(8) Required Permanent Human Resources

Phase 0 (Preparation Stage)	Human Resources	Financial Cost for Human Resources
	MOWE&MOPMR No incremental staff	No incremental cost
Phase 1 (Pilot Stage)	Human Resources	Financial Cost for Human Resources
	SEEC HQ Energy management staff: 3	Standard Cost: 300,000 SR/year/person 0.3 x 5 = 1.5 million SR/year
Phase 2&3 (Final Stage 1&2)	Human Resources	Financial Resources
	SEEC HQ Energy management staff: 3 SEEC Local Offices Energy management staff: 2x2	Standard Cost: 300,000 SR/year/person 0.3 x 7 = 2.1 million SR/year

(9) Required Items

Phase 0 (Preparation Stage)	Item	Budget
	- Database soft ware (MOWE) - Internet access system to the database (MOWE) - Training for temporary energy manager (20 person)	0.3 million SR 0.1 million SR 0.2 million SR
Phase 1 (Pilot Stage)	Item	Budget
	-	-
Phase 2&3 (Final Stage 1&2)	Item	Budget
	-	-

(10) Expected Legislation for Enforcement

Phase 0 (Preparation Stage)	Items to be stipulated in Act	Relating Order/Regulation
	(Agreement between MOWE and voluntary site)	-
Phase 1-3 (for Mandatory)	Items to be stipulated in Act	Relating Order/Regulation
	Evaluation of Criteria for Business Operators	Detail of evaluation criteria (*1) is prepared by energy-consuming operators in accordance with an Announcement from the Ministry.
	Guidance and Advice	-
	Designation of Designated Energy Management Factories and Buildings	Designation (*2) is specified by a Cabinet Order.
	Energy Managers	Assignment of energy manager (*3) is specified by a Cabinet Order.
	Duty of Energy Manager	Concrete duties (*4) are specified by a Cabinet Order.
	Preparation of Medium Term Plan	Format (*5) is specified by an Announcement from the Ministry.
	Periodical Reports	Format (*6) is specified by an Announcement from the Ministry.
	Instructions and Orders on Rationalization Plans	-
	Penalty	-
	(Remark) "Qualified Energy Manager's License" is defined as "Training Program for Energy Manager"	

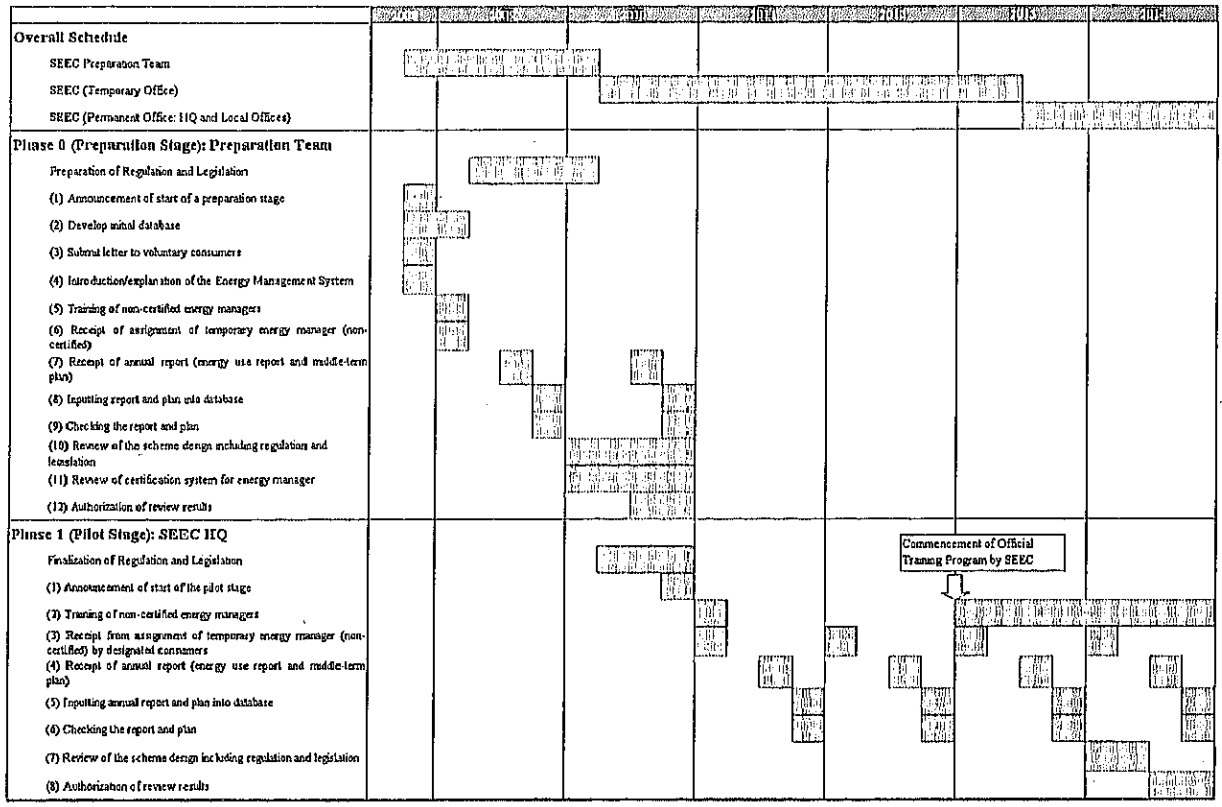
Cabinet Order: In case that decision making can be made among more than 2 ministries.
Ordinance of the Ministry: In case that decision making can be made by 1 ministry.
Announcement from the Ministry: Guideline or notification

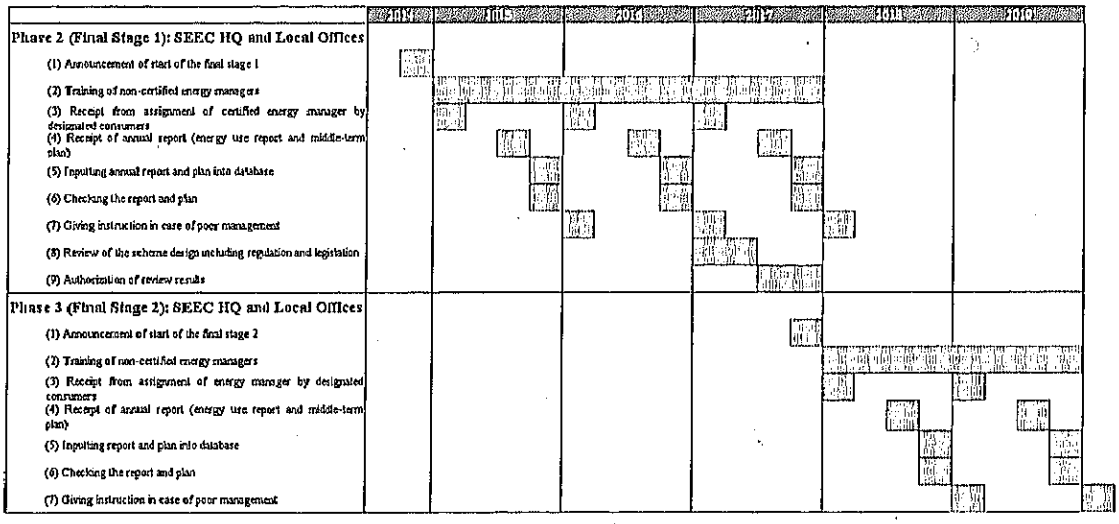
(11) Expected Action Plan

(Summary)

	Phase 0 (Preparation Stage)	Phase 1 (Pilot Stage)	Phase 2 (Final Stage 1)	Phase 3 (Final Stage 2)
	2008/10-2010/12 2+1/4 years	2011-2014 4 years	2015-2017 3 years	2018-
10 Voluntary Consumers	**Voluntary**		**Mandatory**	
Electricity and Heat for Electricity Generation		**Voluntary**	**Mandatory**	
Electricity and Heat			**Voluntary**	**Mandatory**

(Detail)


Overall Schedule
SEEC Preparation Team
SEEC (Temporary Office)
SEEC (Permanent Office: HQ and Local Offices)
Phase 0 (Preparation Stage): Preparation Team
Preparation of Regulation and Legislation
(1) Announcement of start of a preparation stage
(2) Develop mind database
(3) Submit letter to voluntary consumers
(4) Introduction/explanation of the Energy Management System
(5) Training of non-certified energy managers
(6) Receipt of assignment of temporary energy manager (non-certified)
(7) Receipt of annual report (energy use report and middle-term plan)
(8) Inputting report and plan into database
(9) Checking the report and plan
(10) Review of the scheme design including regulation and legislation
(11) Review of certification system for energy manager
(12) Authorization of review results
Phase 1 (Pilot Stage): SEEC HQ
Finalization of Regulation and Legislation
(1) Announcement of start of the pilot stage
(2) Training of non-certified energy managers
(3) Receipt from assignment of temporary energy manager (non-certified) by designated consumers
(4) Receipt of annual report (energy use report and middle-term plan)
(5) Inputting annual report and plan into database
(6) Checking the report and plan
(7) Review of the scheme design including regulation and legislation
(8) Authorization of review results
Commencement of Official Training Program by SEEC


Phase 2 (Final Stage 1): SEEC HQ and Local Offices
(1) Announcement of start of the final stage 1
(2) Training of non-certified energy managers
(3) Receipt from assignment of certified energy manager by designated consumers
(4) Receipt of annual report (energy use report and middle-term plan)
(5) Inputting annual report and plan into database
(6) Checking the report and plan
(7) Giving instruction in case of poor management
(8) Review of the scheme design including regulation and legislation
(9) Authorization of review results
Phase 3 (Final Stage 2): SEEC HQ and Local Offices
(1) Announcement of start of the final stage 2
(2) Training of non-certified energy managers
(3) Receipt from assignment of energy manager by designated consumers
(4) Receipt of annual report (energy use report and middle-term plan)
(5) Inputting report and plan into database
(6) Checking the report and plan
(7) Giving instruction in case of poor management

(12) Attachment

- Sample of Act
- Sample document of management of criteria for Business Operators" (*1)
- Sample document of "Designation of energy management factories and buildings" (*2)
- Sample document of "Assignment of energy managers" (*3)
- Sample document of "Duty of energy manager" (*4)
- Sample document of "Medium term plan" (*5)
- Sample document of "Periodical reports" (*6)
- Sample

(Others)

- Sample of management criteria prepared by each business operator
- Sample of indicators for each sub-sector in industry, and building

(13) Items to be Further Studied

- Reporting from one company with several business units or each business unit?
  - In former case, report from each business unit shall be attached.
- How to provide necessary measuring instruments, especially SMEs.
  - Government supply or self-pay by target site
- Clarification of Penalty under mandatory program: Is penalty charge necessary?

Attachment 1-1. Samples

Sample of Act

Item	Contents	Remark
Article 1 Evaluation of Criteria for Business Operators	(1) The competent Minister shall establish and publicize evaluation criteria by the Announcement from the competent Ministry*1 with regard to the following matter as well as the targets for rational use of energy and the measures to be taken systematically to achieve such targets. • Rationalization of combustion of fuels, • Rationalization of heating and cooling as well as heat transfer, • Recovery and utilization of waste heat, • Rationalization of conversion of heat into power, etc., • Prevention of Energy loss due to emission, conduction, resistance, etc., • Rationalization of conversion of electricity into power, heat, etc.	This item stipulates that the competent Minister shall establish the target fields and the guidance for rational use by the Announcement from the competent Ministry.
	(2) The standards of judgment prescribed in the preceding paragraph shall be established by taking into consideration long-term energy supply-demand forecasts, the technical level related to the rational use of energy, and other circumstances, and shall be revised if necessary depending on any changes in these circumstances.	This item stipulates that the evaluation criteria shall be revised considering energy situation and technology evolution.
Article 2 Guidance and Advice	In order to ensure the proper implementation of the rational use, the competent Minister may provide business operators with necessary guidance and advice by taking into consideration the standards of judgment prescribed in the Article 1.	This item stipulates that the power to correct improper implementation is given to the Minister. Judgment can be done by the Minister by the prescribed standard.
Article 3 Designation of Designated Energy Management Factories and Buildings	(1) The competent Minister shall designate Factories and Buildings with respect to which energy consumption for a given business year is beyond the level specified by a Cabinet Order*2, as Factories and Buildings for which the promotion of the rational use of energy is required.	This item provides the definition of the designated Factories and Buildings specified by a Cabinet Order.

Item	Contents	Remark
Article 3 (continued)	(2) A business operator that has a Factory and Building shall, where energy consumption at the Factory and Building and for the previous business year, as calculated pursuant to the provision of a Cabinet Order mentioned in the preceding paragraph, is beyond the level specified by a Cabinet Order mentioned in the same paragraph, notify the competent Minister of the matters concerning the energy use situation at the Factory and Building.	This item stipulates an obligation of reporting by designated each Factory and Building using common format and calculation rule specified by the Ordinance of the competent Ministry.
Article 4 Energy Managers	(1) Designated Factory and Building Operator shall, pursuant to the provision of an Ordinance of the competent Ministry, appoint Energy Manager(s)*3 for each of its Designated Energy Management Factories from among persons who have a qualified Energy manager's license. (2) Designated Factory and Building Operator shall notify the competent Minister of the appointment, death or dismissal of the Energy Manager.	This item stipulates how to appoint Energy Manager(s) in designated Factory and Building, specified by the Ordinance of the competent Ministry. This item stipulates notification obligation.
Article 5 Duty of Energy Managers	Energy Managers shall, with regard to the rational use of Energy in designated Factories and Buildings, manage the maintenance of Energy-consuming facilities, the improvement and supervision of methods for using energy, and other affairs specified by an Ordinance of the competent Ministry.*4	This item stipulates duty of Energy Managers, specified by the Ordinance of the competent Ministry.

Item	Contents	Remark
Article 6 Preparation of Medium Term Plan	(1) Designated Factory and Building Operator shall, pursuant to the provision of an Ordinance of the competent Ministry, prepare each business year a medium- and long-term plan for achieving the targets for the rational use of energy that are specified for designated Factories and Buildings in the standards of judgment prescribed in Article 1, paragraph (1), and submit the plan to the competent Minister.	This item stipulates preparation of medium and long term plan according to standards of judgment, and submission.
	(2) Designated Business Operator that has appointed an Energy Manager, shall, when preparing a medium term plan pursuant to the preceding paragraph, have a person who has a qualified Energy manager's license participate in the planning process.	This item stipulates that a licensed Energy Manager has to participate in the planning process of the medium term plan.
	(3) The competent Minister may develop necessary guidelines for contributing to Designated Business Operators' efforts to properly prepare plans set forth in paragraph (1). The competent minister shall, when having developed guidelines set forth in the preceding paragraph, publicize them, by the Announcement from the competent Minister.*5	This item stipulates that the competent Minister develop a guideline for preparation of plans and publicize it.

Item	Contents	Remark
Article 7 Periodical Reports	(1) A designated Business Operator shall report to the competent Minister each business year the matters specified by an Ordinance of the competent Ministry*6 with regard to the energy consumption and other status of energy use in the designated Factories and Buildings (including the matters concerning efficiency in energy use and CO2 emissions from energy use) as well as the status of establishment, modification and abolition of energy-consuming facilities and other facilities relating to the rational use of energy.	This item stipulates that designated Business Operator shall report energy consumption and other status data specified by an Ordinance of the competent Ministry.
	(2) Designated Business Operator that has appointed an Energy Manager, shall, when preparing a periodical report, pursuant to the preceding paragraph, have a person who has a qualified Energy manager's license participate in the making report process.	This item stipulates that a licensed Energy Manager has to participate in the making process of the periodical report.
Article 8 Instructions and Orders on Rationalization Plans	(1) The competent Minister may, when he finds that the status of the rational use of energy in a designated Factory and Building is significantly insufficient in light of the standards of judgment prescribed in Article 1, paragraph (1), instruct the designated Business Operator pertaining to the designated Factory and Building to prepare and submit a plan on the rational use of energy (hereinafter referred to as a "Rationalization Plan"), while presenting the grounds for his judgment.	The competent Minister can instruct a designated Factory and Building who is significantly insufficient in light of the standards of judgment. The competent Ministry can instruct to prepare and submit an additional plan (Rationalization Plan) to improve the performance.

Item	Contents	Remark
Article 8 (continued)	(2) The competent Minister may, when he finds the Rationalization Plan to be inappropriate for the proper implementation of the rational use of energy in the designated Factory and Building, instruct the designated Business Operator to revise the Rationalization Plan. (3) The competent Minister may, when he finds that a designated Business Operator does not implement a Rationalization Plan, instruct the designated Business Operator to properly implement the Rationalization Plan. (4) Where a designated Business Operator that has received instructions prescribed in the preceding three paragraphs has failed to follow the instructions, the competent Minister may publicize this.	This item is more strict instruction for a Business Operator who submit an inappropriate Rationalization Plan This item is also more strict instruction to properly implement the Rationalization Plan. This item is a kind of penalty.
Article 9 Penalty	A person who falls under any of the following items shall be punished by a fine of not more than ## Saudi Riyal. • A person who has violated an order issued under Article 4 (1) and Article 8 (3).	This is penalty clause when a Factory or Building does not appoint Energy Manager properly, and fails to follow the Minister's instructions.

