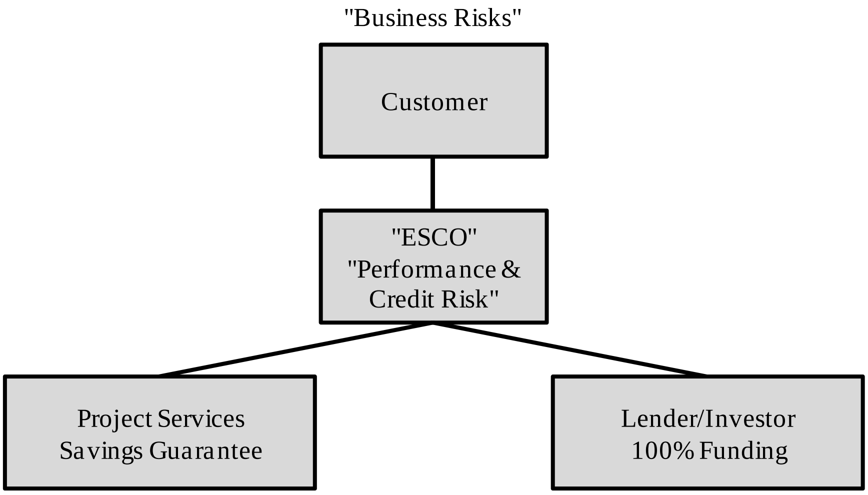


Figure 6 Diagram of Performance-based contracts, Shared Savings

Regarding work process in this method, financing mainly conducted as show in Figure 4 based on method of financing by ESCO from third party. In this way, ESCO must manage both risks involved in efficiency and credit in addition to contract risk.

In these services, an energy-efficiency contract is concluded between ESCO and Energy Consumer; and, ESCO undertakes implementation costs of the project. Depends on terms and conditions, this cost can be paid either by ESCO or paid using loan or facilities obtained from banks and financial enterprises. As shown in Figure 2, the diagram shows how the savings profit is dividing under Shared Savings Contract upon completion of optimization project depending on agreement made in Energy efficiency Contract, a portion of savings profit is given to the energy consumer and the other portion, by the end of contract period, shall be dedicated to ESCO. It is understood that the ESCO's share from the savings profit must be dedicated in the way that the loan repayment, supporting initial investment costs and its interests be covered. These type of contracts are usually concluded for a long term (more than 10 years). It must be added that no standard procedure is available for sharing ratio which determined on mutual agreement and based on factors such as investment amount, contract period, amount of acceptable risk by ESCO or client.

B) Guaranteed Savings Contract

This method is also highly regarded in ESCOs' market. The diagram of this method represented in Figure 7.

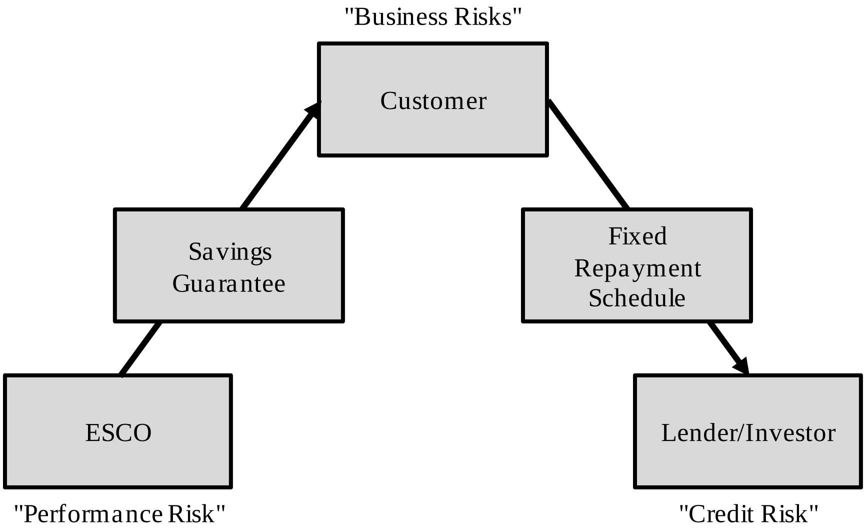


Figure 7 Diagram of Energy Savings Guaranteed Contract

In this way, ESCO guaranteed a certain level of energy saving and accordingly undertakes all risks raising from performance. In other hand, client also covers all risks involved in investment. Having regard to the type of work process, it can be said that this model of contract is mainly available in the financing models offered by client provided by a third party. In these services, an Energy Efficiency Contract is signed and concluded by and between the Energy Consumer and ESCO; accordingly, ESCO guarantees a certain level of energy savings for the consumer. The cost of project is supported by the consumer, which either paid by himself/herself or funded through loaning from a bank or financial corporation. Upon completion of the project, if the guaranteed level of savings is produced, the costs of project as stipulated in the Contract is paid to ESCO. Loan is repaid from the profit generated by savings in energy. Table 2 compares the Guaranteed Saving Contracts and Shared Savings.

Table 2 Compares the Guaranteed Savings and Shared Savings

Shared Savings	Guaranteed Savings
Risks of project efficiency, design and performance are taken by ESCO	Risks of project efficiency, design and performance are taken by ESCO
Funding is provided by ESCO and loan is recorded in Balance Sheet	Funding is provided by the Owner and loan is recorded in Balance Sheet
Performance is measured against the financial savings generated as a result of the energy savings	Performance is measured against the savings
Payment to ESCO is generally varied depending on produced savings and price of energy	Payment to ESCO is generally fixed depending on achievement of the guaranteed savings
Use of leased equipment is allowed	Requirement for providing comprehensive Measurement, Verification and Monitoring Services to make sure guarantee requirements are met
It generally has a high profit	It generally has a low profit

It is understood that innovative financing methods could be used in response to the needs. For example, composing Shared Savings and Guaranteed Savings to the extent that by change in savings the division ratio of profit produced by savings is changed or credits and financial facilities which in general provided by ESCOs in particular projects. Generally, Guaranteed Savings is employed in housing sector and smaller projects in which the user achieves savings to a certain level against funding. In larger projects almost industrial projects Shared Savings is employed due to high investment requirement and also priority of investment in manufacturing development over energy efficiency in these sectors.

C) Pay from Savings

A percent of costs and expensive generated by achieved savings shall be paid to ESCO to indemnify ESCO company investment.

6. Non-performance-based contracts

In Non-performance-based Agreements, remuneration to the project executor not depends on the performance produced by the project and its rate is determined in advance. In Non-performance-based Agreements, contracts are divided to Design/Build; Fee-for-service; Fixed price contracts.

A) Design/Build

ESCO Company conducts project on turnkey basis and payments are made against provision of service. In this way, payment of costs and expenses to ESCO company could be made based on initial offer.

B) Payment based on Services

ESCO Company is remunerated for the services provided during the project period.

C) Fixed-price contracts

Project price for the client shall be notified on a fixed rate by the Energy Service Company.

In certain definitions, Non-efficiency-based projects are not categorized among the Energy Services Companies' projects and it is only the first models acceptable as contracts of ESCO companies.

7. Consulting Services

Consulting Services is of non-performance-based agreements dealing with provision of solutions.

8. Details of ESCO Contracts

Energy Efficiency-based Contracts are a comprehensive set including Energy Productivity Promoting Services, Renewable Energy Utilization and DG Projects Implementation. In these contracts, the value of savings derived from implementation of the project, will be sufficient for supporting the project investment costs. Energy Service Company may procure its required services for completion of project through an Energy Efficiency-based Contract. These services include:

1. Energy Auditing,
2. Engineering Design and Development of Energy Efficiency Projects,
3. Structure Management,
4. Financing of Energy Consuming Optimization Projects,
5. Commissioning,
6. Implementation and Maintenance,
7. Measurement, Supervision and Verification of Energy Savings produced in project.

In an Energy Efficiency-based Contract, the energy service company forms a group of comprehensive measures to satisfy the clients' needs. These measures include:

1. Optimization of Lighting Systems,
2. Installations, Heating and Air Conditioning,
3. Control Systems,
4. Improving building roofing (Isolation, roofs, windows and ….),
5. Multiple and simultaneous production of heat and power,
6. Meeting energy demand,
7. Using of Renewable Energies and Biomass Projects,
8. Measuring and reducing consumption in Water and Wastewater Systems

Implementation of an energy service project is initially started by conducting an energy auditing within the applicant unit. By energy auditing, the way the unit uses of energy is specified; accordingly, it will be possible to provide and prioritize cost-effective energy saving solutions. Basic and detailed design of the nominated project is developed and the project feasibility studies (engineering and economic) studied in full. Having been consulted with financial and credit institutions, the project financial support provided, then, project implementation process starts and equipment are installed. By monitoring energy consumption and verification of the saving by a neutral organization, the amendment shall be applied on implemented system, if any. In this stage, the guaranteed savings could be examined. Subsequently, having regard to the concluded contract, both parties, ESCO and the Client, will be the beneficiary of the savings made.

ESCOs in response to the demands, are capable to include new measures simultaneously to the project. These companies and their clients behave fairly conservative in selecting technologies for Projects, because the costs and expenses involved in projects have been paid from saving resources and they are almost secured by letter of guarantees. Projects almost financed by long-term debentures / lease contract. Though, some clients can pay, wholly or partially, the costs and expenses of projects contracted under the Energy Efficiency-based Contract from its capital budgeting. In the early prevalence of these contracts credit and financial institutions did not have an accurate understanding of these contracts, and they were not willing to finance the projects, so ESCOs undertook both engineering services and projects financing. Some of ESCOs, due to lacking interests in ordinary distributors to invest in Modern High-efficiency Technologies, acting as the distributors of High-efficiency products.

The main deference between Energy Service Companies and Energy Services Providers Companies, is the type of financial support provided to an optimization project. Most of the projects include guarantee letters offered by ESCO to the clients in which project saving covers costs and expenses of a long-term project. Form of guarantees varies in different projects because the guarantees designed for clients' particular requirements as well as countries' law and regulations.

Contracts of and services offered to ESCO projects mentioned in project phase 1, are divided into three general categories:

1. Performance-based Agreements (Performance)
   In performance-based contracts, remuneration to the project executor depends on performance of the project. These contracts include: Shared Savings; Guaranteed Savings; Pay-from-savings.
2. Non-performance-based Agreements
   In Non-performance-based contracts, remuneration to the project executor is not depending on performance of the project and its rate determined in advanced. These contracts include: Design/Build; Fee-for-service; Fixed price contracts. In certain definitions, Non-efficiency-based projects are not categorized among the Energy Services Companies' projects and it is only the first models acceptable as contracts of ESCO companies.
3. Consulting Services

   Consulting Services is of non-performance-based agreements dealing with provision of solutions.

Unspecified Price of Contract

Unlike other contracts, contracts of energy service companies do not bear specified and fixed price, but the amount paid to the company depends on savings produced. In order for determining company's share, consumed energy is measured and specified using appropriate methods and apparatuses. Accordingly, these types of contracts called Efficiency-based Contracts.

No Cost to the Client according to Type of Contract

In general, optimizing measures are highly expensive to the extent that a client with no technical vision, rarely takes its risk. In such a contract in which Energy Service Company personally proceeds to investment, the client pays no money for contract and only takes advantage from the profits of savings. Under any other energy service contracts, client pays no more than savings to the company.

Cut the Costs of Repair and Maintenance

In most contracts concluded based on efficiency by energy service companies, costs of repair and maintenance of newly-installed machinery, wholly or partially, could be undertaken by the service provider company during the contract period.

In addition, during the contract period, Energy Service Company shall provide the maintenance team with the required training so that after completion of the contract period they would be able to keep up with the scheduled repair and maintenance plan.

Standard Job Description

Having no prescribed and standard job description, is of the most important characteristics of the ESCOs’ contract in different projects. Most of the clients, particularly those are in certain industrial units or some of administrative organizations with high security priority, deny access to some of its devices or processes for implementing energy consumption optimizing solutions which could extremely affects the contract terms and negotiated agreements. In other hand, considering the vast range of activities could be done by ESCOs and client’s unawareness about them, providing an introductory phase of energy consumption entitled “Energy Descriptive Auditing” is essential. Regarding the size and nature of the client, provision of this service by ESCOs could be sometime expensive. Status of this initial expenditure must be taken into account during the project process. Having been conducted Energy Auditing, energy optimizing opportunity and accordingly, ESCO’s doable activities will be specified and outlined in negotiation process and job description.

Two main consumers of energy, Industrial and Housing Sectors (Residential, Office Apartments and Shopping Centers), are among the most important and prominent clients of the ESCOs which referred to in other countries’ experiments. Accordingly and regarding the fact that the range of ESCO’s clients is cleared, there is an opportunity to develop a comprehensive service description and standardization of job description for ESCO companies in any of these sectors which must be agreed upon at the beginning of any negotiation and based on scope of activities of client and ESCO.

Financing

Financial components and capability of active companies, particularly in project contracting and its implementation, play an important role in referral of job and build up of client’s trust. Therefore, for energy service companies who provide various services ranging from feasibility studies to implementation of energy consumption optimizing projects, financial capacity is so important. Financial capacity must be taken in to consideration when ESCO companies are assessed and graded. Project financing status has a high effect on the Client and ESCO’s entailed risks and the same, on each party’s share of energy savings and projects’ revenues.

Specifically, in energy service companies, financial capability is not considered alone, that is why these companies may take advantage of so many mechanisms for financing and absorbing financial resources. In general, financing for energy service projects are arranged in three forms set forth below in brief:

1. Financing by ESCO which refers to investment by ESCO’s domestic budget using its own capital or funding through bond issue or leasing contract. For financing, ESCOs rarely use of

shares, because this option limited their capabilities for implementation of projects on a sustainable basis.

2. Financing by client or end user, usually consists of investment by client's internal fund which returned by ESCO's guaranteed energy saving. (eg. A university may use of an Endowment Funds for financing an Energy Project where energy optimization shall be guaranteed by an ESCO).
3. Third party's Finance. In this way, financing shall be conducted in the way of loaning from credit and financial institutions. There are two overall differences in arrangement and regulations of this model with Energy Efficiency-based Contract. The Key difference between them is that which part proceeds to loan: ESCO or its client?
    - The first option: ESCO loans financial resources required for implementation of the project.
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The loaning cost is extremely affected by the borrower's credit size and profile. When ESCO is the borrower, the client avoided from financial risks involved in the project technical performance. In this case, guaranteed savings provided by ESCO derived from the project value or calculated from ESCO's balance sheet; Therefore, the debt is mentioned in other entity's balance sheet (ESCO or Financial Institutions). Both public and private sector clients benefitting from lack of such a financing record in their balance sheets, because loaning service considered as an executive expenditure rather than capital liability. Countries apply various terms. For much stronger companies, it is important that liabilities not mentioned as loan in balance sheet, it means that the company's capacity for loaning is not filled, otherwise, financing terms and conditions are automatically considered as the investment liability.

Large scale ESCO project with high capital and credit rating would prefer rather third party's financing, because costs and expenses involved in their investment and financing often exceeded than the cost of leasing of capital from financial markets. Also, if an ESCO takes advantage of a third party's financing, involved risk will be lower. Energy Efficiency-based Contract needs a Risk Management System and effective ESCOs learns how to use of projects financial structure for risk management.

Essentially, the main factor in classifying projects, is the project financing. One of the most important problems the developing countries facing with is the way in which financial resources and required funding procured for infrastructure projects and using of products and services produced by them. Considering special status of developing countries and financial crises these countries go through, financing required for implementation of large projects cannot be easily arranged; therefore, use of foreign investment is tabled. Foreign investment absorbed in two ways, borrowing or investment.

Borrowing

In this method, the investee country receives a loan from investor country or institution and become obliged to repay the loan installments to the investor on due dates. In this way, investor country or bank, does not take any risk and the investee country entails all risks.

Finance

Finance or financial facilities, is a credit that the Central Bank pays from foreign states banks (on credit of the central bank of the buying country). This credit offered on time and interest rate and for which the buying country obliged to buy the creditor country products. In other word, in this way, the required capital for implementation of a specified commercial project is supported by a foreign credit institution or bank. Central Bank of buying country, undertakes to indemnify the investor party's damages. It is also fixed an annual interest which rate determined according to the economic conditions and the degree of risk of the investee country which determined at the time the credit is offered. In general term, finance is used for financial support of projects in two ways, Autonomous and Non-autonomous.

International Loans

This method referred to particular and conditional arrangements made for using of the loan and applies controlling measurements on the way the loan is spent during the period of time the project implemented. In this case, there had to be conducted the feasibility studies required by the lending institutions, accordingly, the technical and economic aspects of the project must be accepted by the lending institutions.

Considering the consequences of financing procedure on project final price, as well as, the involved risks, financing in ESCO's contracts must be explicitly and clearly stipulated and duly deciding on.

9. Measurement and Verification (M&V)

Measurement and verification known as M&V, is an Independent Analysis conducted on energy efficiency examines the alleging saved energy from demand side. International Performance Measures and Verification Protocol (IPMVP) is protected by Ministry of Energy of the United States of America, and a broad alliance consisting of owners of the centers or operators, investors, contractors, ESCOs and shareholders. Measurement of energy consumption saving includes measurement of saved fuel, water productivity measurement, change in load and reduction of energy through retrofitting of the equipment or modification of operational processes covered by this protocol.

Measurement and Verification Protocol Committee, is currently an Efficiency Valuating Organization (NGO) developing products and services to help below-mentioned items:

1. Measuring and Verifying Water and Energy Savings and the water saved in retrofitting stage or structure of water or energy productivity.
2. Managing financial risks of contracts based on energy efficiency
3. Determining the reduction in pollutant gas emission from energy productivity projects
4. Expansion of green and sustainable buildings through accurate and profitable analysis of water and energy savings.

But the question is how to certain that after completion of an Energy Productivity Project, saving in costs is made? The purpose of this protocol is to answer to this question. Protocol procures a measurement and verification framework for clearing water and energy savings obtained as a result of Energy Productivity Program. This framework is used as an Industrial Standard for verification of the savings achieved. This manual in a section has developed concepts and options for verification of savings and in other sections dealt with monitoring efficiency of renewable energy systems and improving environmental quality of buildings.

Measurement and verification protocol is a profile of the best techniques available for verifying the results of energy productivity and renewable energy projects.

The question addressed above, necessarily states risks involved in energy productivity measurement without efficiency. Since, the measurement and verification could be expensive, it is essential to adjust the measurement and verification strategy with the level of risk. In the most energy productivity projects, payment to contractors is made based on the amount of savings as a result of various measurements made on energy productivity, using of this protocol is a standard.

There is a simple formula for measurement of savings:

Energy Savings = Base Year Energy Use – Post Retrofit Energy Use +/- Adjustment

Knowing this point is so important, "where these figures come from" and "How these adjustments will be made". Adjustments (significant change in square meter of occupancy, weather differences, operational hours, and other loads did not exist in base year), provide a more realistic comparison of post-retrofit conditions to those of the base year. In these factors are left unaccounted for, it is possible that any realized savings would be improperly calculated.

There are different scenarios for measuring savings. Due to significant effect of measurement procedure designation on project final price, these items must be explicitly outlined in public or private terms of ESCO's contracts.

Considering International Protocol of Measurement and Verification, it is understood that a central measurement and verification for appropriate saving method, is essential in verification. Measurement and Verification Project, conceptually provides definition for savings in any project and must includes:

1. Definition of energy saving measures and the desirable results
2. General profile of protocol options including the measures and verification applied; formulating of measurements and verification measures or data of basic operational year, develop of energy saving plan and the saving boundaries.
3. Measurement methods and devices must be used
4. Commissioning, measurements and verification have recently been conducted
5. Formulating energy and operational data and post-measurement and verification operations
6. Saving reports
7. Operational costs and measurement and verification equipment

International Performance Measures and Verification Protocol procures a comprehensive list of elements must be available in a measurement and verification plan based on nature of project.

Without taking into account the used strategy of measurement and verification, the similar steps are taken for potential verification of guaranteed saved energy, which are itemized as follow:

1. Base conditions must be accurately defined which is a portion of technical energy auditing including all conditions needed for proving of guaranteed savings, before and after implementation.
2. A project special measurement and verification plan must be developed through negotiations. This plan is the most important factor in a guaranteed saving program which includes all details pertaining to energy saving measures.
3. Post-installation verification in which systems and devices are properly installed, and then, ESCO and Agency are verified. This verification is made for ensuring the proper performances of devices whether has the required potential for production of energy savings forecasted.
4. Verification of efficiency period. The period for the first time covering at least, 2 to 3 years post-installation period that ESCO must produce and forward an annual report of actual energy savings achieved. This report must cover the result or index of measurements and efficiency inspections, savings produced for the year, differentiate of actual savings and guaranteed amount and savings analysis, details of each efficiency program, the problem raised in repair and maintenance which required more attention, …

10. ESCO Contracts Components

Accordingly, the effective details of ESCO's contracts must be taken in to consideration in uniform contracts of these companies and clearly and quantitatively stipulated as follow. It must be mentioning that the general items available in all contracts will be considered the default and there are subsections which must be added to typical contracts like uniform Design and Development Contract.

Details of ESCO Contracts

In case of being edited and become binding an Assessment and Grading System for Energy Service Companies, these companies are examined and assessed against different indexes including facilities and equipment, information, technology and knowhow, specialized man power and financial resources for investment required for providing and performing special and appropriate solutions, as well as, skills and required capabilities for design and engineering, procurement, installation and commissioning, repair and maintenance of equipment and required software required for reaching to energy efficiency improvement and control, reduction and saving in consumption of energy and water. This assessment brings peace of mind for both employers and clients for job referral to these companies and creates appropriate ground for systematic activities. In following lines, the most important components which must be foreseen in the contracts of energy service companies under the public and private service descriptions, are provided:

Subject of the Contract

Subject of the contract covers certain activities the agreement thereof must be negotiated before the contract is concluded. Editing of standard job description to uniform subjects of ESCO contracts is essential. If the standard job description is served following energy transitional audit of the applicant's unit (client) there is an opportunity to hold a meeting for reaching to an agreement on paragraphs of the approved service descriptions.

In general, service description of these contracts can be included with a set of actions and activities such as:

1. Evaluation of energy auditing report,
2. Render of consulting and provision of engineering analysis
3. Provision of particular and commercial solutions practically for control, reduction, and producing saving in consumption of energy and water
4. Design and engineering services
5. Financial investment
6. Procure, supply and produce of instruments and software in full
7. Installation, commissioning and delivery
8. Guarantee the amount of saving
9. Monitoring
10. Provision of repair and maintenance, modification and retrofitting activities
11. Provision of training to the employer's staff
12. Other actions and activities

Standardized service description must be agreed upon and set out in one of the appendices of the contract.

Contract period

Period and rate of return on capital are two key factors that an energy service company using for making decision whether enters into a contract. Period of contract has a direct effect on these two factors, so, an initial agreement must be negotiated on. It must be added that in ESCO's contracts there are two types of contract period:

1. Implementation period of retrofitting project
2. Maintenance period of the contract and repayment of costs (guarantee and follow up of project performance)

These two periods must be outlined in Schedule Plan and take into consideration an actual estimation, in the form of Schedule Plan, on contracts appendices and both parties reach an agreement on. Description of activities and both parties' obligations in each one of these two periods must be cleared specifically.

Price of Contract

Being unspecified the price at the beginning of the contract, is one of the most important aspects and features of ESCO Contracts. Change in price of project costing items is mainly borne by the ESCO which brings about change in profitability, period of contract and rate of return on investment of the project (eg. Change in the price of foreign currencies occurred in the recent years, raising energy price which mainly were in the scope of authorities of the Government rather than companies and clients, may changed time to time. Energy price raising in a positive direction, boosts cost-effective aspect of ESCO's projects).

Therefore, an agreement letter as an appendix must be incorporated into ESCO's contract, in which fundamentals, calculation method and payment method of contract price is laid down in, and there must be incorporated in subsequences of change in prices, exchange rate and purchasing in foreign currencies to such an extent that in an appropriate way, expectations of both parties are satisfied.

Legal and other Requirements

Legal requirements including personnel and staff's insurance coverage, Staff Intervention Ban, Direct Tax and the requirements specified by the employer such as HSE requirements, requirements urging employees to comply with work environment prestige, certificates and work permits requirements, confidentiality of information, assignment and transfer to third parties, …. must be agreed upon and observed.

Intellectual Property Rights

In addition to financial capability and engineering knowledge, ESCO companies employ their creative ideas and initiatives in the projects to achieve more desirable results. Client's role is so effective in this process and typically, under joint cooperation, these initiatives find operational ground and get implemented. Parties must reach to an agreement on Intellectual Property Rights of these projects, and their agreement must be registered.

It is also to determine the status and share of expenditures related to royalties, intellectual property rights, authorizations for using of licensors' rights and patents and permissions, verifications, assessments, controls required and essential for implementing and completing of the subject of contract.

Terms of Revocation, Termination or Expiration of Contract

If under any circumstances, parties to the contract unable to keep the contract up, there must be laid down in contract certain provisions keeping both parties harmless. These provisions must be formulated in initial agreements and stipulated in the contract.

Guarantees

Contributions of both ESCO and Client are of highly importance in ESCO contracts. On the one hand, client has made available its production line, facilities and installations to the ESCO, and any destruction or malfunction in their performances could cause irreparable damages to the client; and on the other hand, ESCO company a huge costs and expenses occurred to ESCO company for implementing the project and providing the project with engineering services and manpower. Receiving two-sided guarantees for reassuring purposes is essential. These assurances may be partially or wholly equal to the value of either contract, project or equipment in form of banking guarantees.

Parties' Obligations

Regarding the fact the ESCO Contracts are almost on trust and creditability; and the client and ESCO entering in to partnership based on the other party's creditability, so, both parties' obligations shall be mentioned in the contract as their commitments. Regarding the executive and financial cohesions in these projects, both parties' obligations shall be of more credit and importance in these contracts.

Disputes Settlement Authority

Considering some uncertainties in the subjects and service descriptions of the contract, as well as price and financial liabilities, savings produced, savings value, measurement and verifications and more importantly, unavoidable risks involved in technical and financial aspects of the ESCO's projects, it is essential that the dispute settlement authority be determined for the event any dispute raises. The authority must basically be familiar with updated legal concepts, the technical and financial views of ESCO's projects and understood their concepts.

Confirming Executive Projects Details

In terms of amount of savings, investment costs and level of technical and technological complexities, retrofitting measures and savings solutions are not weighing the same. Taking client's conformation on development of solutions is mandatory. However, the surface and deep extents of the projects are of the items which must be agreed upon. In other word, for some projects confirmation of title is sufficient, in fact for other projects verification and approval of maps, technical documents and execution details are required.

Measurement and Stipulations

Upon implementation of retrofitting project, guaranteed savings period is started. Formulation, confirmation and approval of an appropriate methodology which represents amounts of water and energy savings produced by ESCO's saving solutions, is essential at the beginning of this stage.

In industrial units, there are several factors effective in energy consumption including level of production, climatic conditions, material and quality of raw materials input, operational terms, number of production pauses, fuel quality, repair and maintenance conditions of equipment, life and durability of equipment, process and energy requirement profile of the organization effective in energy consumption. In buildings, there are also different factors effective in energy consumption level including the number of users, climatic conditions, heating and cooling required on degree/day basis, utilization terms, life and durability conditions of main equipment, repair and maintenance conditions, and energy requirement profile of the organization.

Methodology of measurement and verification must be capable to provide an accurate estimation of the level of organization energy requirement for being recognizable the ESCO's activities contribution to the next stage when the Energy Performance Retrofitting Project is implemented. According to the energy consumption baseline, this methodology could be subject to measurement and agreement based on effective factors on energy consumption, systems and measurement equipment or counters, analytic methods and other confirmed methodologies.

Measurements are used to confirm the equipment performances and represents that the saving could be achieved. Generally, one or two group of measurements shall be conducted and the results thereof are verbally mentioned in the contract concluded by both parties. If it is not anticipated that the desired parameter modifies subsequent installations and implementations, another measurement shall be conducted. If it is anticipated that the said parameter, modifies the subsequent installation and implementation, two measurements are conducted before and after installation and implementation. Instead of measurements, some of variables will be based on contributions and shall be mentioned, expressly and explicitly, in the contract as stipulation. In these events, an agreement is reached by all parties which assumed fixed within the whole period of the contract or project.

Stipulation is provided as keeping fixed a parameter, without any consideration to the actual quantity of that during the contract period. Stipulation in measurement and verification program of an agreement between ESCO and Agency, is for acceptance of a defined quantity of a special factor such as operation hours which is guaranteed for determination of base energy consumption and after installation and implementation, is applied for calculating the guaranteed savings that the calculated quantity must be close to the actual quantity and as a result, having omitted the measurement process, savings be produced in costs and expenses. According to the realistic information resources, the rejected values must be traceable and documented. Such as:

1. Table of standard lightings extracted from recognized resources,
2. Characteristics of the Producer
3. Building operation time table
4. Documents pertaining to repair and maintenance
5. Efficiency curve published by national organizations
6. Climatic data extracted from the state's agencies

The resources of the conditioned values must be edited in the measurements and verification programs. Even while the conditioned value applying for the measurements, yet verification of equipment performance must regularly (Technical y and potentially for implementation) be applied and the accepted derivation of results from the guaranteed value of savings as well as, measurement period must be set out in this section. It is highly important that the Dispute Settlement Authority and Third party's Confirmation terms be mentioned in this section.

Third Party's Conformation

Based on IPMVP, the client, in association with a professional consultant, is entitled to examine and review the report related to Energy Savings Project. This service must be conducted in beginning of the M&V process. It is very important that the beneficiary parties to the contract (the Client and ESCO), guaranteed savings contract in particular, believing that the payments are made in an appropriate and accurate manner.

Evaluation of the Saved Resources

One part of IPMVP pertains to Energy Price which stipulated as follow:

The value of the energy savings produced by project may be set aside in accordance with the price of any energy item with selling price. The price of energy item must be based on the energy priced by the supplier or a clear simplified method. Appropriate simplifying uses of the final prices which included all effective items on the invoice including costs of electricity power, demand, transformation credit, power factor, …

Defining and clarifying of the evaluation method of the saved resources in ESCO's contracts are very important for the beneficiary parties to contract (the Client and ESCO) particularly, guaranteed savings contracts, and is influential in conclusion or not conclusion of the contract.

Repair and Maintenance

Preventive repair and maintenance of energy has an important role in reduction of operational costs of the equipment. In other word, if an organization purchases the most efficient equipment and in time of operation its operational conditions are not appropriate, the organization will be faced with the consequences thereof in the raise of energy consumption fee. Keeping equipment in the highest efficiency conditions, is the desirable objective of the maintenance section. Concerning the equipment reaching to the end of life during the guaranteed savings period, or due to any reason required to be repaired or replaced, the fact must be stipulated in the contract clearly. Considering the Client and ESCO's joint objective to keep the organization in the best operational conditions and lowest level of energy consumption, providing repair and maintenance service to the organization during the guaranteed energy saving period is essential. Providing repair and maintenance services and its effect on failing to reach to the savings milestones and parties' attitudes toward collected guarantees must be outlined in the contract clearly.

Insurance

On insurance coverage, there are three different aspects considered:

1. Insurance coverage for Personnel and Staff's Civil Liability. Under article 38 of Social Security Act, ESCO Company must provide Civil Liability Insurance coverage for its staff.
2. Insurance coverage for equipment and installations erected by the ESCO: ESCO Company shall purchase adequate insurance coverage for equipment and supplies have bought and installed in the Energy Efficiency Optimization Project. Investment Policies in this section could be more profitable.
3. Insurance coverage against damage to the employer's installations and facilities: the payment obligation of the costs involved in provision of Liability Insurance Coverage for indemnifying the employer against the loss derived from damaging installations and facilities as a result of implementing energy savings solutions, must be determined. These insurance coverage must be purchased in favor of and through making arrangement with employer and prior to installation and implementation operation is delivered to the employer.

Under article 2 of the By-law, note 2 of article 134 of the Fifth Development Act, the term of insurance is defined as set forth below:

Article 2 – the company shall provide Liability Insurance Coverage for indemnifying the employer against any damage incurred to its installations and facilities as a result of the execution of the contract, if any; and be authorized to provide Investment Insurance Coverage too.

Note: Investment Policies as acceptable securities, which could be used for Energy Service Contracts.

Accordingly, and for covering probable risks involved in implementation of energy savings solutions, there must be prepared a list of probable risks in accordance with phasing and time scheduling plan facing execution of the contract; and concerning insurance coverage, deciding on payment of the costs and management them and being attached to the contract as an appendix.

Risks, Losses, Damages and Hazards

One of the main objectives of Measurement and Verification, is to reduce the level of risk to an acceptable level based on Agency's priorities and preferences. In Energy Efficiency-based contracts, risks created on both parties, ESCO and the Owner. The risks are calculated through a precise Measurement and Verification Strategies.

Risk in sense of Measurement and Verification, is attributed to the uncertainty that the anticipated savings is realized or not; assumption of risk, paving acceptance of potential financial consequences. Both parties, ESCO and Agency, do not tend to accept any responsibility for such factors are out of their control. Therefore, asserting cleared parameters in measurement and verification program may give each party responsibility for the parameters are well controlled. For example, Factors under the control of agency including operating hours in daylight and set point of thermostats which are usually specified. Efficiency risk resulted by uncertainty in associated with features of a special level of equipment performance. Ultimately, ESCO is responsible for selection, application, design and equipment efficiency operation and usually takes the responsibilities for achieving energy savings using efficient equipment. For efficiency credibility, ESCO should represent that the equipment operating as they designated for and are capable for the guaranteed savings.

Both parties' responsibilities in taking on the contract loss and damages risks until the final delivery of the subject of the contract considering in to account the guaranteed savings period and project performance, must be specified.

Using of different policies such as Liability Insurance Policy, Investment Insurance Policy, shall cover all damages, losses and harms to the employer's installations, machines and ESCO's investment.

Training

Training plays an important role in the energy savings programs of the organizations. Accordingly, providing specialized training to the ESCO's personnel occupied in any project as well as, provision of the required training to the employer's personnel is essential and both parties' obligations and manner of calculation of its costs and expensive must be agreed upon in the contract. The responsibility for failing to provide such a training or inadequate training must be set aside in agreements.

Force Majeure Events

In accordance with clauses set out in other engineering contracts, this clause must be available in Energy Service Companies' contract and making a proper decision on both parties' contributions, securities, insurance policies and obligations. Referral terms in force majeure must be mentioned in contract clearly.

11. Activities and Executable Projects by ESCO

The titles of executable projects by ESCOs have been provided through Table 3 to 5. It must be added that it is impossible for all users to use of these projects as a general prescription that energy saving optimization solutions in any organization shall be produced by conducting detailed energy auditing.

Table 3 ESCOs' Executable Projects in Industry Sector

Type of Solutions	Titles
Low-costs Solutions	- Insulation of Heating Surfaces
	- Regulation of Air to Fuel Ratio in Combustion Processes
	- Management of Electrical Energy Usage Load
	- Management of Energy Tariff
	- Establishment of Energy Management System based on ISO 50001
	- Application of Energy Preventive Repair and Maintenance
	- Production of Low-cost Solutions for different systems: Examine pressure drop in production and distribution network of compressed air and steam, cleaning of heating surfaces in boilers
	- Constant Monitoring and Measuring of Systems Energy Consumption
Average Costs Solutions	- Use of Equipment with Higher Electrical and Thermal Efficiency
	- Analysis and Control of Combustion System with Constant Monitoring of Combustion-emitted Gas
	- Optimization of Steam Systems
	- Optimization of Compressed Air Systems
	- Optimization of Process Furnaces and Heating Systems
	- Use of Renewable Energy Technology and Equipment, specially Solar
	- Use of Variable Speed Driver and Control Norms in Electric Systems
Costly Solutions	- Use of CHP Systems
	- Improvement and Optimization of Production Process
	- Renewable Energy Power Generation Projects
	- Waste Heat Recovery Projects (WHR)

Table 4 ESCOs' Executable Projects in Buildings

Type of Solutions	Titles
Low-costs Solutions	- Establishment of Energy Management System based on ISO 50001
	- Constant Monitoring and Measuring of System Energy Consumption
	- Regulation of Air to Fuel Ratio in Combustion Processes
	- Cleaning Heating Surfaces in Boilers and Chillers
	- Preventive Energy Repair and Maintenance
	- Management of Electric Energy Consumption Load
	- Management of Energy Tariff
	- Insulation of Heating Surfaces
	- Energy Sustainable Architecture
	- Application of Sealants
Average Costs Solutions	- Use of Renewable Energy Technology and Equipment, specially Solar
	- Analysis and Control of Combustion System with Constant Monitoring of Combustion-emitted Gas
	- Use of Equipment with Higher Electrical and Thermal Efficiency
	- Use of Smart Control Systems of Engine Room
	- Use of Window Film in Building Windows
	- Maximum use of Natural Day-light
	- Optimization of Lighting Energy
Costly Solutions	- Replacing Available Cooling Systems with VRF Cooling System
	- Installation of Double-glass Windows with UPVC frame
	- Use of CHP System

Table 5 ESCOs' Executable Projects in Transportation Sector

Type of Solutions	Titles
Low-costs Solutions	- Replacement of Exhausted Parts affecting Vehicle Energy Consumption
	- Preventive Repair and Maintenance of Vehicles
	- Vehicles Fuel Change
	- Training and Fostering Culture
Average Costs Solutions	- Replacement of Efficient Vehicles with Available Inefficient Vehicles
	- Optimization of Vehicle Engines Technologies
	- Optimization of Vehicle Manufacturing Methods
	- Manufacture of Hybrid Vehicles
Costly Solutions	- Optimization of Transportation Systems
	- Development of Rail Transport

12. Standard Service Description for Activity of Energy Service Companies

Energy Service Companies under a specified system that interactive with other beneficiaries, conduct Energy Saving Projects. What is certain, reduction of energy costs in an organization is not such a subject that achievable through a single project. But in general, a project under the title of Energy Consumption Optimization must be developed in any organization, which essentially has many sub-projects. These sub-projects can cover a range of stages from studies and design to purchasing, installation and implementation.

Regarding the fact that the responsibility of energy auditing with investment degree as well as, edition of M&V Project has been placed on Energy Optimization Consulting Company, it shall be provided with a Standard Service Description for them.

Methodologies of ESCOs' activities in Building and Transportation sectors are similar, but only activities of these companies in each group varied over the effective factors on energy consumption, costs, return on investment period, risk management, insurance and energy saving solutions those are taken into consideration and clarifies in private terms of the contracts according to the requirements of each item.

ESCO's Service Description includes implementation of optimization project notified in tender documents. The service description in the subject-matter of contract shall be mentioned in Energy Performance Contract and could be divided in to lower levels of activity, if required. It must be added that from the beginning of each project, M&V Project (1 out of 4 main options) of that project must be specified and confirmed by ESCO and the Client. Accordingly, the syllabuses of the service description of Energy Efficiency Contract shall be provided as follow:

- Rendering Energy Savings Consulting;
- Conducting Studies and Engineering Analysis;
- Providing Basic and Detailed Design Services;
- Supplying Goods, Equipment and Parts;
- Design and Manufacture of the Required Equipment

- Financial Management and Investment
- Provide Energy Consumption Optimization Solutions;
- Installation, Commissioning and Delivery
- Procure, Supply / Development of the Required Software
- Guaranteeing Energy Saving
- Monitoring
- Training
- Developing Energy Repair and Maintenance System

It ‘s worth mentioning that based on the nature of ESCO Contract which are similar to EPC in Industrial and Non-industrial Sectors, the executive regulations of design and development method of State’s Engineering Order could be referred to in this connection. If the client needs to use of a consultant services in this job, service description of the Employer’s Consultant in Design and Development case, has been stipulated in this regulations and can be referred to.

Regarding provided items, standard service description of ESCO Companies in different sectors are provided as follow. It must be added that provided activities are practicable in all sectors, however, severity, dept and attention level to them, in different sectors are different. Here, not being specified an activity for one sector does not mean that it has no priority in that sector.

Table 6 ESCO Service Description in Different Sectors Projects

Phasing	Description		Building	Industry	Processing Industries & Power Plants
Phase I	Formulation of Basket of Practicable Projects				
	1-1	Analysis of Energy Auditing Results	*	*	*
	1-2	Analysis of Energy Auditing if required		*	*
	1-3	Identifying Prioritized Project to Implement		*	*
	1-4	Determining and Finalizing Project to Client	*	*	*
	1-5	Finalizing M&V Option for the projects have been finalized in association with the Client and Optimization Consulting Engineers, if required	*	*	*
	1-6	Formulation of Basket of Practicable Projects to Implement	*	*	*
Phase II	Financial Management and Investment				
	2-1	Formulation of Feasibility Study Packages (Economic and Engineering) for Designated Projects	*	*	*
	2-2	Interaction with Financial and Investment Organization (National and International)		*	*
	2-3	Conclusion of Financial Memorandum of Understanding		*	*
	2-4	Financial Management and Investment	*	*	*
	2-5	Formulation of Financial Balance Sheet of Projects	*	*	*
	2-6	Guarantee of Energy Saving	*	*	*
Phase III	Engineering Analysis, Detailed and Basic Design, Manufacture and Supply of Equipment of Basket Projects				
	3-1	Providing Expert Team of Detailed and Basic Design		*	*
	3-2	Supplying Goods, Equipment and Parts	*	*	*
	3-3	Design and Manufacture of the Required Equipment		*	*
	3-4	Procure, Supply / Development of the Required Software	*	*	*
	3-5	Installation, Commissioning and Delivery	*	*	*
Phase IV	Confirmation of Measurement and Verification				
	4-1	Adjust Projects with M&V Procedures in association with the Client and Optimization Consulting Engineers, if required	*	*	*
	4-2	Examination and Confirmation of the amount of Energy Saved	*	*	*

13. Standard Service Description of Consulting Engineers Companies for Energy Optimization

Consulting Engineers Companies for Energy Optimization are responsible for energy auditing and preparation of tender documents for implementing energy optimization project in an organization. They have also the duty of measurement and verification. This duty through a Supervision Contract based on Measurement and Verification Protocol, becomes conductible.

Table 7 Description of Energy Detailed Auditing and Formulation of Tender Documentation

Phase I	Studies, Initial Examination and Information Collection	
	1-1	Identification and Examination of Installations and Facilities of the Energy Consuming Organization through Perception
	1-2	Collection of Information Records of Heating and Electrical Energy Consumption related to Preceding 3 years (through Analysis of Bills)
	1-3	Analysis of Information of Energy Consumption and Determination of Particular Consumption of Heating and Electrical Energy
	1-4	Examination of Effective Parameters on Energy Consumption of an Organization
	1-5	Edition of the Organization Energy Baseline considering Consumption Records and Effective Parameters
	1-6	Comparison of the Energy Consumption of the Organization with Standard Amount and Conducting of Gap Analysis
	1-7	Examination of Performance Records of Energy Management Unit (Energy Management Matrix)
Phase II	Measurement of Electrical and Mechanical Parameters	
	2-1	Preparation and Edition of Energy Auditing Checklists
	2-2	Collection of Information and Technical Documentations related to Performances of Different Sectors of the Organization Consuming Energy
	2-3	Measurement of Mechanical and Electrical Parameters of main Energy Consuming Equipment
	2-4	Completion of Energy Auditing Checklists and Analysis of Information Collected on Energy Items
	2-5	Determination of Performance Indexes of Organization Energy
Phase III	Information Processing and Provision of Solutions	
	3-1	Processing of Data obtained from Measurements conducted for Identification of Energy Waste Points and the degree of wasting in them.
	3-2	Determination of Reduction Practical Potential in Energy Consumption of the Organization
	3-3	Provision of Energy Consumption Optimizing Solutions in Different Sectors of the Organization on Energy Items, Consumption and Energy Application
	3-4	Engineering and Economic Assessment of the Provided Solutions
	3-5	Provision of Final Report on Energy Auditing
Phase IV	Formulation of Tender Documentations	
	4-1	Formulation of Optimizing Project for Energy Consumption of the Organization in association with Energy Management Unit members, including: - Description for Optimizing of Energy Consumption - Assessment of Investment Costs - Assessment of amount of Energy Saving - Assessment of Contract Period - Assessment of Rate of Return on Investment - Assessment of Parties' Share
	4-2	Formulation of Tender Documentation
Phase V	5-1	Collaboration in Edition of M&V Project for the Project confirmed by the Client and ESCO

14. Legal Provisions Pertaining to Energy Service Companies

Article 17: Amendment to Consumption Model:

In order for protecting of Energy service Companies, based on joint proposal of the Ministry of Petroleum, Energy, Economic and Financial Affairs, President's Planning Deputy and Strategic Supervision, Ministers' Council ordered to formulate the required procedures which adequately motivates formation and development of these types of companies throughout the country and enacting it within six months after enactment of this act. Financial resources for implementation of this article will be supported from article (37) of this act. Also, executive organizations, subject-matter of article (4) of Civil Service Act may create obligation for conclusion of energy saving contracts from the produced savings and proceed to from credit resource of article 73 and yield savings.

Article 73: Amendment Act of Consumption Model:

In order for protecting implementation of Consumption Optimization Solutions, and promotion of Energy Efficiency in framework of objectives and provisions laid down in this act, hereby, Ministries of Petroleum and Energy shall be authorized to acquire the required financial facilities from savings produced by this act, annual budgets, internal resources and affiliated companies. The amount of financial facilities mentioned in this article shall be determined by Supreme Council of Energy.

Article 134: 5th Development Program Act

In order for applying saving measurements, encouraging and protecting of consumers in line with making logic and modify electricity power and energy consumption models, preserving country's energy reservoirs and protecting environment, Ministries of Energy, Oil, Industries and Mines, shall be authorized to apply financial intensive packages for observing consumption model and optimizing energy consumption, producing CFL Products under high standard, based on directives which shall be approved by the Economic Council by the end of the first year of the program at most. Financial resources required for implementation of this article shall be supported from the funds produced by the implementation of Subsidiaries Act, Internal Resources of Affiliated Companies of Ministries of Oil, Energy, Industries and Mines / Selling Power Plants and Other Assets including Moveable or Immovable Properties, Ministry of Energy Shares and Stocks, as well as, Subsidiary and Affiliated Companies and Enterprises in form of annual budgeting.

Note 2: Executive Organizations shall be authorized to conclude contract with private sector and cooperative companies for reaching to saving in energy consumption preserving previous productivity. Contract price shall be supported and payable from savings produced by savings under the agreement exchanged with Deputy Office. Directive thereof, based on proposal of Ministries of Energy and Oil and Deputy Office shall be approved by the Ministers' Council.

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Completion Report (ANNEX)

Deliverables on technical cooperation activities

Model contract of ESCO

December 2018

Nippon Koei Co., Ltd

Recommended contract text for building's energy performance

This agreement is made and entered into as of ……………….. by and between Mr./Mrs. …………… holder of national I.D. card No ………… , owner/ representing building's managing board, residing at …………………………………, post code ……………………, phone no. ………………… (hereinafter referred to as the Employer) and ……………… corporation as the energy services provider with registration No. ………….. , holder of national I.D. card No. ………. , residing at ………………………., post code …………………, phone No. ………………….. (hereinafter referred to as the Contractor) with the following terms and conditions:

Article 1: Object of Contract

The object of this contract is a set of works and activities including: performing project description specified in appendix 1, consulting and providing engineering analyses and operational specific and economical procedures in order to control, reduction and saving in energy and water consumption, providing design and engineering services, management, financial investment, preparing, supplying or manufacturing equipment, requirements and software completely, installing, starting and delivering, ensuring the amount of saving and performing survey, repairing, correcting and improving, teaching Employer's staffs and other services in order to performing the project and ensuring the improvement of energy efficiency, reduction and saving in different forms of energy and water which are accomplished in Employer's site so that the Employer profit from the advantages and revenues resulting these savings.

Both parties acknowledge that performing the project is not limited to the contract's object and appendix, but the contractor shall undertake complete investment and all the services mentioned in the contract, prepare and provide equipment, software and required machinery and also the tasks which are necessary to achieve purposes of the contract's object.

Article 2: Contract Duration

2.1. Duration of this contract is …………….. Contract leverage shall be after contract's conclusion and exchange. Contractor acknowledges that date of commencement of saving guarantee will be formed after interim delivery or each separate section of project which is presentable.

Article 3: Value of Contract

3.1. Ceiling price of the contract is …………………… This ceiling price is sum of all the expenses of services and purchasing equipments under the contract including capital charges, providing finance and contractor's profit until final delivery and all the expenses of capital return out of the income resulting from saving and reduction in energy and water costs in the long term and commensurate with final term of the contract and commensurate of total costs. Contractor's part from returning savings shall be equal to ………… percent of conducted monthly savings until contract liquidation.

3.2. The parties herein consideration agree that if contractor's invoices up to final ceiling price of the contract issued earlier, the contract will be terminated, Employer's payments will be stopped and the contract will be settled. Then the income resulted from more savings is chargeable to the Employer.

3.3. The parties herein consideration agreed that savings in energy and water consumption based on reduction in energy and water consumption will be calculated due to performing this contract, not the decrease or increase in energy and water consumption. Therefore invoices are calculable and payable based on the amount of proved savings and the forms of energy market price.

3.4. The contractor shall be responsible for all taxes including income tax and other state pensions arising out of contractor and the staff in accordance with this contract, which is held from the commencement date and during execution of the contract.

3.5. Employer shall pay for confirmed invoices one month after the invoices submission, as per appendix 5 of the contract.

3.6. Down payment shall not be paid for this contract.

Article 4: Employer and Contractor's Obligations

4.1. Employer will introduce a representative to contractor with limited authorities in order to confirm or reject services and works provided in contract on behalf of the Employer. Employer may replace Employer's representative notifying the contractor in written form.

4.2. Employer shall perform higher supervision, evaluation and validation both directly by introducing a representative, and indirectly by consulting related experts.

4.3. Employer, compliance with regulations, shall immediately provide technical information necessary for contractor in order to perform contract's provisions. Any documents and information which is provided to contractor by Employer is only to facilitate contractor's task. Therefore the Employer will not ensure adequacy, validity and reliance of submitted documents and information.

4.4. Contractor undertakes contractor's full authority and the best skills and attention in technical, financial and capital capabilities as well as necessary permits and certificates to perform and completion of the contract.

4.5. Completion of the contract and obligations specified in the contract's job description, based on technical and engineering principles and according to Employer's accepted professional and expert standards observing financial consideration and executive economical procedures, according to related codes and regulations and guidelines, and exploiting maximum proficiency and accuracy by prominent design, engineering and executive experts and other qualified staff.

4.6. Contractor undertake to introduce natural entities as contractor's fully authorized representatives related to the contract's provisions with limited powers, at last one week after conclusion of the contract. Contractor may replace contractor's representatives notifying the Employer in written form.

4.7. Contractor's own procedures and performance under contract's provisions, by no means, shall not intervene in current matters or degrade Employer's position.

4.8. Contractor shall submit service and purchase invoices to Employer along with progress reports.

Article 5: NO Assignment

5. Contractor has confirmed and declared that contractor is not subjected to prohibition mentioned in the law approved on 22th of Dey, 1337 (Persian calendar). Contractor undertakes that benefits of this contract will not be transferred to any predicted or inferable person in the aforementioned law or accepted their entrance into the company. In the case of breach in the abovementioned circumstances, Employer shall have the right to treat contractor according to the regulations.

Article 6: Guarantee

6.1. In event of providing investment on behalf of Employer, in order to fulfillment of the obligations, contractor undertakes to submit a bank letter of guarantee amounting 5 % of total value of the contract as a guarantee of contractor's obligations, concurrent with signing of contract and before starting any executive task of the contract. Guarantee letter shall be released after interim delivery of the project. In event of contractor's failure in fulfillment of obligations, Employer shall have the right to confiscate the amount of bank guarantee or cover the incurred losses according to the regulations.

6.2. In event of providing investment on behalf of contractor, in order to fulfillment of the obligations, Employer undertakes to submit a bank letter of guarantee/ certified check/ bank paper accepted by contractor amounting 5 % of total value of the contract as a guarantee of Employer's obligations, concurrent with signing of contract and before starting any executive task of the contract. Guarantee letter shall be released after interim delivery of the project. In event of Employer's failure in fulfillment of obligations, contractor shall have the right to confiscate the amount of bank guarantee or cover the incurred losses according to the regulations.

Article 7: Evaluating the amount of savings/ surveying and certifying

7.1. Contractor shall prove the amount of water and energy savings based on reduction in water and energy consumption arising from project execution measuring validity and the extent of recommendation or agreements in one of the manners hereunder and observing specified instances in international protocol of measurement and certifying energy performance (IPMVP) appendix 2 of the contract to Employer/adviser after interim delivery and before the period of guarantee of annual saving.

7.1.1. Through meters and measuring facilities: contractor shall install proper meters and measuring equipment on every available consumer of water and energy forms notifying Employer and register and report changes in consumption of energy forms. Contractor also may utilize existing measuring equipment in event of Employer's consent and changes in the amount of consumption shall be proved in this manner. State of usage and installed measuring equipment's accuracy shall be confirmed by both parties. The results of this method, in which registration manner and reporting registered results shall be approved by both parties, will be noticed by contractor to Employer in periods of at most 3 months.

7.1.2. Using the approved measuring method by both parties according to appendix 2 of the contract.

7.1.3. Using energy bills and showing the reductions in water and energy consumption.

Article 8: Maintenance

8.1. Maintenance of installed facilities, until the date of final delivery, shall be paid by contractor at contractor's own expenses and contractor shall control facilities' proper performance and prevent damages.

8.2. Expenses of repairing and replacement of damaged pieces during maintenance period shall be paid by contractor unless it is proved that the appeared damages resulted from demolition activities of Employer's staff.

8.3. Employer shall provide contractor with conventional access during period of maintenance or repair damages of guarantee period and pursuing project performance.

Article 9: Contract changes

9.1. Changes in amount

9.1.1. It may be necessary to make changes in amount, volume, type, quality and facilities and services technical information while the project is running.

These changes, including decrease or increase, will be valid only by approving Employer and at most 25 percent of initial amount of contract. The abovementioned changes shall not reduce the percentage of uncommitted savings by contractor.

9.1.2. If changes appear only in technical specifications and quality and the amount of contract doesn't change, contractor shall receive technical approval of Employer. If changes lead to change in the amount of contract, it shall be valid by proportional changes in guaranteed amount of savings. In this case contractor shall notify Employer of detailed price analysis including real costs and percentage of profit and if it approved by Employer, new prices shall be the basis for payment of invoice during refund of the amount of contract.

9.1.3. If Employer consider any changes necessary to protect and prevent from risks and reductions in production capacity, contractor shall be notify Employer in writing the amount of effectiveness of aforesaid changes on savings rate, and perform in event of Employer's approval. In event of decrease or increase in savings, the corresponding time shall be effective in contract duration.

9.1.4. If contractor encounter undefined conditions during project execution, Employer shall be informed immediately and both parties must reach to an agreement toward aforesaid condition and possible changes.

9.2. Changes in contract term

Date of interim completion and interim delivery of contract, final delivery, time periods and specified critical path in phasing and scheduling contract's execution will not changed if contractor have Employer's approval to make changes in contract duration. Changes in contract duration, corresponding to changes in labor, are applied in schedule and shall not be subjected to delays.

Article 10: Insurance

10.1. Contractor is obliged to provide liability insurance coverage in order to compensate probable losses due to damaging installations and facilities of Employer as a result of contract execution. Related insurance policy shall be bought to the advantage of Employer and submitted to Employer before commencement of installation and execution.

10.1.1. In event of failure in providing liability insurance by the insured, contractor is obliged to provide related approved guarantees in order to compensate probable losses and damages.

10.2. Contractor is obliged to cover civil liability insurance of staff (according to article 23) with no exemption of any incidence, disability and disease and discharge Employer from any other claims hereof.

10.3. Contractor is obliged to provide necessary insurance coverage for purchased facilities and equipment in order to contract execution and authorized to provide investment insurance coverage.

Article 11: Training

11.1. Providing necessary education for Employer's staff during installation, execution, establishment and interim delivery is obligatory and contractor shall submit recommended training instructions to Employer to be approved.

11.2. Contractor's guiding training and exploitation shall be complete in a manner that introduced staffs of Employer are able to lead and exploit from project's facilities and equipment after interim delivery.

11.3. Contractor is obliged to demonstrate basic and trivial maintenance instruction booklets for introduced staffs on behalf of Employer.

11.4. In event of any incidence due to failure in proper training of Employer's staffs, contractor shall be responsible for compensation until final delivery of contract.

Article 12: Suspension of the contract

In event of suspension of contract on behalf of Employer, expenses of suspension period shall be calculated according to suspension period and amounting accomplished investment by contractor until suspension period which is in accordance to Employer's approved documents and based on three year term deposit of Islamic Republic of Iran's central bank and paid by contractor. Suspension period of the contract, in any cases, shall not exceed two months. In this case contractor has the right to terminate the contract.

Article 13: Termination of the contract

Employer may, any time, terminate the contract with the following terms and conditions:

13.1. Employer, in each phase of the contract in which Employer intends to terminate the contract, shall notify contractor by determining a two month deadline.

13.2. Contractor, upon receiving termination notice, shall immediately stop operation and prepare the report of service progress condition up to termination notice until 15 days and submit it to Employer. This report must contain degree of progress in each part of services, phases and sections which their completion is necessary to protect Employer's interest during two month deadline, and it is also include determining their fees.

13.3. Employer, within fifteen working days after receiving invoices, shall measure necessary considerations with contractor to terminate the contract and prepare contract termination minutes and pay contractor's expenses as follows:

13.3.1. Employer shall pay contractor's expenses and their interest, at most within 21 working days, according to contract termination minutes in other sections different from services in accordance to appendix 5 and project progress up to determined time table for termination of the contract based on three years term deposit rate by Islamic Republic of Iran's central bank.

13.3.2. Employer shall pay expenses of contract services when social security organization's liquidation certificate is submitted and with tax deduction and complete settlement with contractor consist of releasing whole amounts, guarantees and providing tax payment receipt.

Article 14: Natural and unexpected events (Force majeure)

14.1. In event of natural and unexpected events such as war including declared and undeclared, revolutions, public strikes, outbreak of contagious diseases, earthquakes, dust pollution, unusual overflows and floods, unprecedented droughts and widespread fires which are not resulted from the operation of contractor, and both parties cannot fulfill their obligations, failure in the aforesaid fulfillment shall not be considered as violation of the contract and the contract will continue to be valid. In event of force majeure occurrence, both parties undertake that, up to at most 48 hours, notify the other party considering that the force majeure prevent which party under contract from fulfillment of obligations.

14.2. If force majeure condition lasts for more than 45 successive days, both parties hereto have the right to terminate the contract submitting written notice during 15 working days after above mentioned duration.

Article 15: Regulations governing the contract and disputes conciliation

Islamic Republic of Iran's rules and regulations govern this contract. In event of arising differences between the parties in connection with interpretation or execution of this contract's clauses, Employer's association of energy services as consensual reviewer shall consider the dispute in presence of both parties, and if no settlement can be reached. The differences shall be solved in accordance with the current law and regulations of Iranian courts.

Article 16: Notices

Any types of announcement, instruction, opinion, suspension notice, completion and termination of the contract shall be valid in writing. Secretariat receipt on both parties, and post delivery receipt will be the proof of notice submissions (reports, documents and letters).

Employer	Contractor (energy services cooperation)
……………………………………	……………………………………
Name:	Name:
Position:	Position:
Address:	Address:
Economic code:	Economic code:
Tax area:	Tax area:
Postal code:	Postal code:
Phone No:	Phone No:
Fax no:	Fax no:
Signature	Signature

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Completion Report (ANNEX)

Deliverables on technical cooperation activities

Brief report based on pre-walk through at candidate building

December 2018

Nippon Koei Co., Ltd

Example format

Financial proposal (one case)

Technical proposal (three cases)

Note: This format was suggested and shared to SABA as sample of ESCO proposal.