Sample document of management of criteria for Business Operators

* Business Operator should establish actual management criteria in the following manners;

Management	● Operation pattern, points to keep in mind
	● Bundled requirement for similar equip
	● Follows description in "Standards of Judgment
	● Setup of managerial and standard value
	● Specify control concept/feature for automatic/computer control
Measurement & record	● Periodical check with managerial/standard value
	● Periodical output of measurements even in automatic/computer control
Maintenance & inspection	● Procedure and points
	● Periodical
	● Bookkeeping

Sample document of "Designation of energy management factories and buildings"

Annual energy consumption	Factory and businesses and their owner	
Fuel (Heat) + Electricity	• All industry	• Buildings e.g. office buildings, department stores, hotels, schools, hospitals, governmental offices and amusement parks • Head office and office building of the left listed industries

Not less than 3,000kL (equivalent to 12 GWh)

Sample document of "Assignment of energy managers"

Coke production, power producer, gas supplier and heat supplier	
< 100,000 kl [400 GWh] in crude oil equivalent or larger	One
>= 100,000 kl [400 GWh] in crude oil equivalent or larger	Two

Other factory and business place	
< 20,000 kl [80 GWh] in crude oil equivalent or larger	One
< 50,000 kl [200 GWh] in crude oil equivalent or larger	Two
< 100,000 kl [400 GWh] in crude oil equivalent or larger	Three
>= 100,000 kl [400 GWh] in crude oil equivalent or larger	Four

Sample document of "Duty of energy manager"

No	Category	Energy Manager's tasks	Examples of documents to be drafted
1	Energy-saving fundamental policies	Gives assistance when drafting the energy-saving fundamental policy. Calculates necessary investments/costs based on the fundamental policy.	Energy-saving fundamental policy and budget document
2	Energy-saving promotion framework	Develops an energy-saving promotion organization plan, and decides on the energy-saving promotion organization framework after oordination with the employer and department heads. Periodically convenes meetings of the energy-saving promotion committee, and acts as the committee's secretariat.	Energy-saving promotion organization chart
3	Management standards	Develops the mandatory management standards as stipulated in the legally established criteria, prepares other management standards necessary for his/her company, and also designates the department responsible for the management criteria. When preparing the management criteria, the energy manager should act as the coordinator and provide related departments with necessary information on the basic philosophy, the format, the responsible department and the deadline.	Management standards drafting Management tandards, etc.
4	Identifying actual energy consumption	Investigates actual energy consumption, and makes out the basic units management chart.	Basic units anagement chart, etc.
5	Energy-saving plan and target setting	Designates the energy-saving tasks for the entire company and for each department once a year, and quantitatively sets out applicable targets.	Energy-saving plan
6	Education and prize-giving for employees	Educates employees on an entire company basis as well as on an each department basis. Works with the employer to establish a prize-giving scheme that honors a department or worker that contributes to energy conservation.	Education plan table
7	Periodic internal reporting on energy-saving efforts	Reports energy-saving efforts to the employer and each department on a monthly and yearly basis by using the energy basic units management chart.	
8	Improvements in energy-saving efforts	Develops an improvement plan (e.g., company-level energy-saving efforts and facility enhancement) after hearing opinions from related departments. Drafts a workplace-level improvement plan after hearing opinions from related departments.	Energy-saving improvement plan
9	Procedures/reporting scheme in accordance with Energy Conservation Law	• Drafts the periodic report • Prepares a preliminary draft of the medium-to-long term plan.	Periodic report Medium-to-long term plan
10	Self-development by energy managers	Remains informed of state-of-the-art technologies and other firm's best practices.	

Sample document of "Medium term plan"

Form No. 9 (related to Article XXX)

* Date received	
* Date processed	

Medium Term Plan

To:

Year Month Day

Address:

Name: Signed/stamped

This report is created according to Clause YYY, Article ZZZ of Law concerning the Rational Use of Energy (including application of Clause VVV, Article WWW of the same law) as follows:

Registered Number of Energy Management Designated Factory	
Registered Number of Designated Emission Factory	
Name of factory	
Address of factory	Phone: (— —) FAX: (— —)
Business type of factory	
Responsible document creator	
Registered license number of Qualified Energy Manager or number of Workshop Certificate of the responsible document creator	

Sample document of "Periodical reports"

Form No. 9 (related to Article XXX)

* Date received	
* Date processed	

Periodical Report

To:

Year Month Day

Address:

Name: Signed/stamped

This report is created according to Clause YYY, Article ZZZ of Law concerning the Rational Use of Energy (including application of Clause VVV, Article WWW of the same law) as follows:

Registered Number of Energy Management Designated Factory								
Registered Number of Designated Emission Factory								
Name of factory								
Address of factory	Phone: (– –) FAX: (– –)							
Business type of factory								
Responsible document creator								
Registered license number of Qualified Energy Manager or number of Workshop Certificate of the responsible document creator								

Attachment 1-2. Others

Sample of management criteria prepared by each business operator

	Item			Management Criteria	Note
Operation and mgmt	Mgmt of operation time, room temp and # of ventilation				
	Operation schedule of AC	AC		Ref to op schedule	
		Ventilation		Ref to op schedule	
				Request by phone	Received by CCR
		Overtime hour		Basically FCU	For less power, less area
	Room temp and humidity	Office	Temp	Summer: 28 degree C	Gov. recommendation
				Winter: 20 degree C	Gov. recommendation
				Others: 20-28 degree C	By outside air
			Humidity	Summer: Leave it to nature	No humidity control
				Winter: > 40%	Building mgmt law
				Others: Leave it to nature	No humidity control
			CO2 density	800 – 1000 ppm	Target
		Machine room	Temp	AC inspection table	
	Remarks	•In principle, government recommendation is used. But, it is tried not to exceed value specified building mgmt law (17 – 28 degree C) in all AC area. (Confirmation required by checking monitor display of CCR. •Moderation of room temperature: On request of room temp moderation, after checking room temp by monitor display of CCR and confirming its validity, moderation should by made, less than 27 degree C in summer and 22 degree C in winter as a guide.			
Measurement & record	Figure out condition of temp and etc.				
	Office room	Temp		Once a week, once a hour	Measure at each floor, AC daily report
		Humidity		Once a week	Measure at each floor
		CO2 density		Once two months	Environment & sanitation report
		Temp		Once a hour	AC daily report
		Humidity		Once a hour	AC daily report
		CO2 density		Once a week	AC equip inspection table
	Machine room	General system (upper & lower tier)		Once a hour	Daily load report
	Load at secondary side	Central system (upper & lower tier)		Once a hour	Daily load report
		Hot Water (upper & gen lower tier)		Once a hour	Daily load report
		TR-1,2,3 at underground S/S		Once a hour	Daily load report
	Remarks	•Temp and humidity can be monitored on monitor console in CCR always.			
Maintenance & inspection	Maintain good condition of automatic control system Periodical inspection of temp and humidity sensor			Once a year	
	Remarks				

I. Period of plan

2008 – 2012 KSA fiscal year

II. Content of plan and expected results by rationalization of energy use

Process	Content of plan	Expected results of rationalization of energy use
Co-generation system		
AC		
Lighting		
Process		
Drive power for delivery		

III. Content of plan and expected results by measures on peak shift/cut

Process	Content of plan	Expected results by measures on peak shift/cut
Factory operation		
Schedule of maintenance work		
Thermal storage system		

IV. Comparison with plan of previous year of energy rationalization

Process	Deleted plan	Reason
Co-generation system		
AC		
Lighting		
Process		
Drive power for delivery		

V. Comparison with plan of previous year of peak shift/cut

Process	Deleted plan	Reason
Factory operation		
Schedule of maintenance work		
Thermal storage system		

Sample of indicators for each sub-sector in industry and building

- kWh/m2/y (for building, shopping mall, hospital, ...)
- kWh/barrel/y (for refinery)
- kWh/ton/y (for steel maker, cement, ...)
- kWh/shipping volume/y
- kWh/sales/y

2. Energy Efficiency Labels and Standards (EELS)

(1) Program Name

Energy Efficiency Labels and Standards (EELS)

(2) Objective

- Promotion of supply of high efficiency appliances to the market
- Raising energy conservation awareness of customers

(3) Outline of the Scheme and Each Phase

Overall Scheme	Contents	
	- Test of local/import product in accordance with SASO standard - Sending local/import product information to SASO - Registration of performance data - Display of performance data at retail shops - Making database - Random inspection - Monitoring and awareness survey	
Phase 1 (Pilot Stage)	Task	Responsible Agency
	(1) Making and updating performance standard and test method	SASO
	(2) Authorization of laboratories for performance test	SASO
	(3) Sending local/import product information to SASO periodically	M&Is
	(4) Request of registration of performance data to Manufactures and Importers	SASO
	(5) Registration of performance data obtained from M&Is	SASO
	(6) Request of display of label sheet to retail shops	SASO
	(7) Making database and publication (booklet and internet)	SASO
	(8) Printing label sheet with performance data and putting it on product by M&Is	M&Is
	(9) Monitoring and awareness survey to be improved	SASO
	(10) Dissemination with campaign	SASO
Phase 2 (Final Stage)	Task	Responsible Agency
	(To be added to Phase 1)	
	(1) Enforcement of registration of performance data to M&Is	SASO/SEEC
	(2) Enforcement of display of label sheet to retail shops	SASO/SEEC
	(3) Random inspection of labeled performance data	SASO/SEEC
	(4) Random inspection to retail shops to confirm compliance	SASO/SEEC

(4) Executing Agency

Name of Agency	Saudi Arabian Standards Organization (SASO)
Expected Role	- Making and updating performance standard and test method - Authorization of laboratories for performance test - Request of registration of performance data to M&Is - Registration of performance data obtained from M&Is - Request of display of label sheet to retail shops - Making database and publication (booklet and internet) - Monitoring and awareness - Dissemination with campaign
Name of Agency	Saudi Energy Efficiency Center (SEEC)
Expected Role	- Enforcement of registration of performance data to M&Is - Enforcement of display of label sheet by retail shops - Dissemination with campaign (transferred from SASO task) - Random inspection of labeled performance data - Random inspection to retail shops to confirm compliance - Monitoring and awareness (transferred from SASO task)
Name of Agency	Ministry of Commerce and Industry (MOCI)
Expected Role	- Establishment of law to be mandatory (inspection, penalty and instruction, etc.)

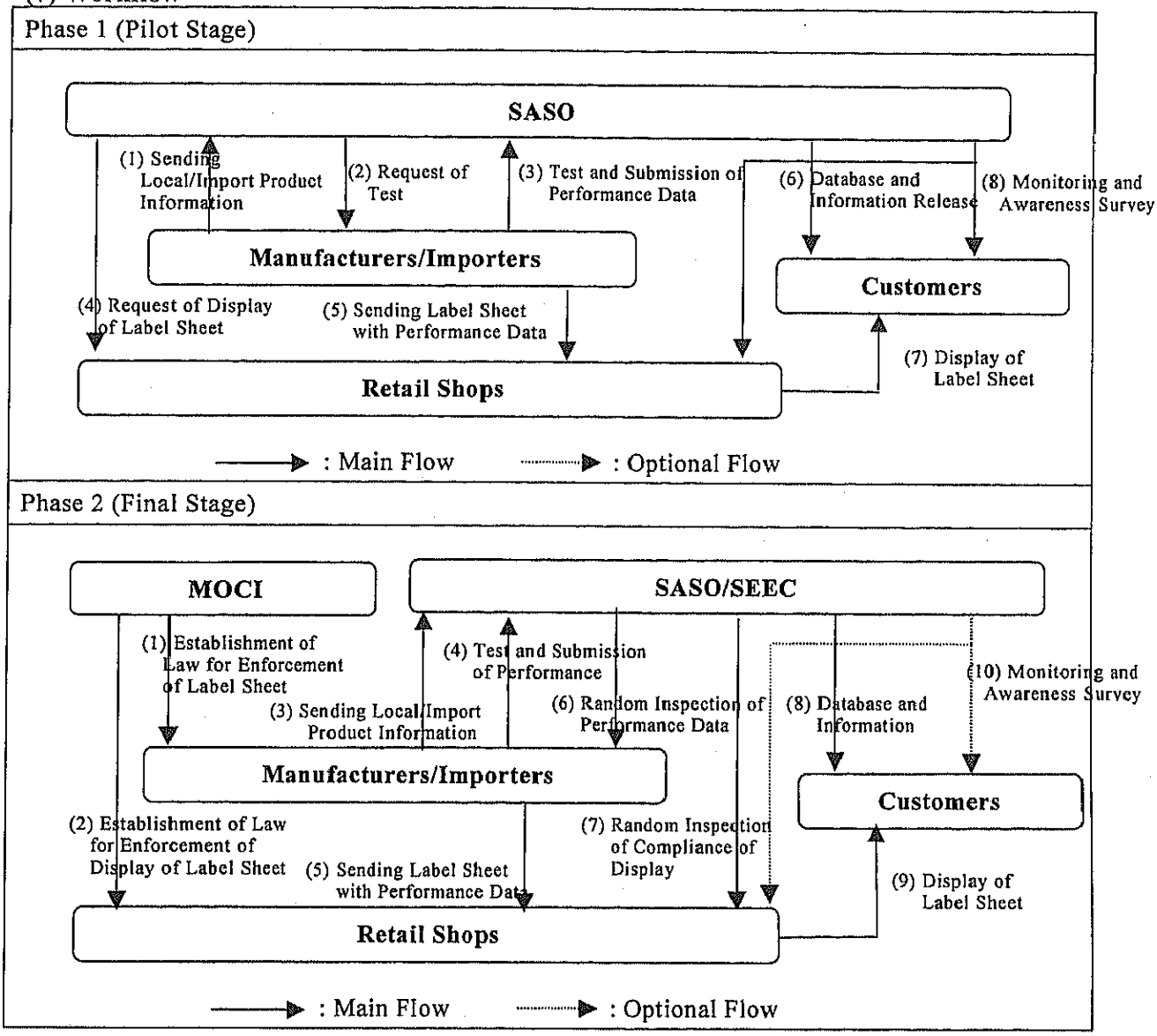
(5) Relating Agency

Name of Agency	Ministry of Water and Electricity (MOWE) and SEC
Expected Role	- Dissemination in cooperation with SASO and SEEC

(6) Target of the Scheme

Name of Target	Manufacturers and Importers (M&Is) of AC, Washing Machine, Refrigerator and Freezer
Expected Action	- Sending import product information to SASO periodically - Testing performance of designated products in accordance with SASO standard in authorized laboratories - Printing label sheet with performance data and putting it on product
Name of Target	Retail Shops selling AC, Washing Machine, Refrigerator, and Freezer
Expected Action	- Display of label sheet in shops

(7) Workflow



(8) Required Permanent Human Resources

Phase 1 (Pilot Stage)	Human Resources	Financial Cost for Human Resources
	<u>SASO New Department</u> Registration: 2 Dissemination and publication: 2 Database engineer: 1	Standard Cost: 300,000 SR/year/person 0.3 x 5 = 1.5 million SR/year
Phase 2 (Final Stage)	Human Resources	Financial Resources
	SEEC Inspection: 1 Dissemination and publication: 1	Standard Cost: 300,000 SR/year/person 0.3 x 2 =0.6 million SR/year
	<u>SASO New Department</u> Registration: 1 Database engineer: 1 Some of SASO tasks might be transferred to SEEC.	Standard Cost: 300,000 SR/year/person 0.3 x 2 =0.6 million SR/year

(9) Required Items

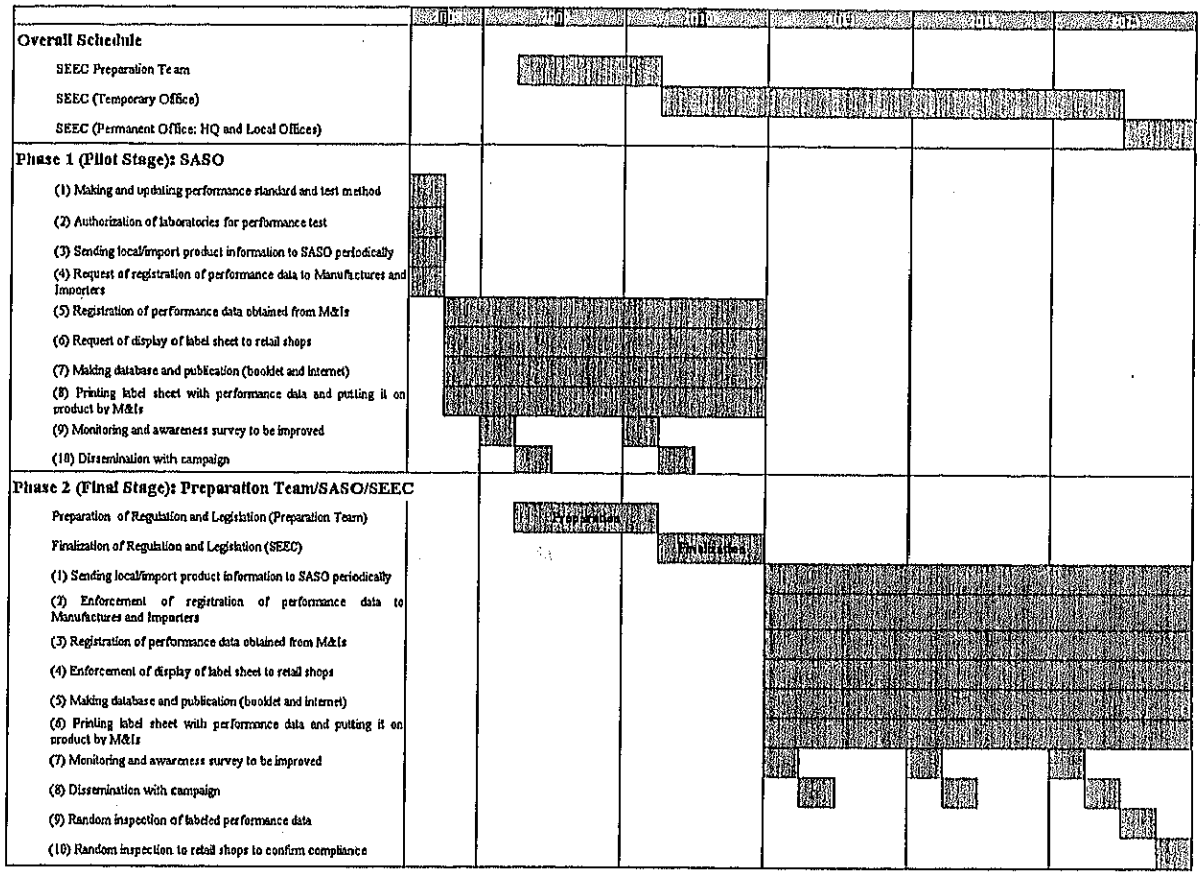
Phase 1 (Pilot Stage)	Item	Budget
	- Database soft ware (SASO) - Internet access system to the database (SASO)	0.3 million SR/time 0.1 million SR/time
Phase 2 (Final Stage)	Item	Budget
	- Testing cost for random inspection of performance data (SEEC)	180,000 SR/year (=60,000 SR x 3 times) AC: 30,000 Washing M: 10,000 Ref&Fre: 10,000 x 2