(Format A-1)

Summary - 1

a. Table of opted EE&C technique

Item	Current amount of consumption of Electric power, Gas, Oil, Water		Energy consumption Base line XXXX MJ/Annual (a)		CO2 Emission Base line XXXX kg-CO_2/Annual (c)		Estimated Energy fee Million Rials/Annual (A)	Investment Million Rials (B)	Pay Back Period Year (B/A)
	Type	Reduction (Unit)	Reduction MJ/Annual (b)	Rate % (b/a)	Reduction kg-CO_2/Annual (d)	Rate % (d/c)			
Replace to LED lighting from fluorescent lamp	Electric	61,440kWh	553,000				190	1,296	6.8
Introduction of VSD and number control of pumps	Electric	110,600 kWh	995,000				244	200	1.2
Replace to high efficiency turbo chiller from existing turbo chiller	Electric	~~351,628 kWh~~	~~3,164,000~~				~~776~~	~~25,500~~	~~32.2~~
Sum	—	172,040 kWh	1,548 MJ				434	1,496	3.9

Remark) Competitor must not mention reduction of energy, CO2 emission, in case that they will optimize proposal for water reduction.

(Format A-2)

Summary - 2

Competitor shall mention Summary of project estimation in entire ESCO project period.

I	Presided energy fee reduction	434 Million Rials/Annual	
II	Guaranteed energy fee reduction	391 Million Rials/Annual	
III	ESCO service fee (payment to ESCO)	371 Million Rials/Annual	
IV	Building owners benefit	20 Million Rials/Annual	II - III
V	Contract period	7 Years	
VI	Sum of presided energy fee reduction in contract period	3,038 Rials	I x V
VII	Sum of guaranteed energy fee reduction in contract period	2,737 Rials	II x V
VIII	ESCO service fee in contract period	2,597 Rials	III x V
IX	Sum of Building owners benefit	140 Rials	IV x V

(Format C-1)

Summary of ESCO plan -1

a. ESCO project balance sheet (ESCO contract duration 7 years)

(Included tax, Unit: million Rials)

	FY	1394	1395	1396	1397	1398	1399	1400	1401
	Year	Construction	1st	2nd	3rd	4th	5th	6th	7th
Prospected reduction of charge	I	-	434	434	434	434	434	434	434
Guaranteed reduction of charge	II	-	391	391	391	391	391	391	391
ESCO service fee	III	-	371	371	371	371	371	371	371
Guaranteed benefit of building owner	IV=II-III	-	20	20	20	20	20	20	20

(Format C-2)

Summary of ESCO plan -2

b. ESCO project balance sheet (ESCO contract duration XX years)

(Included tax, Unit: thousands Rials)

	FY	1394	1395	1396	1397	1398	1399	1400	1401
		Construction	1st	2nd	3rd	4th	5th	6th	7th
	In - come								
A	Finance procurement	1,712,300	---	---	---	---	---	---	---
B	Subsidy (If possible)		---	---	---	---	---	---	---
C	ESCO service	---	371,000	371,000	371,000	371,000	371,000	371,000	371,000
D	The other	---	0	0	0	0	0	0	0
	Out - go								
a	Charge for detailed audit	141,500	---	---	---	---	---	---	---
b	Charge for design work	74,800	---	---	---	---	---	---	---
c	Charge for construction	1,496,000	---	---	---	---	---	---	---
d	Charge for maintenance	---	20,000	45,000	45,000	45,000	45,000	45,000	45,000
e	Charge for operation	---	10,000	10,000	10,000	10,000	10,000	10,000	10,000
f	Charge for measurement and verification	---	28,000	28,000	28,000	28,000	28,000	28,000	28,000
g	Charge for insurance	---	0	0	0	0	0	0	0
h	Tax	---	8,000	8,000	8,000	8,000	8,000	8,000	8,000
i	The other	---	0	0	0	0	0	0	0
j	Benefit to ESCO company		50,000	50,000	50,000	50,000	50,000	50,000	50,000
k	Interests(=4%)	---	68,492	61,032	49,390	38,215	27,486	17,187	7,299
l	Repayment to financer	---	186,508	291,032	279,390	268,215	257,486	247,187	237,299
m	Debt	-1,712,300	-1,525,792	-1,234,760	-955,370	-687,155	-429,669	-182,482	54,817

(Form B-1)

Technical proposal 1-1

a. Explanation of optimized EE&C technique

ESCO company shall mention each EE&C techniques of technical proposal under format bellow respectively.

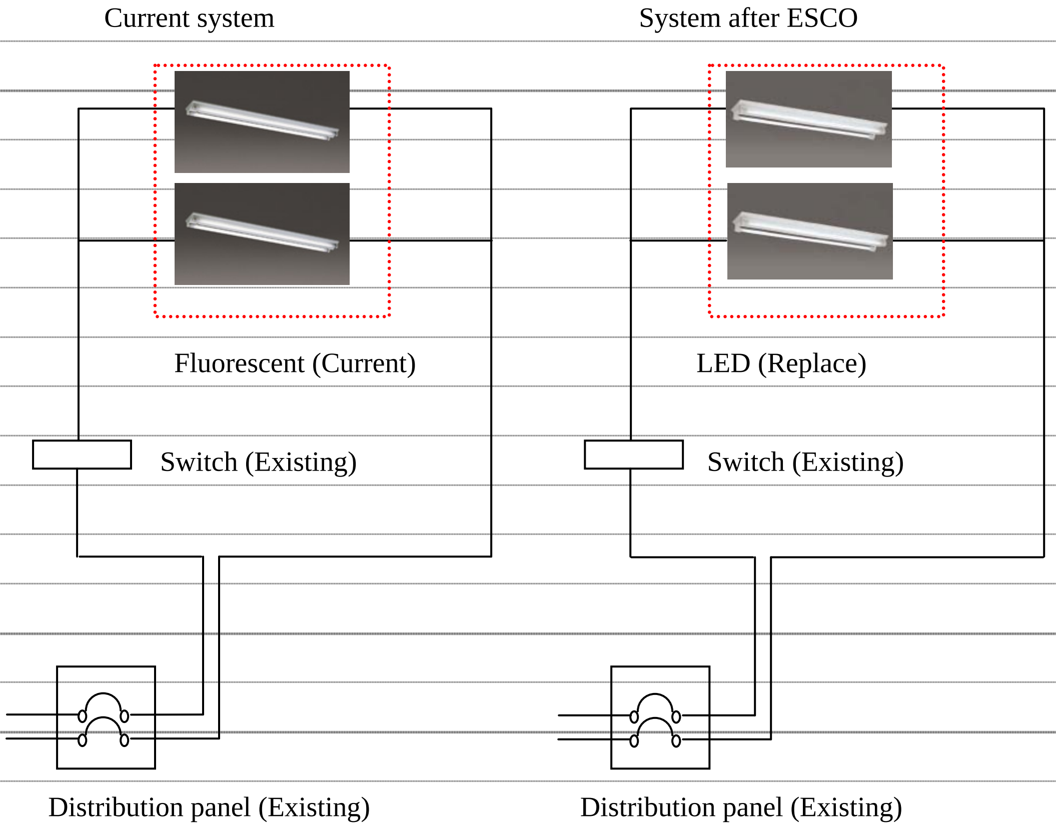
(On First page)

1. System diagram both current system and after ESCO.

(From next page after first page)

2. Estimation of energy consumption on current system and the issues on it.
3. Explanation of techniques of technical proposal
4. Estimation of energy consumption on current system after ESCO and sources to be calculated.

(1) General diagram between current system and system after ESCO



(Form B-2)

(2) Presumption of the current energy consumption and current issue

At present, conventional type fluorescent lamps are installed in office area of Ministry of Finance as lighting equipment, that consumes approx. 50 W of energy consumption per lamp, 40 W of energy consumption is at fluorescent lamp and 10 W of energy consumption is at blast. It means that current system consumes more energy than case of introduction of high energy efficiency lamp.

Because diagrams regarding number and location of lighting in Ministry of Finance were not shared prior to walk through survey, We has no idea for exact figure of fluorescent equipment. Therefore we estimated energy efficiency potential with assumption under experience.

Assuming that 4 fluorescent lamps with 40 W of capacity are installed in 15m2 of area, because total floor area of Ministry of Finance is approx. 55,000m^2, approx. 15,000 fluorescent lamps (55,000 / 15 x 4 =14,666 = approx. 15,000) may be installed.

1,000 lamps with high operation factor among installed fluorescent lamp will be replaced in this Proposal.

In case that amount of energy consumption is calculated under mentioned condition,

(a) Daily lighting time : 8 hours/day

(b) Annual operation days : 240 days/year

(c) Energy consumption per fluorescent lamp : 50 W (fluorescent 40W＋blast 10W)/lamp

(d) Number of fluorescent lamp : 1,000 lamps

Annual energy consumption = (a) x (b) x (c) x (d) =8 x 240 x 50 x 1,000

=1,440,000,000Wh/year =96,000kWh/year

(3) Brief presentation of optimized energy efficiency technology

Fluorescent lamps are operated to turn on/off of lighting switch by hand control that someone uses the room under existing system. On this proposal, fluorescent lamps will be changed to LED lamps without amendment of such hand operation system, then power consumption will be reduced with introduction of high efficiency lighting appliances.

Because energy efficiency potential on this proposal is estimated under assumption that is mentioned in clause (2), energy efficiency potential shall be amended based on result of detailed audit.

Especially, the lamps with low return on investment, it means that the lamps are short time turning on annually, shall be omitted from candidate lamps to be replaced.

(Form B-3)

(4) Presumption of the energy consumption after the replacement

Assuming that energy consumption on LED lamp is set 40 W of electric power per lamp, further number of replace of fluorescent lamps are 1,000 lamps with high operation factor, annual energy consumption is estimated below,

(a) Daily lighting time : 8 hours/day
(b) Annual operation days : 240 days/year
(c) Energy consumption per LED lamp : 18W/lamp
(d) Number of fluorescent lamp : 1,000 lamps

Annual energy consumption ＝(a) x (b) x (c) x (d) =8 x 240 x 18 x 1,000=34,560,000Wh/year
=34,560kWh/year

(Form B-4)

Technical proposal 1-2

b. Environmental Effect

ESCO company shall mention environmental effect for increase and decrease of NOx, SOx, PM, Noise with introduction of EE&C technique.

(1) New on-set environmental impact

Environmental impact, e.g. NOx, SOx, PM, Noise, will not occur newly with replace of lighting equipment.

But, it is necessary to dispose fluorescent lamp tube with removal of existing equipment.

(2) Decrease of environmental impact

NOx, SOx emission from power plant will decrease with reduction of power consumption.

In 1393, amount of NOx and SOx emission per 1 kWh of power consumption is set XX1 mg/kWh, XX2 mg/kWh respectively. So, annual amount of NOx and SOx emission will decrease to YY1 mg, YY2 mg respectively with replace of lighting equipment.

(Form B-5)

Technical proposal 1-3

c. Effect for existing equipment

ESCO company shall mention scope to install new equipment or delete existing equipment.

(1) Introduction of new equipment

Just the part of fluorescent lamp tube will be replaced to LED lamp tube.

The other miscellaneous parts, e.g. blasts and covers, will not be replaced.

Because LED lighting does not need blast part, the wire from blast to lighting tube is not available, so the wire works to electric source from LED lamps need newly.

As mentioned in clause a (2), the lamps with low return on investment, it means that the lamps are short time turning on annually, shall be omitted from candidate lamps to be replaced. And the scope of replace will be discussed with building owner after detailed audit.

As mentioned above, some existing fluorescent lamp will remain after introduction of LED lamps, so the whole look together on lighting equipment will be lost.

And, because it is guessed that colour uniformity will be changed from present condition, specification of LED lamps will be decided under adequate discussion with building owner.

(2) Removal of existing equipment

As mentioned above, number and location of LED lamp to be exchanged will be specified after detailed audit.

Only fluorescent lamp tube will be removed, Cover and wire will not be removal for using continuously, blast will not be removed despite non using it.

(Form B-6)

Technical proposal 1- 4

d. Building operation in construction period

ESCO company shall mention the important item regarding safety, project schedule control, further quality control, deadline of completion of construction and handover of ESCO equipment.

(1) The effect for building operation on Ministry of Finance

In order to reduce any risk to be obstacles on implementing daily business by construction work, ESCO company will implement the replace work of lighting appliances on holydays or night time of working days.

ESCO company will discuss the details with building owner after detailed audit.

(2) Safety management

ESCO company will make the replace work plan under confirmation of replace methods for existing fluorescent lamp from current operation company, because of reducing risk of high place work.

ESCO company will provide appropriate scaffold (including stepladder), use safety belt out and out, work with supervisor to be ensured safety and support person, because of implementing construction work with smooth and safety.

ESCO company will discuss the details with building owner after detailed audit.

(3) Quality management

ESCO company will carry out lighting test of LED lamp prior to installation, further will carry out lighting test of LED lamp after installation.

(4) The date of competition

ESCO company shall complete the construction work by DD MM.

(5) Taking over of ESCO equipment

Despite of the date of completion for construction work, ESCO company will take over the equipment that will be completed installation and lighting test either on the date, on the tomorrow or the immediate working day.

On taking over ESCO equipment to building owner, ESCO company will re-confirm that the LED lamps can turn on/off without problem in the presence of in charge of person of building owner.

(Form B-7)

Technical proposal - 5

e. Treatment on termination of ESCO contract

ESCO company shall mention treatment on termination of ESCO contract, e.g. transfer of property of ESCO equipment

(1) Ownership transfer of ESCO equipment

ESCO company will own the ESCO equipment.

After termination of ESCO contract, ESCO company will assign and transfer ESCO equipment ownership to Building owner.

(Form B-1)

Technical proposal 2-1

a. Explanation of optimized EE&C technique

Competitor shall mention each EE&C techniques of technical proposal under format bellow respectively.

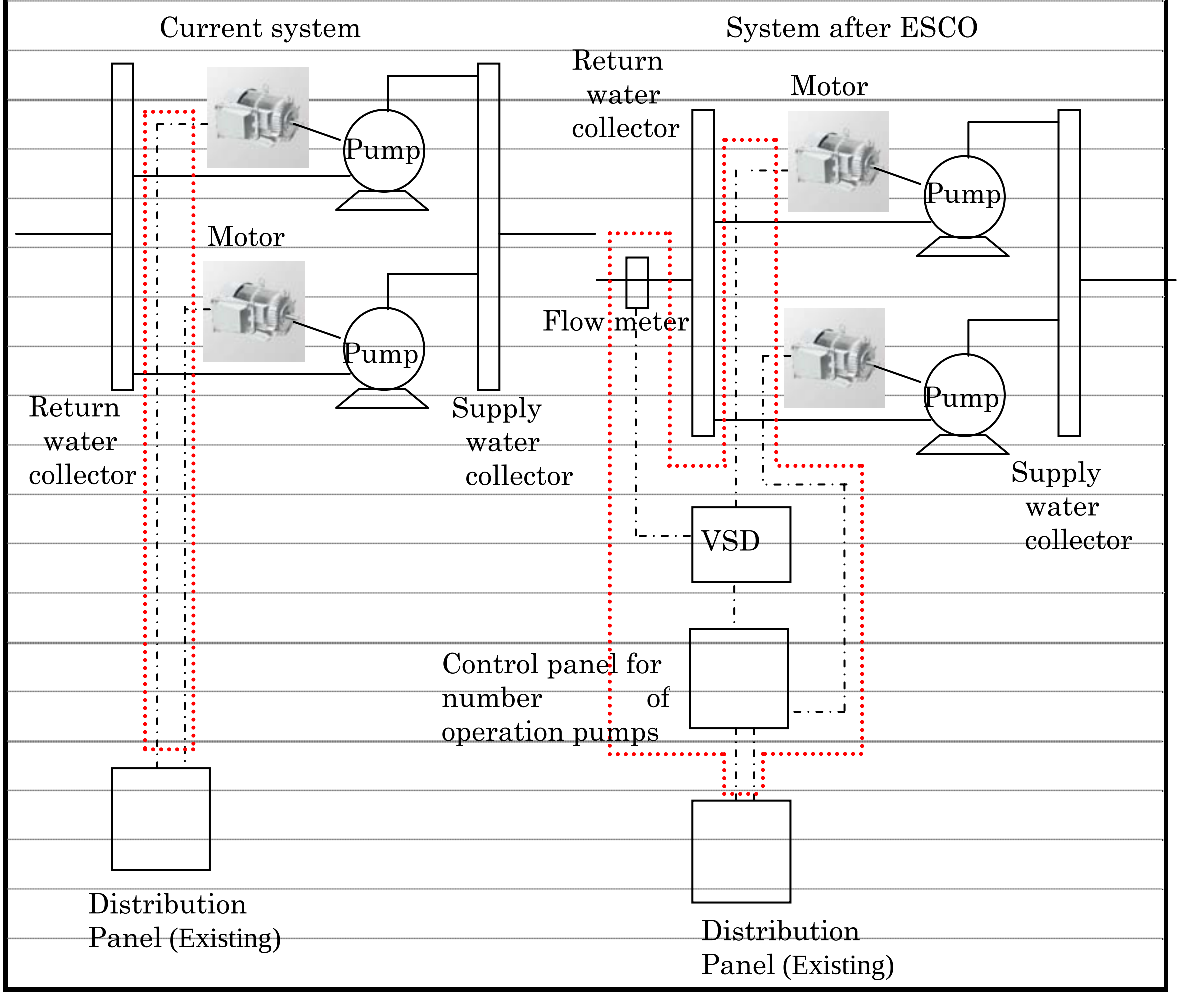
(On First page)

1. System diagram both current system and after ESCO.

(From next page after first page)

2. Estimation of energy consumption on current system and the issues on it.
3. Explanation of techniques of technical proposal
4. Estimation of energy consumption on current system after ESCO and sources to be calculated.

(1) General diagram between current system and system after ESCO



(Form B-2)

(2) Presumption of the current energy consumption and current issue

At present, twelve pumps for chilling and warm water with conventional type motor exist, and such all motors have 22 kW of rated capacity per motor and are turned on/off switch by hand control of operator. Current system consumes more energy (low energy efficiency) in comparison with introduction of high efficiency control system.

Because ESCO company can not get diagrams and operation record from Ministry of finance, actually ESCO company does not have accurate information on air conditioning system, so energy efficiency potential is estimated under assumption of operation condition based on interview of walk through.

Due to interview of walk through, the duration of warm air conditioning is from 20th September to 20th March, the duration of cooling air conditioning is from 1st May to 20th September, further assuming that daily operation time for air conditioning is eight hours, eight pumps within twelve pumps with installation is operated usually.

In case that amount of energy consumption is calculated under mentioned condition,

(a) Daily operation time for air conditioning: 8 hours/day

(b) Annual operation days : 240 days/year

(c) Energy consumption per pump : 19kW (22kW x 85%)

(d) Number of pump in operation：8pumps

Annual energy consumption =(a) x (b) x (c) x (d) =8 x 210 x 19 x 8

=255,360kWh/year ≒250,000 kWh/year

(3) Brief presentation of optimized energy efficiency technology

Pumps for chilling and warm water are operated to turn on/off of pump switch by hand control of operator under existing system. On this proposal, Pumps for chilling and warm water will be changed to automatic operation system with control system for number of operation pumps and variable speed control system (by VSD) power consumption will be reduced by introduction of such control system.

Because energy efficiency potential on this proposal is estimated under assumption based on finding of walk through due to lack of accurate information, energy efficiency potential shall be amended based on result of detailed audit.

(Form B-3)

(4) Presumption of the energy consumption after the replacement

Assuming that two VSDs will be introduced newly, further number of pump control system will be introduced as from eight pumps operation to four pumps operation in low load months, and the other condition is the same as current condition,

annual energy consumption is estimated below,

Annual energy consumption =140,000Wh/year

(Form B-4)

Technical proposal 2-2

b. Environmental Effect

Competitor shall mention environmental effect for increase and decrease of NOx, SOx, PM, Noise with introduction of EE&C technique.

(1) New on-set environmental impact

Environmental impact, e.g. NOx, SOx, PM, Noise, will not occur newly with introduction of VSD and the parts incidental to VSD newly.

But a portion of existing pipe shall be removed and be disposed with installation of flow meter.

And in case that existing motors do not comply with requirement specification for operation by VSD, existing motors will be replaced to compliance type for operation by VSD. In such case, existing motors will be disposed.

(2) Decrease of environmental impact

NOx, SOx emission from power plant will decrease with reduction of power consumption after introduction of VSD and the parts incidental to VSD newly.

In 1393, amount of NOx and SOx emission per 1 kWh of power consumption is set XX1 mg/kWh, XX2 mg/kWh respectively. So, annual amount of NOx and SOx emission will decrease to YY1 mg, YY2 mg respectively with introduction of VSD and the parts incidental to VSD newly.

(Form B-5)

Technical proposal 2-3

c. Effect for existing equipment

Competitor shall mention scope to install new equipment or delete existing equipment.

(1) Introduction of new equipment

As introduction of new equipment, VSD, control panel for number of operation pump and flow meter will be installed.

In case that existing motors do not comply with requirement specification for operation by VSD, existing motors will be replaced to compliance type for operation by VSD. Such motor also will be installed, and relevant wire will be installed newly.

ESCO company proposes that two pumps will be introduced variable speed control newly with installation of VSD respectively.

ESCO company proposes installation of one control panel for number of operation pump, and it can control twelve pumps (including two pumps with VSD control) per panel.

ESCO company proposes installation of one flow meter.

Number of installation of control appliances as mentioned above are just draft idea at the phase of proposal, it will be decided in consultation with building owner after detailed audit.

(2) Removal of existing equipment

A portion of existing pipe will be removed. And existing motor may be removed under consideration based on detailed audit.

(Form B-6)

Technical proposal 2-4

d. Building operation in construction period

Competitor shall mention the important item regarding safety, project schedule control, further quality control, deadline of completion of construction and handover of ESCO equipment.

(1) The effect for building operation on Ministry of Finance

In order to reduce any risk to be obstacles on implementing daily business by construction work, ESCO company will implement installation of VSD and the parts incidental to VSD on holydays or night time of working days.

ESCO company will discuss the details with building owner after detailed audit.

(2) Safety management

Pipe may be cut and welded on installation of flow meter. So ESCO company will comply with legal provision for treatment of heavy weight material and method of welding.

ESCO company will discuss the details with building owner after detailed audit.

(3) Quality management

ESCO company will carry out loop test of VSD and the parts incidental to VSD after installation.

(4) The date of competition

ESCO company shall complete the construction work by DD MM.

(5) Taking over of ESCO equipment

Despite of the date of completion for construction work, ESCO company will take over the equipment, VSD and the parts incidental to VSD, that will be completed installation and verification test of normal operation either on the date, on the tomorrow or the immediate working day.

On taking over ESCO equipment to building owner, ESCO company will re-confirm that the VSD and the parts incidental to VSD can execute normal operation in the presence of in charge of person of building owner.

(Form B-7)

Technical proposal 2-5

e. Treatment on termination of ESCO contract

Competitor shall mention treatment on termination of ESCO contract, e.g. transfer of property of ESCO equipment

(1) Ownership transfer of ESCO equipment

ESCO company will own ESCO equipment.

After termination of ESCO contract, ESCO company will assign and transfer ESCO equipment ownership to Building owner.

(Form B-1)

Technical proposal 3-1

a. Explanation of optimized EE&C technique

Competitor shall mention each EE&C techniques of technical proposal under format bellow respectively.

(On First page)

1. System diagram both current system and after ESCO.

(From next page after first page)

2. Estimation of energy consumption on current system and the issues on it.
3. Explanation of techniques of technical proposal
4. Estimation of energy consumption on current system after ESCO and sources to be calculated.

(1) Improvement of chiller operating efficiency by replacement

E/E plan is the replacement of the superannuated turbo chiller to latest high-efficient one which reduces power consumption and contract demand.

Current system	System after ESCO implementation

(Form B-2)

(2) Presumption of the current energy consumption

The chillers of 600USRT×3 are used as a heat source for air-conditioning now.

The chillers were turbo refrigerators made by the York Company 35 years ago, and superannuation is advanced.

As the existing chiller's COP and the capacity of the electric motor were uncertain, COP is assumed to be about 3.0 considering the aged deterioration.

Moreover, because details are uncertain, the operating days and hours of the chiller are assumed to be the following.

(a) Operating hours per day: For 10hours (Assuming 2hours longer than AHU)
(b) Operating days per year: 100days (Summer)
(c) Annual power consumption: 703,256 kilowatt-hour (before E/E).
(d) Used power: 703.3 kilowatt (before E/E).

(3) Presumption of the energy consumption after the replacement

The newly established turbo refrigerator is assumed to be COP6.0.

The new machine assumed the one always driven for the air-conditioning period as a base machine. Refer to the energy calculation seat for details.

(a) Operating hours per day: For 10hours (Assuming 2hours longer than AHU)
(b) Operating days per year: 100days (Summer)
(c) Annual power consumption: 351,628 kilowatt-hour (after E/E).
(d) Used power: 351.6 kilowatt (after E/E).

(4) Presumption of amount of reduction and reduction cost

Unit price of the contract power(kW) and the power consumption(kWh) assumed the following. Refer to the energy calculation seat for details.

Unit price: Contract power: 1,500yen/kW, Power consumption: 6cent/kWh

(a) Decrease contracted power: 350kW
(b) Amount of reduction electric power consumption: 351,628 kilowatt-hour
(c) Reduction cost: 8,831,721 yen

(5) Presumption of investment cost of E/E construction and payback years for the cost

As follows. Refer to the energy calculation seat for details.

(a) Cost of E/E construction: 90 million yen
(b) Payback years for the cost: 10.2 years

(Form B-3)

Technical proposal 3-2

b. Environmental Effect

Competitor shall mention environmental effect for increase and decrease of NOx, SOx, PM, Noise with introduction of EE&C technique.

(1) New on-set environmental impact

New environmental impacts such as NOx, SOx, PM, and Noise are not generated by replacing the chiller.

(2) Decrease of environmental impact

It leads to the reduction in the power plant in the amount of the CO2 generation along with the reduction in the amount of the electric power use.

(Form B-4)

Technical proposal 3-3

c. Effect for existing equipment

Competitor shall mention scope to install new equipment or delete existing equipment.

(1) Introduction of new equipment

The chiller equipment is updated to the latest high-efficiency type.

Neither the cold water pump, the cooling-water pump nor the cooling tower are included in the renewal cost assuming that existing is used as it is.

(2) Removal of existing equipment

600USRT freezer of existing is removed.

(Form B-5)

Technical proposal 3-4

d. Building operation in construction period

Competitor shall mention the important item regarding safety, project schedule control, further quality control, deadline of completion of construction and handover of ESCO equipment.

(1) The effect for building operation on Ministry of Finance

The construction of the replace of the chiller equipment shall be carried out on holidays or the weeknight, not to prevent the influence on staff and visitors.

ESCO company will discuss the details with building owner after detailed audit.

(2) Safety management

Substitution plan shall be planned appropriately after the safe installation is confirmed to the trader.

Execute construction smoothly and safely by multiple people such as support and supervisors in the work stand excluding the worker.

Confer on details in the implementation plan submitted after the detailed diagnostics.

(3) Quality management

Carry out a performance test after construction and verify the expected performance.

(4) The date of competition

Complete construction and the adjustment before beginning of the air-conditioning season. (Until which month what day)

(5) Taking over of ESCO equipment

Operation by the MOF building operator will be started after the operation guidance with the attendance of the person in charge of the Ministry of Finance.

(Form B-6)

Technical proposal 3-5

e. Treatment on termination of ESCO contract

Competitor shall mention treatment on termination of ESCO contract, e.g. transfer of property of ESCO equipment

(1) Ownership transfer of ESCO equipment

The ESCO company will own the ESCO equipment.

After termination of ESCO contract, ESCO company will assign and transfer ESCO equipment ownership to Building owner.

Brief report on

1. Tehran Vaterinary University,
2. Medical Science University,
3. Department of Energy,
4. Ministry of Finance,
5. Tehran Municipality Building
6. Isfahan municipality

Brief report
on Tehran Vaterinary University
in English

Date of Visit : 2015/07/28

1394/05/04

(Form B-2)

Name of Building	: Tehran Vaterinary University
Name of Department in charge	: Tehran Vaterinary University, Dr. Qasimi and Mr. Sharifi
Postal Address of building	: Tehran Enghelab Square street intersection Qryb- freedom of Tehran University
Use of building	: University
Number of days in operation per year	: Approx. 280Days / year (This building is in operation on working day.)
Number of hours in operation per day	: 12 Hours / Day Air conditioning:12H
Number of users	: About 1,200 people at a time (Quite approximate)
Temprature of air condition	: At cooling season: from beginning of March to end of September Unknown Degree C(Set by office stuff as they wish) At heating season: from end of September to end of March Unknown Degree C (Set by office stuff as they wish) There is no control system on heating and cooling.
Season of air condition	: At cooling season : Manually and close people (water coolers and gas systems) At heating season: From 15 October to Persian date Farvardin 30
Hour of condition per day	: At cooling season : 12H (Regulated by the people - water coolers and gas) At heating season: 12H (Unregulated by thermostat)
Total floor area	: Approx. 10,000 squere meters
Year of construction	: Approx. 65 years ago

Outline of building		
Item	Contents	Remark
Name of building	Tehran Vaterinary University	
Use of building	University	
Total floor area	Approx.10,000 squere meters	
Year of construction	Approx. 65years	
Number of floor	SRC/SC/WCAbove ground : 4 stories Underground : 1storey	
Record of Rehabilitation or Repair		
Architecture field	No rehabilitation is carried out until now.	
Mechanical facilities	No rehabilitation is carried out until now.	
Electrical facilities	No rehabilitation is carried out until now.	
Other facilities	No rehabilitation is carried out until now.	

■Energy consumption （Whole Building） All bills is not yet available

Power contract	Type of contract	No data	
	Received voltage	No datakV	
	Peak of power	No datakW	
	Unit price of power	No dataRials / kW	
	Unit price of pay-as-you-go	No dataRials / kWh (summer season) No dataRials / kWh(other season)	
Gas contract	Type of contract	No data	
	Diameter of receiving pipe	No datamm	
	Max amount of gas consumption per hour	No datacubic meter / hour	
	Price based on max amount of gas consumption per hour	No dataRials / (cubic meter / hour)	
	Price based on amount of gas consumption	No dataRials / (cubic meter / hour)	

(Form B-3)

■Outline of facilities

The building has a central room for hot water and heating.

And the cooling of air conditioners and water for local use

Month (in 1393)	The number of days	Power cousumption			
		in Low rate time	In standard rate time	In peak time	Total
Tīr	31	27,900	79,567	12,400	119,867
Mordād	31	27,679	80,821	13,286	121,786
Shahrīvar	31	23,250	74,179	11,071	108,500
Mehr	30	18,000	55,000	10,000	83,000
Ābān	30	15,517	42,414	8,276	66,207
Āzar	30	17,778	46,667	10,000	74,444
Dei	30	17,500	43,750	10,000	71,250
Bahman	30	17,308	43,846	9,231	70,385
Esfand	29	18,962	45,731	10,038	74,731
Farvardīn	31	18,744	42,535	10,093	71,372
Ordībehesht	31	11,759	56,655	8,552	76,966
Khordād	31	26,867	83,700	12,400	122,967

Month (in 1393)	The number of days	Natural gas consumption
Tīr	31	14,923
Mordād	31	13,072
Shahrīvar	31	12,297
Mehr	31	1,542
Ābān		
Āzar		
Dei		
Bahman		
Esfand		
Farvardīn	28	3,912
Ordībehesht	38	8,723
Khordād	31	10,876

(Form B-4)

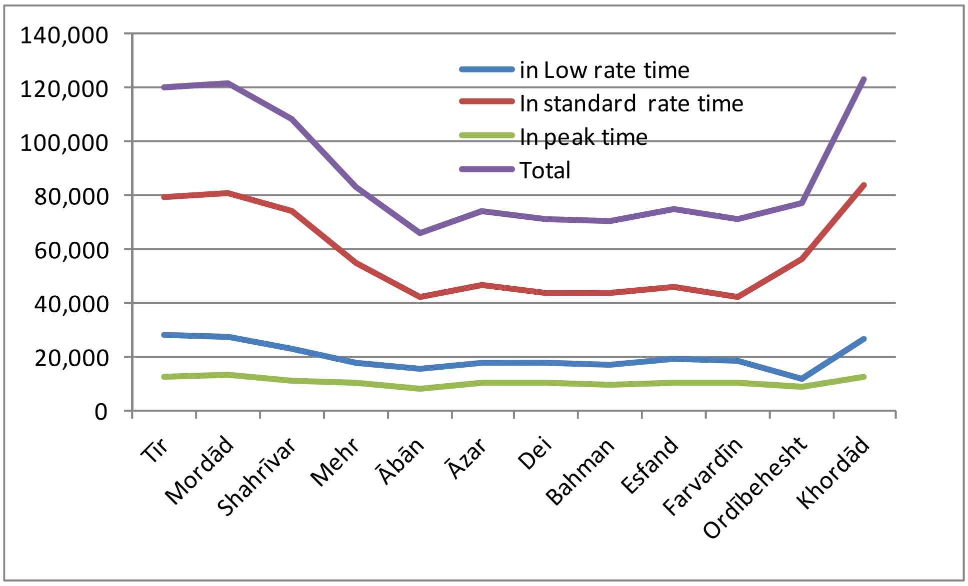


Figure Monthly electric power consumption (Unit: kWh)

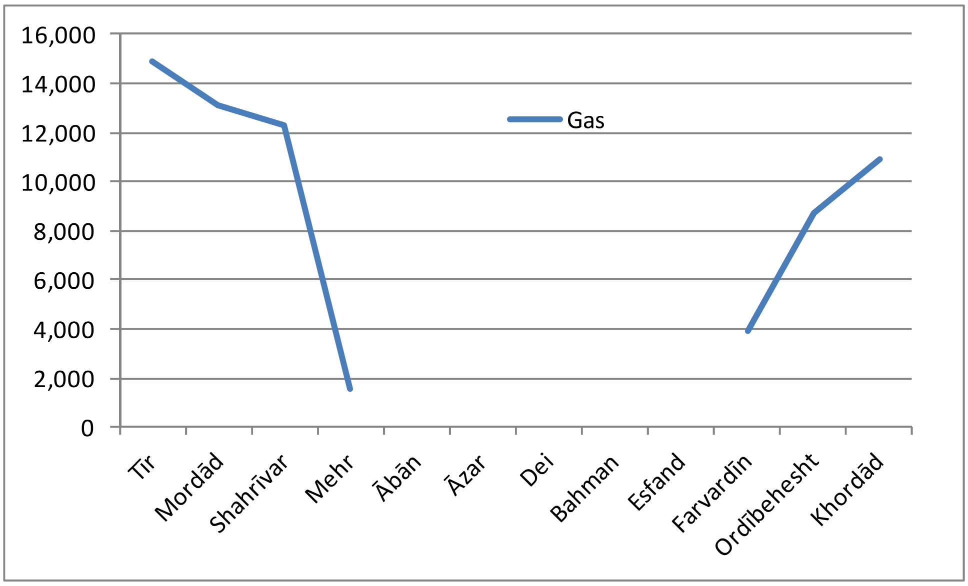
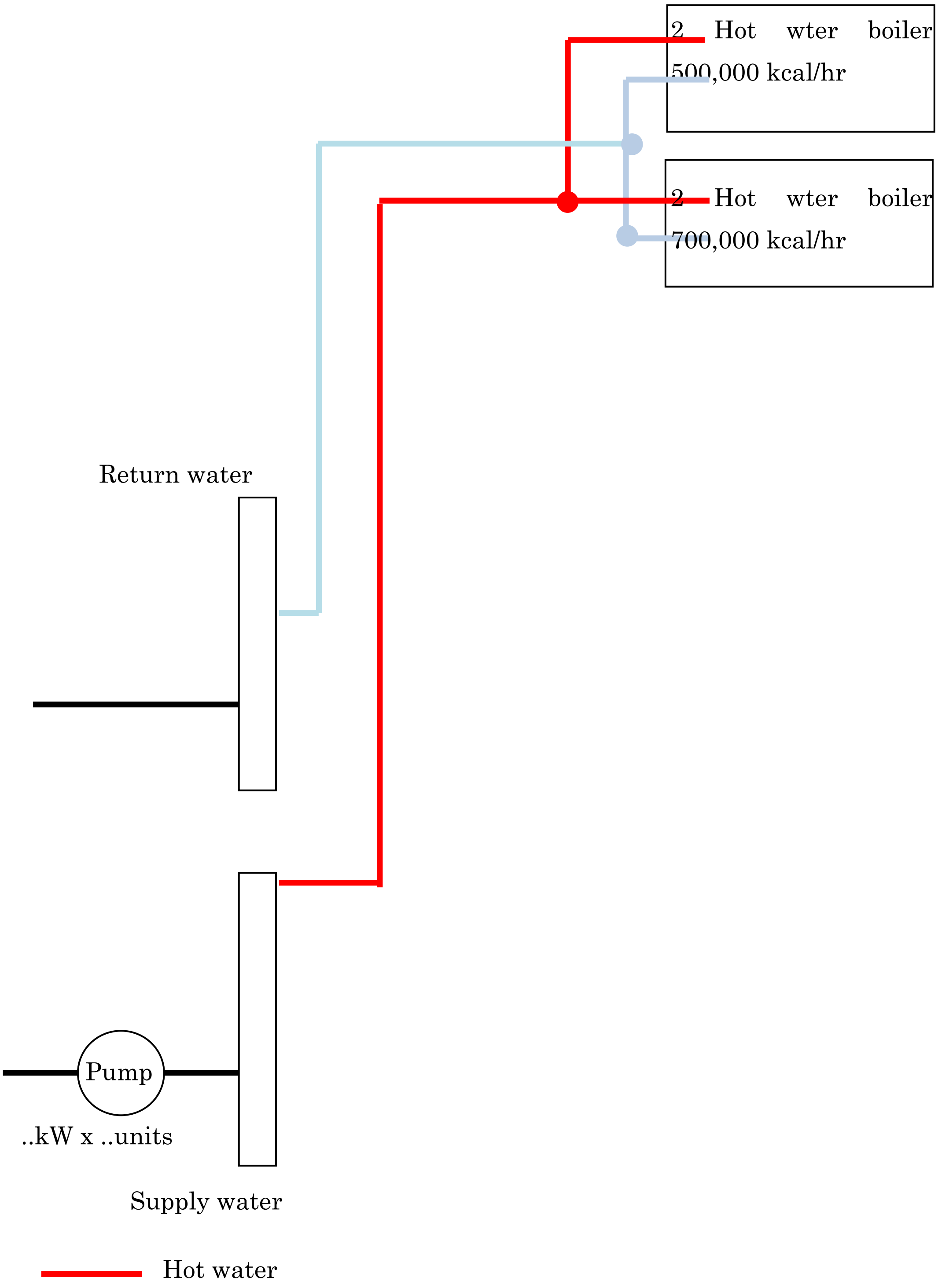


Figure Monthly natural gas consumption (Unit: m^3)

(Form B-5)



2 Hot wter boiler
500,000 kcal/hr
2 Hot wter boiler
700,000 kcal/hr
Return water
Pump
..kW x ..units
Supply water
Hot water

(Form B-6)

Summary of Interview

The building was very old and consequently it is an old heating system. After years of central chiller cooling system for water cooler and gas has changed. However, the set consists of three separate buildings Notes on the electrical and mechanical installations for buildings below are available separately.

Notes on electrical installations for buildings:

Main Building:

In the main building of old electrical panels have been used. Cabling and wiring, and Sarbandi Fydrbndy and communication paths on the surface and the old method that can be used with new, optimized system.

Old high-consumption lighting of lamps that can be used instead of LED lights and the other used to consume about 50 percent less than the current lights and higher quality lights are used.

The lighting in the stairwell of motion detector sensor can be used only at the time of travel, active, and intelligent lighting systems can be optimized consumption.

In the laboratory of pendant lights are used for lighting lab tables that can be used with desktop outlets and interior lighting lighting systems more efficient.

You can make panels with quality new equipment and more efficient use of the principles feeders. In addition, more and better to exploit the space.

Advanced audio-visual systems and fire alarm, the quality and quantity will improve.

Anatomy Building:

The type of lamps used in the lighting system, which has replaced the old with LED lights and other energy-saving can be made great.

The building was very old made an investment compared to the same pod, Wiring, headscarves, and feeder routes of communication were worn with up to date can be a significant savings in energy consumption.

According to the signs of intelligent electrical system can be updated and optimized.

Construction of electrical panels with quality new equipment and more efficient use of the principles feeders. In addition, more and better to exploit the space.

Advanced audio-visual systems and fire alarm, the quality and quantity will improve.

Building doctor prosper:

Lighting in the hallways and rooms, offices and classrooms with smart designing and calculation of equipment and systems, including the use of LED lights and motion detectors in the stairwell communication Tvandr energy savings.

The electrification system and split air conditioners can be used in heating and cooling systems that consume less compared to the current system, such as VRF and VRF that lead to better and more beautiful is all.

Notes on the mechanical construction:

Main Building:

Radiator heating and cooling system water cooler, conditioning and split in different areas according to the degree of importance is that the largest share, related to the domestic.

Building consists of five steel boiler room capacity is 500,000 and 700,000 kcal.

Three old with a capacity of 500,000 kcal that a device has been switched off and two new machines with a capacity of 700,000 kcal, the torch of the two new boilers and also looks good.

Two coils with a capacity of 2,000 liters, there is rust on the pipes and coils.

Four-ground pump and radiator heating system is 250-50 for feeding a device is switched off.

(Form B-7)

Descaling and adjust the burner and boiler temperatures and smart as well as the engine room, which is off the burners are fitted with outside temperature, can affect efficiency.
In the event that the employer is willing to pay higher costs, more suitable for air supply, taking advantage of the central cooling system chiller and fan coils is recommended.

Anatomy Building:

The building's heating and cooling system radiator with water coolers, air conditioners and split air conditioners percent higher that account.
Engine room of the building consists of three cast-iron boilers with different capacities that two switching devices and also made modifications to the engine room piping and two new coil also appears. Three pump for circulation radiators ground that one out of the circuit.
After repairs are not insulated engine room. Tuesday chimney pot and one horizontal and vertical movement is not out of the room.
Also a chiller capacity and a room air ventilation for the exams separately. Full air control appliances looks, but current practice is not clear.
For optimal performance, insulation, pipes and resource room, correction for control and adjustment of the engine room torches and Hmchnynaslah chimney is recommended.

Building doctor prosper:

New building for around 7 years of fan coil heating and cooling system with fresh air is by air.

Room includes a direct flame absorption chiller and two cast-iron boilers and two ground stations for cooling towers, two sets of circulation fan coil, two devices for air circulation and two linear pump intended to supply coils is.
To optimize, modify the chiller chimney approximately 6 m long horizontal and the slope is not good, also replace the water pump, diaphragm tank, The capacity of this tank will pump off water, which subsequently reduces the lifetime of the pump and the inappropriate use of power. The use of variable speed pumps for water supply was more appropriate. The building's intelligent engine reduces fuel consumption will be affected.

The form, for example, only for chiller replacement has been completed. Please following forms to all the proposed solutions, such as lighting, inverters, cooling system and fill out Vgrmaysh.

Since very old building and facility systems is beyond practical repair and change, and if solutions are to be considered more changeable and since the company is still the energy consumption bills,
A detailed analysis of existing and possible solutions for Tytrvar offered a proposed solution.

- T5 or T8 replacement lamps available with lamps or LED
- Full Replacement Lamps
- Replacement of magnetic ballasts with electronic
- Replacement of the existing cooling system with central chiller
- Intelligent control room and adjust burners

(Form B-8)

Technical proposal - 1

a. Explanation of optimized EE&C technique

Competitor shall mention each EE&C techniques of technical proposal under format bellow respectively.

(On First page)

1. System diagram both current system and after ESCO.

(From next page after first page)

2. Estimation of energy consumption on current system and the issues on it.
3. Explanation of techniques of technical proposal
4. Estimation of energy consumption on current system after ESCO and sources to be calculated.

(1) Improvement of chiller operating efficiency by replacement

E/E plan is the replacement of the superannuatedturbo chiller to latest high-efficient one which reduces power consumption and contract demand.

Current system	System after ESCO implementation

(Form B-9)

(2) Presumption of the current energy consumption

The chillers of 600 USRT×3 are used as a heat source for air-conditioning now.

(a) Operating hours per day:

(b) Operating days per year:

(c) Annual power consumption:

(d) Used power:

(3) Presumption of the energy consumption after the replacement

(a) Operating hours per day: For 10 hours (Assuming 2hours longer than AHU)

(b) Operating days per year: days (Summer)

(c) Annual power consumption: kilowatt-hour(after E/E).

(d) Used power:

(4) Presumption of amount of reduction and reduction cost

Unit price of the contract power(kW) and the power consumption(kWh) assumed the following. Refer to the energy calculation seat for details.

Unit price: Contract power:

(a) Decrease contracted power:

(b) Amount of reduction electric power consumption:

(c) Reduction cost:

(5) Presumption of investment cost of E/E construction and payback years for the cost

As follows.　Refer to the energy calculation seat for details.

(Form B-10)

Technical proposal - 2

b. Environmental Effect

Competitor shall mention environmental effect for increase and decrease of NOx, SOx, PM, Noise with introduction of EE&C technique.

(1) Aincrease in environmental impact by the E/E implementation

New environmental impacts such as NOx, SOx, PM, and Noise are not generated byreplacing the chiller.

(2) A decrease in environmental impact by the E/E implementation

It leads to the reduction in the power plant in the amount of the CO2 generation along with the reduction in the amount of the electric power use.

(Form B-11)

Technical proposal - 3

c. Effect for existing equipment

Competitor shall mention scope to install new equipment or delete existing equipment.

(1) About the newly introduced equipment

The chiller equipment is updated to the latest high-efficiency type.

Neither the cold water pump, the cooling-water pump nor the cooling tower are included in the renewal cost assuming that existing is used as it is.

(2) About the removal of the existing equipment

(Form B-12)

Technical proposal - 4

d. Building operation in construction period

Competitor shall mention the important item regarding safety, project schedule control, further quality control, deadline of completion of construction and handover of ESCO equipment.

(1) Influence of the ………………………… on facilities operation

The construction of the replace of the chiller equipment shall be carried out on holidays or the weeknight, not to prevent the influence on staff and visitors.

(2)Safety measure

(3) Quality control

(4) Completion day of the construction

(5) Beginning to use of E/E equipment by the ………….. building operator

(Form B-13)

Technical proposal - 5

e. Treatment on termination of ESCO contract

Competitor shall mention treatment on termination of ESCO contract, e.g. transfer of property of ESCO equipment

(1) Transfer of ESCO equipment ownership

The ESCO entrepreneur owns the ESCO equipment.

After ending the ESCO contractduration, the ESCO entrepreneur transfers the ESCO equipmentownership.

(Format A-1)

Summary - 1

a. Table of opted EE&C technique

	Energy Type	Energy Consumption (m^3/yr-kWh/yr)	Energy Saving (m^3/yr-kWh/yr)	Energy Price (Rials)	Annual Revenue (Rials/yr)	Investment (Rials)	Simple Payback (Year)
Thermal Insulation of Pipe and Domestic Hot Water Storage Tank	NG	30,095	6,000	1,500	9,000,000	30,000,000	3.3
T10 Fluorescent Replacement (With LED)	Electrical	479,692	263,831	2,000	527,661,500	622,888,000	1.2
Boiler Room Control (ON/OFF And Temp Control)	NG	300,949	45,142	1,500	67,713,462	60,000,000	0.9
Optimal Excess Air for Combustion	NG	300,949	18,129	1,500	27,194,161	20,000,000	0.7
Radiator(Thermostatic Valve)	NG	190,038	22,805	1,500	34,206,836	62,500,000	1.8
Bad Operation (Such as Reactive power consumption, Peak Shaving etc)	Governmental Restriction	-	-	-	60,000,000	200,000,000	3.3
Photocell for Lighting	Electrical	47,969	14,391	1,500	21,586,153	40,000,000	1.9
Reduction in Infiltration (Automatic Door and Air Curtain)	NG	57,011	7,982	2,000	15,963,190	40,000,000	2.5
Domestic Hot Water Boiler	NG	110,911	36,970	2,000	73,940,493	150,000,000	2.0

Total NG Saving	137,028	(m^3/yr)
Total Electrical Energy Saving	278,222	(kWh/yr)
Total Revenue	821,985,269	(Rials/yr)
Total Investment	1,225,388,094	(Rials)

Brief report
on Medical Science University
in English

Name of building:	Iran Medical sciences faculty
Name of charge:	Engineering- technical assistance of Aliverdizadeh
Postal address:	Next to Milad Hospital- among Shahid Chamran & Hakim & Hemat highways- Tehran- Iran.
User:	Administrative- Training
Number of working days per day:	About 240 days
Number of working hours:	8 hours per day Air conditioning: 8 hours
Number of users:	
Air conditioning temperature:	Cooling season from beginning of September to end of march Heating season: from middle of April to end of September
Air conditioning season:	From April to November
Air conditioning hour:	24 h day and night except holidays, Thursday & Friday
Number of floors:	From 4 to 10 floors
Year of building:	About 37 years ago up to now

Outline of building

Name of building:	Iran Medical sciences faculty involving 12 units
User:	Administrative- Training
Infrastructure:	Approx. 90,000 cubic meter
Year of building:	About year 1978
Renovation or repair history	
Architecture branch	------------
Mechanical	------------
Electrical Installations	------------
Other facilities	------------

Energy consumption of the whole building

Power contract	Type of contract	Demand purchase (training)
	Received voltage	20 kW
	Consumption peak	2,000 kW
	Unit price of power	431.3 Rials/kWh
	Unit price of summer Unit price in the other seasons	431.3 Rials/kWh
Gas contract	Type of contract	Demand purchase (training)
	Received pipe diameter	No data
	max amount of gas consumption per hour	5,000 cubic meter h
	Price based on max amount of gas consumption per hour	No data
	Price based on max amount of gas consumption per hour	1,260 Rials/NM_3

Brief Report of installations

Outline of air condition installations:

1- Air condition system: it has been used chiller cooling systems & boiler heating and fan coil.

2- Central Air condition system: 4 absorption chillers with capacity 2,800 tone.

3- Heating source: using 4 boilers with 110,000 pond/h

4- Heating source helping system: 6 cooling towers for chillers and significant number of ceiling fan coils in the work rooms and softener system and de-aerator.

5- Pumps.

6- Hot water transfer: heat transfer through plumping sweet in the manhole canals to inside fan coils.

7- Hot air transfer.

Outline toiletries

1. Installations water

A 3-inch diameter branch of municipal water for drinking, sanitation, heating and cooling and water treatment plants to separate and recycle of green space

Table Energy Information collected annually							
Month (in 1393)	Electric power		natural gas		Weather		Sum
	Rial	kWh	Rial	Normal cubic meters	Rial	M^3	Rial
Khordād	315,934,000	920,000	58,023,300	48,477			373,957,300
Tīr	265,831,000	668,000	77,819,055	42,567			343,650,055
Mordād	326,942,000	836,000	71,440,624	39,078			398,382,624
Shahrīvar	297,360,000	764,000	75,815,398	41,471			373,175,398
Mehr	234,398,000	676,000	71,153,604	38,921			305,551,604
Ābān	173,743,000	496,000	76,745,928	41,980			250,488,928
Āzar	181,040,000	524,000	76,153,606	41,656			257,193,606
Dei	182,349,000	528,000	74,619,785	40,817			256,968,785
Bahman	139,212,000	404,000	77,902,000	59,536			217,114,000
Esfand	349,571,000	476,000	87,792,000	45,287			437,363,000
Farvardīn	343,370,000	796,000	40,056,000	31,787			383,426,000
Ordībehesht	268,829,000	548,000	57,974,000	46,856			326,803,000
Sum	3,078,579,000	7,636,000	845,495,300	518,433			3,924,074,300

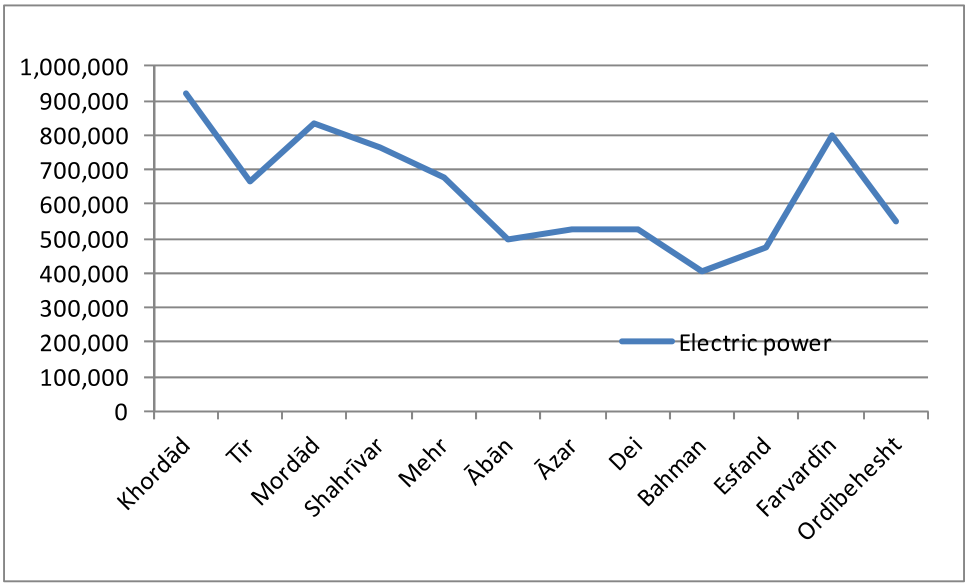


Figure Monthly electric power consumption (Unit: kWh)

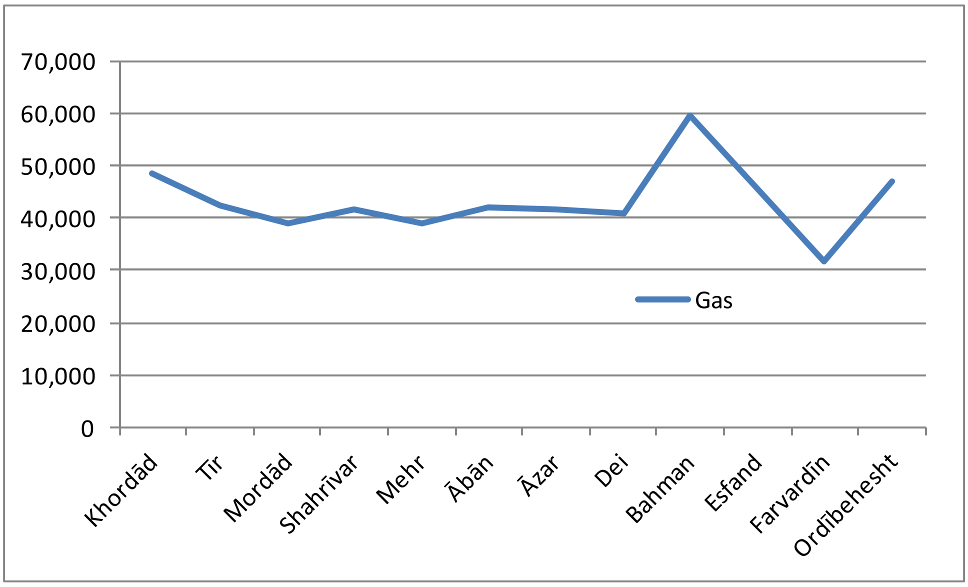


Figure Monthly natural gas consumption (Unit: m^3)

Summary

- It has been issued to construct human power to strategic infrastructure installations including power, water, gas and cooling & heating system by technician have contractual relationship.
- Current work situation.
- It has been used for electrical installations part to control light from emotion sensors and for mechanical part in the central powerhouse to control electro motors from inverter system, and for preventing loss of energy of systems to use heating insulation for heating & cooling pipes.
- Status and life of available installed equipment.

2 central powerhouse chillers are 5 years and 2 other systems are 30 years.
Also, used boilers are 20 years.

Technical Proposal 1

A) EE&C explanation & optimization

Competitors shall mention EE&C techniques of technical proposal under format below respectively:

1- System diagram both current system and after ESCO.

2- Estimation of energy consumption on current system.

3- Explanation of techniques of technical proposal.

4- Estimation of energy consumption on current system after ESCO and sources to be calculated.

Proposal solutions to be reduced consumption and energy cost:

1- Power sector.

1-1- Changing florescent lights T10 by magnetic ballast

1-1-1- Replacement lamps T8 by T10 without replacing light and repairing magnetic ballast to electrical.

1-1-2- Changing current lights by new kind of lights with high quality and changing magnetic ballast to electrical (when it presented to construct administrative & education building.)

1-2-Using sensor in public ways and toilets (of course some places has been installed and optimized).

1-3-Transforming lighting projects of ways & street by LED with low consumption.

1-4-Chnaging projects 1,000 W of stadium lights to LED & SMD approx. 1.4 to 1.6 consumption.

1-5-Using 4 lowering devices of power losses in the output of 4 Trans based on complex with approximate consumption 10%.

2- Mechanical section (fuel consumption)

2-1-Installation of heat analyzers to mix fuel and air to save consumption and to improve environment and to reduce the heat of the chimney to reduce CO2 production and to reduce soot production, to predicate economizer in the chimney of the boilers to preheated input air of water flame and to makeup hot pot.

2-2-to be intelligent powerhouse and thermostats at the rooms to be reduced function time and losses of energy to be prevented.

2-3-review of fan coils to improve energy consumption optimization (such as fuel and power).

Review of air condition system of paramedics faculty buildings to be reformed and to be optimized.

3- Water filed

3-1-Rehabilitation of existing water wells and to activate it to supply green space water

4- Precise analysis of devices including computers, its accessories including printers, photocopies, scanners, and in any case of high consumption devices, to be replaced low consumption ones (initial estimation about 1,500 devices).

One of two items of power consumption and contract demand is reduced.

Current system System after ERSCO implementation

2- Current energy consumption.

a) Operating hours per day: 24 h
b) Operating days per day: 240 days
c) Annual power consumption: 7,636,000 kW
d) Used power: 2,290 kW
3- Presumption of energy consumption after the replacement
a) Operating hours per day: (assuming 2 hours longer than AHU)
b) Operating days per day: summer days
c) Annual power consumption: kWh (after EE)
d) Used power:
4- Presumption of amount of reducing consumption & cost
Unit price of contract power kW (demand) and price of energy consumption (kWh) refer to details.
Energy cost calculations: 17,856 Rials and 431,3 Rials gross power cost
Unit Price of power contract
a) Decrease contract power: 0kW
b) Amount of reduction of electrical energy consumption: 1145400 kWh
c) Cost reduction: 461,786,850 Rials
5- Presumption of investment cost of E/E and payback years for the cost as follows. Refer to energy calculation seat for details.

Technical proposal 2

B) Environmental effects

Competitors shall mention environmental effects for increase and decrease of NOX, SOX, Pm, noise with introduction of EE&C techniques.

Based on proposal techniques of energy management and estimation 15% saving for their performing will increase for CO_2 174,194 and for power 478,777 kg per year.

Technical proposal 3

C) Effect for existing equipment

Competitors shall mention scope to install new equipment or delete existing equipment.

1- New equipment in the mechanical installation are: installation of heat analyzer for facilitating in mix of fuel and gas which no one is replaceable. Changing thermostats of current fan coils to intelligent thermostats for control of fan coils operation day and night. Previous thermostats were collected in this section and it is possible to sell low price. These proposals was issued based on pre-audit and precise proposal will be issued after auditing.

2- New equipment in the electrical installation are: replacement of florescent lights by magnetic ballast and also, replacement of street lights and using electrical energy losses system which is logged previous florescent lights and street lights, but reducing system shall be added to system.

3- New equipment of power production through solar energy in the area of paramedical roof of building it is predicated approx. 300 kW in any cased new equipment shall be installed & implemented.

4- New equipment for construction of gas-fired power plant with system CCHP and CHP near central powerhouse capacity 3000 to 5000 kW shall be predicated no equipment won't be changed.

Rows 3 and 4 are extra proposal of energy management and they will be performed when approved.

Technical proposal 4

D) Building operation in construction period

Competitor shall mention the important item regarding safely, project schedule control, further quality control, deadline of completion of construction and handover of ESCO equipment.

1- Operation of replacement and replaced equipment will be carried out and installation of new equipment performed, on holidays or the working days not to prevent the influence on staff and visitors.

2- It is predicated to require 12 months for operation period. It is necessary to mention that precise period of operation project shall be determined after auditing.

Technical proposal 5

Treatment on termination of ESCO contract

Competitor shall mention treatment on termination of ESCO contract such as transfer of property of ESCO equipment.

After mobilization and carrying out energy audits and enforcement action relocation and installation of equipment required for the project operations products.