(10) Expected Legislation for Enforcement

Phase 1 (Pilot Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 2 (Final Stage)	Items to be stipulated in Act	Relating Order/Regulation
	Role of Manufacturers and Importers	-
	Standards of Judgment for Manufacturers /Importers and Registration of the Performance	(1) Designated machinery and equipment is specified by a Cabinet Order. (to be prepared by SASO or MOCI) (2) Standards of judgment for each machinery and equipment is specified by an Ordinance of the Ministry. (to be prepared by SASO or MOCI) (3) Designated agency to register the performance is appointed by an Announcement from the Minister. (to be prepared by MOCI)
	Recommendation and Orders concerning Improvement of Performance	Manufacturer/Importer to be recommended is specified by a Cabinet Order. (to be prepared by SASO or MOCI)
	Labeling and Obligation to Manufacturers /Importers	The labeling method to be taken by Manufacturers /Importers is specified by an Announcement from the Ministry. (to be prepared by SASO or MOCI)
	Recommendation and Orders concerning Labeling	-
	Provision of Information to General Consumers	-
	Penalty	-

Cabinet Order: In case that decision-making can be made between more than 2 ministries.
Ordinance of the Ministry: In case 1 ministry can make that decision-making
Announcement from the Ministry: Guideline or notification

(11) Expected Action Plan



(12) Attachment

(Act and Relating Documents to Act to be established)

- Sample of Act (Order and Regulation have been already prepared by SASO)

(Others)

- Japan's sample database form for designated machinery and equipments (booklet and internet)

Attachment 2-1. Act and Relating Documents to Act to be established

- Sample of Act (Order and Regulation have been already prepared by SASO)

Item	Contents	Remark
Article 1 Role of Manufacturers and Importers	Business operators engaged in manufacturing or importing energy-consuming machinery and equipment hereinafter referred to as "Manufacturers/Importers" shall endeavor to contribute to the rational use of energy for machinery and equipment that they manufacture or import, by improving the performance of machinery and equipment in light of energy consumption.	This item stipulates that all business operators engaged in manufacturing or importing energy-consuming machinery and equipment shall endeavor to improve the performance of machinery and equipment.
Article 2 Standards of Judgment for Manufacturers /Importers and Registration of the Performance	(1) With respect to energy-consuming machinery and equipment that is heavily used in Saudi Arabia and consumes a considerable amount of energy, which is specified by a Cabinet Order*1 in the respect that it is particularly necessary to improve the performance thereof hereinafter referred to as "Specified Equipment", the competent Minister shall establish and publicize standards of judgment, specified by an Ordinance of the Ministry*2, for Manufacturers/Importers, with regard to the improvement of the performance for the respective Specified Equipment.	This item stipulates that designated machinery and equipment is specified by a Cabinet Order. The standards of judgment is specified by the competent Ministry. The standards of judgment stipulates the performance data to be indicated, the test methods, and the lowest level of the performance (minimum standard level).
	(2) The standards of judgment prescribed in the preceding paragraph shall be established by taking into consideration the lowest level of the performance as prescribed in the preceding Article for the respective Specific Equipment.	This item stipulates the minimum standard level of the Specific Equipment.
	(3) The Manufacturers/Importers shall send the performance of Specific Equipment to a designated agency appointed by the competent Minister*3.	This item stipulates an obligation of sending the performance data to a designated agency.

Item	Contents	Remark
Article 3 Recommendation and Orders concerning Improvement of Performance	(1) The competent Minister may, when he finds it necessary for a Manufacturer/Importer whose production or import volume of Specified Equipment satisfies the requirements specified by a Cabinet Order*4 to improve the performance prescribed in Article 1, with respect to the Specified Equipment that the Manufacturer/Importer manufactures or imports, to a considerable extent in light of the standards of judgment prescribed in paragraph (1) of the preceding Article, recommend the Manufacturer/Importer to improve the performance of the manufactured or imported Specified Equipment, setting targets for improvement.	This item specifies manufacturers and importers who shall comply with this Act, by a Cabinet Order. Besides the competent Minister can recommend to improve the performance when necessary.
	(2) Where a Manufacturer/Importer that has received recommendations made under the preceding paragraph has failed to follow the recommendations, the competent Minister may publicize this.	This item is a kind of penalty.
	(3) Where a Manufacturer/Importer that has received recommendations prescribed in paragraph (1) has failed to take the measures recommended without justifiable grounds, the competent Minister may, when he finds that such failure significantly affects the rational use of energy for the Specified Equipment, order the Manufacturer/Importer to take the measures recommended.	This item is stronger treatment for Manufacture /Importers who has failed to take the measures recommended without justifiable grounds even after the above recommendation.

Item	Contents	Remark
Article 4 Labeling and Obligation to Manufacturers /Importers	The competent Minister shall specify the following matters for the respective Specified Equipment*5, and make public notice of them. • Matters to be indicated in labels by Manufacturers/Importers with regard to energy efficiency of Specified Equipment the value calculated pursuant to the provision of an Ordinance of the Ministry. • The labeling method and other matters to be observed by Manufacturers/Importers when indicating energy efficiency.	This item stipulates the labeling method for Specific Equipment, specified by an Announcement from the Ministry. Besides, it stipulates the labeling obligation to the Manufacturers/Importers.
Article 5 Recommendation and Orders concerning Labeling	(1) The competent Minister, when he finds that a Manufacturer/Importer does not affix labels indicating energy efficiency in accordance with the public notice made under the preceding Article with respect to Specified Equipment, recommend the Manufacturer/Importer to affix labels indicating energy efficiency, in accordance with the public notice, to the manufactured or imported Specified Equipment.	The competent Minister can recommend a Manufacturer/ Importer to affix labels indicating energy efficiency when necessary.
	(2) Where a Manufacturer/Importer that has received recommendations made under the preceding paragraph has failed to follow the recommendations, the competent Minister may publicize this.	This item is a kind of penalty.
	(3) Where a Manufacturer/Importer that has received recommendations prescribed in paragraph (1) has failed to take the measures recommended without justifiable grounds, the competent Minister may, when he finds that such failure significantly affects the rational use of energy for the Specified Equipment, order the Manufacturer/Importer to take the measures recommended.	This item is stronger treatment for Manufacturers /Importers who has failed to take the measures recommended without justifiable grounds even after the above recommendation.

Item	Contents	Remark
Article 6 Provision of Information to General Consumers	Business operators engaged in retailing energy-consuming machinery and equipment, and other business operators capable of cooperating, through their business activities, in general consumers' efforts towards the rational use of energy shall endeavor to provide information that contributes to general consumers' efforts towards the rational use of energy, by making notifications on the status of energy use by consumers and indicating the performance of machinery and equipment in light of energy consumption.	This item stipulates that retail shops shall endeavor to provide information.
Article 7 Penalty	A person who falls under any of the following items shall be punished by a fine of not more than ## Saudi Riyal. • A person who has violated an order issued under Article 3 (3) and Article 5 (3).	This is penalty clause when a Manufacturer/Importer does not improve even after recommendation and order of the Minister.

***1 Energy-consuming machinery and equipment (Cabinet Order)**

To be prepared by SASO or MOCI

***2 Standards of judgment (Ordinance of the Ministry)**

To be prepared by SASO or MOCI

***3 A designated agency appointed by the competent Minister (Announcement from the Ministry)**

To be announced by a competent Ministry

***4 Production or import volume of Specified Equipment satisfies the requirements (Cabinet Order)**

To be prepared by SASO or MOCI

***5 Matters for the respective Specified Equipment (Announcement from the Ministry)**

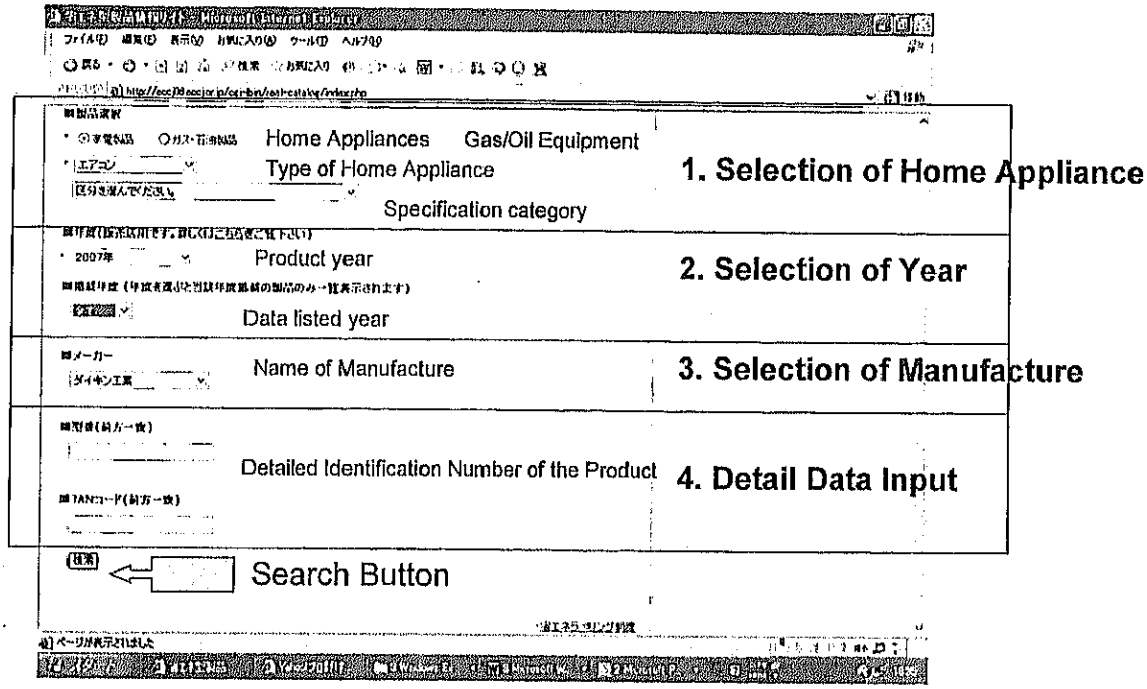
To be formulated by SASO or MOCI

Attachment 2-2. Others

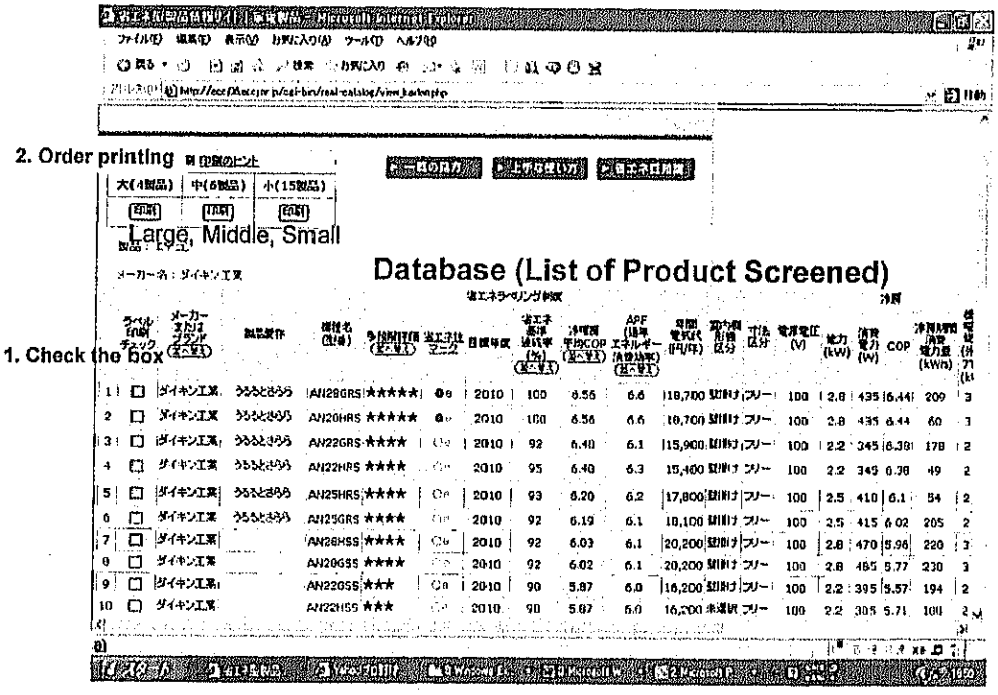
Japan's sample database form for designated machinery and equipments (booklet and Internet)

(1) Internet Access Database (Printing System in End-User's Computer)

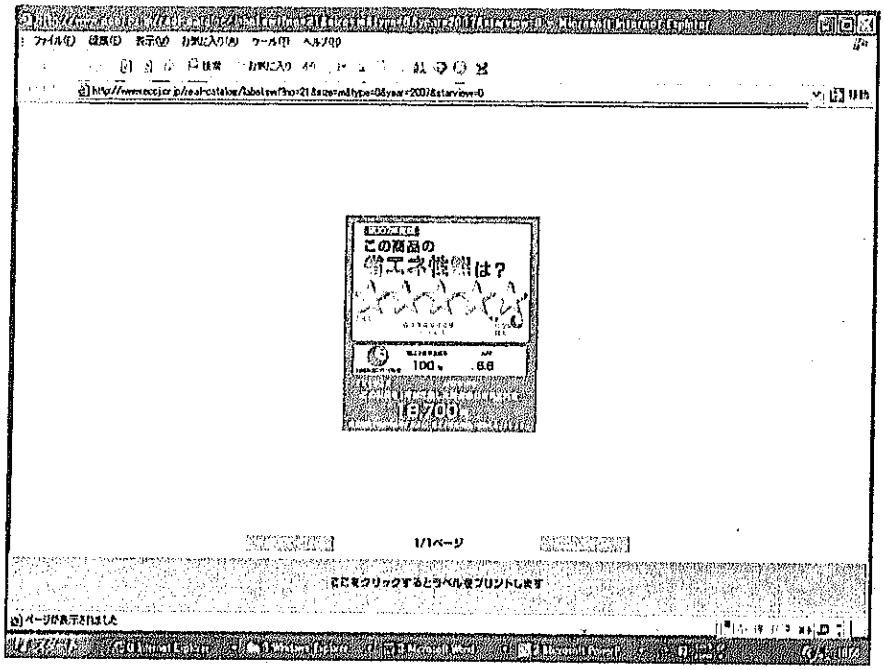
(a) Input Data for Searching



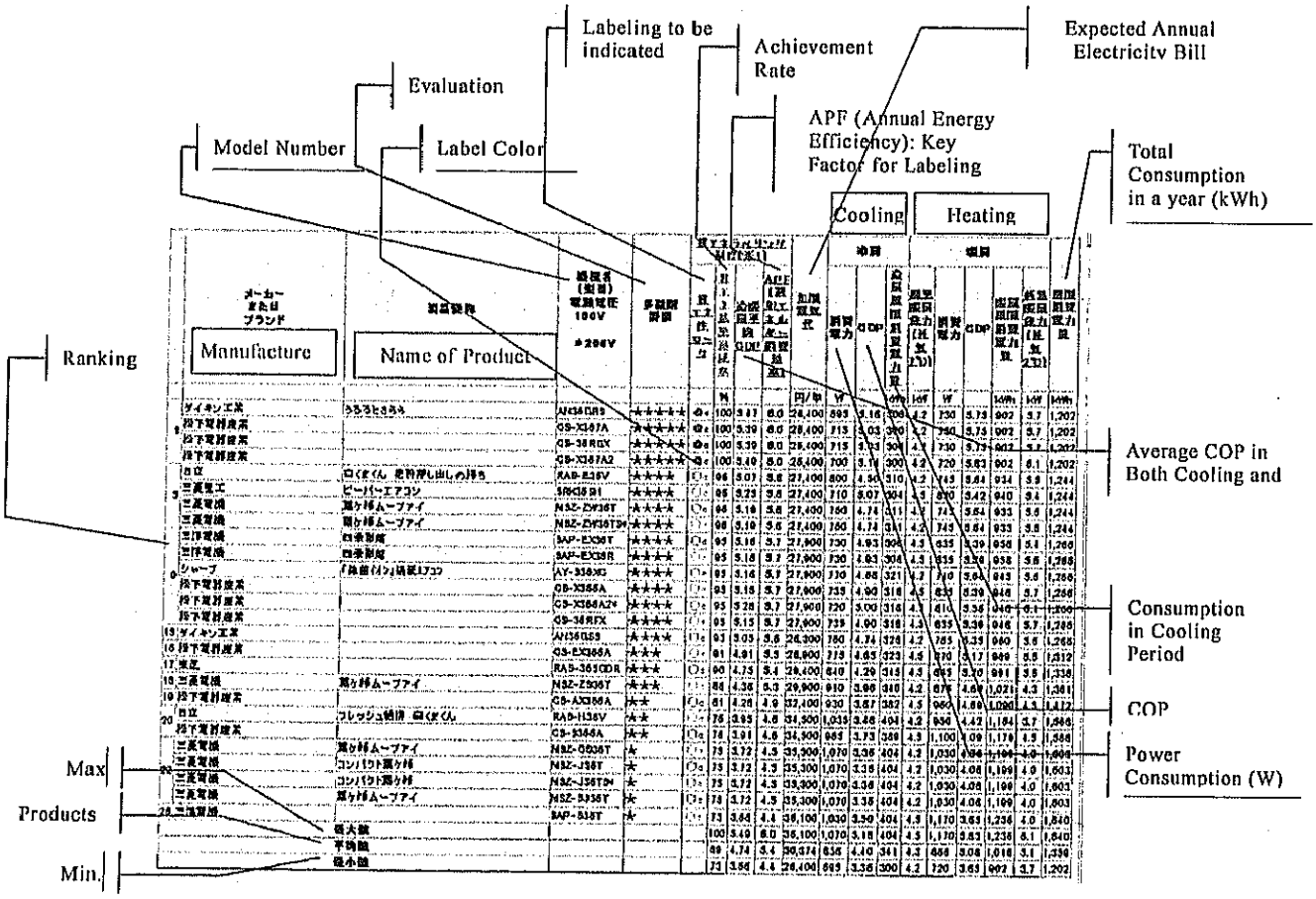
(b) Selection of Printing Label



(c) Confirmation of Label Sheet and Printing



(2) Booklet Database (in case of AC 3.6kW Class)