ESCO project delivery for the interim and final delivery will be dismantled and shop equipment and property of the ESCO project site is carried out.

After ending the ESCO contract duration, the ESCO entrepreneur transfers the ESCO Equipment ownership.

Summary

Optional table of EE&C techniques

Row	Amount of Power consumption, gas, oil and water		Amount of Energy base consumption		CO2 distribution based on Kg per year		Estimated value of energy cost
	Type	Unit of reduction	Reduction of MJ/year	Percentage	Reduction annual Kg CO2	Percentage	Percentage
1	Power	MJ/year	12,370,320	15	478,777	15	461,786,850
2	Gas	MJ/year	2,895,966	15	174,193	15	126,824,295
Total	----	----					588,611,145

Note: competitor shall not mention amount of reduction of energy losses, distribution CO2 in the conditions of water consumption reduction.

1- Saving amount is estimated for these projects and is considered by technical section of university including appropriate insulation of hot & cold networks and it has optimized power filed.

2- It shall be calculated amount of investment and payback after precise examine in the auditing duration and estimation of provided cost and operation of projects improvement and amount of their saving.

Brief report
on Department of Energy
in English

Name of building: Department of Energy	Working hour per day: 9	Contract Demand:
User: Administrative	Working day per annual: 250	Type of energy consumption: Gas & Gasolin
Year of building: 17 years	Year of installations: 16 years	Number of floors: 6

Contact person: Mr. Eng. Salehi	Contact No.: +98 9125487402
Working months of cooling system: 5	Working months of heating system: 5
Type of window: plain aluminum with double glazing	Situation of building: south side
Color of walls: cream	Powerhouse operating hour: 7:00-18:00 Status of powerhouse operating on holidays: off

Number, capacity & type of cooling system (Density chiller- absorption chiller- water cooler- air conditioner- fan coil- cooling tower):

3 density chillers (each two compressor 90 ton)

3 cooling towers each has two fans

19 splits with several capacities

3 air conditioners of window

5 ventilators (3 systems 1.5 hp, 1 system 5.5 hp, 1 system 20 hp)

250 fan coil systems mainly overhead (average power each 100 W)

Number, capacity & type of heating system (boiler- fan coil):

2 boilers 1,000,000 kcal/ h

1 small boiler for consumption hot water

5 ventilators (3 systems 1.5 hp, 1 system 5.5 hp, 1 system 20 hp)

250 fan coil systems mainly overhead (average power each 100 W)

Number, capacity & type of lighting system (florescent, series, low consumption, LRD and other):

About 1,100 florescent lamps 40 W in florescent lights 2, 3 and 4 lamps

About 850 tubes LED each 16 W in lights 2, 3 lamps

About 100 halogen LED lamps each 3 W and install built-in ceiling

About 30 CFL lamps each 18 W and install built-in ceiling

About 30 bulb LED lamps with coupling E27 each 5 W and installation in wall

Number & power of Electro pumps (total number & number of different seasons 7 operating days, equipped by inverter or not):

6 electro pumps 7.5 kW for circulating hot & cold water (3 reserve pump)

2 electro pumps 7.5 kW for consumption hot water (1 reserve pump)

2 electro pumps 7.5 kW for ventilators (1 reserve pump)

8 electro pumps 7.5 kW for cooling tower (4 reserve pump)

Neither of electro pumps has remote control system.

Control system of powerhouse (intelligent or manual):
Operating heating system is intelligent and cooling system is manual.

Lightening control system (intelligent or manual):
Manual

Manner of control system of powerhouse (by building or central)
By building operation personnel

Has been done anything to be optimized energy consumption? What is done? Which year?
Installation solar cells to supply some electrical energy needs of building- installation in 2013
Installation of Control system of powerhouse- installation in 2013
Replacement some lamps by LED
Installation motion detection sensors in some spaces- in 2010- at present all of them are inactive.
Installation UPVC

Possible actions to be performed by estimating energy saving & cost & investment needed and payback time (such as repairing lighting system- cooling system repairing- heating system repairing- using remote control system (inverter) in the electro pumps)

Lighting:

Number of lamps or light by replacement high efficiency= about 1,100 lamps
Reduced power difference for each lamp or light= about 27 W
Reducing Annual energy consumption= about 67,000 kWh
Reducing Annual cost= about 80,000,000 Rls. (assumption 1200 Rls. per kWh)
Needed investment= about 400,000,000 Rls.
Payback time= 5 years

Cooling system:

Installation of intelligent control system of density chiller
Reducing Annual energy consumption= about 45,000 kWh
Reducing Annual cost= about 54,000,000 Rls. (assumption 1,200 Rls. per kWh)
Needed investment= about 100,000,000 Rls.
Payback time= 1.8 years

Heating & cooling system:

Installation of radio control system of blower terminals (fan coils & ventilators, air conditioner, splits)

Reducing Annual energy consumption= about 42,000 kWh

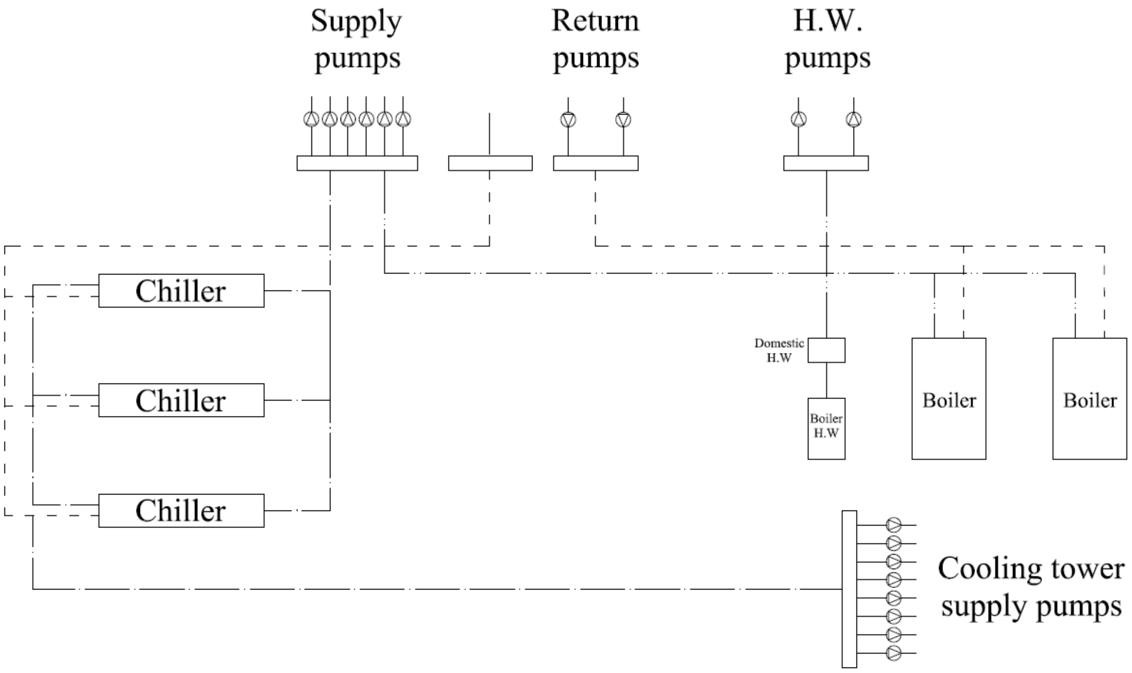
Reducing Annual cost= about 50,000,000 Rls. (assumption 1,200 Rls. per kWh)

Needed investment= about 300,000,000 Rls.

Payback time= 6 years

Collecting & energy calculation at least previous year (energy, peak, demand and cost and energy diagram of previous year)

Single line diagram of the building facilities:



Brief report
on Ministry of Finance
in English

In according to energy statistic of annual country, more than 1/3 energy is consumed in the building and at present, consumed energy of buildings is 2 – 3 times the global standards. Among available buildings, administrative part has mainly dedicated to consume energy. However, energy subsidies has been deleted and to be real prices and updated and timely and valuable care about consumption and energy costs reduced, management performed and energy calculated has been more concerned by the senior managers of organizations.

Providing Energy Consulting services in the buildings aimed at optimizing energy consumption (heat & electrical) and reduced relevant costs, providing comfortable conditions to operate buildings based on available standards, and reducing environmental pollution including fossil fuels consumption.

Asiawatt Eng. Company is one of the pioneer and active one in the field of performing optimization projects, management and auditing energy in the industry & construction sector (performing more than 200 management project and energy auditing in the industry & construction sector) in Iran and having experienced experts and expanded facilities of hardware and software in this field, also, having long experiences in the study and performing audit projects and managing energy in the different administrative buildings, Providing consulting services to recognize energy consumption improvement potentials in ministry of economy and finance construction and performing recognized methods.

In order to identify of energy lost in ministry of economy and finance construction, installations and different of organization were reviewed, and some methods of energy consumption improvement has been identified in the building. In the following, general specifications building has been presented, methods of energy consumption in the recent years and some methods of consumption reduction which has been calculated its efficiency in the energy consumption reduction.

Name of building: ministry of economy and finance	Working hour per day: 9	Contract Demand: 3 MW
User: Administrative	Working day per annual: 290	Type of energy consumption: Gas
Year of building: more than 50 years	Year of installations: more than 50 years	Number of floors: 6 floors
Number of Fixed persons: 1,500	Annual consumption fuel: 1,200,000 cubic meter	Infrastructure: 80,000 m^2
Annual consumption power: 6000Mwh	Power subscription code.: 0044752/8	Gas subscription code.: 003183037869

Name of charge: Mr. Eng. Tahmouresi	Contact No.: +98 21 33967010
Working months of cooling system: 5	Working months of heating system: 6
Type of window: 60% single-sided- 40 % double glazing	Situation of building: north & south side- east & west
Color of walls: outside walls (dark half)- inside walls (bright)	Powerhouse operating hour: 6,000 h Status of powerhouse operating on holidays:

Number, capacity & type of cooling system (density chiller- absorption chiller- water cooler- air conditioner- fan coil- cooling tower, …):

3 density chillers 600 tone

3 cooling towers

30 air conditioners

1,200 fan coil model 600

Number, capacity & type of heating system (boiler- fan coil, …):

3 hot pots fire tubes made in Arak machinery capacity BTU/hr

Number, capacity & type of lighting system (florescent, series, low consumption, LRD and other):

Most of the lights are florescent involve 5,000 numbers (2, 40 W) lamps 40 W in florescent

Number & power of Electro pumps (total number & number of load in the different seasons & operating days, equipped by inverter or not):

27 pumps in the installations or powerhouse

16 pumps are usually under load.

24 pumps 22 kW

1 pumps 18.5 kW

1 pumps 11 kW

Control system of powerhouse (intelligent or manual):

Control system of powerhouse is manual.

Lightening control system (intelligent or manual):

Lightening control system of rooms are Manual and are is intelligent.

Manner of control system of powerhouse (by building or central or …)

Control system of powerhouse is manual and done by operation personnel

Actions of optimization of energy consumption in the building in the recent years:

Replacing single-walled window by double glazing in the parts of building which are repaired.

Replacing all the series lamps by florescent lamps

Installing photo voltaic panels 70 kW

Collecting fan coils inside the corridors

Reducing corridors lighting by removing some lamps from circuit distributing electrical energy

Voltage received: 20 kW contract demand: 3 MW

Max amount of electrical consumption: 1,800 kW

Tariff Code: 1-A-2

Power price: 44,640 (Rial/kW)

Electrical energy price: (Rial/kW)

Low load: 818,5 full load: 1637

peak load: 3,274

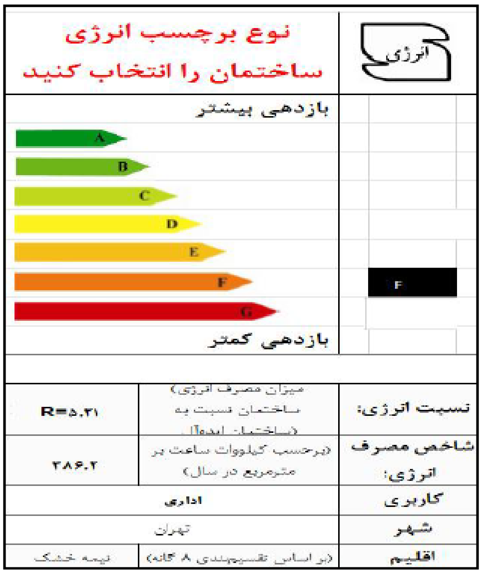
Gas Consumption price: 1,000 (Rial/m^3)

Natural Gas Consumption group: D

Contour capacity: 2,500

2- Index and situation of energy consumption:

Energy consumption in the Ministry of Economy and Finance construction is electrical and heat energy which electrical energy is consumed average 6,000 MW h and natural gas consumption is consumed 1,200,000 m^3 per year.



نوع برچسب انرژی
ساختمان را انتخاب کنید

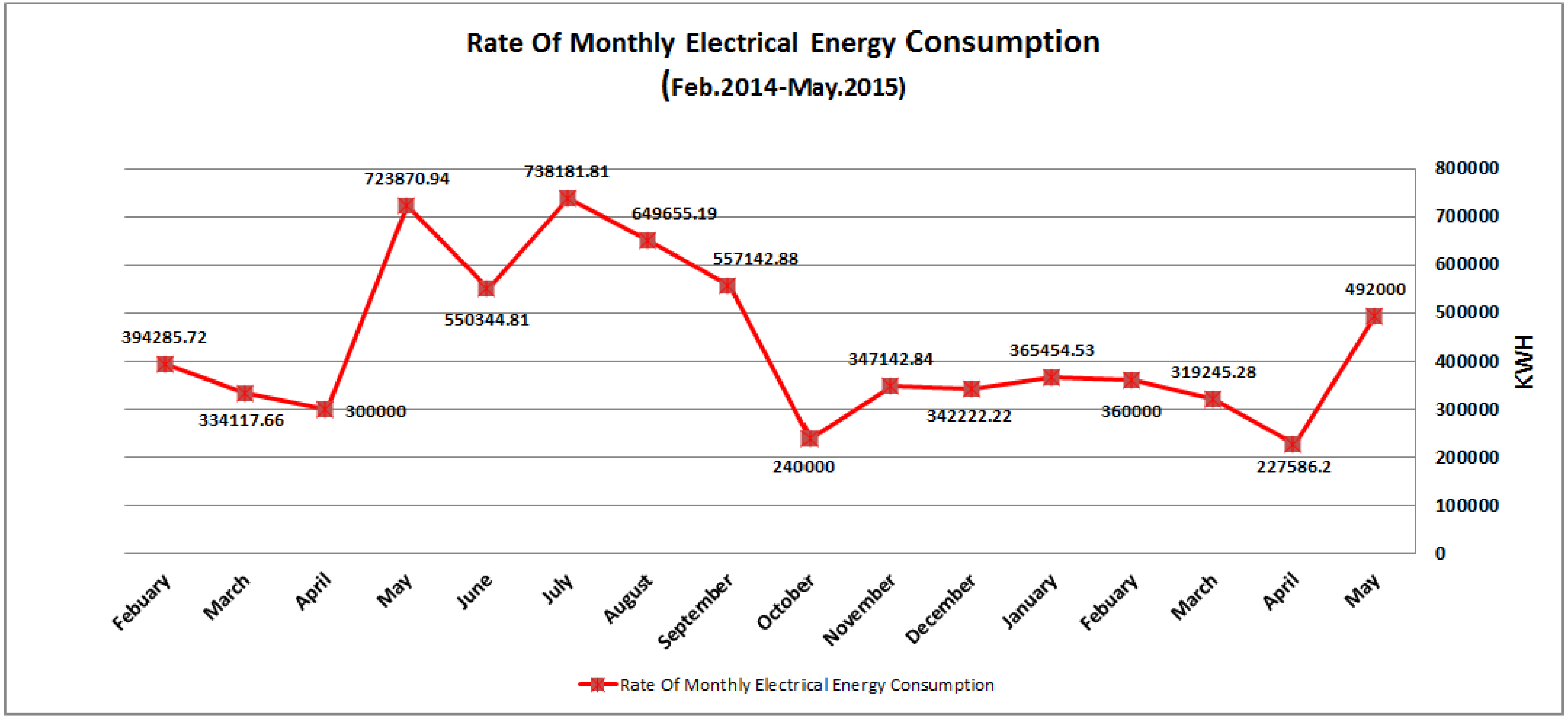
انرژی

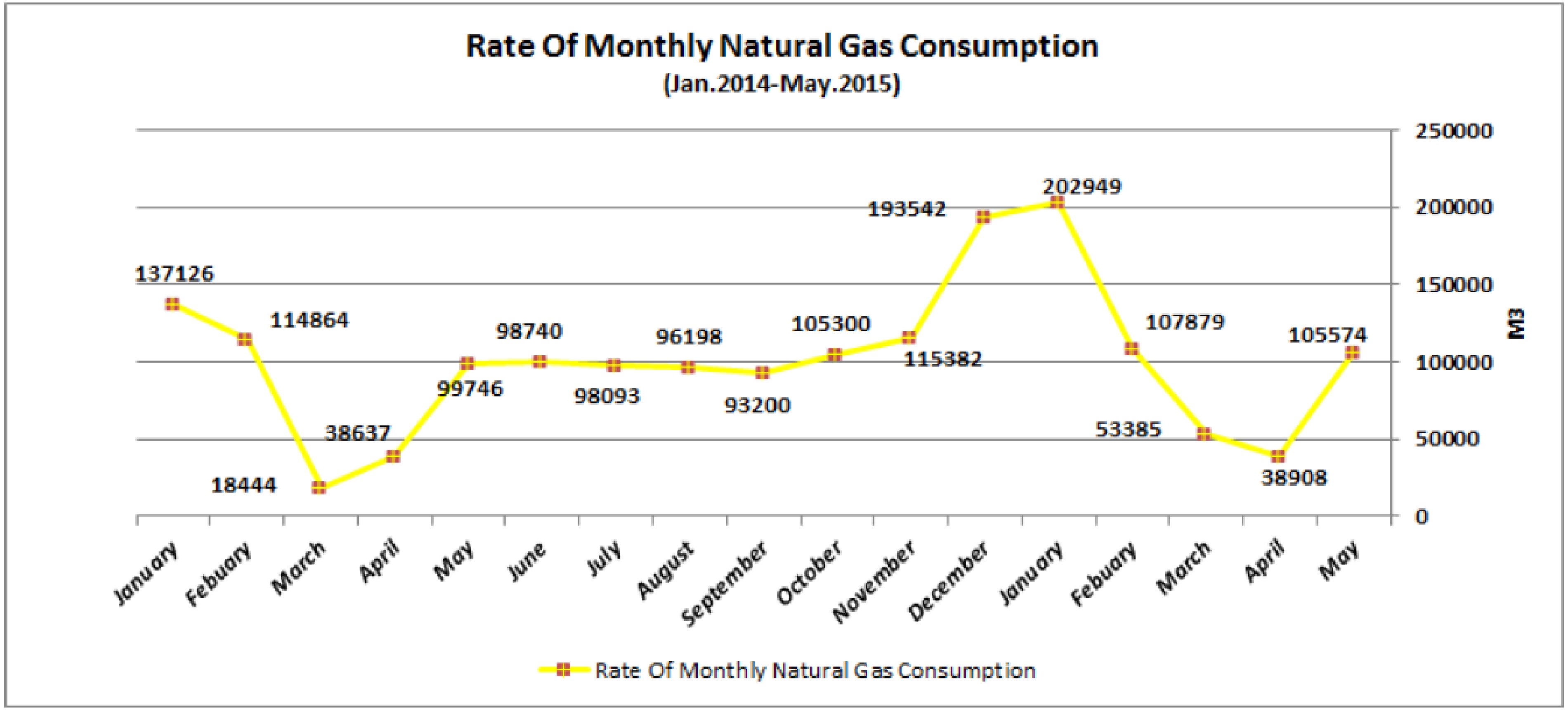
بازدهی بیشتر

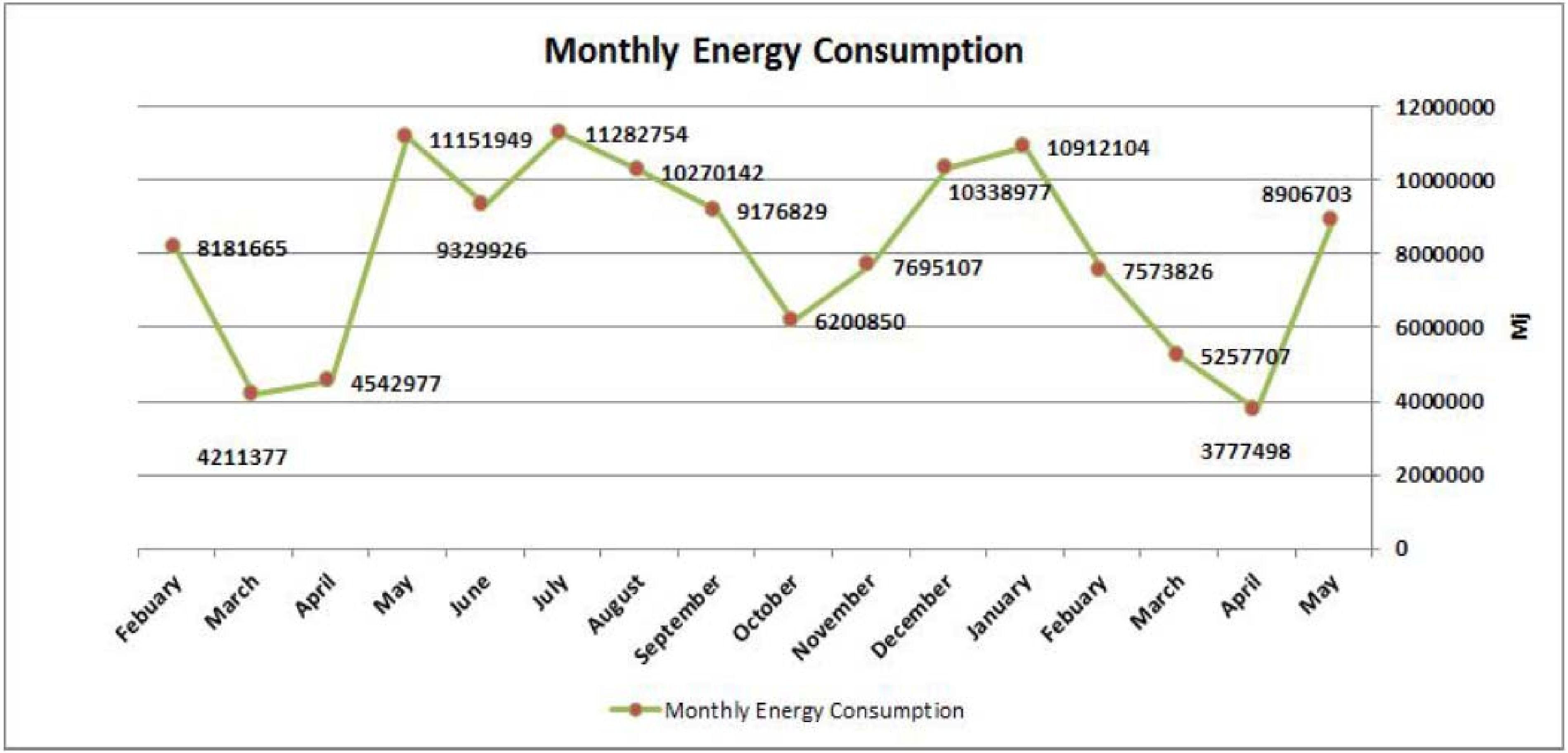
بازدهی کمتر

نسبت انرژی:	(میزان مصرف انرژی ساختمان نسبت به ساختمان ایدهآل)	R=۵.۳۱
شاخص مصرف انرژی:	(برحسب کیلووات ساعت بر مترمربع در سال)	۳۸۶.۲
کاربری	اداری	
شهر	تهران	
اقلیم	(بر اساس تقسیمبندی ۸ گانه)	نیمه خشک

Changes of energy consumption at the several months are according to figures 1 and 2 and Changes of total energy consumption shown in the figure 3. In the calculation of total energy consumption, heat value of natural gas is 34,500 kJ/ m^3 and conversion coefficient kWh to MJ is 10,7. Basis on the standard 14254, energy consumption standard in the administrative- governmental building in Tehran is 74 kWh per year for each m^2. However, it is presented basis of energy consumptions, energy consumption index in this building is 386,2 kWh/m^2.yr this index 5,2 equals to ideal energy consumption standard. The building has dedicated rank of energy consumption F.


Rate Of Monthly Electrical Energy Consumption
(Feb.2014-May.2015)
394285.72
334117.66
300000
723870.94
550344.81
738181.81
649655.19
557142.88
240000
347142.84
342222.22
365454.53
360000
319245.28
227586.2
492000
800000
700000
600000
500000
400000
300000
200000
100000
0
KWH
Febuary
March
April
May
June
July
August
September
October
November
December
January
Febuary
March
April
May
Rate Of Monthly Electrical Energy Consumption


Rate Of Monthly Natural Gas Consumption
(Jan.2014-May.2015)
250000
200000
150000
100000
50000
0
M3
137126
114864
18444
38637
99746
98740
98093
96198
93200
105300
115382
193542
202949
107879
53385
38908
105574
January
Febuary
March
April
May
June
July
August
September
October
November
December
January
Febuary
March
April
May
Rate Of Monthly Natural Gas Consumption


Monthly Energy Consumption
12000000
10000000
8000000
6000000
4000000
2000000
0
Mj
8181665
4211377
4542977
11151949
9329926
11282754
10270142
9176829
6200850
7695107
10338977
10912104
7573826
5257707
3777498
8906703
Febuary
March
April
May
June
July
August
September
October
November
December
January
Febuary
March
April
May
Monthly Energy Consumption

3- Influential factors in the loss of energy

* According to the evidences, Influential factors in the loss of energy in the MoEF construction are as follow:

* Equipment failure administrative rooms to thermostat and continuous operation of heating & cooling systems

* Excessive standard light in the administrative rooms and non- use proper of natural light potential

* Distances of floor to ceiling are high which heating & cooling load in the building go up.

* Being below coefficient of performance of density chiller and being high energy consumption index for each tone of cooling.

* Malfunction control circuit of chiller capacity.

* Not being central monitoring system and sensors detect the presence of people at work.

* Not set hot water pots flames.

* Low efficiency and lack of remote control system on the pumps of circulation.

* There are metal single-wall windows in the outside walls.

* do not turn off heating & cooling systems in the non-office hours & holidays.

* No door closer for administrative room's doors, as a result, the air flow inside the joints.

* Old building and non-conforming total transfer coefficient of slough with section 19 national building regulations.

* Lack of culture, knowledge and compliance factors in energy consumption by staff.

* Not using lamps with index of low energy consumption in the light system.

* Wide network of distributing system of heating & cooling energy and the loss of insulation of transfer pipes in some areas and loss of their energy.

* Not being intelligent control system of powerhouse due to regulate heating & cooling load and basis on outside temperature changes.

* Worn internal electricity distribution network and the high percentage of waste in the internal network.

4- Energy consumption reduction solutions:

Possible actions (such as repairing light system- repairing cooling system- repairing heating system- using remote control system (inverter) in the electro pumps) are done by energy saving, needed investment, and calculating economic index, based on identified loss of energy places in clause 4 are following.

4-1- improving energy consumption in the lighting system:

All available lamps in the lighting system of the building are florescent with normal blast are on during working hours. Because of many lamps, replacing by new florescent lamps is effectively to reduce electrical energy consumption.

- Number of lamps or replaceable light with high efficiency= replacing 10,000 florescent lamps 40 Watt with magnetic ballast by florescent lamps T5 with electronic ballast.

- Reduced power difference for lamp or light= 27 W for each lamp
- When the lamps on= 2,500 H per year
- reducing annual energy consumption= 600 MWh
- reducing annual cost= 100 million Rials.
- Necessary investment= 4,300 million Rials
- Payback time= 4, 3 years

4-2- installation thermostat

Neither of distribution terminals of heating & cooling energy in the ministry of economy and finance construction is equipped by thermostat. Regulating inside the rooms temperature off or is done manual. This causes to increase energy cost.

- Necessary thermostat number in the rooms= 200
- Reduction in annual electrical and thermal energy consumption in case of using thermostat= reduction natural gas consumption 48,000 m^3 per year and at least 40 MWh electrical energy.
- Reduction annual cost= 48 million Rials per year (reduction fuel consumption) and at least 48 million Rials. Reduction electrical consumption is not specified.
- Necessary investment= 250 million Rials.
- Payback time B= 2.84 year.

4-3- installation inverter on the circulation pumps

There are 25 circulation pumps which often are 22 kW in the central installations at the 2nd floor of MoEF construction which 9 pumps are between condenser chiller and cooling towers to circulate water and 16 pumps are in the heating & cooling circuit to circulate water. Out of these 25 pumps, 16 pumps are in the circuit remarkable potential is to reduce electrical energy consumption of pumps with regard to functioning of the pumps in capacities less than rated capacities.

- Reduction annual electrical energy consumption in case of installing drive on 16 circulated pumps: 105 MWh per year
- Investment cost for providing and installing 16 drives 22 kW model FC51 danfoss: 720 million Rials.
- Reduction electrical energy cost: 168,000,000 Rials.

Payback time: 4.2 year

4-4- other effective solutions:

Since the determination of reducing energy consumption a significant number of solutions required to calculate compressive energy in ministry of economy and finance construction, so, it is not possible to estimate energy consumption reduction and investment costs, for this reason they were only introduced.

- Installation of intelligent control system in the powerhouse.
- Replacing single-wall windows by double glazing.

- Installation of intelligent control system in the building.
- Regulating combustion of hot water pots.
- Repairing chillers control system.
- Applying lighting management system.

5- Improving energy consumption in the building by applying solutions:

In regard to introduced solutions, it will be reduced electrical energy consumption 745 MWh and reduced natural gas consumption 48,000 cubic meter per year. The effectiveness of the solutions presented to reduce electrical energy consumption 12.4% and thermal 4%. This causes to improve energy consumption index 386.2 kWh/m^2 per year and rank of energy reaches from F to E.

Brief report
on Region 2 of the Tehran municipality –
Central Building
in English

Date of Visit : 2015/../..

(Form B-2)

Name of Building : Region 2 of the Tehran municipality - Central Building
Name of Department in charge : Mr. Ghazimirsaeid
Postal Address of building : Sa audat-AbadBetween Kauj Square and SarveGhaysar Aminpour Square, Shahrdari BlvdAt the corner of 13 West Street
Use of building : Office
Number of days in operation per year : Approx. 240 Days / year(This building is in operation on working day.)
Number of hours in operation per day : 8 Hours / Day
Air conditioning:8 H
Number of users : 120 persons / year（Male 62 %, Female 38 %）
Temprature of air condition : At cooling season: from beginning of March to end of September
Unknown Degree C(Set by office stuff as they wish)
At heating season: from end of September to end of March
Unknown Degree C (Set by office stuff as they wish)
Season of air condition : At cooling season : frombeginning of March to end of September
At heating season: from beginning of November to end of February
Hour of condition per day : At cooling season : 8 H (Set by residents as they wish)
At heating season: 8 H (Set by residents as they wish)
Total floor area : Approx. 2,000 squere meters
Year of construction : Approx. 20 years ago

Outline of building		
Item	Contents	Remark
Name of building	Region 2 of the Tehran municipality - Central Building	
Use of building	Office	
Total floor area	Approx. 2,000squere meters	
Year of construction	Approx 20 years	
Number of floor	SRC/SC/WCAbove ground：4stories Underground：1story	
Record of Rehabilitation or Repair		
Architecture field	ApproxNO windows were replaced to double glass windows.	
Mechanical facilities	Three cooling tower were replaced ………years ago.	
Electrical facilities	No rehabilitation is carried out until now.	
Other facilities	No rehabilitation is carried out until now.	

■Energy consumption （Whole Building）

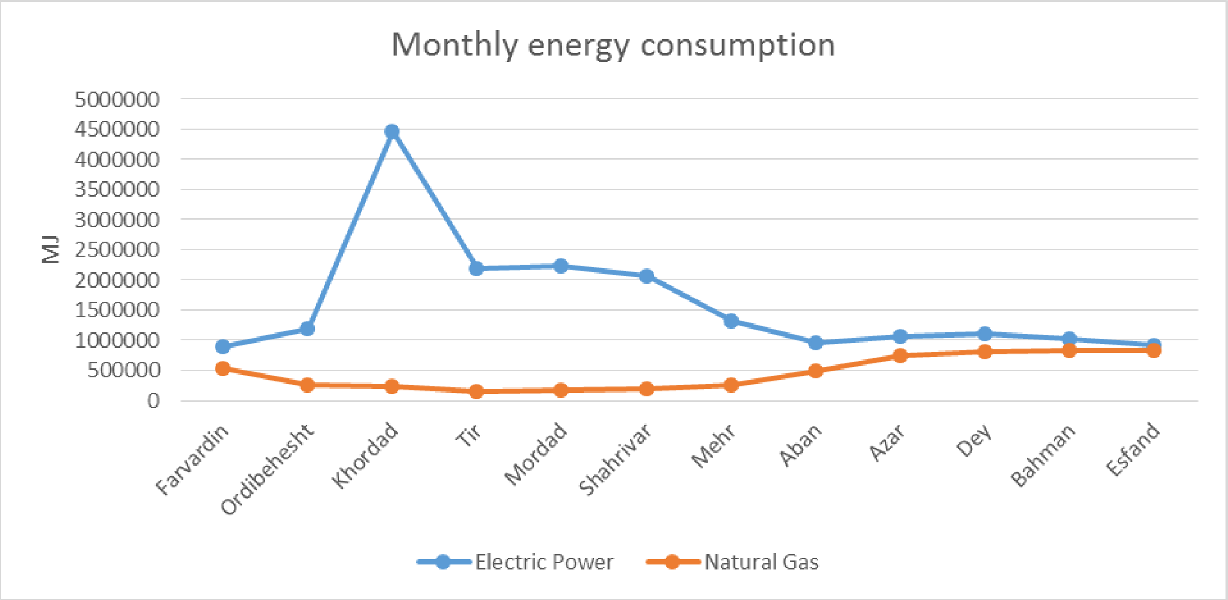
Power contract	Type of contract	600kW Demand	
	Received voltage	400kV	
	Peak of power	600kW	
	Unit price of power	44,640Rials / kW	
	Unit price of pay-as-you-go	No dataRials / kWh (summer season) No dataRials / kWh(other season)	
Gas contract	Type of contract	diafragm	
	Diameter of receiving pipe	No datamm	
	Max amount of gas consumption per hour	30.8 cubic meter / hour	
	Price based on max amount of gas consumption per hour	11,438 Rials / (cubic meter / hour)	
	Price based on amount of gas consumption	No dataRials / (cubic meter / hour)	

(Form B-3)

	Electric Power		Natural Gas		Water		Sum
	[kWh]	[Rials]	[m3]	[Rials]	[litr]	[Rials]	[Rials]
Farvardin	83057	148601207	14393	79319843	611181	11104310	239025359
Ordibehesht	110959	192312993	7032	66518666	572012	7055762	265887421
Khordad	412791	280809657	6202	34317692	700056	10426966	325554316
Tir	202859	390206437	3792	44104282	655835	9802298	444113017
Mordad	207398	407643420	4386	34881333	669088	10027827	452552580
Shahrivar	191163	373392052	5072	34774625	681259	10035061	418201738
Mehr	122793	224034358	6610	41120633	462630	5701975	270856967
Aban	88979	157605000	12867	46829466	545048	6650813	211085279
Azar	98845	173330505	19850	64809041	463995	5493007	243632552
Dey	102034	177543300	21474	65977791	435900	5094357	248615447
Bahman	95088	167758958	22054	89635752	409021	6348194	263742904
Esfand	83925	176452251	22191	82359231	25632	15624388	274435869
Sum	1799892	2869690138	145923	684648355	6231658	103364955	3657703448

Average Unit Price	1609 Rials/kWh	5910 Rials/m3	64 Rials/litr
Conversion Factor	10.80 MJ/kWh	37.34 MJ/m3	
	0.418 kgCO2/kWh	2.240 kgCO2/m3	
Energy Consumption	19438833 MJ/year	5448764 MJ/year	

Energy Consumption	24887597 MJ/year
Utility Costs	3657703448 Rials/year
Specific Energy Consumption	12443 MJ/m2



(Form B-4)

■Outline of facilities

Outline of Air conditioning facility

●Air conditioning system : Centralair conditioning system

●Heat source

Turbo chiller 140 hp x 3 units

Hot waterboiler :(639 kW)x 3 units

●auxiliary machine of heat source

Cooling tower fan : saravel c-70 x 2 & e-140 x 1 units

●Pump

Chilling water and warm water pump for AHU and FCU: 60 kWx 3 units (for FCU ?)

Cooling water pump: 50 kWx 2 units

●Heat transport (Water)

AHU (Air Handling Unit) : 3 x 15 hp

FCU (Fan Coil Unit) : 60 fan coils for whole building

●Heat transport (Air)

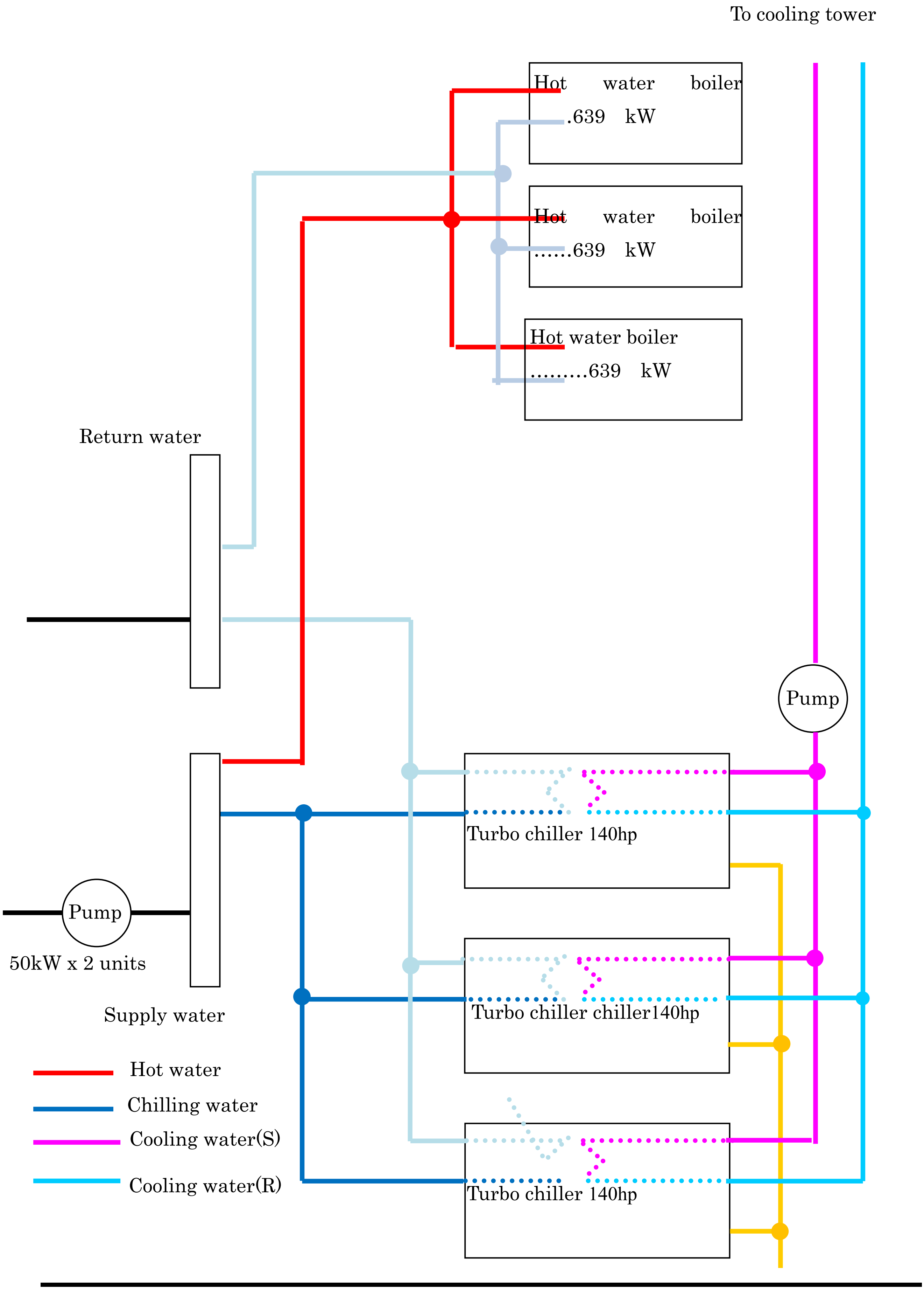
Air supply fan : 3 x 15hp

Air exhaust fan: No data

Outline of Sanitary installation

●Drinking water facilities :not available

(Form B-5)


To cooling tower
Hot water boiler
.639 kW
Hot water boiler
……639 kW
Hot water boiler
………639 kW
Return water
Pump
Turbo chiller 140hp
Pump
50kW x 2 units
Turbo chiller chiller140hp
Supply water
Hot water
Chilling water
Cooling water(S)
Cooling water(R)
Turbo chiller 140hp

(Form B-6)

Summary of Interview
Management Several technicians who belong with O&M company areexist. **The situation of implementation of counter measure for energy conservation** BEMS has not installed yet. They have keen interests to improve energy efficiency due to notification from previous Minister of Finance. **Current condition in operation** City Hall to Vsylh¬Y two chiller water chiller and a chiller 140 hp 146 kW 650 kW liquid chiller and three boiler feed, which is made at the request of 100 staff split to average 24,000 capacity building is also used for internal cooling is. Kvyl¬Hay fan for cooling and heating of buildings 400 and 600, 800 Saravl to be used in classes. According to the person in charge of architecture, 3 Air Handling Unit with 43 Hp of capacity respectively are installed for air conditioning to 3 conference holes on both in summer season and in winter season. **The situation of aging equipment of equipment, etc.** About 20 years have passed after those facilities were installed, the situation of aging equipment of equipment is bad.

(Form B-7)

The form, for example, only for chiller replacement has been completed. Please following forms to all the proposed solutions, such as lighting, inverters, cooling system and fill out Vgrmaysh.

Technical proposal –1

Optimization activities in electricity and electronics

A - Electrical Energy audit

A -1) Audit through short-term visits

A.2) Audit through the analysis of costs

A -3) Detailed audit

Checking includes:

Study of optimal power flow (Balance / Unbalance) in the network and power quality

Evaluation of network losses (lossesdue to cabling, and voltage drop, flow, harmonics ...)

Check conditions and cons of networks and systems

Check the accuracy of measuring devices (meters, transformers, current, ...)

Evaluate the performance of protective equipment

Reactive consumption in different parts of the network

Feasibility study and implementation of new approaches (CHP, CCHP, solar, wind, biogas, ...)

Calculate the amount of damage, such as special losses in the system

Check lighting and lighting design

B - Proposed solutions

B - 1) solutions, without the cost:

Preparation instructions of electrical energy consumption custom for the operation of the network

Provide maintenance instructions for electrical energy equipment for the operation of network

Providing energy consumption standards for set and networks

Report conditions and optimization solutions without the cost

Reducing peak programs for special applications in the network

Synchronization programs for special applications in the network

B - 2) low-cost solutions:

- Proposal and implementation of systems for eliminating reactive power costs (capacitor banks)
- Recommend and implement systems eliminate harmonics (harmonic filters)
- Proposal and implementation of optimal power flow and the elimination of asymmetries of the network
  - Proposal and implementation of compensation for loss / over-voltage (Voltage Stabilizer)
  - Proposal and implementation of driving systems of electric motors

- Proposal and implementation of layout and type of lighting

B -3) costly solutions:

- Proposal and implementation to replaced compression or absorption chillers
- Proposal and implementation of combined heat and power production (CCHP-CHP)
- Proposal and implementation of electrical energy through solar energy
- Proposal and implementation of electrical power generation through wind energy
- Proposal and implementation of electrical energy through biogas plants

B - 4) Consulting services:

- Advice for the buying of electricity
- Advice and supervision of the distribution network
- Advice and supervision of electrical posts
- Consumer demand optimization advice
- Consulting peak reduction
- Consulting to chose optimal tariff
- Taking advantage of modern equipment and advice day
- Counseling and monitoring of electrical plans
- Counseling and monitoring of lighting projects
- Counseling and monitoring of power projects

Energy audit of mechanics

- Check gas and water bills
- Determine the amount of thermal energy per year
- determine the extent of thermal energy consumption compared to standard values
- Identify energy consumer equipment such as air conditioners , boilers , compressors and process equipment
- Measure and calculate the amount of energy efficiency of equipments
- Give Strategies at no cost , low cost and expensive due to economic considerations and return on investment
- Priorities for the implementation of the strategies mentioned
- Implement the strategies by priorities
- Review the effectiveness of implemented strategies

(Form B-9)

Technical proposal - 2

a. Environmental Effect

Competitor shall mention environmental effect for increase and decrease of NOx, SOx, PM, Noise with introduction of EE&C technique.

(1) Aincrease in environmental impact by the E/E implementation
New environmental impacts such as NOx, SOx, PM, and Noise are not generated by implementation of strategies

(2) A decrease in environmental impact by the E/E implementation
It leads to the reduction in the power plant in the amount of the CO2 generation along with the reduction in the amount of the electric power use.

(Form B-10)

Technical proposal - 3

b. Effect for existing equipment

Competitor shall mention scope to install new equipment or delete existing equipment.

(1) About the newly introduced equipment
UPVC windows will be replaced with the previous window
Lighting control system is installed
The outer shell of the insulated walls
Solar water heater to provide hot water in summer and warm in winter water is installed

(2) About the removal of the existing equipment
Remove air conditioners are available
Windows with metal frames are removed

(Form B-11)

Technical proposal - 4

c. Building operation in construction period

Competitor shall mention the important item regarding safety, project schedule control, further quality control, deadline of completion of construction and handover of ESCO equipment.

(1) Influence of the ………………………… on facilities operation

The construction of the replace of the chiller equipment shall be carried out on holidays or the week night, not to prevent the influence on staff and visitors.

(1) Safety measure

All measures will be taken with regard to the measures done HSE

(3) Quality control

All measures will be taken under the supervision and approval of employee representative

(4) Completion day of the construction

All enforcement actions to be completed in 200 days

(2) Beginning to use of E/E equipment by the building operator

(Form B-12)

Technical proposal - 5

d. Treatment on termination of ESCO contract

Competitor shall mention treatment on termination of ESCO contract, e.g. transfer of property of ESCO equipment

(1) Transfer of ESCO equipment ownership
The ESCO entrepreneur owns the ESCO equipment.
After ending the ESCO contractduration, the ESCO entrepreneur transfers
the ESCO equipmentownership.

(Form A-1)

Summary - 1

a. Table of opted EE&C technique

Item	Current amount of consumption of Electric power, Gas, Oil, Water		Energy consumption Base line XXXX MJ/Annual		CO2 Emission Base line XXXX $kg\text{-}CO_2$/Annual		Estimated Energy fee Rials/Annual (A)	Investment Rials (B)	Pay Back Period Year (B/A)
	Type	Reduction Unit	Reduction MJ/Annual	Rate %	Reduction $kg\text{-}CO_2$/Annual	Rate %			
Insulation of the building shell	Electric power		302,220				204,000,000	973,000,000	4.7
	Gas		199,360				11,200,000		
Replacement windows	Electric power		243,144				144,000,000	12,930,000	7.6
	Gas		1,121				6,300,000		
Installation of solar collector									
	Gas		33,820				45,000,000	55,000,000	11
	Electric power								
	Gas								
Sum	—	—							

Remark) Competitor must not mention reduction of energy, CO2 emission, in case that they will optimize proposal for water reduction

Brief report
on Isfahan Municipality
in English

Among visited buildings, building of Isfahan municipality of district 4 is relatively suitable for activities of this company. (Following reports have been presented by confirming charge of building to technical expert of this company).

Regarding to activity of this company in the field of (optimizing heating & cooling equipment) it has not estimated lights of building.

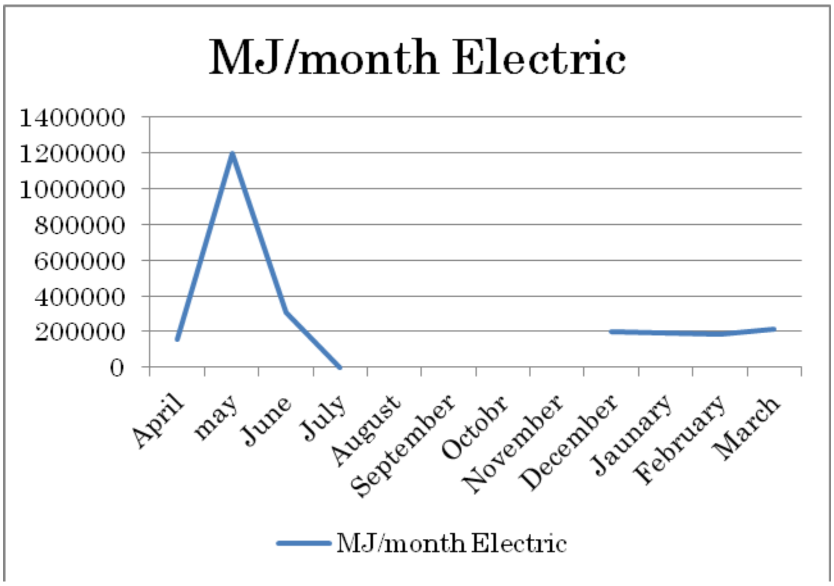
Specification of building of Isfahan municipality of district 4

Working hour per day: 8 H	infrastructure: 2,500 m^2	Type of energy consumption: urban gas
Year of building: 20 years	Year of installations: 20 years	Number of floors: 4 floors
Cooling operating months: 4 months	heating operating months: 5 months	Type of window: metal-single-walled
Type of wall: brick without heat insulation	Color of walls: cream	Powerhouse operating hour: 24 H

Status of powerhouse operating on holidays: off	Status of powerhouse operating after working hour: chiller: on, heating powerhouse probably is off
Number & type of cooling system: 2 water cooler 7000- absorption chiller	Number & type of heating system: hot water powerhouse- fan coil
Code No. of power: 80076746	Gas subscription No.: 002126451363

Technical expert declared there is an absorption chiller in this building, but it was found there is two chassis of density chiller 30 ton.

During many years ago, some remarkable of buildings of Isfahan municipality measured to inactivate heating & cooling systems as manual & human power after end of working hours. This makes to reduce potential saving.



month	MJ/month
	Electric
April	160,369
may	1,194,019
June	307,208
July	No data
August	
September	
Octobr	
November	
December	199,260
Jaunary	193,730
February	182,250
March	214,164

month	Electric	
	Rials	KWh
April		14,849
may		110,557
June		28,445
July		0
August		0
September		0
Octobr		0
November		0
December		18,450
Jaunary		17,938
February		16,875
March		19,830

Annex 2- forecasting energy saving:

Heating system:

Gas energy is consumed per day is 33740 cubic meter from 17 June 2014 to 25 May 2015. Mainly consumption is 31308 cubic meter from 29 October 2014 to 15 April 2015 (for 5 months at cooling season) and 2432 cubic meter for 7 months at heating season.

Gas consumption measure of this building is approximately 14 cubic meter for each m^2 of building area per year.

Administrative buildings are average 30 to 35 cubic meter. After working hours, powerhouse of building inactivate manual.

A significant part of potential saving reduces for inactivating powerhouse after working hours. And it is time to save in operation despite the heat terminals (fan coil) is necessary to avoid cold wind blowing and staff dissatisfaction at least is supplied hot water 50 centigrade circulating in the systems. So, it is predicated to consume gas about 5% per year.

Cooling system:

Building officials declared condition of operation of chiller has not been equivalent to heating system. Cooling systems is always on during 4 months. Of course, because of inaccessibility of annual power consumption it hasn’t been checked consumption. (Courses available are as date of December 2014 to May 2015).

Regarding to officials building declaration and experimental calculations it is predicated to be consumed power of cooling system approx. 110000 kWh during 4 months (120 days).

According to the hours of operation is expected to be saved 30% potential during power consumption.

While peak load is from 11 to 15. So, the basis for calculating the saved power tariff is based on the average price is low load and full load.

Forecasting energy saving:

a) Annual gas saving:

33,740×5% × 1,300 (gas tariff based on gas site) = 2,193,100 Rials.

b) Annual power saving (according to bill of municipality building):

Forecasting power saving in the cooling system during 120 days operation:

103,680 × 30% = 31,104 kWh

31,104 kWh × 1,228 Rials. (Average low load and full load) = 38,195,712 Rials.

c) Forecasting total saving Rials (gas- power):

2,193,100 Rials. + 38,195,712 Rials. = 40,388,812 Rials.

As it has visited and estimated building for a short time and less than one hour and this company has no information about operation conditions, compliance or non-compliance of heating & cooling systems capacity fitted building conditions, number of staff, heat efficiency and other efficient parameters in energy saving as well as service conditions, maintenance & basic repairs of powerhouse. Audits carried out empirically and is only forecasted.

Annex 3- Cash cost of the project:

Table 1- Cost Estimation (Control equipment of source)

Row	Type of equipment	Number	Unit price (Rials.)	Total (Rials.)
1	Heating intelligent control system	1	9,500,000	9,500,000
2	Cooling intelligent control system (density chiller)	1	78,500,000	78,500,000
Total				88,000,000

Table 2- Cost Estimation (Control equipment of destination)

Row	Type of equipment	Number	Unit price (Rials.)	Total (Rials.)
1	Radio control transmitter	1	67,000,000	67,000,000
2	Fan coil radio receiver	72	800,000	57,600,000
3	Antenna amplifier	2	6,000,000	12,000,000
Total				136,600,000

Total tables 1 & 2: 224,600,000 Rials.

Above prices are basis on cash purchase of equipment and tariffs in 2015. If energy services contract (ESCO) due to incrassation of costs such as inflation rate, expert costs and energy auditing, maintenance costs of equipment, course review, training cost, and so on. It will be increased said costs so that it is predicated to take period of contract for 8 years.

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Completion Report (ANNEX)

Deliverables on technical cooperation activities

ESCO proposal for pilot project implementation

December 2018

Nippon Koei Co., Ltd

In the Name of God

Instructions for Measuring & Verifying Energy Saving Strategies
In the Building of Ministry of Economy & Finance

Employer:

Ministry of Economy & Finance

Consultant:

Asia Watt Engineering Co.

July 2016

Document code: EM/R/B33

1. Definitions

1.1. Option C

In order to determine the savings in the consumptions of energy carriers at the building of Ministry of Economy and Finance, by considering the saving resulted from the execution of all strategies, Option C (the entire property) presented in the protocol of IPMVP shall be used as the selected option for calculating the savings. In the Option C method of calculating the savings, all savings resulted from all the proposed strategies must be more than 10% of the consumptions measured with the counters in the time period of the base line.

1.2. Base line

It is an index for the energy performance that indicates the energy performance of the building of Ministry of Economy and Finance during a full operational period. By determining the base line, it is possible to calculate the savings in the reporting period.

1.3. Reporting period

Time periods agreed by all the beneficiaries after the execution of the strategies in order to calculate the savings and savings value.

1.4. Independent variable

They are parameters that change constantly and have considerable effects on the energy consumption of the said building. Such parameters must be measurable.

1.5. Fixed factors

They are parameters that affect the energy consumption of the building but they do not change constantly. In case of occurrence of any change in the fixed factors, the owner must notify the ESCO company of the changes and the base line be modified according to the agreed instructions. In case of failure of the owner to do so, and the supervisor of measuring and verifying discovers the changes during a periodical inspection, according to the said instructions, the owner will be fined and the base line will be modified.

1.6. Usual corrections

In case of occurrence of any changes in the independent variables during the reporting period in the building of Ministry of Economy & Finance, such changes shall be considered in the index of energy consumption in the base line.

1.7. Unusual corrections

The calculations in which the changes in the fixed factors within the measurement limits are considered regarding the base line.

1.8. Subject of measuring & verifying project

The subject of this project is the execution of saving energy strategies in order to reduce the energy consumption in the building of Ministry of Economy & Finance. The strategies of this project include the following items:

Table 1: The proposed saving energy strategies in the building of Ministry of Economy & Finance

No.	Strategy	Predicted saving in gas (m3/yr.)	Predicted saving in electricity (kwh/yr.)	Saving value (Rial/yr.)
1	Implementing the intelligent control system for water circulation pumps flowing in the cooling and heating circuits	---	420000	690/900/000
2	Implementing the intelligent control system for water circulation pumps flowing in the circuits of the chilling condensers of the compressive chillers	--	120000	197/400/000
3	Implementing the intelligent control system for hot water boilers	90000	--	135/000/000
4	Implementing the control system for the performance of fan coils	--	100000	164/500/000
5	Supervision and control on the utilizing of the installations	10000	120000	212/400/000
6	Changing the fluorescent bulbs with LED	--	150000	253/330/000
Total:		**10000**	**750000**	**1/653/530/000**

- In calculating the saving value, the average price of each khw of electrical energy consumption in the building of Ministry of Economy & Finance is considered as

1645 rials and the average price of each cubic meter of natural gas is considered as 1500 rials.

1.9. Base line

1.9.1. Time period of the base line

The time period of the base line shall be from 13 Jul 2013 to 10 Apr 2016 for 32 months.

1.9.2. Independent variables

The only independent variable that is considered in this project and is measurable, is the weather conditions (CDD & HDD)

1.9.3. Gas consumption in the period of the base line

Regarding the use of compressive chiller in the building of Ministry of Economy & Finance, the gas consumption of the building is in the heating equipment in the cold season. With the help of the data of the gas bills of the building for the period of the base line and the average HDD in the same period according to the periodical readings of the gas counter, the index for the thermal energy consumption will be calculated in the period of the base line. In order to formulate a mathematical relation for the period of the base line, the regression method is used for the consumption of natural gas and the extracted HDDs (for the bills with HDD>100°C). The base temperature is considered as 21°C in the cold season and the resulting equation and diagram is shown below.

Figure 1. The base line of natural gas consumption based on HDD

According to the diagram above, the base line of thermal energy consumption in the building of Ministry of Economy & Finance based on HDD is according to the relation (1).

(1) E_{th} (m3) = (308.62 x HDD_{Tin}) = 19721

1.9.4. Electricity consumption in the period of the base line

Regarding the use of compressive chiller in the cooling system and that the circulation pumps are active in the cold and hot seasons in the building of Ministry of Economy & Finance, the equipment in the engine room of the building consume a considerable amount of electrical energy both in cold and hot seasons. According to the data of the electricity bills of the building for the period of the base line and the average HDD and CDD in the periods of electricity bills, the index of electrical energy consumption will be calculated for the period of the base line. In order to formulate a mathematical relation proposed for the period of the base line, the regression method is used for electrical consumption and CDD, HDD and the number of days in each period of the bill (because the bill periods are not the same). The following relations indicate the equations of electrical consumption in the time period of the base line according to CDD, HDD, and number of days in each bill. The base temperature for hot seasons is considered as 23°C and for cold seasons as 21°C and the resulting equation is as below.

(2) Electrical energy consumption (kwh)

$$= (11005.65 \text{ x days}) + (1532.67 \text{ x } CDD_{Tin:\ 23C}) + (27.91 \text{ x } HDD_{Tin:21C})$$

1.9.5. Fixed factors

All the fixed factors that are considered in the project of measuring and verifying in the building of Ministry of Economy & Finance are as below:

1. **The thermal used area of the building**

   In case of increase or decrease in the thermal used area of the building and also use of heating and cooling equipment common in the building of Ministry of Economy & Finance, the heating and cooling consumptions shall be corrected in proportion to the increase or decrease.

   (3) The corrected energy consumption = the energy consumption of the period of the base line before the change in the area x (1 + the added area/total initial area)

2. **Type of the usage of the building**

In case of change in the usage of the building, the owner must pay the entire costs of investment to the ESCO company.

3. Number of the personnel and their working hours

The effect of the number of personnel on the energy consumption is refrained. However, any change in the working hours will require an unusual correction and the energy consumption will be corrected as below.

(4) Corrected energy consumption = the energy consumption of the period of the base line before the change in the time x (1 + the added time/ initial time)

4. Number of electricity and gas counters of the building (whether major or minor)

In case of change in the number of electricity and gas counters of the building, if necessary, there will be unusual corrections in the energy consumption of the period of the base line.