Class name: Cooling Capacity 3.6 kW and Free Dimension

3. Training Program for Energy Manager (TPEM)

(1) Program Name

Training Program for Energy Manager (TPEM)

(2) Objective

- Qualifying Energy Managers in line with the Energy Management System (EMS)
- Improving technical level on energy conservation in factories and/or buildings
- Promoting basic understanding of legislation regarding energy conservation

(3) Outline of the Scheme and Each Phase

Overall Scheme	Contents	
	- Dissemination of the training programs in line with EMS - Preparation of training materials - Making arrangements and implementation of free training programs (at pilot stage) - Making arrangements and implementation of chargeable training including hands-on practice (at final stage) - Issuing Qualified Energy Manager's license	
Phase 0 (Preparation Stage)	Task	Responsible Agency
	(1) Formulating 4 training programs; i.e. Energy Manager qualification training, electrical EC technology training, heat EC, technology training and AC maintenance training	MOWE
	(2) Sourcing and registration of instructors	MOWE
	(3) Execution of Training of Teacher (TOT)	Relating Agency
	(4) Formulating the energy manager certification system	MOWE
	(5) Dissemination of the training programs in line with EMS	MOWE
Phase 1 (Pilot Stage)	Task	Responsible Agency
	(1) Establishment of energy conservation training center in SEEC HQ	SEEC
	(2) Preparation of training materials	SEEC
	(3) Making arrangements for free training programs	SEEC
	(4) Implementation of free training programs	SEEC
	(5) Issuing Qualified Energy Manager's license	SEEC
	(6) Dissemination of the mandatory EMS	SEEC
	(7) Plan, design and construction of facilities for hands-on practice training	SEEC

Phase 2 (Final Stage)	Task	Responsible Agency
	(To be added to Phase 1) (1) Establishment of EC training center in SEEC local offices (2) Making arrangements for chargeable training including hands-on practice (3) Implementation of chargeable training (4) Issuing Qualified Energy Manager's license	 SEEC SEEC SEEC SEEC

(4) Executing Agency

Name of Agency	Ministry of Water and Electricity (MOWE) as Preparation Team
Expected Role	**(Preparation Stage)** - Formulating 4 training programs; i.e. Energy Manager qualification training, electrical EC technology training, heat EC, technology training and AC maintenance training - Establishment of EC training center(s) - Plan and Execution of TOT - Formulating the Energy Manager certification system - Dissemination of the training programs in line with EMS
Name of Agency	Saudi Energy Efficiency Center (SEEC)
Expected Role	**(Pilot and Final Stage)** - Preparation of training materials - Plan, design and construction of facilities for hands-on practice training - Making arrangements and implementation of free training programs (at pilot stage) - Making arrangements and implementation of chargeable training programs including hands-on practice (at final stage) - Issuing Qualified Energy Managers' licenses in accordance with the procedure to be stipulated in the EC Act.

(5) Relating Agency

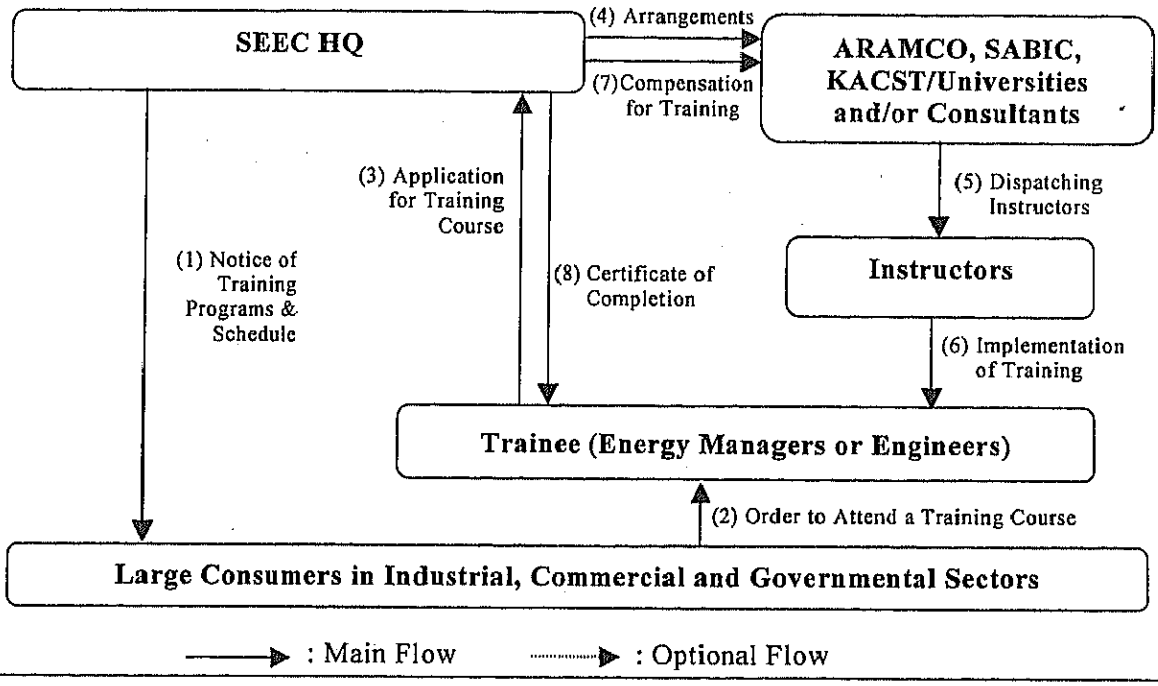
Name of Agency	ARAMCO, SABIC, KACST, Universities, and Consultation service companies
Expected Role	- Sourcing and registration of instructors - Implementation of free training programs - Implementation of chargeable training programs
Name of Agency	TVTC (former GOTEVOT)
Expected Role	- Working out a plan for establishing school(s) for industrial EC and/or building EC in cooperation with SEEC
Name of Agency	Saudi Council of Engineers (SCE)
Expected Role	- Coordinating in formulating the Energy Manager certification system

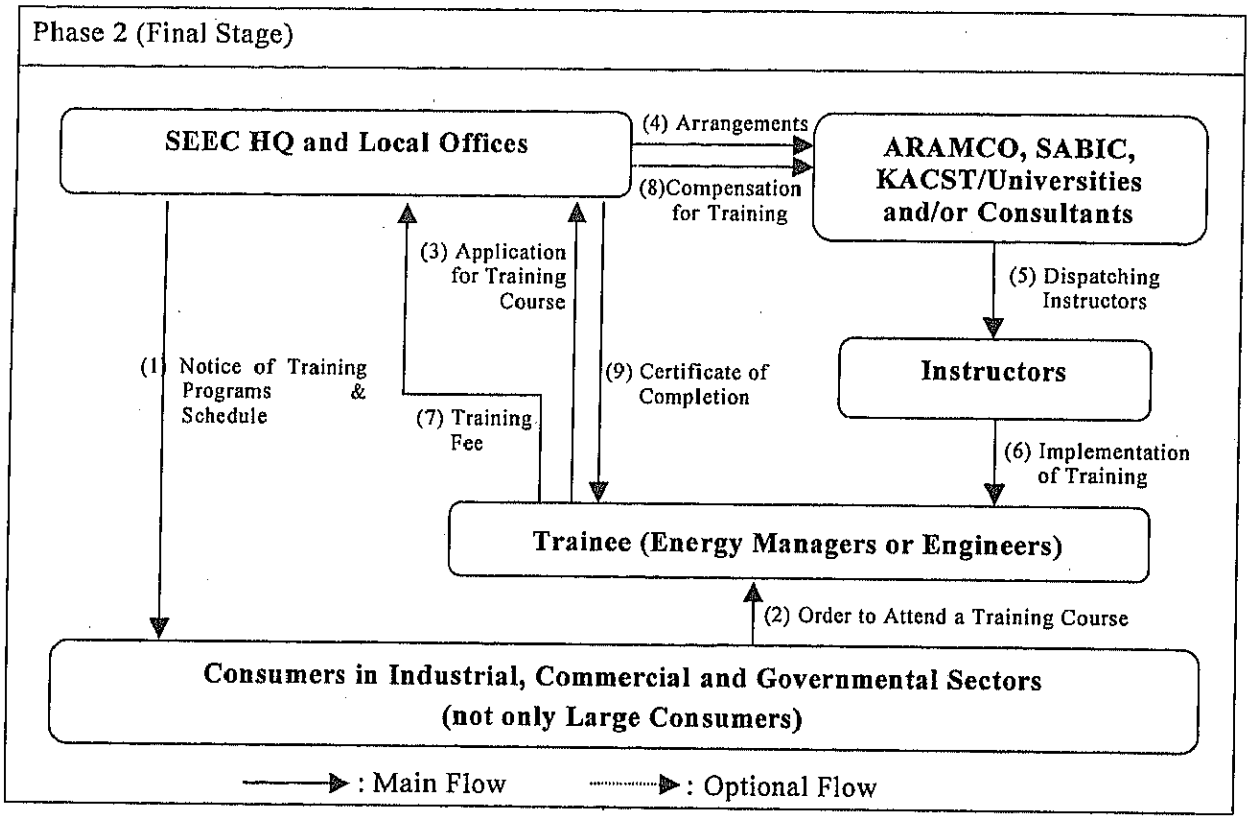
(6) Target of the Scheme

Name of Target	- Managers and engineers
Expected Action	- Playing a role as Energy Managers defined in the EMS - Implementation of EC activities in factories and/or buildings
Name of Target	- Field engineers from AC maintenance service companies
Expected Action	- Providing appropriate maintenance services for ACs

(7) Workflow

Phase 1 (Pilot Stage)





(8) Required Permanent Human Resources

Phase 0 (Preparation Stage)	Human Resources	Financial Cost for Human Resources
	MOWE No incremental staff	No incremental cost
Phase 1 (Pilot Stage)	Human Resources	Financial Cost for Human Resources
	SEEC HQ Planning and administration: 1 Arrangement staff: 1 EC technology information staff: 1	Standard Cost: 300,000 SR/year/person 0.3 x 3 = 0.9 million SR/year
Phase 2 (Final Stage)	Human Resources	Financial Resources
	SEEC HQ Planning and administration: 1 Arrangement staff: 1 EC technology information staff: 1	Standard Cost: 300,000 SR/year/person 0.3 x 3 = 0.9 million SR/year
	SEEC Local Offices (Dammam/Jeddah) Arrangement staff: 1x2	Standard Cost: 300,000 SR/year/person 0.3 x 2 = 0.6 million SR/year

(9) Required Items

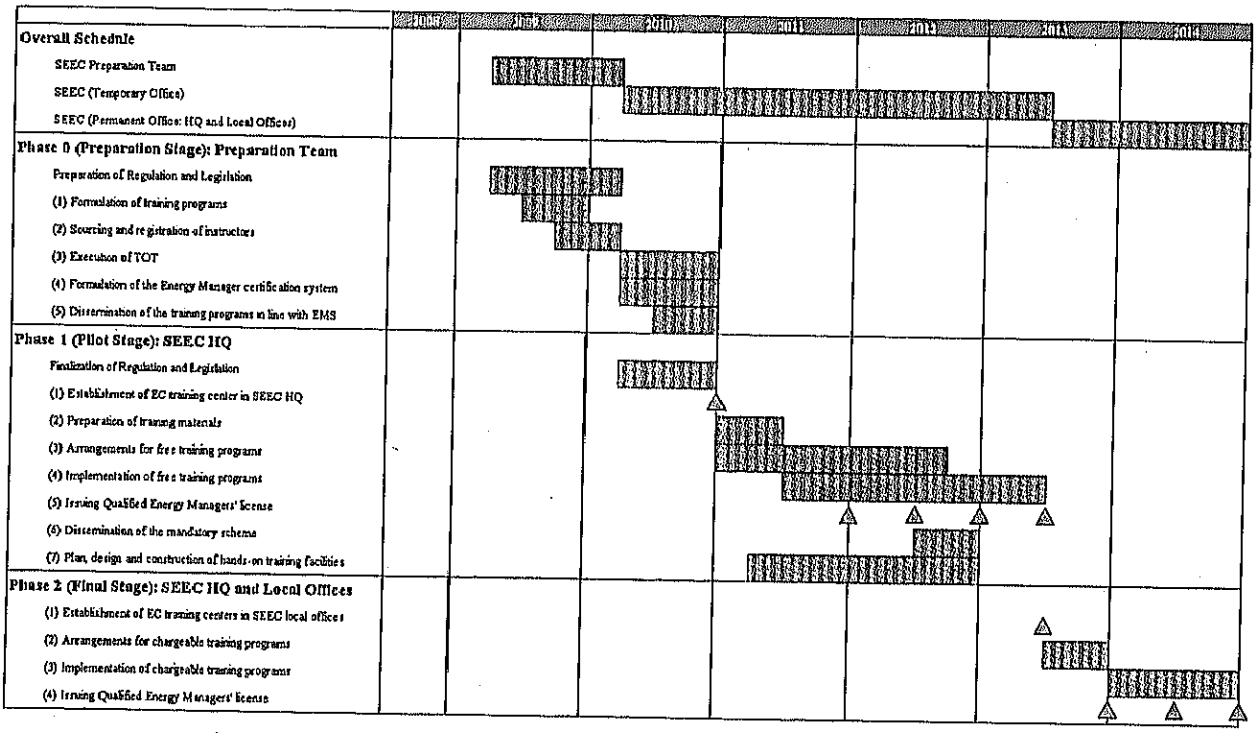
Phase 0 (Preparation Stage)	Item	Budget
	- TOT fee based on 1 month training for 3 groups each	0.36 million SR (= 4,000 SR/day x 30 days/group x 3 groups)
	- TOT expenses based on 1 month overseas training (travel, accommodation, allowance, etc.)	0.9 million SR (= 75,000 SR/person x 4persons/group x 3 groups)
Phase 1 (Pilot Stage)	Item	Budget
	- Training equipment (Interactive Whiteboards (IWBs) including basic software, AV, PCs and others for lecture and/or practice excluding lecture rooms) at HQ	0.35 million SR
	- Design and construction of training facilities for hands-on practice	5 million SR (in case of construction)
	- Material preparation (textbooks and brochures)	0.05 million SR/year
	- Compensation for instructors	0.24 million SR/year (= 3,000 SR/day x 80days/year)
	- Direct expenses for local site training (venue lease and others)	0.024 million SR/year (=120 SR/day/person x 20 persons x 10 days/year)
	- Operating and maintenance cost for hands-on training facilities	0.03 million SR/year
Phase 2 (Final Stage)	Item	Budget
	- Training equipment (IWBs including basic software, AV, PCs and others for lecture and/or practice excluding lecture rooms) for SEEC local offices (Dammam and Jeddah)	0.3 million SR (= 0.15 million SR x 2)
	- Material preparation (textbooks and brochures)	0.05 million SR/year
	- Compensation for instructors	0.3 million SR/year (=3,000 SR/day x 100 days/year)
	- Operating and maintenance cost for hands-on training facilities	0.03 SR/year
	(Expected Income) Training fee: 0.28 million SR/year (= 1,000 SR/trainee/course x (20 trainee x 12 courses/year + 10 trainee x 4 courses/year))	

(10) Expected Legislation for Enforcement

Phase 0 (Preparation Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 1 (Pilot Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 2 (Final Stage)	Items to be stipulated in Act	Relating Order/Regulation
	Qualified Energy Manager's License	Qualified Energy Manager's license (*1) shall be granted in accordance with an Ordinance of the competent Ministry.

Cabinet Order: In case that decision making can be made among more than 2 ministries.
Ordinance of the Ministry: In case that decision making can be made by 1 ministry.
Announcement from the Ministry: Guideline or notification

(11) Expected Action Plan



(12) Attachment

(Act and Relating Documents to Act to be established)

- Items to be regulated in Qualified Energy Manager's License (*1)

(Others)

- Training Program Concept Paper (for each)
- Sample of hands on training facilities

(13) Items to be Further Studied

- What are the criteria for instructor qualification?
- Hands on facilities should be a rental basis using existing facilities in university, school or factory. In this case, facilities cost can be included in training fee.