5. Number and types of heating and cooling equipment

In case of any change in number and types of heating and cooling equipment, the amount of energy such equipment need, will be measured by M&V supervisor and applied in the base line as unusual corrections.

In order to measure the energy consumption of such equipment, if the equipment use electrical energy, the power required by the equipment will be measured and their working hours will be estimated on a mutually agreed basis (If necessary, the working hours are also measurable.) The energy consumption in one piece of equipment is calculated as below:

(5) Energy consumption = measured power x estimated (measured) working hour

In order to measure the energy consumption in the equipment that use thermal energy (natural gas), it would be enough to measure their fuel consumption in the reporting period or reach an agreement on the basis of their technical specifications in order to estimate their energy consumption. Thus, the energy consumption in the time period of the base line according to the calculated energy consumption for such equipment would be unusual correction.

6. The base temperature of the building

In case of a change in the base temperature of the building, the base line will be reformed according to the new base temperature (with changing CDD and HDD according to the new base temperature) and the resulting new equation shall be the basis for calculations.

7. Number of electrical equipment in the building (including computers, printers, copiers, study lamps, etc.)

In order to measure the changes in the energy consumption in case of change in the number of electrical equipment in the building, the power required by such equipment is measured and the working hours are agreed upon (if necessary, the working hours can be measured) and the base line will be corrected according to the changed energy consumption. The energy consumption in one piece of equipment is measured as below:

(6) Energy consumption = measured power x estimated (measured) working hour

8. The material of walls

The effect of change in this fixed factor is refrained and there is no need of unusual correction of the base line. In case of any change in the fixed factors, the owner is obligated to notify all the beneficiaries or the owner will be responsible for failure of accomplishment of the expected savings and the owner is obligated to pay the fine based on the agreement of all the beneficiaries.

Also, in case of a pre-determined development plan in the building, it is obligatory for the subscriber to notify the investor and in order to calculate the actual saving according to the protocol of IPMVP, it is necessary to install auxiliary counter(s) for the new section(s) while their construction. Otherwise, the owner will be responsible for failure to accomplish the expected saving and owner is obligated to pay the fine based on the agreement of all the beneficiaries.

1.9.6. Reporting period

The reporting period after the execution of the proposed and confirmed strategies will begin by the investor and the saving reports will be presented for maximum 42 months or equivalent to the maximum investment repayment in two-month intervals for the repayment.

1.10. Calculation of the amount and value of the avoided energy

The amount of accomplished savings will be calculated in two-month intervals subject to accessibility to the data of counter readings in those periods. The amount of accomplished savings are calculated based on the amount of avoided energy consumption as below.

1) The average daily temperature is extracted from meteorology organization and HDD and CDD for each period of counter reading are calculated during the reporting period by using the base temperature recorded in the base line of natural gas and electrical energy (according to the formula presented in the definitions section).

2) Then the HDD and CDD calculated for each new reading period (after execution of the strategies) are put in the equation for the consumption pattern of the natural gas and electrical energy base line period and the expected energy saving for each period of new counter reading is accomplished.

3) In order to calculate the savings in each new period of counter reading, the actual energy consumption of that period is deducted from the expected energy consumption gained from the previous period (step 2) and the resulting figure indicates the saving of natural gas in the said period of reading the counter.

4) (7) Avoided energy consumption = energy of the corrected base line period (±) unusual correction according to the conditions of the reporting period (-) energy of the reporting period

In the Name of God

Ref.: 5-958861

Date: 13 Aug 2016

Dear Dr. Doodabinejad

The Respectful Educational Deputy for Optimizing Energy Consumption

Subject: Proposal of Energy Services Contract (ESCO) Tehran City Electrical Power Distribution Co.

With Compliments;

Thank you for holding the meeting of talks on 10 Aug 2016 regarding the presentation of technical-economic assessment project and the M&V model of Energy Services Contract (ESCO) Tehran City Electrical Power Distribution Co. Please find in attachment the technical requirements for utilizing the installations, in response to the questions of Engineer Eshtehardian, the respectful supervisor of construction installations together with the M&V project and the proposed contract.

You are kindly required to have them reviewed and inform us the results.

Best regards;

Tooraj Bathaee

Chairman of the Board of Directors

Copy sent to Engineer Hashemi, the respectful CEO of Tehran City Electrical Power Distribution Co. for information and issuance of proper instructions

Attachment I

One of the effective methods stipulated in the draft of Energy Services Contract (ESCO) Tehran City Electrical Power Distribution Co. is the radio control of all fan coils and blowing equipment of the building which provides the technical conditions required for proper control of cooling-heating installations due to the possibility of online control and monitoring of all fan coils during the cold and warm seasons of the year.

1. Control of the hot water boiler in the cold season:

This design will shut down the pumps of circulating hot water and all the fan coils after the working hours of the building. In order to prevent the probability of occurrence of thermal tension in the boiler, will be in the standby status with a temperature of 30°C. In case of the employer's requirement, the temperature can be increased up to 35°C.

In this way, a considerable amount of saving will be done in the gas consumption due to the shut-down of pumps and fan coils, and also the hot water in the boiler is at a proper temperature in the standby position.

At the beginning of the next day, first the pumps of the circulating hot water are turned on and then after temperature of transfer lines are the same as the boiler, the fan coils are turned on one by one. In this way, during the time required and in proportion with the thermal increase of hot water, the boiler reaches operating temperature from standby position.

2. Control of compressing chiller for the warm season:

The control of compressed chiller for saving purposes at the time of building closure and weekends is as below:

- All the pumps of the chilled water and the tower fan are equipped with inverter and after the working hours, they are completely shut down and in the next morning, they are turned on one by one and in respect with the utilization of equipment. The pumps of the chilling tower will shut down with a timer after the end of the working hours of the building and in the next morning they are turned on according to the utilization conditions.

- The compressing chiller will also shut down with a timer after the working hours and the set of cooling installations and the chiller will be turned on in the next morning as it was described above for the boiler of hot water and after some time they will reach the proper working temperature in a way that the time of staring the work, the rooms have a proper temperature.

The execution of these measures shall be done after separating the cooling and heating usages of the spaces in the building which are always used.

Attachment II

The Project for Measuring and Verifying Energy Services Project at Tehran City Electrical Power Distribution Co.

Prepared by:

Maryam Shekari

(Pishran Energy Co.)

Table of contents

1. Introduction

Measurement and verification (M&V) is referred to the process of utilizing measurement for determining the actual savings created in the employer's property with the help of energy management projects which are achieved in a trustable manner. As saving energy is actually the same as not using energy, thus it can't be measured directly and it can be determined by comparing the energy consumption before and after the execution of energy saving project upon the insertion of the required corrections and in proportion with modifications in the conditions.

2. Description of the project

The project under study at this M&V project, is the energy services (ESCO) at Tehran City Electrical Power Distribution Co. with a built area of 6400 sq. m. and with office usage. The annual energy consumption at this company is about 122926 cubic meters of natural gas and also 803288 kwh (the average consumption of three years 2013-2015).

At this project, after doing the initial studies and collecting data required at the site of the building of Tehran City Electrical Power Distribution Co. and doing the relevant analyses, strategies for saving energy are proposed to be implemented in the framework of ESCO and the results will be studied and confirmed according to the agreed measurement and verification project.

3. Projects of energy efficiency improvement

The projects of energy efficiency improvement include the following items:

1- Separation of cooling and heating systems of Hall 121 and Dispatching Hall.

2- Switching off the cooling/heating engine room after the working hours

3- Using invertors on pumps of chilled water

4- Using invertors on pumps of chilling tower

5- Using invertors on fans of chilling tower

The predicted saving energy capacity is as shown in the following table. Also, the duration of the predicted project is shown in the table.

Prediction of saving electricity capacity per year	KWh	83274
Prediction of the cost of saving electricity capacity per year based on the tariffs of 2016	Rials	141062254
Prediction of saving gas capacity per year	m^3	15749
Prediction of the cost of saving gas capacity per year based on the tariffs of 2016	Rials	73735000
Annual income based on the tariffs of 2016	Rials	214797254
Prediction of the duration of the contract	4 years and 2 months	

4. The Proposed M&V Project

4.1. The proposed option and the measurement limits

Option C (the entire property) according to protocol IPMVP will be used in this project in order to determine the amount of savings. The reason to choose this option is that firstly, the amount of savings predicted in this project according to the list of saving measures in the table above is more than 10% of the total consumed energy and also, with this option, the counter effects existing among the proposed strategies shall be covered. The basis of calculations in this option is the amounts read from the main counters of the company.

4.2. Time period of the base line and its conditions

The time period of the base line in this project will be for 36 months from 21/03/2013 to 20/03/2016. The amounts of energy consumption in the period of the base line for each of the energy carriers have been shown in the tables of appendix A. The key conditions during the period of the base line that may be changed in the period of reporting are recorded in Appendix B. The fixed variables recorded in the project for the period of the base line include:

- Hot degrees day (HDD)

- Cold degrees day (CDD)

The amounts of HDD and CDD are extracted from the data available at Degreedays.net and according to the data of the nearest meteorological site with site of the project.

Also the fixed factors relating to the period of the base line include the following items:

- The area of the controlled sections in the building

- Type of usage of the building

- Number of personnel and working hours

- The type of materials of the building crust including walls, windows, …

- Number, types, and working hours of the electrical equipment of the building

- Number, types, and working hours of the heating and cooling equipment of the building

4.3. Reporting period

The reporting period after implementing the proposed strategies confirmed by the employer and the saving reports shall be presented every two months up to 60 months or equivalent to the maximum investment return in order to make the repayments.

4.4. Principles of corrections of the base line and method of analysis

The savings accomplished in the reporting periods (two months) shall be calculated subject to the accessibility of reading data at that period. The amounts of accomplished savings are calculated based on the amount of avoided energy consumption according to the following procedure:

The amounts of HDD and CDD for each reporting period are extracted from the data available at Degreedays.net and are used for the calculations and creation of the base line for each energy carrier.

Then, the amounts of HDD and CDD for each reporting period (after implementation of the strategies) are put in the equation of relevant consumption pattern of the period of the base line and the amount of energy consumption expected for each reporting period is achieved.

In order to calculate the savings in each reporting period, the actual consumption of that period is deducted from the expected consumption of the period extracted from the previous stage (the base line corresponding to that period) and the resulting figure is considered as the saving amount of energy carrier in the said period.

The equation used for this, according to protocol of IPMVP is as follows:

Energy of the reporting period (-) unusual correction according to the conditions of the reporting period (±) corrected energy of the base line period – avoided energy consumption

4.5. Prices of energy carriers

The prices of consumed energy carriers, i.e. natural gas and electricity, in each of the reporting periods are as below according to the relevant tariffs provided that the energy tariffs would not become less than the 2016 prices. In such cases, the last tariffs before the reduction of the prices of energy shall be the basis for calculation of the avoided costs (savings).

Appendix A- The energy consumptions recorded at the period of base line

Table A-1-The amount of electrical consumption in various periods (KWh) 2013-14-15

Period	**From**	**To**	**Days**	**Mid-load**	**High-load**	**Low-load**	**Read diamond**	**Calculating diamond**	**Total consumptions**
9501	29/02/2016	20/04/2016	51	38100	10200	19800	60	284	68100
9412	30/01/2016	29/02/2016	30	28800	7500	14100	90	284	50400
9411	06/01/2016	30/01/2016	24	22200	5400	10800	120	284	38400
9410	13/12/2015	06/01/2016	24	24600	6000	11700	120	284	42300
9409	15/11/2015	13/12/2015	28	25200	6600	12900	90	284	44700
9408	21/10/2015	15/11/2015	25	23100	5400	10800	90	284	37500
9407	19/09/2015	21/10/2015	32	33300	8700	16200	150	284	58200
9406	25/08/2015	19/09/2015	25	33600	9000	16500	150	284	59100
9405	22/07/2015	25/08/2015	34	50100	12900	23400	150	284	86400
9404	21/06/2015	22/07/2015	31	46800	12000	22200	180	284	81000
9403	12/05/2015	21/06/2015	40	51000	12600	23700	180	284	87300
9402	22/04/2015	12/05/2015	20	9600	900	5700	0	284	16200
9401	02/03/2015	22/04/2015	51	43500	11700	22500	90	284	77700
9312	05/01/2015	02/03/2015	56	37200	8700	17100	60	284	63000
9311	16/12/2014	05/01/2015	20	23400	6300	11400	0	284	41100
9309	20/11/2014	16/12/2014	26	27600	7800	14400	120	284	49800
9308	21/10/2014	20/11/2014	30	31500	8700	16200	120	284	56400
9307	20/09/2014	21/10/2014	31	41400	11100	19200	180	284	71700

9306	23/08/2014	20/09/2014	28	50400	14100	25200	240	284	89700
9305	21/07/2014	23/08/2014	33	67500	17700	32100	180	284	117300
9304	22/06/2014	21/07/2014	29	58200	15300	27600	210	284	101100
9303	20/05/2014	22/06/2014	33	53400	13500	24000	180	284	90900
9302	23/04/2014	20/05/2014	17	34500	9300	16200	150	284	60000
9301	25/02/2014	23/04/2014	57	60300	17400	33900	120	284	111600
9212	02/02/2014	25/02/2014	23	28200	7500	14100	120	284	49800
9211	09/01/2014	02/02/2014	24	28200	8100	14700	120	284	51000
9210	18/12/2013	09/01/2014	22	28500	7500	13800	120	284	49800
9209	20/11/2013	18/12/2013	28	27900	7200	14100	120	284	49200
9208	21/10/2013	20/11/2013	30	31200	8400	15600	120	284	55200
9207	21/09/2013	21/10/2013	30	41400	10800	18300	210	284	70500
9206	21/08/2013	21/09/2013	31	56400	15600	28200	180	284	100200
9205	22/07/2013	21/08/2013	30	60000	16500	30600	180	284	107100
9204	22/06/2013	22/07/2013	30	59400	16500	29700	210	284	105600
9203	22/05/2013	22/06/2013	31	51900	13200	22800	210	284	87900
9202	24/04/2013	22/05/2013	28	33300	9000	16500	120	284	58800
9201	07/03/2013	24/04/2013	48	50100	147000	27900	120	284	92700

Table A-2 Amounts of consumption of natural gas for each period (according to gas bills)

From	To	Consumption (Nm3)	Days
12/03/2016	01/05/2016	25610	41
18/02/2016	12/03/2016	1060	23
12/01/2016	18/02/2016	21250	37
28/10/2015	12/01/2016	62360	76
29/09/2015	28/10/2015	2360	29

13/08/2015	29/09/2015	1458	47
09/05/2015	13/08/2015	2981	96
20/03/2015	09/05/2015	64694	41
19/02/2015	20/03/2015	11997	29
06/01/2015	19/02/2015	1765	44
06/12/2014	06/01/2015	27751	31
30/10/2014	06/12/2014	27942	37
24/09/2014	30/10/2014	3500	36
20/08/2014	24/09/2014	1999	35
17/07/2014	20/08/2014	1608	34
14/06/2014	17/07/2014	1244	33
14/05/2014	14/06/2014	4383	31
14/04/2014	14/05/2014	0	30
27/02/2014	14/04/2014	21091	38
22/01/2014	27/02/2014	31076	36
12/12/2013	22/01/2014	41118	41
11/11/2013	12/12/2013	21965	31
07/10/2013	11/11/2013	9736	35
31/08/2013	07/10/2013	0	37
23/06/2013	31/08/2013	3270	69
16/05/2013	23/06/2013	0	38
30/03/2013	16/05/2013	7562	47
18/02/2013	30/03/2013	24093	30

Appendix B-Fixed factors recorded at the period of base line

- The area of the controlled sections in the building: 6400 sq. m.

- Type of usage of the building: office building (including round the clock working section to use the 121 system and dispatching section)

- The type of materials of the building crust including walls, the windows are metal single glazed

- Number, types, and working hours of the electrical equipment of the building:

* Number of lights: 100 miniature switches in 7 electrical panels, each miniature switch (each line) on average 7 amperes with manual control system

- Number, types, and working hours of the heating and cooling equipment of the building:

* Number, capacity, and type of cooling system: 2 sets of compressive chillers with chilling capacity of 160 tons each with 4 compressors with chilling capacity of 40 tons and 2 unloaders on each chassis of chillers

* Number, capacity, and type of heating system: 2 steel boilers each a capacity of 500000 kc/h and the flamers each with a power of 246-581 kW with manual control system

* Number of sound chilled water pumps: 3

* Number of sound tower pumps: 3

* Number of tower fans: 2

* Number of fan coils of the building: around 200 sets (180 sets with wall thermostats and 20 sets without thermostats) with CFM capacity: 400-600

* Number of split conditioners: around 20 sets (cold and hot)

* Number of standing conditioners: 4 sets (3-phase) for meeting hall

- Number of personnel and working hours

The Project
On
Implementation of Pilot Projects to Introduce ESCO for Government's Buildings
in
Islamic Republic of Iran

Completion Report (ANNEX)

Deliverables on technical cooperation activities

The proposal regarding monitoring method of pilot project on government building

December 2018

Nippon Koei Co., Ltd

In the name of God

Report on saving natural gas during heating in the building of the Ministry of Economy and Finance

Employer:

Consultant: Asia watt Engineering Company

1 Measures taken during the reporting period to save energy in the second half of the year and with the shutdown of the cooling system and after the preparation of the plans for intelligent control schemes for circus pumps and hot water boilers, the implementation of the installation and commissioning of the control system was carried out. The following is a summary of the steps taken.

1. Preparation of electric control system for smart circle pumps and hot water boilers

2. Performing the necessary electrical changes in the power supply and control boards of the cold and hot water heating pumps.

3. Installing temperature and pressure sensors on the roundabouts along with the wiring

4. Perform electrical wiring for the transmission of steering signals and status to circulate pumps and hot water boilers.

5 Build a central control panel with electrical wiring

6. Perform a program control system

7. Preparing As built maps for control system

8. Testing and commissioning

9. Providing training to the exploiter group 10. Supervision over exploitation process.

In this period of saving along with the operation of installing the intelligent control system for the operation of circus pumps and hot water boilers, the renovation of the control panel of hot water boilers was placed in the unit building unit of the Ministry of Economy and Finance, which is the same as the boiler deck Gram No. 1 was replaced and changes needed to communicate with the central intelligent control system were carried out. In this period due to lack of financial resources, it was not possible to renovate the boilers no. 2 and 3.

Defective in the settings for the operation of the boiler water boiler unit (1) After delivery of the boiler number 1, this defect was not resolved by the contractor to construct the control panel, which caused the defect to increase the boiler operating time (as well as the lack of modernization of the hot water control panel number 2 and 3). In spite of the availability of software and hardware infrastructure, it is not possible to control the smart boilers of hot water and fuel saving in this period will not be as predicted and the intelligent control system will only control the operating schedule of the circus pumps.

During the heating period, which included 6 gas bills from 6/8/1396to 1/2/1397, because of the inability to control the smart boilers of the hot water, the saving of natural gas consumption was not as predicted and in accordance with the observed gas consumption in the mentioned period has decreased by 16827.5 cubic meters compared to baseline consumption. According to the plan for measuring and verifying energy savings, the Rial's value of saving natural gas in the building of the Ministry of Economic Affairs and Finance is calculated in accordance with the following equation.

The total amount of gas saved $\frac{96/08/06}{97/02/01}$ (Rials)=

gas saved$\frac{96/08/06}{96/09/01}\text{m3}$ × Gas price period$\frac{96/08/06}{96/09/01}$

+ gas saved$\frac{96/09/02}{96/10/03}m3$ × Gas price period$\frac{96/09/02}{96/10/03}$

+ gas saved$\frac{96/10/04}{96/11/01}m3$ × Gas price period$\frac{96/10/04}{96/11/01}$

+ gas saved$\frac{96/11/02}{96/11/30}m3$ × Gas price period$\frac{96/11/02}{96/11/30}$

+ gas saved$\frac{96/12/01}{96/12/26}m3$ × Gas price period$\frac{96/12/01}{96/12/26}$

+ gas saved$\frac{96/12/27}{97/02/01}m3$ × Gas price period$\frac{96/12/27}{97/02/01}$

= + 20783.44 $m3$ × 2918.26$\frac{Rial}{m3}$

+ −6621.73 $m3$ × 1869.35$\frac{Rial}{m3}$

+ −11080.95 $m3$ × 1779.05 $\frac{Rial}{m3}$

+ −18143.64 $m3$ × 1779.05 $\frac{Rial}{m3}$

+ −144.85 $m3$ × 1779.05 $\frac{Rial}{m3}$

+ 32035.24 $m3$ × 2592.33$\frac{Rials}{m3}$ = 79069389.95 rials

In (1), the amount of gas saved from equation (2) is calculated

(2) [Unusual adjustments based on reporting period ±Baseline corrected gas consumption-Gas consumption reporting period] $\frac{96/08/06}{96/09/01}$

+ [Unusual adjustments based on reporting period ±Baseline corrected gas consumption-Gas consumption reporting period] $\frac{96/09/02}{96/10/03}$

+ [Unusual adjustments based on reporting period ±Baseline corrected gas consumption-Gas consumption reporting period] $\frac{96/10/04}{96/11/01}$

+ [Unusual adjustments based on reporting period ±Baseline corrected gas consumption-Gas consumption reporting period] $\frac{96/11/02}{96/11/30}$

+ [Unusual adjustments based on reporting period ±Baseline corrected gas consumption-Gas consumption reporting period] $\frac{96/12/01}{96/12/26}$

+ [Unusual adjustments based on reporting period ±Baseline corrected gas consumption-Gas consumption reporting period] $\frac{96/12/27}{97/02/01}$

= Gas saved$\frac{96/08/06}{97/02/01}$

= [(48343.44) ± (0) − (27660)] $\frac{96/08/06}{96/09/01}$

+ [(139092.27) ± (0) − (145714)] $\frac{96/09/02}{96/10/03}$

+ [123801.05 ± (0) − (134882)] $\frac{96/10/04}{96/11/01}$

+ [(138844.36) ± (0) − (156988)] $\frac{96/11/02}{96/11/30}$

+ [(69922.14) ± (0) − (70067)] $\frac{96/12/01}{96/12/26}$

+ [(57704.24) ± (0) − (25669)] $\frac{96/12/27}{97/02/01}$ = (16827.52) $\frac{96/08/06}{97/02/01}$

In relation (1), the gas tariff for each billing period is calculated in accordance with equation (3)

Gas Price Period$\frac{96/08/06}{96/09/01}$=

$$\frac{\text{Gas prices + Continuous Services (Aboneman) + Complications + Complications of supplying to the villages}}{\text{Consumption period}}$$

=$\frac{58846649+9808767+6178986+5884665}{27660}$

= 2918.26$\frac{Rial}{m3}$

Gas Price Period$\frac{96/09/02}{96/10/03}$=

$\frac{217842430+12072329+20692327+21784243}{145714}$ =1869.35$\frac{Rial}{m3}$

Gas Price Period$\frac{96/10/04}{96/11/01}$=

$\frac{= 201648590 + 0 + 18148372 + 20164859}{134882}$ =1779.05$\frac{Rial}{m3}$

Gas Price Period$\frac{96/11/02}{96/11/30}$=

$\frac{234697060 + 0 + 21122735 + 23469706}{156988}$ =1779.05$\frac{Rial}{m3}$

Gas Price Period$\frac{96/12/01}{96/12/26}$=

$\frac{104750165 + 0 + 9427514 + 10475017}{70067}$ =1779.05 $\frac{Rial}{m3}$

Gas Price Period$\frac{96/12/27}{97/02/01}$ =

$\frac{55918083 + 0 + 5032626 + 5591809}{25669}$ =2592.33 $\frac{Rial}{m3}$

Also, in relation (2), the energy consumption of the base line period is calculated in accordance with the energy savings measurement and verification scheme (4).

$E_{\text{natural gas}}\, m3\, \frac{96/08/06}{96/09/01} = 6380.697 + (480.32 \times CDD) + (312.704 \times HDD)$

$= 6380.697 + (480.32 \times 7.3) + (312.704 \times 123.3) = 48443.44$

$E_{\text{natural gas}}\, m3\, \frac{96/09/02}{96/10/03} = 6380.697 + (480.32 \times CDD) + (312.704 \ast HDD)$

$= 6380.697 + (480.32 \times 0) + (312.704 \times 424.4) = 139092.27$

$E_{\text{natural gas}}\, m3\, \frac{96/10/04}{96/11/01} == 6380.697 + (480.32 \times CDD) + (312.704 \ast HDD)$

$= 6380.697 + (480.32 \times 0) + (312.704 \times 375.5) = 123801.05$

$E_{\text{natural gas}}\, m3\, \frac{96/11/02}{96/11/30} == 6380.697 + (480.32 \times CDD) + (312.704 \ast HDD)$

$= 6380.697 + (480.32 \times 0.2) + (312.704 \times 423.3) = 138844.06$

$E_{\text{natural gas}}\, m3\, \frac{96/12/01}{96/12/26} = 6380.697 + (480.32 \times CDD) + (312.704 \ast HDD)$

$= 6380.697 + (480.32 \times 0) + (312.704 \times 203.2) = 69922.14$

$E_{\text{natural gas}}\, m3\, \frac{96/12/27}{97/02/01} = 6380.697 + (480.32 \times CDD) + (312.704 \ast HDD)$

$= 6380.697 + (480.32 \times 10.58) + (312.704 \times 148) = 57704.24$

With the operationalization of the smart circle pump control system, a report on the saving of natural gas during the heating period, including bills received from the Ministry of Economic Affairs and Finance, and the calculation of savings, are presented in the table below.

Table 1: Report on Natural Gas Conservation Report during Heating

Row	Specifications		Unit	amount	Source
1	Beginning of Gas Billing Reporting	Period1-1	_	96/08/06	gas bill
		Period1-2		96/09/02	
		Period1-3		96/10/04	
		Period2-1		96/11/02	
		Period2-2		96/12/01	
		Period2-3		96/12/27	
2	The end of the Gas Billing Reporting Period	Period1-1		96/09/01	gas bill
		Period1-2		96/10/03	
		Period1-3		96/11/01	
		Period2-1		96/11/30	
		Period2-2		96/12/27	
		Period2-3		97/02/01	
3	Cool day	Period1-1	Centigrade degree	7.3	www. degreedays .net
		Period1-2		0	
		Period1-3		0	
		Period2-1		0.2	
		Period2-2		0	
		Period2-3		10.5	
4	Cool day	Period1-1	Centigrade degree	123.3	www. degreedays .net
		Period1-2		424.4	
		Period1-3		375.5	
		Period2-1		423.3	
		Period2-2		203.2	
		Period2-3		148	
5	Gas consumption per period	Period1-1	$m3$	27660	gas bill
		Period1-2		145714	
		Period1-3		134882	
		Period2-1		156988	
		Period2-2		70067	
		Period2-3		25669	
6	Gas consumption in the same period of the	Period1-1	$m3$	48443.44	Measurement and monitoring report
		Period1-2		139092.27	
		Period1-3		123801.05	
		Period2-1		138844.36	

	base line model	Period2-2 Period2-3		69922.14 67704.24	
7	Routine corrections			no	Measurement and monitoring report
8	Routine corrections			no	Measurement and monitoring report
9	Savings		$m3$	16827.5	Measurement and monitoring report
10	gas cost	Period2-1 Period2-2 Period2-3 Period3-1 Period3-2 Period3-3	$\frac{Rial}{m3}$	2918.26 1869.35 1779.05 1779.05 1779.05 2592.33	Gas bill
11	Saving value			79069389.95	Measurement and monitoring report

There is no change in the reported factors in this reporting period

Table 2: Summary Table of calculations for saving natural gas consumption during the heating period at the Ministry of Economic Affairs and Finance

Second and Third Reporting Period	Start date	End date	CDD (℃.day)	HDD (℃.day)	Real consumption (M3)	Base line Consumption in the course (M3)	Saving (M3)	Saving value (Rials)
Bill 1-2	98/8/6	96/9/1	7.3	123.3	27660	48443.44	20783.44	60651481.61
Bill2-2	96/9/2	96/10/3	0	424.4	145714	139092.27	-6621.73	-12378330.98
Bill3-2	96/10/4	96/11/1	0	375.5	134882	123801.05	-11080.95	-19713565.79
Bill 1-3	9611/2	96/11/30	0.2	423.3	156988	138844.36	-18143.64	-3227843565.79
Bill2-3	9612/1	96/12/26	0	203.2	70067	69922.14	-144.85	-257695.75
Bill3-3	96/12/27	97/2/1	10.5	148	25669	57704.24	32035.24	83045936.08
Total	-	-	18	1697.7	560980	577807.5	16827.5	79069389.95

As it is clear, with the implementation of the proposed strategy, in this report consumption in the reporting period has decreased by 79069389.95 Rials compared to the baseline period under the same conditions as the reporting period. That is, if the solution was not implemented, the amount of the bill in this period increased by 79069389.95 Rials

First report on M & V energy performance in the energy services project of Tehran Electric Power Distribution Company

Energy Transmission Company

Contents

summary of the report:

The present report is the first energy and power saving report of Shiraz building, Tehran Power Distribution Company, for the period from 24/5/96 to15/7/96. The gas savings report (due to the failure to issue gas bills over the period covered by this report) and water savings (due to significant water overflow from the cooling towers of this complex) have not been reported.

The amount of savings achieved in the building's electricity consumption from the date of launching the smart systems of the cooling system (4/6/96) to 15/7/96 is shown in Table 1, respectively.

Table 1. Energy savings achieved during the reporting period

Electric saving (kWh)	Description	Row
15356	Chiller No.2off	1
4886	Chilled Water Pump Off	2

10407	Cooling tower pumps off	3
5235	Cooling Tower Fan Off	4
2305	Fan Coil off	5
3881	Saving chiller number 2 during working hours	6
42070	Total Power Savings in Reporting Period (kWh)	

In this way, the Rial savings achieved in this reporting period are based on the agreements made in accordance with Table 2. Also, at the end of this report, a detailed description of the problems encountered in the operation of the engine room installations that has been observed during the reporting period in this building and is expected to be undertaken by the employer to resolve the problems in order to obtain the conditions for obtaining Provisional savings.