Attachment 3-1. Act and Relating Documents to Act to be established
Items to be regulated in Qualified Energy Manager's License (*1)

(1) Act (it will be one part of the Act of Energy Management System)

Article 10 Qualified Energy Manager's License (* Article 1-9 are EMS)	The qualified Energy Manager's license shall be granted by the competent Minister to a person who is qualified in accordance with the procedures concerning the grant of the qualified Energy Manager's license specified by an Ordinance of the competent Ministry*1.	This article stipulates that the qualified Energy Manager's license shall be granted in accordance with an Ordinance of the competent Ministry.

(2) Procedures concerning the grant of the qualified Energy Manager's license (Ordinance of the competent Ministry)*1

Item	Expected Contents	Remark
Item 1 Criteria for the Qualification of Energy Manager	• A person who has passed the examination for the qualified Energy Manager's license. • A person who has been authorized by the competent Minister upon completing the qualification course of Energy Manager's license (hereinafter referred to as the "Qualification Course").	This item stipulates criteria for granting the qualified Energy Manager's license. It is suggested that a qualification training be adopted during the initial stage and the state exam be introduced in the future if need be.
Item 2 Examination for the Qualified Energy Manager's License	• The "Designated Examining Body" to administer the affaires concerning the examination for the Qualified Energy Manager's License. • The subjects of the examination for the Qualified Energy Manager's License, and other details concerning the examination for the Qualified Energy Manager's License	This item stipulates the executing body of the examination for the qualified Energy Manager' license. SEEC is expected as the Designated Examining Body.
Item 3 Qualification Course	• The "Designated Examining Body" to administer the affaires concerning the Qualification Course. • The subjects of the Qualification Course and other details concerning the Qualification Course.	This item stipulates the executing body of the qualification training for the Energy Manager's license to be executed SEEC is expected as the Designated Examining Body.

Attachment 3-2. Others

Training Program Concept Paper

(1) **Concept Paper for Training Program for Energy Manager Qualification**

<table>
<tr><td>Program</td><td>Training Program for Energy Manager Qualification</td></tr>
<tr><td>Target</td><td>Managers and Engineers in the Governmental, Commercial and Industrial Sectors</td></tr>
<tr><td>Purpose</td><td>Smooth enforcement of the Energy Conservation Act by qualifying Energy managers.
Improvement of energy management level in the relevant sectors.</td></tr>
<tr><td>Duration</td><td>5 day training (from 8:00-15:00)</td></tr>
<tr><td>Venue</td><td>Utilization of Private/Government Sector's Training Facility
(or SEEC Training Office)</td></tr>
<tr><td>Frequency</td><td>4 times in a year (2 times in Riyadh and once in Dammam and Jeddah each).</td></tr>
<tr><td>Max. Capacity</td><td>20 trainees in 1 time</td></tr>
<tr><td>Fee</td><td>Ex. 1,000 SR/person (excluding trip cost, lunch, daily allowance, etc.)
(Free for the pilot stage. In the final stage, fee should be set at a reasonable rate.)</td></tr>
<tr><td>Certification</td><td>At the final day of the training program (the 5th day), a completion examination shall be done. Qualified trainees can receive a SEEC's certification, with which the trainees can apply for the national qualification to the competent minister.</td></tr>
<tr><td>Summary of Program</td><td>
Training Program
<table>
<tr><th></th><th>1st Day</th><th>2nd Day</th><th>3rd Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Orientation
- Comprehensive Energy Management
- Overview of the Energy Conservation Act</td><td>- Electricity related Energy Conservation: Electric Energy Conservation Technologies</td><td>- Heat related Energy Conservation: Heat Energy Conservation Technologies</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Building related Energy Conservation</td><td>- Electricity related Energy Conservation: Electrical Measurement</td><td>- Heat related Energy Conservation: Heat Calculation and Heat Measurement</td></tr>
</table>
Training Program
<table>
<tr><th></th><th>4th Day</th><th>5th Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Energy Conservation in factories</td><td>- Qualification Examination</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Energy Conservation in factories: Practice</td><td>- Wrap-up
- Closing</td></tr>
</table>
Detailed contents of each lecture are proposed as the Annex
</td></tr>
</table>

Annex: Contents of Each Lesson (Training Program for Energy Manager Qualification)

Lesson	Contents	Purpose
Orientation	◆ Opening address by instructors; ◆ Introduction of trainees; ◆ Presentation of the course objectives; ◆ Special remarks.	Raising trainees motivation; Clarification of the course objectives.
Comprehensive Energy Management	◆ Energy situation and energy conservation policy in the KSA; ◆ Unit energy consumption management; ◆ Energy conservation activities in factories and/or business premises.	Acquisition of fundamental knowledge of energy management
Overview of the Energy Conservation Act	◆ Background of Energy Conservation Act. ◆ Periodical reporting; ◆ Designated Factory and Energy Manager; ◆ Evaluation Criteria and Management Standard.	Promotion of proper understanding of the Energy Conservation Act
Building related Energy Conservation	◆ Building energy conservation overview; ◆ Lighting related energy conservation; ◆ AC related energy conservation; ◆ Others.	Acquisition of basic skills in building related energy conservation
Electricity related Energy Conservation: Electric EC Technologies	◆ Pump related EC technologies; ◆ Fan related EC technologies; ◆ Compressor related EC conservation technologies.	Acquisition of basic knowledge of electric EC technologies
Electricity related Energy Conservation: Electrical measurement	◆ Voltage, electric current, and temperature measurement; ◆ Electric power measurement; ◆ Measuring methods.	Acquisition of basic knowledge of electrical measurement required to implement electric EC measures
Heat related EC: Heat EC Technologies	◆ Combustion improving technologies; ◆ Heat transmission technologies; ◆ Heat loss control technologies; ◆ Exhaust heat recovery technologies.	Acquisition of basic knowledge of heat EC technologies
Heat related EC: Heat Calculation and Measurement	◆ Heat balance calculation; ◆ Furnace control and measurement; ◆ Heat flow and pressure measurement; ◆ Exhaust gas analysis.	Acquisition of basic skills required to implement heat EC measures
Energy Conservation in Factories	◆ Approach to EC in factories; ◆ Basic data acquisition, recording and grasping energy intensity; ◆ Sample format for periodical reporting.	Promotion of appropriate reporting required in the EC Act
Energy Conservation in Factories: Practice	◆ Practice of developing Management Standards.	Promotion of proper development of MS
Qualification Examination	◆ Examination on each training curriculum	Accrediting successful completion
Wrap-up	◆ Release of correct answers to each question of the examination; ◆ Explanation of the procedure to apply for Energy Manager certification; ◆ Q&A	Reminding trainees of future schedule and procedure regarding the Energy Manager qualification
Closing	◆ Closing address; ◆ Questionnaire survey concerning the program.	Collection of trainee feedback

(2) **Concept Paper for Training Program for Electricity related Energy Conservation**

<table>
<tr><td>Program</td><td>Training Program for Electricity related Energy Conservation</td></tr>
<tr><td>Target</td><td>Managers and Engineers responsible for EC regarding electrical systems in the Governmental, Commercial and Industrial Sectors</td></tr>
<tr><td>Purpose</td><td>Promotion of EC regarding electrical systems in factories and/or buildings</td></tr>
<tr><td>Duration</td><td>5 day training (from 8:00-15:00)</td></tr>
<tr><td>Venue</td><td>Utilization of Private/Government Sector's Training Facility
(or SEEC Training Office)</td></tr>
<tr><td>Frequency</td><td>4 times in a year</td></tr>
<tr><td>Max. Capacity</td><td>20 trainees in 1 time</td></tr>
<tr><td>Fee</td><td>Ex. 1,000 SR/person (excluding trip cost, lunch, daily allowance, etc.)</td></tr>
<tr><td>Certification</td><td>At the final day of the training program (the 5th day), a completion examination shall be done. Qualified trainees can receive a SEEC's certification.</td></tr>
<tr><td>Summary of Program</td><td>
Training Program
<table>
<tr><th></th><th>1st Day</th><th>2nd Day</th><th>3rd Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Orientation
- Electrical Measurement</td><td>- Compressor related EC: Technologies</td><td>- Pump & Fan related EC: Technologies</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Electric Power Measurement: Hands-on Practice</td><td>- Compressor related EC: Hands-on Practice</td><td>- Pump & Fan related EC: Hands-on Practice</td></tr>
</table>
Training Program
<table>
<tr><th></th><th>4th Day</th><th>5th Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Building related Energy Conservation</td><td>- Completion Examination</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Case Study on Electrical Energy Conservation</td><td>- Wrap-up
- Closing</td></tr>
</table>
Underlined: Hands-on Training
Detailed contents of each lecture are proposed as the Annex
</td></tr>
</table>

Annex: Contents of Each Lesson (Training Program for Electricity related Energy Conservation)

Lesson	Contents	Purpose
Orientation	◆ Opening address by instructors ◆ Introduction of Trainees; ◆ Presentation of the course objectives; ◆ Special remarks.	Raising trainees motivation; Clarification of the course objectives.
Electrical measurement	◆ Voltage, electric current, and temperature measurement; ◆ Electric power measurement; ◆ Measuring methods.	Acquisition of basic knowledge required for electrical energy management.
Electric Power Measurement: Hands-on Practice	◆ Measurement practice – Pump, Fan; ◆ Lighting measurement practice; ◆ Practice using high-efficiency transformer; ◆ AC related measurement practice.	Capacity building in electric power measurement required for electrical energy management.
Compressor related Energy Conservation: Technologies	◆ Types and characteristics of compressors ◆ Compressor and shaft power; ◆ Leak prevention and its effects; ◆ Piping-related pressure loss; ◆ Measuring instruments and method; ◆ EC using control measures; ◆ Compressor-related EC.	Acquisition of basic knowledge regarding compressor related EC.
Compressor related Energy Conservation: Hands-on Practice	◆ Power measurement at time of pressure setting change; ◆ Leak measurement; ◆ Measuring piping-related pressure loss; ◆ Consideration of energy efficiency improvement measures.	Capacity building in implementing compressor related EC.
Pump & Fan related Energy Conservation: Technologies	◆ Type and characteristics of pump & fan; ◆ Selection of appropriate types; ◆ EC technologies (cutting impeller, revolution control, damper control, etc.)	Acquisition of basic knowledge regarding pump & fan related EC.
Pump & Fan related Energy Conservation: Hands-on Practice	◆ Pump performance measurement; ◆ Fan performance measurement; ◆ Data summary and review.	Capacity building in implementing pump & fan related EC.
Building Energy Conservation	◆ Building EC overview; ◆ Lighting-related energy conservation; ◆ AC-related energy conservation; ◆ EC related to power receiving and transformer facilities.	Acquisition of basic knowledge regarding building related EC.
Case Study on Electrical Energy Conservation	◆ Explanation of electrical equipment and facilities related EC examples (AC, lighting, compressor, pump and fan, power receiver and transformer, etc.)	Capacity building in electricity related EC by acquiring practical know-how.
Completion Examination	◆ Examination on each training curriculum.	Confirming proper understanding of the training program
Wrap-up	◆ Announcement of test performance and awarding; ◆ Q&A and individual consultation.	Incentive giving and awareness raising by awarding
Closing	◆ Closing address; ◆ Questionnaire survey concerning the program.	Collection of trainee feedback

(3) **Concept Paper for Training Program for Heat related Energy Conservation**

<table>
<tr><td>Program</td><td>Training Program for Heat related Energy Conservation</td></tr>
<tr><td>Target</td><td>Managers and Engineers responsible for energy conservation regarding heat systems in the Governmental, Commercial and Industrial Sectors</td></tr>
<tr><td>Purpose</td><td>Promotion of energy conservation regarding heat systems in factories and/or buildings</td></tr>
<tr><td>Duration</td><td>5 day training (from 8:00-15:00)</td></tr>
<tr><td>Venue</td><td>Utilization of Private/Government Sector's Training Facility
(or SEEC Training Office)</td></tr>
<tr><td>Frequency</td><td>4 times in a year</td></tr>
<tr><td>Max. Capacity</td><td>20 trainees in 1 time</td></tr>
<tr><td>Fee</td><td>Ex. 1,000 SR/person (excluding trip cost, lunch, daily allowance, etc.)
(Free for the pilot stage. In the final stage, fee should be set at a reasonable rate.)</td></tr>
<tr><td>Certification</td><td>At the final day of the training program (the 5th day), a completion examination shall be done. Qualified trainees can receive a SEEC's certification.</td></tr>
<tr><td>Summary of Program</td><td>
Training Program
<table>
<tr><th></th><th>1st Day</th><th>2nd Day</th><th>3rd Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Orientation
- Energy Conservation Technologies and Field Application</td><td>- Steam related Energy Conservation: Technologies</td><td>- Heating Facilities and Heat Measurement</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Fuel and Combustion Calculation
- <u>Combustion related Hands-on Practice</u></td><td>- <u>Steam related Energy Conservation: Hands-on Practice</u></td><td>- <u>Heating Facilities and Heat Measurement: Hands-on Practice</u></td></tr>
</table>
Training Program
<table>
<tr><th></th><th>4th Day</th><th>5th Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Case Study on Heat related Energy Conservation</td><td>- Completion Examination</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Case Study on Heat related Energy Conservation</td><td>- Wrap-up
- Closing</td></tr>
</table>
<u>Underlined: Hands-on Training</u>
Detailed contents of each lecture are proposed as the Annex.
</td></tr>
</table>

Annex: Contents of Each Lesson (Training Program for Heat related Energy Conservation)

Lesson	Contents	Purpose
Orientation	◆ Opening address by instructors; ◆ Introduction of Trainees; ◆ Presentation of the course objectives; ◆ Special remarks.	Raising trainees motivation; Clarification of the course objectives.
Energy Conservation Technologies and Field Application	◆ Combustion technologies; ◆ Heat transfer technologies; ◆ Heat loss control technologies; ◆ Waste heat recovery technologies.	Acquisition of basic knowledge required for heat energy management.
Fuel and Combustion Calculation	◆ Types and characteristics of fuels; ◆ Combustion calculation of gas fue;l ◆ Combustion calculation of liquid fuel; ◆ Oxygen concentration, air ratio, heat transfer efficiency of exhaust gas.	Acquisition of basic knowledge regarding fuel and combustion.
Combustion related Hands-on Practice	◆ Prevention of gas explosion; ◆ Method of confirming and adjusting the right flame; ◆ Burner combustion exercise.	Capacity building in heat management by acquiring practical know-how.
Steam related EC: Technologies	◆ EC through efficient use of stem; ◆ Selection, installation and management of steam traps; ◆ Drain recovery.	Acquisition of basic knowledge regarding steam related EC.
Steam related EC: Hands-on Practice	◆ Practice using engineering software; ◆ Steam piping design, calculation of pressure loss and steam consumption.	Capacity building in steam related EC by acquiring practical know-how.
Heating Facilities and Heat Measurement	◆ Heat efficiency improving measures (management of facilities, combustion, preheating air temperature and/or furnace pressure) ◆ Heat balance and diagnosis. ◆ Measuring instruments and method.	Acquisition of basic knowledge regarding heating facilities related EC..
Heating Facilities and Heat Measurement: Hands-on Practice	◆ Heat calculation practice; ◆ Collection of heat balance data; ◆ Analysis of collected data.	Capacity building in heating facilities related EC by acquiring practical know-how.
Case Study on Heat related Energy Conservation	◆ Fuel efficiency improvement examples; ◆ Heat transfer improvement examples; ◆ Heat radiation improvement examples; ◆ Waste heat recovery improvement examples.	Capacity building in heat related EC by enhancing practical knowledge.
Completion Examination	◆ Examination on each training curriculum.	Confirming proper understanding of the training program
Wrap-up	◆ Release of correct answers to each question of the examination; ◆ Q&A and individual consultation.	Incentive giving and awareness raising by awarding
Closing	◆ Closing address; ◆ Questionnaire survey concerning the program.	Collection of trainee feedback

(4) **Concept Paper for AC Maintenance Training Program**

<table>
<tr><td>Program</td><td>AC Maintenance Training Program</td></tr>
<tr><td>Target</td><td>Operators and Maintenance Staff for AC in Buildings</td></tr>
<tr><td>Purpose</td><td>Well Understanding for AC Basic Theory
Obtaining Energy Conservation Know-how (Operation and Maintenance)
Encouraging Awareness of Operators and Maintenance Staff</td></tr>
<tr><td>Duration</td><td>5 days training (from 8:00-15:00)</td></tr>
<tr><td>Venue</td><td>Utilization of Private/Government Sector's Training Facility
(or SEEC Training Office)</td></tr>
<tr><td>Frequency</td><td>4 times in a year</td></tr>
<tr><td>Max. Capacity</td><td>10 trainees in 1 time</td></tr>
<tr><td>Fee</td><td>Ex. 1,000 SR/person (excluding trip cost, lunch, daily allowance, etc.)
(Trainees pay for training program fee. However, fee should set at a reasonable price.)</td></tr>
<tr><td>Certification</td><td>At the final day of the training program (the 5th day), a test will be done. Qualified trainees can receive a SEEC's certification as an award. (not national qualification)</td></tr>
<tr><td>Summary of Program</td><td>
Training Program
<table>
<tr><th></th><th>1st Day</th><th>2nd Day</th><th>3rd Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- Orientation
- Principles of Refrigeration
- Classification of Air Conditioner</td><td>- Energy Conservation by Equipment:
- Energy Conservation by Maintenance.
- Operation Data Collection</td><td>- Heat Load Calculation and AC Model Selection</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Components of AC;
- Hands-on Practice: Model Facility</td><td>- Hands-on Practice Data Collection;
- Hands-on Practice on Energy Conservation by Maintenance</td><td>- Practice of Heat Load Calculation and Selection</td></tr>
</table>
Training Program
<table>
<tr><th></th><th>4th Day</th><th>5th Day</th></tr>
<tr><td>AM (8:00-11:00)</td><td>- General Theory for Trouble Shooting</td><td>- Examination
- Introduction of a new Air Conditioner</td></tr>
<tr><td>PM
(11:00-12:00,
13:00-15:00)</td><td>- Practice of Trouble Shooting using a Model AC Facility</td><td>- Award Ceremony for Certification
- Closing</td></tr>
</table>
Underlined: Hands-on Training
Detail contents of each lecture are proposed as the Annex.
</td></tr>
</table>