Total Amount (Rials)	cost (Rials)	Volume	Description	Row
---	1,500	---	**Saving rate of gas consumption (cubic meter)**	1
75,768,070	1,801	42,070	**saving rate of power Consumption (kW / h)**	2
---	14,460	---	**saving rate of water Consumption (cubic meter)**	3
75,768,070	Total amount of savings (Rials)			

1. Introduction

Measurement and verification (M & V) process is used to determine the real savings created on the employer's property through energy management projects in a credible manner. Since saving water and energy is in fact a lack of energy consumption, it cannot be measured directly and therefore, by comparing the costs before and after implementing energy saving project, and taking into account the required and appropriate corrections to the changes in the circumstances under consideration. It turns out.

2. Description of the actions taken so far

The phase of reviewing the existing building and its audit was carried out in 1395, and the necessary technical and legal meetings were held to finalize the applicable solutions in this building and the M & V project, and the contract between the company Osko (consultant) and Tehran Electricity Distribution Company until April of this year It lasted. At the same time as the contract was approved by the parties, the project's implementation phase, which included the installation of the following solutions, began on 30/3/96. It should be noted that the contract date for this project is 27/4/96.

The description of the activities carried out during the project implementation phase is as follows:

Implementation Phase

- Installation of two intelligent power control systems on two chillers in the engine room (from 30/3/96 to 3/4/96)
- Installing a Smart Thermal Control Device along with a heating engine engineer monitoring system (from 30/3/96 to 3/4/96)

- Fan coil control system installation includes a radio transmitter with 122 two way radio receivers and a fan-coil monitoring system (from 4/4/96 to 19/4/96)
- Purchase and install the trays and their accessories in the engine room and complete the cabling required for intelligent control systems in the engine room (15/4/96)
- Installation of two monitoring systems for two chillers in the building engine room and the completion of the control systems for intelligent control and monitoring of the building and the hotbed (from 20/4/96 to 25/4/96)

Phase of Operation Solutions

- The boiler control system was launched on 24/5/96and was defined in the boiler's initial setting from 5:00 to 17:00, after which, at the request of Mr. Rezaei (due to the need to maintain The boiling water temperature was increased after 6:00 pm to 7:00 pm, after which the burner was extinguished for use by the units of follow-up and 121). It should be noted that boiler operating hours on Thursdays and Fridays are also defined from 6:00 to 19:00 due to the lack of separation of the spa using room 121 as well as the dispensing tracking section.

The spa hot water temperature is set to 40 ℃ by the intelligent system. The thermostat temperature of the boilers was initially set at 55 ℃ but continued due to problems with the use of the spa in the building (described at the end of the report) and, at the request of Mr. Rezai, the temperature of the thermostats was 60℃ increased.

- Installing a water meter on the water supply path of the cooling towers and delivery of the water meter readout checklist to Mr. Rezai on 28/5/96
- Setting up intelligent control systems for cooling the cooling towers of chillers, pumps and fans during non-operating hours on 4/6/96 (due to the lack of separation of the dispatcher tracking section and the need for the cooling system in spite of its readiness) The energy company was not able to launch this solution, and only during the working hours the chiller function was controlled by the outside air temperature.

- Launch of the fan coil radio control system on 5/6/96 with the definition of the working hours from 5:30 to 19:00 for weekdays (from Saturday to Wednesday) and fan coils blackout on Thursdays and Fridays. Also in the process of improving the performance of the radio system, four radio receivers (in addition to 127 receivers installed) were installed to amplify the radio signal in the blind spot of the building in order to prevent a possible signal transmission between senders and receivers.

- Setting the hours of the fan coil in rooms based on inquiries from residents of the rooms and then confirming the project management on 26/6/96 (in 7 different groups, ending hours from 16:30 to 19:00).

- Complete commissioning of the cooling control system, chiller and other components of the cooling system, taking into account all technical considerations on 1/7/96. The hours worked for chiller operation on working days (including pre-launch) are defined from 5:00 to 19:00, and the cooling system switches off on Thursdays, Fridays and Sundays.

- Due to the problem with fan coils, the building pumps remained unchanged during the working hours of 3/7/96, so that the cause of the problem was identified and resolved.

3. Working hours arrangements in the energy performance measurement and verification scheme compared to existing conditions

Based on the arrangements made in the energy performance measurement and verification plan annexed to the contract, the working hours of the equipment during the weekdays, together with the nominal power consumption of each of the following, are given in the table below.
It should be noted that out of a total of chiller units, only two 45-kW compressors were active during the day, and even before the implementation of the solution during the night, only one active compressor was disabled in the non-operating hours with the help of the intelligent control system.

Table 3. Working hours agreed upon in the design and verification plan

Working hours Thursday and Friday	working hours from Saturday to Wednesday	Power consumption or capacity	Number	Equipment Name	ROW

Off	17:00-6:00	kW 4×45	1	Compressor Chiller 1	1
Off	17:00-6:00	kW 4×45	1	Compressor Chiller 2	2
Off	17:00-6:00	kW 3.5	3	Child water pumps	3
Off	17:00-6:00	kW 7.5	2	Cooling tower pumps	4
Off	17:00-6:00	kW 7.5	2	Cooling tower fans	5
Off	17:00-6:00	kW 0.13	127	Fan coils	6
Off	17:00-6:00	---	2	Boiler	7

However, the settings made in the period related to this report, due to some of the limitations in the distribution of electricity distribution are as follows:

Table 4. Working hours applied in Shiraz building Power distribution by 15/7/96

Working hours Thursday and Friday	Working hours from Saturday to Wednesday	Power consumption or capacity	Number	Equipment Name	Row
Off	19:00-5:00	kW 4×45	1	Compressor Chiller1	1
Off	19:00-5:00	kW 4×45	1	Compressor Chiller2	2
Off	19:00-5:00	kW 3.5	3	Chiller water pumps	3
Off	19:00-5:00	kW 7.5	2	Cooling tower pumps	4
Off	19:00-5:00	kW 7.5	2	Cooling tower fans	5
Off	17:00-6:00	kW 0.13	127	Fan coils	6
19:00-6:00	19:00-6:00	---	2	Boiler	7

Thus, with regard to the above mentioned calculations, the amount of savings from the start of each set of solutions is presented.

4. Calculation of power saving in the equipment off mode

According to the project's M & V project, the cost savings are calculated by simplifying the calculation methods for solutions that are used to save energy through the outage of energy consuming equipment.

Since the hours of operation defined for the equipment in the present condition (according to Table 4) are, according to the Employer's considerations, different working hours agreed upon in the Project Measurement and Validation Plan, so that in order to avoid the lack of benefit of the consulting company (OSCO) Savings calculations have been made since the launch of each solution, as agreed in Table3

4-1 compressed chiller `s off after working hours in week days and off on all Thursdays and Fridays.

There are currently two chiller chassis in the engine room of the building, each chassis equipped with four compressors (45 kW). After the installation of the cooling control system in the engine room, the chiller chassis No. 1 was removed from the circuit by the authorities of the building, and only the chiller number 2 was placed under the control of the system. In other words, chiller number 1 has not been controlled by the intelligent system due to its inactivity during the time period of issue.

The power consumption of this chiller is based on the measurements taken at the time intervals before and after working hours, as shown in Table 5

Table 5. Average power consumption of chiller recorded by Power Analyzer

After working hours	**During working hours**	**period**
22	44	**Power consumption chiller (kW)**

In this way, the amount of energy savings obtained from the chiller is derived from Equation 1:

Equation 1

<u>The amount of energy saving chiller during the period (kWh)=</u>
Power consumption of chiller (kW) × Off time during period (hours)

Considering that the commissioning time of the smart control system of the cooling system by the power transmission company is 4/6/96, but due to the considerations of the employer, it is not possible to outage the cooling equipment during non-working hours, in order to avoid the lack of support of the company, the amount The savings for the period from 4/6/96 to the beginning of the day of 15/7/96 are calculated as follows.

Number of days of the time period: 41 days

Number of days off: 15 days

Number of working days: 26 days

Number of hours offset for each working day: 13 hours

The total duration of chill outage during the course is as follows:

698 = (15 × 24) + (13 × 26) = Off time period (hours)

15356 = 228 × 698 = Chiller power saving during kWh

4-2 Child water pumps off after working hours during weekdays and off on all Thursdays and Fridays.

There are currently four Childe Water pumps (each of 3.5 kilowatts) in the building, and from these four pumps, most of the time, three pumps, and at the beginning and end of the two pumps series. These pumps have been used in the past, so the equation 2 is used to calculate pump savings.

Equation 2

Power Consumption of Childurate Pumps during the period (kWh)=
Number of pumps used during the period × Power consumption per pump (kW) × Off time period (hours)

Since the study period in this report is related to the end of the season, so during this period, two pumps were active during the day and thus the resulting savings calculations are as follows:

Number of days of the time period: 41 days

Number of days off: 15 days Number of working days: 26 days

Number of hours offset for each working day: 13 hours

The total duration of the child water pump exits during the period is as follows:

698 = (15 × 24) + (13 × 26) = Off time period (hours)

4886 = 2 × 3.5 × 698 = Power saving time for electric motors for chill and electric motors (kWh)

It should be noted, however, that during the reporting period, although the relevant period was located at the end of the season, but all three building pumps were active, but savings calculations were made according to the same 2 pumps. Cooling tower pumps off after working hours during weekdays and their blackouts during the whole of Thursday and Friday. The cooling towers of the building are equipped with three pumps, of which two pumps are used, with a pump capacity of 7.5 kW. These pumps have been working before, so to calculate their energy savings, Equation 3 is used.

Equation 3

The amount of power savings of cooling tower pumps during the period (kWh)= Number of pumps used during the period × Power consumption per pump (kW) × Off time period (hours)

In this way, the calculations for cooling the cooling tower pumps are as follows:

Number of days of the time period: 41 days

Number of days off: 15 days

Number of working days: 26 days

Number of hours offset for each working day: 13 hours

The total duration of pump exits during the period is as follows: 698 = (15 × 24) + (13 × 26) = Off time period (hours) 10407 = 2 × 7.5 × 698 = Power savings of cooling tower pumps during the period (kWh)

4-4. Cooling tower fan exhaust after working hours in daylight hours and their blackouts during the whole of Thursday and Friday.

The cooling towers of the building are equipped with two fans. Depending on whether the chiller compressors are turned on or off, one or two fan towers are used, with an absolute power of one of these fans of 7.5 kW. These fans have been working before, so to calculate the energy savings of cooling tower fans, Equation 4 is used.

Equation 4

The amount of power savings for cooling tower fans during the cycle (kWh)=

Number of fans used during the period × power consumption of each fan (kW) × duration of power outage during the period (hours)

In this way, the calculations of cooling fan fans are as follows:

Number of days of the time period: 41 days

Number of days off: 15 days

Number of working days: 26 days

Number of hours offset for each working day: 13 hours

The total duration of fan extinguishing during the period is as follows:

698 = (15 × 24) + (13 × 26) = off time period (hours)

In the study period, two fan cooling towers were only one active fan, so the savings achieved are as follows:

5235 = 1 × 7.5 × 698 = Power saving factor of cooling tower fans during the period (kWh)

4-5- Fan coil shutdown after working hours during weekdays and their blackouts during the whole days of Thursday and Friday in warm and cold seasons.

At present, 127 fan coils are in control of the building. The measurements on the current of the electromotor of a number of fan coils indicate that the power consumption in the average range of the samples is 130 W (equivalent to 0.13 kW). Field surveys also show that about 20% of fan coils remain clear after working hours, but with the help of the radio control system, it is possible to turn off all of the fan coils after the office hours as well as on holiday days. Accordingly, the calculation of the energy saving fan coil in the warm and cold seasons of the year is given by Equation 5.

Equation 5

The amount of power saving fan coils during the period (kWh)= 0.2 × Total fan coils × Power consumption of each fan coil (kW) × Off time during the period (h) In this way, fan coil working hours are based on the arrangements made in the measurement and validation plan, as follows:

Number of days of the time period: 41 days

Number of days off: 15 days Number of working days: 26 days

Number of hours offset for each working day: 13 hours

The total duration of the fan coils that stayed bright during the period is as follows: 698 = (15 × 24) + (13 × 26) = Off time period (hours) The amount of fan coils is as follows: 2305 = 0.2 × 127 × 0,13 × 698 = Fan coil power savings during the period (kWh)

4-6. calculating the energy savings achieved during the work of the chiller

Part of the savings that can be made by the proposed solutions in this project comes at the time of the operation of the equipment. In the strategy of improving the compressor chiller performance using an intelligent cooling control system, since the chiller function is controlled by the outside air temperature, a portion of the power saving is achieved at this interval. The method of calculating power savings during chiller operation will be as follows:

1. Measure the power consumption of a chiller in one day from the beginning / end of the warm season and during working hours (without activating control systems) and compare it with the power consumption of the cooling system during working hours, on the same day In terms of average temperature (by activating all control systems)

2. Calculate the amount of savings achieved during working hours, in the early days (and the end) of the heating season, by deducting the "consumption rate measured in the use of control systems" from the "consumption rate measured without using Control systems "in the early days of the heating season

Thus, considering that the study period in this report only includes the days of the year, the consumption of chiller condensation power in different operating modes was done using a power analyzer and the consumption of chiller in different modes in table 6 Has been.

Table 6. Power consumption of chiller power consumption

Average temperature (℃)	**Power consumption (kWh) over the working hours (17:00-6:00)**	**Control mode**	**Date of measurement**	**Row**
29.8	**370.9**	**Manual (thermostatic)**	**31/5/96**	**1**
30.0	**221.4**	**Smart**	**15/6/96**	**2**
29.5	**221.8**	**Smart**	**20/6/96**	**3**

Given that:

Number of working days during the reporting period: 26 days

Therefore, the amount of savings obtained during chiller hours will be as follows:

3881.8 = 26 × (370.9-221.6) = The amount of power saving chillers during operating hours (kWh)

5. Natural gas saving calculations

Launch of the building-related gas consumption guidelines (Smart Heating Control System) on 96/5/24 The basis for calculating gas savings in this project is gas bills, and surveys show that the latest gas bill issued to Tehran's power distribution company by this date is 96/59, so it is possible to calculate the amount of gas savings in this There is no report.

6- Calculating water saving

In this project, the cooling tower fans will be able to achieve savings in cooling water towers. In order to calculate the water saving, by installing the water meter on the waterway of the cooling towers, their water consumption was analyzed and analyzed. Reading numbers from the water meter installed in this project are described in Table 7.

Table 7 Read the readings on the meter mounted on the water path of the cooling towers

Average temperature (℃)	**Number read on meter (cubic meter)**	**Reading time**	**Reading date**
30.4	**59.808**	**8:40**	**1/6/96**
27.2	**72.794**	**9:15**	**2/6/96**
30.0	**104.654**	**9:30**	**4/6/96**

In this way, the water consumption for cooling towers in the data collection intervals is according to Table 8.

Table 8 read numbers from the meter installed on the water path of the cooling towers

Average consumption per hour (cubic meter per hour)	**Consumption (Cubic meters)**	**Duration (hours)**	**period**
0.528	**12.986**	**24:35**	**1/6/96 to 2/6/96**
0.660	**31.86**	**48:15**	**2/6/96 to 4/6/96**

As you can see, the average consumption of water in the cooling towers in the building ranges from 528 to 660 liters, while according to estimates, the normal consumption of these towers should be in the range of 300 liters per hour. The reason for the high water consumption in the towers is a significant drop in water from the cooling tower, which was first observed by experts of the energy company on 25/4/96, and then the observations were reported in the presence of the meeting, but the related problem Until the date this report was submitted. In Figure 1, the water jet is well visible from the cooling tower.

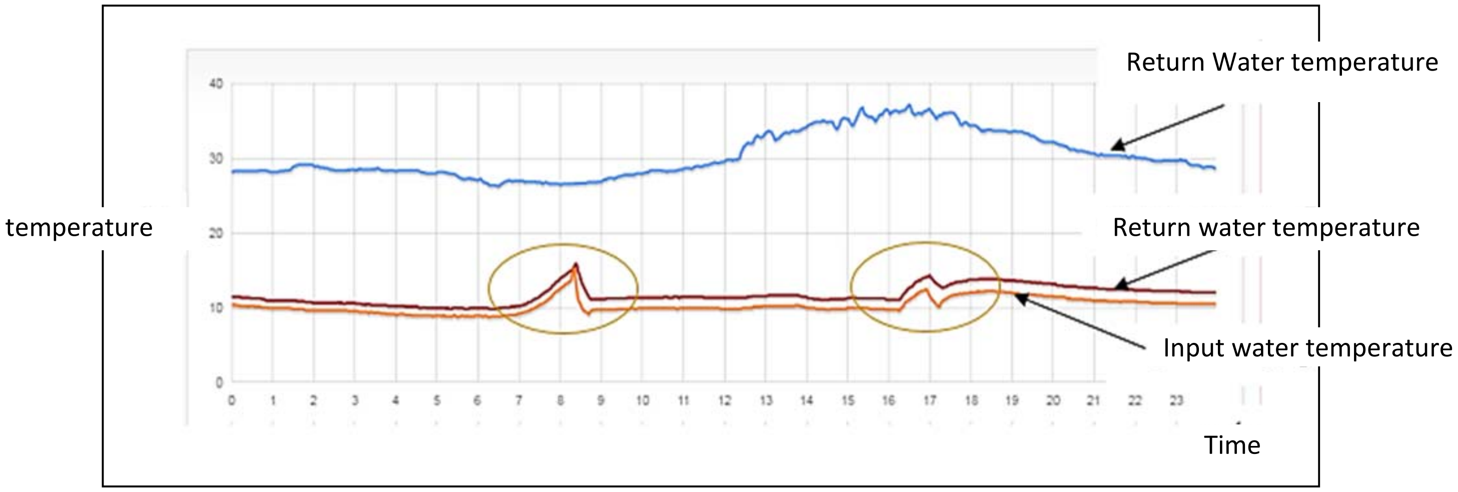
Given the unreasonable consumption of water in this building, it was not possible to calculate the water saving during this period, and therefore, it is expected that in the following year, by solving the observed problem, the lack of support of the energy transport company in the reporting period, saving the calculation Added to that year so that real savings achieved during this period are also reported.

Figure 1. Water overflow from the cooling tower

7. Description of the observed problems in the operation of the engine room installations During the period covered by this report, there have been some problems with the operation of the engine equipment, which disrupts the projected savings in this project and will cause energy losses. The description of two main problems is given below.

1-7 - The problem of chiller

shutdown in the preliminary studies performed after the installation of the cooling system monitoring system, the problem of the chiller shutdown was observed during manual control, examples of which are shown in the following figures.



[i]Figure 2 - Chiller Offsets at around 7am and 16am on 26/04/96

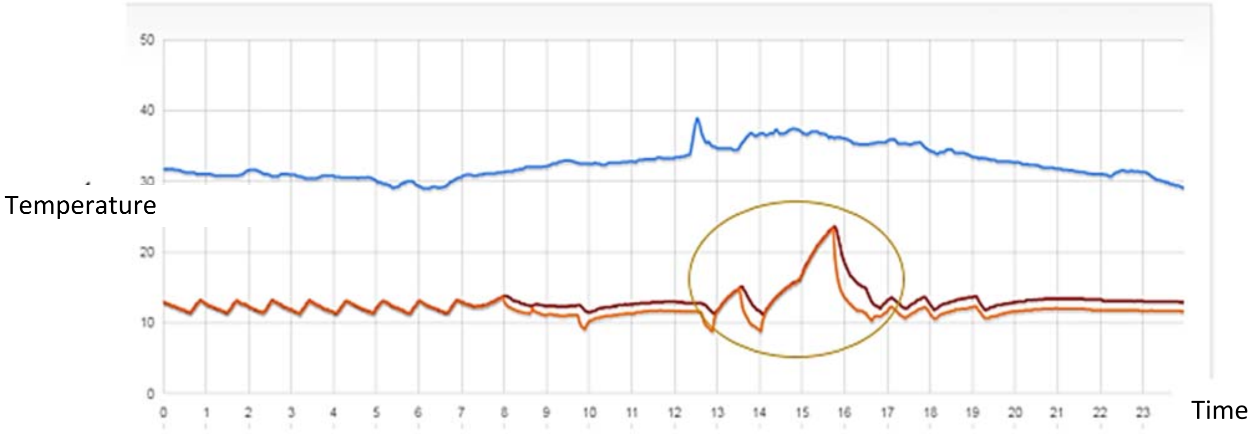


Figure 3 - Chill overshoot at around 13 and 14 on 8/5/96

Mr. Rajabi (contractor representative) said that this problem was caused by an anti-freeze system error, and by the announcement of the problem observed by the Energy Transmission Company at a joint meeting of 22/05/96, in order to prevent the impairment of the intelligent control system of the cooling system, This issue will be corrected, which will be followed by these reforms and the observed issue will not be repeated.

2-7-Fan coil fan conditioning problem and expansion cooling source status

By setting up a smart control system for the chiller cooling and exhaust system and the cooling system in the building engine room, from the first day of October, the chillers and building pumps and cooling tower pumps were shut off at the end of the working hour (19:00).

But, according to Mr. Rezaie, the representative of the employer, it was requested that two building pumps (each of them on the one side of the building), after the hour, were asked about the burning problem on a number of fan coils in the second floor of the building. Stay clear.

Investigations show that fan coils are usually caused by the reduction in water volume and the lack of replacement by the expansion source.

The presence of the problem in the expansion of the expansion source was observed by the presence of the person and the necessary examinations. Due to the shortage of circulating water in the fan coils (due to leakage in the pipes or repairs or other reasons), the water level in the source The expansion of the cooling system is low and due to the closure of the floating feed valve, the expansion source (common to expansions of the heating system and the expansion source of the cooling system), compensatory water has not been introduced and the air system has been taken.

According to the design principles of the building, during the operation of the water valve supply system, the expansion source should not be closed except during repairs, but the closing of the supply valve of the expansion vessel was repeatedly recalled by the presence of experts in the energy transport company, which was once also attended Shift personnel at the facility (Mr. Arjmandi, on Monday, 96/7/10, after seeing this problem and opening the water valve supply source, the person in charge deployed the source flocculation regulator.

Additionally, in visits to the building's engine room, one of the building pumps (Chilled Water) has a fairly significant leak.

With the measurements taken from the expansion spring in the roof of the building, the net water found in the expansion tank of the cooling system is 150 liters (source dimensions: 50 × 50 × 80 cm3).

With the chiller and pumps being switched off at 19:00 and the system clear at 5:00 AM the next day, the total system shutdown time was 10 hours a day. If it is assumed that in the ideal state of the water supply is discharged within 10 hours (without compensating water), 15 liters per hour is required to be reduced from the source, which is equivalent to 250 ml per minute. As can be seen, due to the leakage of the pumped building pump (as one of the reasons for the drain of the circulating cooling system) and the closure of the source feed milk, the drain of the source during the period of pump shutdown and the lack of water compensation of the source and finally Fan cooled ventilation is easily predictable.

Fig. 4: Valve in the pipe connection pipe to the expansion chiller No. 2

Another case that is seen in the building system is the existence of a valve in the main path of expansion of the cooling system as well as in the expansion paths of the heating system (as shown in Figures 4 to 6), while in accordance with clause 14.7-8 2. Section 14 of the National Building Regulations, "Installing the valve or any other obstacle on the pipe connection between the heating system and the expansion tank is not permitted". This clause is related to the heating system, but the same applies to the cooling system, and if this valve is closed, a system malfunction can be created, and this can definitely be done in the heating system, irreparable risks.

Fig. 5: The presence of valve in the pipe connection pipe expansion line to chiller No.1

Fig. 6: Valve in the direction of the pipe connection of the expansion vessel to the boilers

3-7. Problems in supplying the building's spa

Intelligent water control system was installed in the building engine room24/5/96. The initial settings of this system include the operation of boilers from 5:00 to 17:00 (according to the minutes of 22/05/96). The water temperature of the spa using the intelligent system is 40 ° C and the temperature of the boiler thermostat is 55 ° C.

However, due to the inability of the system to provide a health spa with a minimum temperature of 40 ° C, as well as because of the lack of isolation of sanitary spa section 121 and follow-up from the building engine room, on 7/6/96, at the request of Mr. Rezaei, the boiler operation time At 6:00 to 19:00, the mechanical boiler thermostat was increased to 60 ° C. A review of the performance of the sanitary health spa system shows that there are problems with the system, as described below.

According to the observations made using the heating system monitoring system (18/7/96), the heating temperature of the outlet from two sources of water is about 3 ° C (as shown in Fig. 7). Due to the fact that the rotary helix path in two coils of the same sources is the same, there should be no temperature difference between the two sources. It seems that the reason for this is the presence of more sediment in the coil of the spa source number 1. Placement of sanitary spa supplies in the building's engine room is shown in Figure 8.

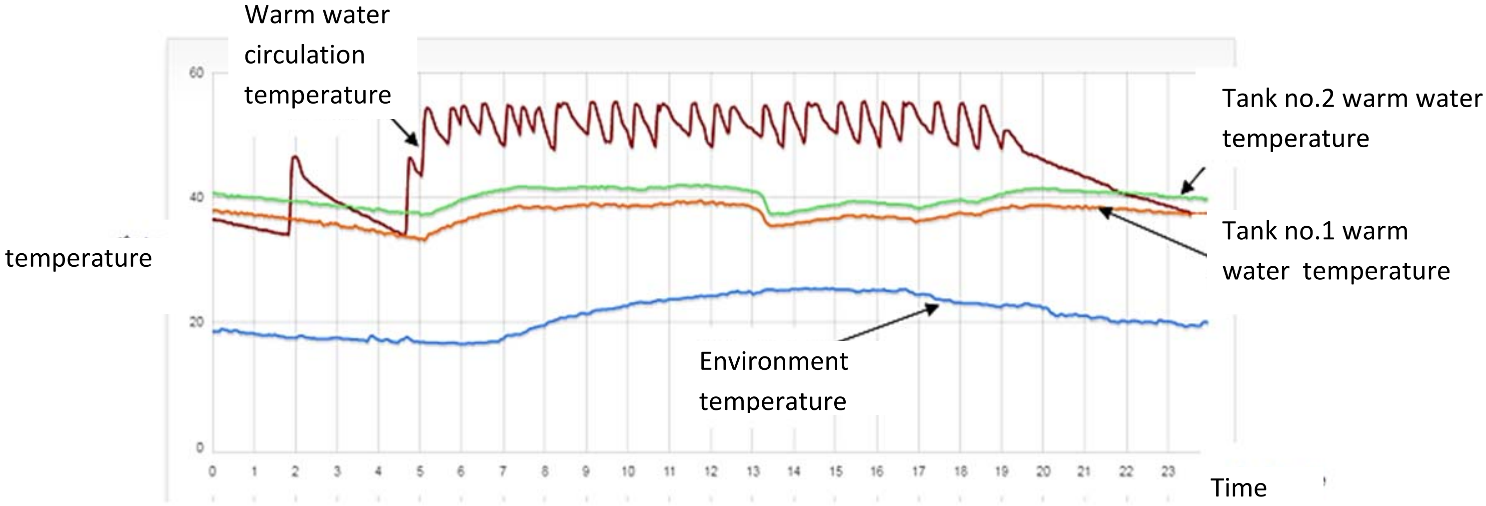


Figure 7. The difference between the heating water temperature between the two sources of the spa

Figure 8 - Locating two sources of spa water

Pumps intended for rotational spin rotation in the coil of hot water supplies, two pumps of the Grand foot model 2540. According to surveys, these pumps do not have the ability to circulate water with the required flow rate for proper heat exchangers inside the coil.

This is evidenced by the current flow of the existing 2540 pumps (in their minimal operating conditions) and the temperature difference above 10 ° C between the rotary spawning medium and the average spawning temperature of the outflow of the two sources in the graph shown 18/7/96(As shown in Figure 9).

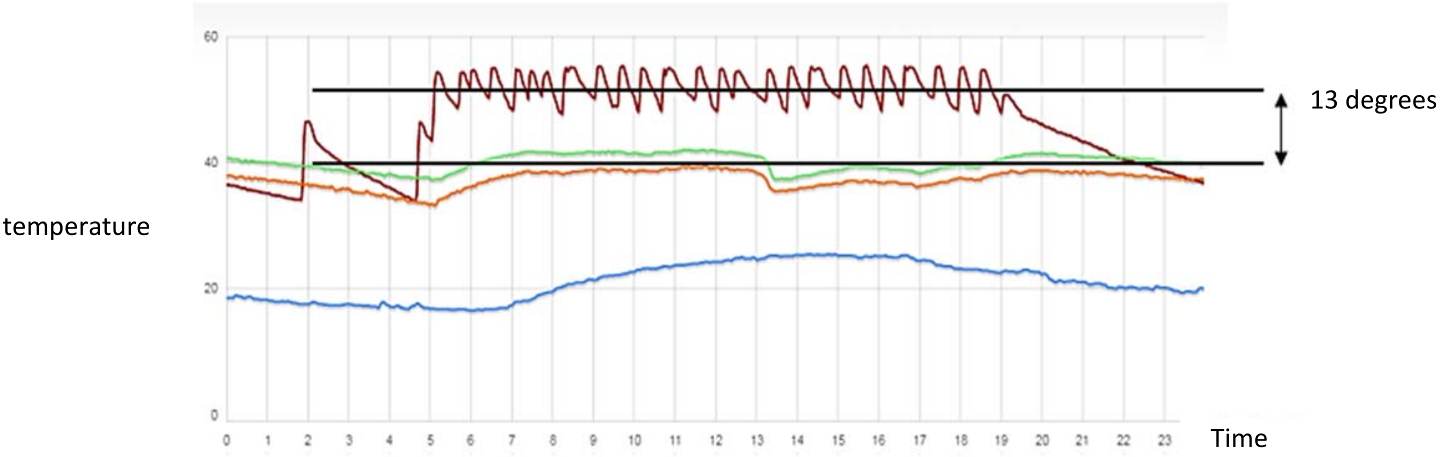


Figure 9 - Temperature difference between rotary spawning with average heating water consumption of the building

Another important suggestion: Due to the forthcoming cold season and the reduction of air temperature and insolation of hot water and other water supply routes in the engine room, it is expected that the temperature of the spa hot water in hot springs, in non-working hours, which boilers off They should be remarkable. Therefore, equipping sections 121 and the Follow-up Office with a separate water heater will be necessary to provide water for these two parts during non-working hours and holidays.

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