Annex: Contents of Each Lesson (AC Maintenance Training Program)

Lesson	Contents	Purpose
Orientation	◆ Opening address by instructors ◆ Introduction of Trainees; ◆ Presentation of the course objectives; ◆ Special remarks	Raising trainees motivation; Clarification of the course objectives.
Principles of Refrigeration	◆ Explanation of the refrigeration principle, mechanism and basic units to study refrigeration;	Promotion of understanding of AC mechanism and various type of ACs.
Classification of AC	◆ AC type, uses and feature of each type.	
Components of AC	◆ Explanation of AC components and their functions	
Hands-on Practice: Model Facility	◆ Observation of a model AC facility; ◆ Explanation of the AC mechanism and components.	Promotion of better understanding of AC mechanism.
Energy Conservation by Equipment	◆ General energy conservation measures by AC equipment	Acquisition of know-how in AC related energy conservation
Energy Conservation by Maintenance	◆ General energy conservation measures by AC maintenance; ◆ Effects of EC measure implementation.	
Operation Data Collection	◆ Method of AC data collection under normal operating conditions; ◆ Equipment for measurement.	Acquisition of basic knowledge of data collection
Hands-on Practice on Data Collection	◆ Practice of data collection using the model facility.	Capacity building in data collection
Hands-on Practice on Energy Conservation by Maintenance	◆ Practice of effective energy conservation by measuring and comparing data between a normal operation and an AC with unclean filter and/or heat exchanger.	Capacity building in EC by maintenance method.
Heat Load Calculation and AC Model Selection	◆ Heat load calculation; ◆ Selection of appropriate AC type.	Capacity building in planning AC systems.
Practice of Heat Load Calculation and Selection	◆ Practice of load calculation and AC type selection using example problems.	
General Theory for Trouble Shooting	◆ Fundamentals of P-h chart required for troubleshooting; ◆ Procedures for dealing with AC failure and troubleshooting using P-h chart	Acquisition of basic knowledge required for troubleshooting
Practice of Trouble Shooting using a Model AC Facility	◆ Forced trouble (with a high frequency) generation on a model AC facility and practice of troubleshooting.	Capacity building in dealing with troubles
Examination	◆ Test to confirm the achievement of the program	Making a check of understanding
Introduction of a new Air Conditioner	◆ Introduction of a new AC; e.g. a hi-COP system, VRV, an ice heat storage system. ◆ Q & A	Promotion of understanding of latest trend.
Award Ceremony for Certification	◆ Announcement of test performance and awarding	Incentive giving and awareness raising by awarding
Closing	◆ Closing address; ◆ Questionnaire survey concerning the program	Collection of trainee feedback

Samples of Hands-on Facilities and Equipments

(1) Intended Objectives of Installation of Each Equipment and Facilities

(a) Facilities for practices on rotating machinery

- ✓ Practice on rotating machinery-related EC technologies;
- ✓ Demonstration of the principle of inverter and its EC effects;
- ✓ Practice on removing factors increasing energy consumption such as pressure losses through the piping;
- ✓ Practice on power measurement by three-phase connection measuring equipment such as a clamping power meter;
- ✓ Acquisition of knowledge on the principle of optimal control by a PID control system.

(b) Facilities for practices on an air compression system

- ✓ Practice on a method of searching places where air leaks;
- ✓ Practice on estimating the volume of air leakage and setting the optimum pressure of compressed air;
- ✓ Practice on removing factors increasing energy consumption such as pressure losses through the piping;

(c) Facilities for practices on a combustion system

- ✓ Practice on heat balance calculation on an industrial heating furnace;
- ✓ Practice on EC operation of industrial burners;
- ✓ Practice on operation of EC equipment (economizer, cooling water recovery system);
- ✓ Practice on handling EC measuring instruments;
- ✓ Practice on calculating EC effects of heat insulation materials for industrial furnaces;
- ✓ Practice on combustion management technologies.

(d) Facilities for practices on steam trap

- ✓ Learning the operating principles and optimal conditions of various kinds of steam traps;
- ✓ Practice on diagnosis of a failure or a malfunction of a steam trap by using dedicated diagnostic equipment;
- ✓ Practice on operating a steam condensate recovery system.

(e) Power supply system

- ✓ Power supply for other equipment and facilities for hands-on practice.

(f) Small once-through boiler

- ✓ Steam supply for other equipment and facilities for hands-on practice;
- ✓ Practice on EC operation of boilers;
- ✓ Education in boiler water management technologies;
- ✓ Practice on heat balance calculation on an industrial boiler.

(g) Measuring instruments and analyzers

- ✓ Practice on measuring operation;
- ✓ Practice on simplified measurement during factory audits.

(2) Specifications for Major Equipment

	Name	No. of Unit	Specifications
A.	Rotating equipment		
	a) Fan	1 set	Air volume: 30 m^3/min.
	b) Pump	1 set	Single suction centrifugal pump Total pump head: 33 m; Discharge rate: 0.4 m^3/min.
	c) Auxiliary equipment		PID control system on flow and vessel level
B.	Air compression system	1 set	Single stage screw compressor with an oil feeding system; Working discharge pressure: 0.7 MPa; Discharge air capacity: 2.0 m^3/min. Auxiliary facilities: piping and instrumentation.
C.	Combustion furnace	1	Combustion volume: 200,000 kcal/h; Fuel: Natural gas and heavy oil
D.	Steam trap	8 lines	Bucket type, Disc type, Float type, Thermostatic type; The system to contain failure equipment.
E.	Power supply system	1 set	
F.	Boiler	1	Once-through boiler; Capacity: 300 kg/h; Steam pressure: 10 kg/cm^2G; Fuel: heavy oil A, light oil.
G.	Measuring instruments and analyzers		
	a) Hot-wire anemometer	1	
	b) Data logger	1	Portable type with transducer; Service temperature: -20 - +70℃.
	c) Ultrasonic flow meter	1	Portable type; Pipe diameter: 12.5-1,000 mm; Flow velocity: 0-10 m/s; Service temperature: -20 - +150℃
	d) Pitot tube anemometer	1	Measuring pressure: 0-2,500 Pa; Flow velocity: 0-50 m/s.
	e) Infrared thermometer	1	Noncontact type with LASER sighting mechanism; Measuring temperature: max. 2,000 ℃; Measuring range: 0-600℃ and 600-2,000℃.
	f) Portable thermometer	10	Measuring temperature: -50 - +1,200℃.
	g) Clamp power meter	Large: 1 Small: 5	Voltage: 600 V; Current: 1,000 A; Power factor: 0-1
	h) Flue gas analyzer	1	Electric power: kW Measuring component: O^2, CO, SO^2, NOx

4. Energy Assessments Service (EAS)

(1) Program Name

Energy Assessment Service

(2) Objective

- Encouraging energy conservation activities in private enterprises
- Dissemination of energy conservation technology

(3) Outline of the Scheme and Each Phase

	Contents	
Overall Scheme	- Making consultant list and recruiting stand-by consultants to implement the assessment and consultation - Announcement of the program to industrial and commercial sector in cooperation with COC - Application from industrial and commercial sector to SEEC - Selection from applicants - Requesting required data (basic information, single line diagram, energy & electricity data, etc) in advance to selected applicants - Dispatching suitable two consultants to the site of selected applicant for one day survey - Making an EC recommendation report within one month by the consultants - Conducting follow-up questionnaire within 2 years and urging actions if necessary	
Phase 0 (Preparation Stage)	Task	Responsible Agency
	(1) Preparation of document forms for assessment implementation	MOWE
	(2) Recruiting consultants for the EAS activities and making a consultant list	MOWE
	(3) Training course of EC consultants (if necessary)	MOWE
	(4) Preparation of information brochures on EAS activities	MOWE
	(5) Notification of assessment and consultation activities	MOWE
	(6) Planning of EC measure database establishment	MOWE
Phase 1 (Final Stage)	Task	Responsible Agency
	(1) Announcement of the program to industrial and commercial sector in cooperation with COC	SEEC
	(2) Application from industrial and commercial sector to SEEC	Applicants
	(3) Selection from applicants	SEEC
	(4) Requesting required data (basic information, single line diagram, energy &electricity data, etc) in advance to selected applicants	Consultant
	(5) Dispatching suitable two consultants to the site of selected applicant for one day survey	Consultant
	(6) Making an EC recommendation report within one month by the consultants	Consultant
	(7) Conducting follow-up questionnaire within 2 years and urging actions if necessary	SEEC

(4) Executing Agency

Name of Agency	Ministry of Water and Electricity (MOWE) as Preparation Team
Expected Role	**(Preparation Stage)** - Preparation of document forms for assessment implementation - Recruiting consultants for the EAS activities and making a consultant list - Training course of EC consultants (if necessary) - Preparation of information brochures on EAS activities - Notification of assessment and consultation activities - Planning of EC measure database establishment
Name of Agency	Saudi Energy Efficiency Center (SEEC)
Expected Role	**(Final Stage)** - Making an implementation plan of EAS next year, and a budget draft - Making budget through MOWE and/or MOPMR - Making consultant list and recruiting stand-by consultants to implement the assessment and consultation - Announcement of the program to industrial and commercial sector in cooperation with COC - Selection from applicants - Requesting required data in advance to selected applicants - Dispatching suitable two consultants to the site of selected applicant for one day survey - Verification of the quality of report by SEEC - Sending a final report to the applicant. - Conducting follow-up questionnaire within 2 years and urging actions if necessary
Name of Agency	Consultant (in the name of SEEC)
Expected Role	- Registration to consultant list - Site survey - Making an EC recommendation report within one month by the consultants

(5) Relating Agency

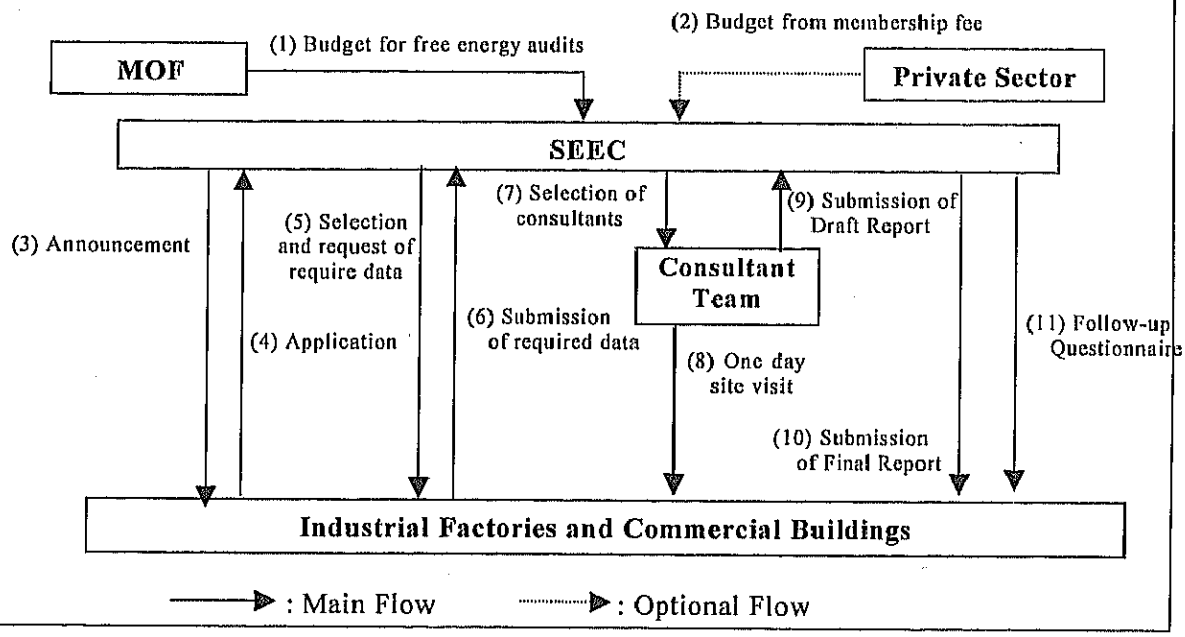
Name of Agency	Chamber of Commerce (COC)
Expected Role	- Cooperation of announcement the program to private sector

(6) Target of the Scheme

Name of Target	Factories and commercial buildings
Expected Action	- Application with an application form to SEEC - Submission of required data - Site arrangement for dispatched consultants and assigned persons to facilitate the one day survey - Receiving EC recommendation report and examine possibility to implement - Answering follow-up questionnaire

(7) Workflow

Phase 1 (Final Stage)



(8) Required Permanent Human Resources

Phase 0 (Preparation Stage)	Human Resources	Financial Cost for Human Resources
	MOWE No incremental staff	No incremental cost
Phase 1 (Final Stage)	Human Resources	Financial Resources
	SEEC HQ Assessment management: 2 Consultant management: 1 Database engineer: 1	Standard Cost: 300,000 SR/year/person 0.3 x 4 =1.2 million SR/year

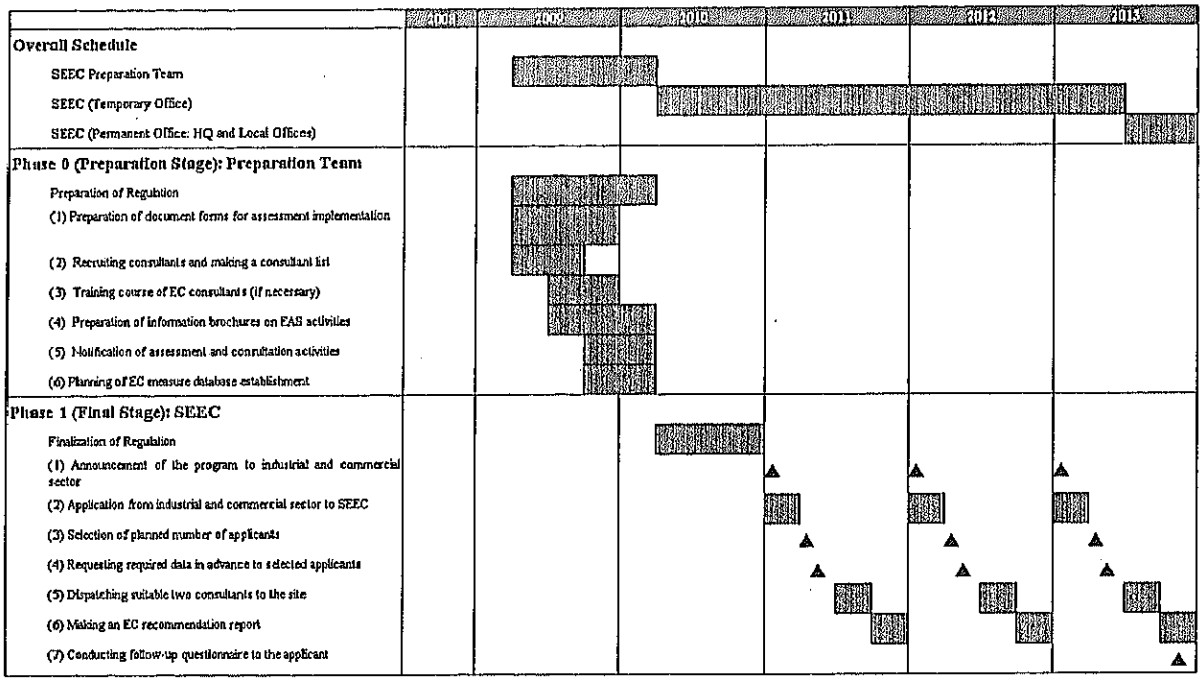
(9) Required Items

Phase 0 (Preparation Stage)	Item	Budget
	(MOWE) - Budget for training course of consultants: 10 days course	40,000 SR
Phase 1 (Final Stage)	Item	Budget
	(SEEC) - Budget for free assessment service (MOF): 10 cases/year - Database software	(0.03 million SR/case) 0.3 million SR/year 0.13 million SR

(10) Expected Legislation for Enforcement

Phase 1 (Final Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-

(11) Expected Action Plan



(12) Attachment

- Sample form of required data to applicant
- Sample from of follow-up questionnaire sheet
- Sample form of EC recommendation report

Attachment 4. Energy Assessments Service (EAS)

Sample form of required data to applicant

1. INFORMATION REGARDING FACILITY	
Date:	
Name of the factory:	Industrial sector:
Address: Person who completes the form:	Telephone: Telex: Fax:
	Title:
Address of The General Directorate: Person to be interviewed:	
Operation starting date of the factory:	
No. of employees:	No. of Shifts:

2. AREA OF ACTIVITY
Please list main production activities and equipments which consume big amount of energy and the important auxiliary systems. Please specify the energy production and consumption amounts on the basis of units. (Refer to examples below)

3. EXAMPLE OF THE AREA OF ACTIVITY		
Raw material Preparation	4500 kg/ hour steam	10hours/day
	325 kW/ electricity	10hours/day
Chemical reactors	3200 kg /hour steam	16hours/day
Product separation	2500 kg /hour steam	24hours/day
Boilers with 3 — 8 bars	10800 kg /hour steam	24hours/day
	815 kg /hour Fuel oil	24hours/day
Air compressors	225kW	24hours/day
Air conditioning	100kW	16hours/day
Office heating	4500 kg hour steam	10 hour/day during winter

4. ENERGY USAGE

Please complete the following table with the previous year's values.

Please attach photocopies of all electric and fuel bills.

Year: .....

Energy Type	Amount of Consumption	Unit	Unit cost	Annual cost
Electric				
Natural gas				
LPG				
Gas oil				
Light Fuel oil				
Heavy Fuel oil				
Petrol coke				
Hard coal				
Lignite				
Other				
Other				

The monthly consumption values and monthly average unit prices of the fuels of which the types and annual consumption values are given in this table are to be printed in the tables in the following pages based on the same year.

Please print the fuel types and their consumption units (Ton / month, Kg / month, kWh / month, etc.) in the given blanks.

3-1	YEAR CONSUMPTION VALUES			
	CONSUMPTIONS			
	ELECTRICITY		.....	
MONTHS	Consumption unit ..... / month	Unit Price $/.....	Consumption unit ..... / month	Unit Price $/.....
JANUARY				
FEBRUARY				
MARCH				
APRIL				
MAY				
JUNE				
JULY				
AUGUST				
SEPTEMBER				
OCTOBER				
NOVEMBER				
DECEMBER				
TOTAL				
Calorific value		Kcal/kWh	Calorific value	

Note : Please print the type, consumption unit (Ton / month, Kg / month, kWh / month etc.), monthly average unit price ($ / ton, $ / kg) of fuel which is consumed and then fill out the related columns according to this data.

: Please print the calorific value of the consumed fuel including its unit (Kcal/kg, Kcal / NM_3, Kcal / ton etc.) if known.

3-2	.....YEAR CONSUMPTION VALUES			
	CONSUMPTIONS			
	FUEL.....			
MONTHS	Consumption unit ..... / month	Unit Price $/.....	Consumption unit ..... / month	Unit Price $/.....
JANUARY				
FEBRUARY				
MARCH				
APRIL				
MAY				
JUNE				
JULY				
AUGUST				
SEPTEMBER				
OCTOBER				
NOVEMBER				
DECEMBER				
TOTAL				
Calorific value			Calorific value	

Note : Please print the type, consumption unit (Ton / month, Kg / month, kWh / month etc.), monthly average unit price ($ / ton, $ / kg) of fuel which is consumed and then fill out the related columns according to this data.

: Please print the calorific value of the consumed fuel including its unit (Kcal / kg, Kcal / NM3, Kcal / ton etc.) if known.

: In case this table is not sufficient please copy it.

4. PRODUCTION DATA

Complete the following table with the previous year's values.

Year: .....

Type of product	Amount of production	Unit

Note : Please print the type of product, and then print the related production value and production unit in the corresponding column.

The monthly production values of the products of which the types and annual production values are given in this table are to be printed in the tables in the following pages based on the same year.

4-1	YEAR PRODUCTION VALUES		
	PRODUCTIONS		
	Name of product	Name of product	Name of product .....
MONTHS	Production unit	Production unit	Production unit .....
JANUARY			
FEBRUARY			
MARCH			
APRIL			
MAY			
JUNE			
JULY			
AUGUST			
SEPTEMBER			
OCTOBER			
NOVEMBER			
DECEMBER			
TOTAL			

Design Capacity			

Note: If it is possible to use different production units for the same type of product, please specify the correlation between these units (For example, it is possible to use m2 and ton as units in square flagstone production.

In that case, specify the correlation as;

m2 flagstone = Ton flagstone

: In case this table is not sufficient please copy it.

: Print the annual or monthly planned production capacity in the related column by specifying the unit (Ton / month, ton / year)

5. MISCELLANEOUS SUBJECTS
Please express your comments on the following subjects. Problems related to the control of environmental pollution: Possible process changes: Maximum grace periods which can be accepted for the investments:
6. ENERGY MANAGEMENT
Is there an energy management program in your factory? If yes, since when ? Is an energy manager assigned?: If yes, how long has he been working?: Is there any effort in order to Increase the Energy Efficiency, and to Decrease the Energy Consumption ?: Are energy consumption and production values examined in terms of energy efficiency ?: Are specific energy values etc., calculated ?: Are these results checked in terms of problems and causes ?: What are your other comments ?:

7. BOILERS

No. of boilers in the facility

Boiler No.	Capacity	Unit [1]	Production [2]	Pressure	Temperature
1					
2					
3					

1 Ton / h, Kcal / h, m2, please specify the type of heating surface

2 Specify as steam, hot oil etc.

Is flue gas analysis made in the boilers? :

If yes, how often? :

Are the necessary regulations made in the boilers? :

Is the analyzer fixed type or portable? :

Type of the flue gas analyzer (Electronic etc.) :

Results of the flue gas analysis

	Date	Date	Date	Date
Unit				
T gas				
T atmosphere				
O2				
CO				
(*)				
Fuel characteristics				
Type				
H top				
H bottom				
C				
H2				
H2O				
O2				
N2				
S				
Ash				
Results of Slag Analysis (**), if necessary.				
Grate discharge temperature ° C				
Un-burnt carbon rate %				

(*) : The other parameters (SO2, NOX, ETC.) that the device is capable of measuring may be written.

(**) : Please fill out only in case solid fuel is used

Note : Please attach the unit prices of the fuels which have been purchased lately and send the form.

8. ELECTRIC ENERGY USAGE		
Of the existing power transformers:		
Operation voltage (KV)	Installed power (KVA)	Power usage rate (Derived power / installed power)
..... /		
..... /		
..... /		
..... /		
Please print the amount of electric energy consumption according to the area of consumption.		
Manufacturing		
Lighting		
Heating and Ventilation		
Other (specify)		
Purchased electric energy		

☐ Electric tariff

What is the contracted electric power? :

The peak power range of electric energy: ..... kW (min. power) - .....kW (max. power)

Is charge management implemented in your factory? : ☐ Yes ☐ No

Is there a charge management system in your factory? : ☐ Yes ☐ No

Power factor value ($\cos \phi$) :

Type of compensation :

☐ Single compensation unit ☐ Independent compensation unit

Are the static patching circuits applied to electric motors?

☐ Yes ☐ No

Are variable speed control units applied to the pumps and fans?

☐ Yes ☐ No

Please specify the usage percentages of the lighting armatures in the factory		
Type of armature	Usage Percentage	Place of usage
Glow filament armatures		
Fluorescent armatures		
Compact fluorescent armatures		
Low pressure- High pressure Sodium vapor armatures		
Mercury vapor armatures		
Other (specify)		
Other (specify)		

How is the lighting control done in the factory?

.....% Armature manual control

.....% Armature automatic control

Is electric energy produced in the factory? ☐ Yes ☐ No

Please specify the type of facility that you use for electricity production

☐ Steam turbine ☐ Piston

☐ Gas turbine ☐ Other (specify)

☐ Combination of gas turbine and steam turbine

What is the total amount / installed power of the electric energy that is produced?

.....KVA / ..... KWh / year

9. FIXED MEASUREMENT DEVICES IN THE FACTORY

Water Meters:

Places of usage

a) Factory ..... pieces

b) other building (specify)..... pieces

Electricity Meters

Places of usage

a) Factory ..... pieces

b) other (specify)..... pieces

Steam Meters

Places of usage

a) Boiler house ..... pieces
b) other (specify)..... Pieces

10. PORTABLE MEASUREMENT DEVICES IN THE FACTORY
☐ Flue gas analyzer
☐ Thermometer and its props (including infrared demo meter)
☐ Conduct meter
☐ Energy analyzer (for electricity measurements)
☐ Pliers ammeter
☐ Lux meter (Light)
☐ Hygrometer (Humidity)
☐ Tachometer (Rotating speed)
☐ Recorder
☐ Thermographic camera (Temperature Indicator)
☐ Ultrasonic liquid flow meter
☐ Manometer (Pressure drop)
☐ Steam trap test device
☐ Dissolved oxygen meter
☐ Sound analyzer
☐ Other (specify)

11. COMPRESSOR TYPES AND COMPRESSED AIR SYSTEMS

Type of Compressor:

Brand of Compressor:

Capacity of Compressor:..... (m^3/minute)

Annual operation period of the compressor: ..... (hour / year)

Compressor outlet pressure: ..... (bar)

Air pressure needed in at the final usage point: ..... (bar)

Pressure loss along the line: ..... (bar)

No. of similar compressors: .....

How is the cooling done: ☐ With air ☐ With water ☐ With oil

Cooling (water, air, oil) inlet temperature: ..... ° C

Cooling (water, air, oil) outlet temperature: ..... ° C

Power which is used by the compressor at full load: .....kW,..... hour / month

Power which is used by the compressor at No - load:..... kW, ... hour / month

Is there any compressed air dryer:

Type of the dryer: ☐ Cooling ☐ Adsorption

Compressor control system: ☐ Modulating ☐ On /off load ☐ Start / stop

Is the compressor working connected to a successive (sequential) system? :

From which direction does the compressor get inlet air (suction air) ?:

Where does the compressor get inlet air? :

What is the type of compressed air line? : ☐ Single line ☐ Ring line ☐ Other

Is there any test for air leakage? : ☐ Yes ☐ No

If yes, how often? : ☐ Weekly ☐ Monthly ☐ Other

Is there any waste heat recovery system? : .....

Where is the energy recovered from waste heat, used? :

☐ Boiler feed water pre - heating ☐ Field heating ☐ Bathroom, kitchen

☐ Other (specify).....

Note: Please copy this form and fill the copies out for each of the existing compressors.

12. OTHER INFORMATION

Please attach the following information to this form if possible;

1. Factory settlement' plan
2. Brief description of process
3. Basic flow chart
4. Detailed information regarding auxiliary facilities (boilers, turbines, air compressors, waste cleaning, cooling towers, water supply, cooling units)
5. Distribution lines chart (steam, water, gas, air)
6. Electric energy single line and distribution charts

Total area of the factory	m2	Heating time
Total heating area *	m2	Month / year
Total heating volume *	m2	Month / year
Total air conditioning area	m2	Month / year
Total air conditioning volume	m2	Month / year

Working period s of the main sections

Name of the section	hour / day	day / year
(example)Boiler House		

Hour / day : Working period of the section per day (in hours)
Day / year : Working period of the section per year (in days)

13. AREA OF AUDIT WORK
Please specify the units of the factory to be worked in How long should the working period be? : Convenient dates for work :
(In case the space is not sufficient for the information in the questionnaire, please use this page)

Sample from of follow-up questionnaire sheet

(Date)

Please fill the following form on energy conservation activities after energy assessment implemented on_____in_____.

(1) Did you implement the improvement of energy conservation advised with the energy assessment report?

(2) Please explain effects of energy conservation implementation individually.

(3) Please show improvement of energy intensity of fuel and electricity respectively.

(4) Please show energy consumption comparing before energy conservation activities.

(5) Please explain present activities of energy conservation in your enterprise, for example EC activity items, organization, and others.

Organization _____

Address _____

Telephone_____

Responsible person to entry this form_____

Thank you very much for your cooperation.

Sample form of EC recommendation report

-Content-

5. Publication and Award System (PAS)

(1) Program Name

Publication and Award System (PAS)

(2) Objective

- Dissemination of promising energy conservation practice an/or measure by publishing successful energy conservation cases
- Giving award for superior energy conservation activity and effort conducted by organization

(3) Outline of the Scheme and Each Phase

Overall Scheme	Contents	
	- Establishment of national and local referee committees - Collection of the following EC activity information on a routine basis through associations / organizations, such as Chamber of Commerce (COC) and Saudi Council of Engineers (SCE), Ministry of Commerce and Industry (MOCI) Ministry of Islamic Affairs (MOIA) and Ministry of Education (MOE), etc. • EC practices and measures applied in industrial, commercial, electricity equipment, school and mosque sector (5 categories) - Establishment and maintenance of database by adding collected EC information periodically - Announcement to collect applicants - Receiving application - Selection of superior ones as the local successful cases at local referee committee - Evaluation of the local awardees and selection of the most superior ones as the national successful cases at national referee committee - Publishing the outlines of awardees at SEEC homepage and compiling in annual awarding pamphlet - Holding awarding ceremony at 3 Days Big Fair in the "EC month"	
Phase 0 (Preparation Stage)	Task	Responsible Agency
	<u>Trial of award system in "Electricity" in Riyadh</u>	
	(1) Establishment of a referee committee in Riyadh	MOWE
	(2) Setting target for the trial (electricity, Riyadh, industry and commercial, etc.)	MOWE
	(3) Setting an application format	MOWE
	(4) Request application to COC and other channels	MOWE
	(5) Collection of application and selection by the referee committee	Referee C
	(6) Award ceremony	MOWE

Phase 1 (Pilot Stage)	Task	Responsible Agency
	Award system in "Electricity, Heat and Equipment"	
	(1) Establishment of national committee in Riyadh	SEEC
	(2) Setting target (electricity and heat, Riyadh and Dammam, sector, etc.)	SEEC
	(3) Collection of EC activity information on a routine basis through Associations / organizations	SEEC
	(4) Establishment and maintenance of database	SEEC
	(5) Announcement to collect applicants	SEEC
	(6) Receiving application	SEEC
	(7) Selection by the referee committee	Referee C
	(8) Publishing the outlines of awardees at SEEC homepage	SEEC
	(9) Holding awarding ceremony at 3 Days Big Fair in the EC month	SEEC
	(10) Dissemination of awarded cases	SEEC
Phase 2 (Final Stage)	Task	Responsible Agency
	Award system in all 5 sectors in the whole KSA	
	(1) Establishment of local referee committees in Riyadh, Jeddah and Dammam	SEEC
	(2) Setting target of all award	SEEC
	(3) Collection of EC activity information on a routine basis through Associations / organizations	SEEC
	(4) Maintenance of database	SEEC
	(5) Announcement to collect applicants for award	SEEC
	(6) Receiving application	SEEC
	(7) Selection of superior ones as the local successful cases and contributors at local referee committee	Local RC
	(8) Evaluation of the local awardees and selection of the most superior ones as the national successful cases	National RC
	(9) Publishing the outlines of awardees at SEEC homepage and compiling in annual awarding pamphlet	SEEC
	(10) Holding awarding ceremony at 3 Days Big Fair in the EC month	SEEC
	(11) Dissemination of awarded cases	SEEC

(4) Executing Agency

Name of Agency	Ministry of Water and Electricity (MOWE) as Preparation Team
Expected Role	**(Preparation Stage)** - Establishment of a referee committee in Riyadh - Setting target for the trial (electricity, Riyadh, sector, etc.) - Setting an application format - Request application to COC and other channels - Collection of application and selection by the referee committee - Award ceremony
Name of Agency	Saudi Energy Efficiency Center (SEEC)
Expected Role	**(Pilot Stage and Final Stage)** - Establishment of national committee in Riyadh - Setting target (electricity and heat, Riyadh and Dammam, sector, etc.) - Collection of EC activity information on a routine basis through Associations / organizations - Establishment and maintenance of database - Announcement to collect applicants for award - Receiving application - Publishing the outlines of awardees at SEEC homepage - Holding awarding ceremony at 3 Days Big Fair in the EC month - Dissemination of awarded cases
Name of Agency	National and Local Referee Committee
Expected Role	**(Pilot Stage)** - Selection by the referee committee **(Final Stage)** - Selection of superior ones as the local successful cases and contributors at local referee committee - Evaluation of the local awardees and selection of the most superior ones as the national successful cases and contributors at national referee committee

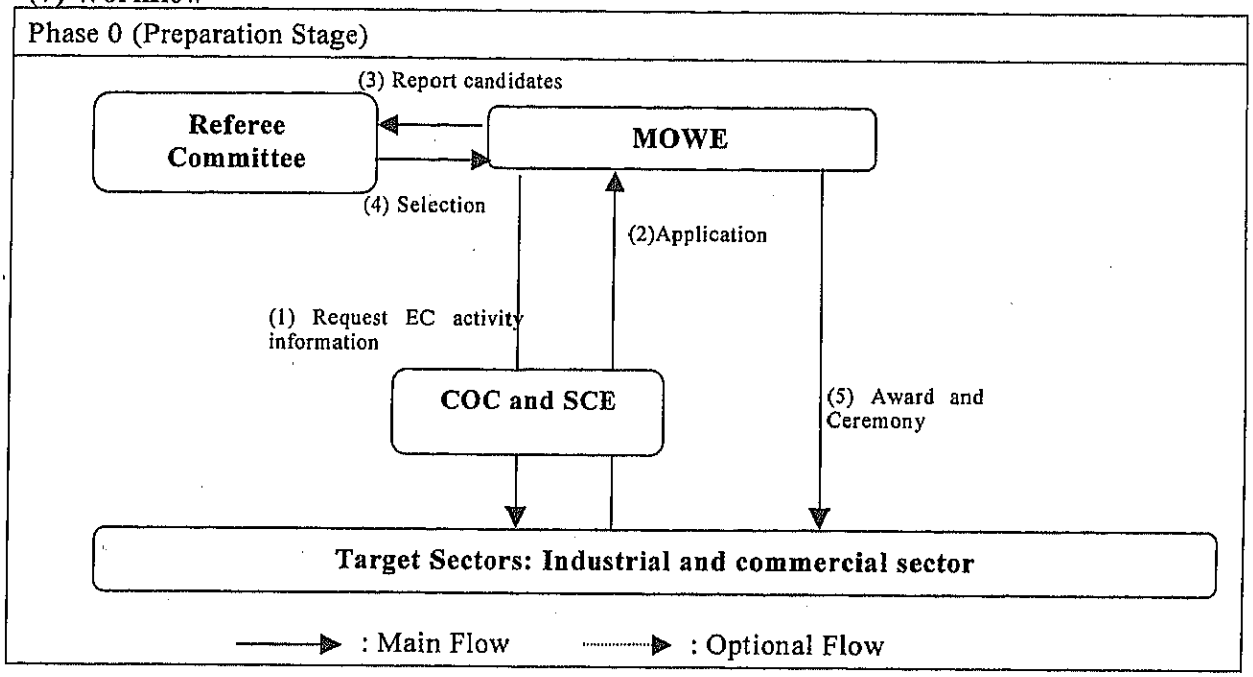
(5) Relating Agency

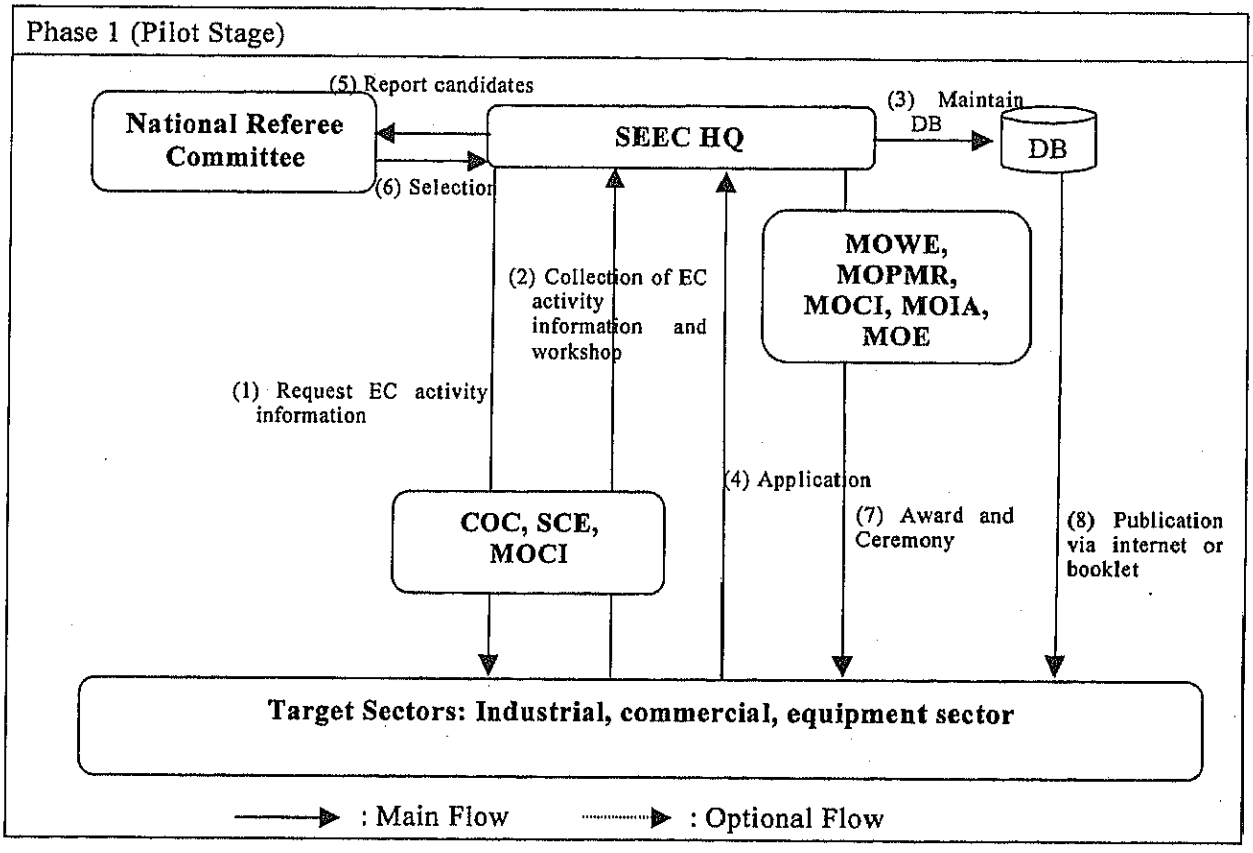
Name of Agency	COC in each city, Saudi Council of Engineers (SCE), Organizations for University, MOIA and MOE
Expected Role	- Providing information on their EC activity/project/product/person to SEEC local office

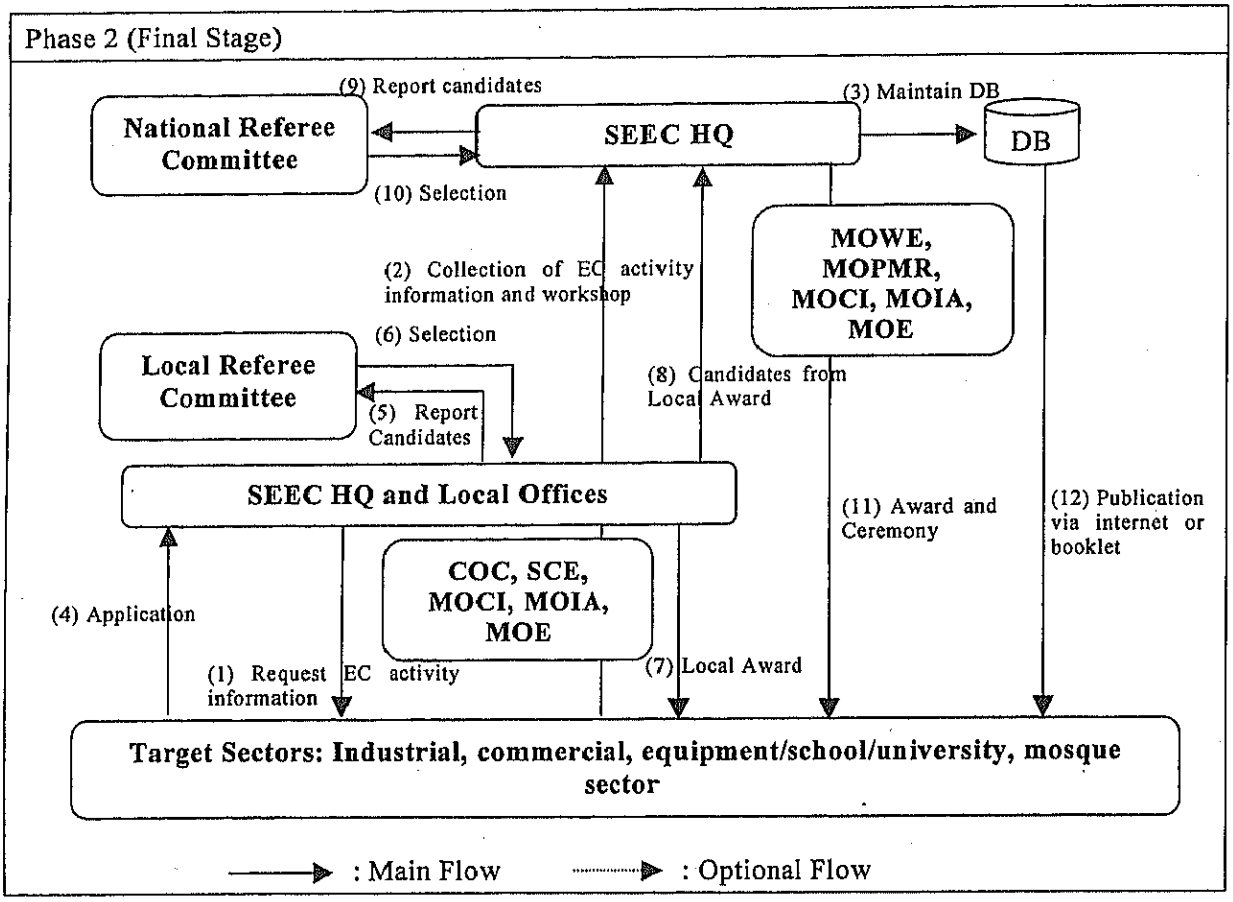
(6) Target of the Scheme

Name of Target	Successful case in industrial/commercial/equipment/school/university/ mosque sector
Expected Action	- Information release of their EC activity/project/product/practice to SEEC actively

(7) Workflow


Phase 0 (Preparation Stage)
(3) Report candidates
Referee Committee
MOWE
(4) Selection
(2)Application
(1) Request EC activity information
COC and SCE
(5) Award and Ceremony
Target Sectors: Industrial and commercial sector
: Main Flow
: Optional Flow


Phase 1 (Pilot Stage)
(5) Report candidates
National Referee Committee
SEEC HQ
(3) Maintain DB
DB
(6) Selection
MOWE, MOPMR, MOCI, MOIA, MOE
(2) Collection of EC activity information and workshop
(1) Request EC activity information
(4) Application
(7) Award and Ceremony
(8) Publication via internet or booklet
COC, SCE, MOCI
Target Sectors: Industrial, commercial, equipment sector
: Main Flow
: Optional Flow



(8) Required Permanent Human Resources

Phase 0 (Preparation Stage)	Human Resources	Financial Cost for Human Resources
	MOWE No incremental staff	No incremental cost
Phase 1 (Pilot Stage)	Human Resources	Financial Cost for Human Resources
	SEEC HQ Dissemination and publication staff: 1 Database Engineer: 1 EC activity monitor: 1	Standard Cost: 300,000 SR/year/person 0.3 x 3 =0.9 million SR/year
Phase 2 (Final Stage)	Human Resources	Financial Resources
	SEEC HQ Dissemination and publication: 1 Database engineer: 1 EC activity monitor: 1 SEEC (Local Offices) EC activity monitor: 1x2	Standard Cost: 300,000 SR/year/person 0.3 x 5 = 1.5 million SR/year

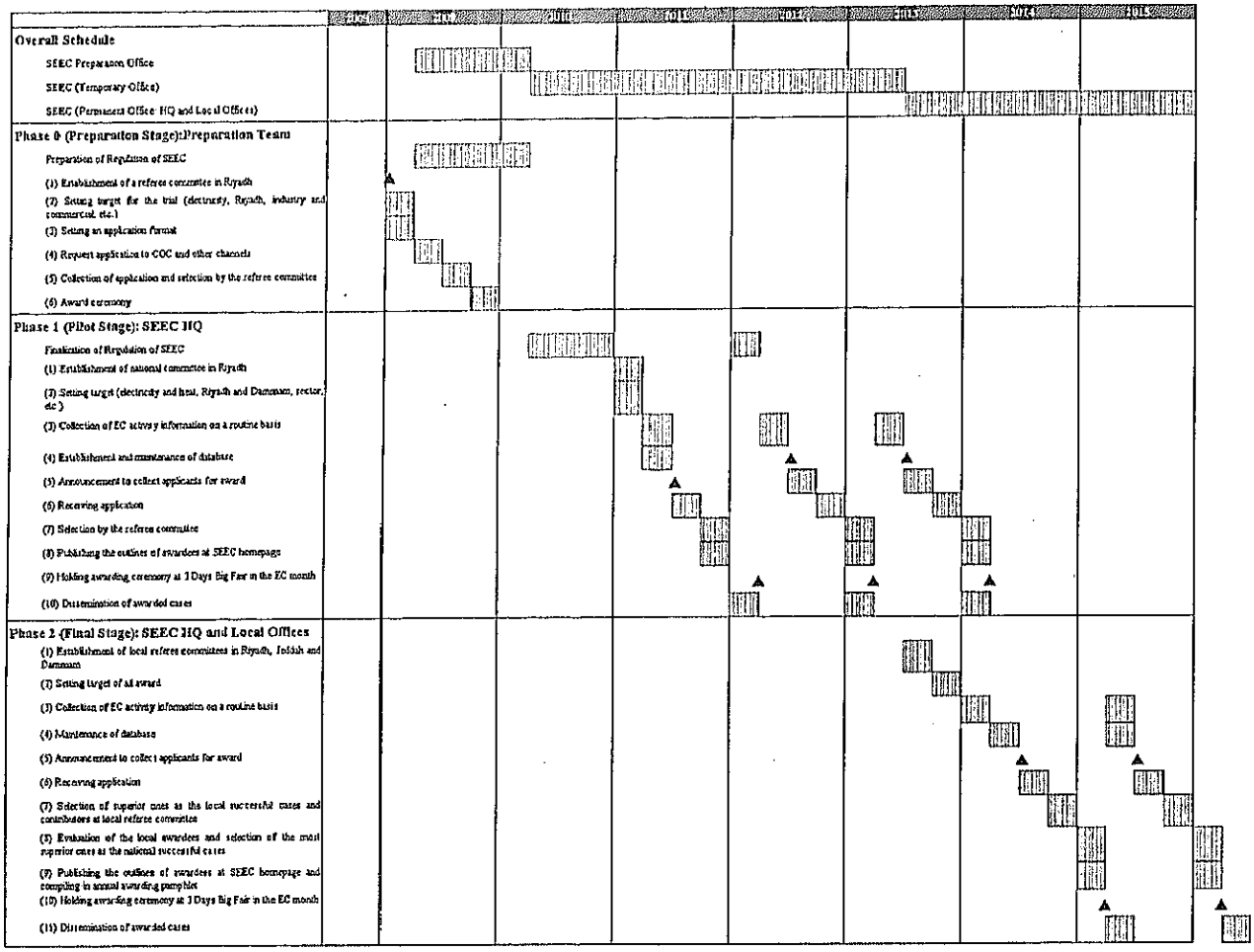
(9) Required Items

Phase 0 (Preparation Stage)	Item	Budget
	-	-
Phase 1 (Pilot Stage)	Item	Budget
	- Database software (SEEC) - Internet access system to the database (SEEC)	1 million SR 0.5 million SR
Phase 2 (Final Stage)	Item	Budget
	- Database software (SEEC) - Internet access system to the database (SEEC)	- -

(10) Expected Legislation for Enforcement

Phase 0 (Preparation Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 1 (Pilot Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 2 (Final Stage)	Items to be stipulated in Act	Relating Order/Regulation
	-	-

(11) Expected Action Plan



(12) Attachment

- Sample of application format
- Sample of evaluation criteria

(Remark) Award Category

	MOWE	MOPMR	MOCI	MOIA	MOE
Target	Electricity	Heat	Equipment	Mosque	School
Award	Project	Project	EC appliance	Activities	Activities
Phase 0	x				
Phase 1	x	x	x		
Phase 2	x	x	x	x	x

Attachment 5. Publication and Award System (PAS)
Sample of application format

1. Application Theme and Project Outline

(1) Name of Theme:_____

(2) Outline:

_____

_____

_____

_____

2. Outline of Application Group

(1) Company and Factory Name:_____

(2) Address:_____

(3) Business Category:_____

(4) Scale of Building: About _____ m^2 Floor Number:_____Floors

(5) Capital:_____Saudi Riyal

(6) Name of Application Group:_____

Name of Group Representative:_____

Belonging Department and Section:_____

Number of Group Member:_____

(7) Contact Person

Name:_____

Belonging Department / Section / Position:_____

Telephone:_____ FAX:_____

E-mail:_____

Application Sheet (1)

Award Criteria (Example)

No.	Items	Contents		
1	Theme Outline			
2	Implementation Period	Planning Period		
		Implementation Period		
		Monitoring Period		
3	Outline of Factory	Factory Name		
		Products		
		Production Capacity		
		Power Generation Capacity		
		Number of Employees		
		Yearly Energy Consumption	Kind of Fuel	Consumption
		Private Power Generation		
4	Target Process			

5	Reason of Theme Selection		
6	Comprehension and Analysis of Current Situation	Current System	
		Current Problem	7. Technological Difficulty
7	Process of Activity	Working Organization	6. Management Involvement
		Establishment of Target	
		Problems and Countermeasures	1. Originality 2. Dissemination
8	Environmental Protection	4. Environmental 5. Occupational Health and	

9	Results of Project Implementation	Technical Effects	
		Conserved Energy	3.
		Economics	
10	Summary		
11	Future Activity	8. Consistencies and Future	

Filled Example of Application Format

1. Theme Outline, 2. Implementation Period, 3. Outline of Factory

ブロワーのインバーター化と諸改善による省エネ活動

住友金属工業株式会社 鋼板・建材カンパニー
鹿島製鉄所 製鉄部 製鉄原料工場

◎キーワード：電気の動力、熱変換の合理化（電動力応用設備・電気加熱設備等）

◎ テーマの概要

大型ブロワーの高効率運用による電力削減
（非効率な吸い込みダンパー制御で運転されていた為、電力に大幅な無駄が発生していた。今回最新型で高効率のIGBTインバーターを導入、また現場の知恵を結集して諸改善を積重ね少ない投資で更なる省エネを行ない、使用電力の削減を図った。）

◎ 当該事例に対する実施期間　平成11年 2月 ～ 15年 3月
- ・企画立案の期間　平成11年 2月 ～ 12年 1月（延べ12ヶ月）
- ・対策の実施期間　平成12年 2月 ～ 14年10月（延べ32ヶ月）
- ・対策の確認期間　平成14年11月 ～ 15年 3月（延べ 5ヶ月）

◎ 事業所の概要
- ・生産品目　鋼板、鋼管、形鋼 等
- ・従業員　3,070 名（平成15年3月末現在 鹿島製鉄所在席社員数）

エネルギー年間使用量（ 14 年 度　実 績 ）
燃 料 3,109,477 KL（ 原 油 換 算 ）
電 力 2,708,372 MWh

4. Target Process

◎ 対象設備の工程

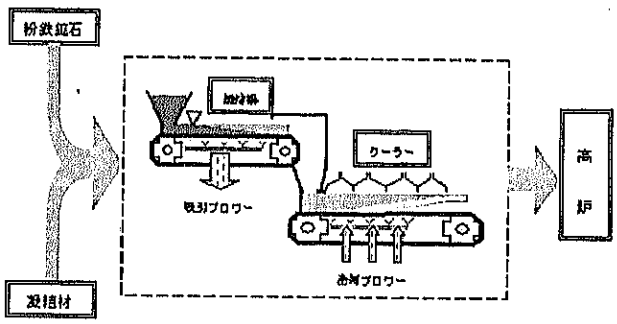


図1 粉鉄鉱石を焼き固め、高炉原料を造るプロセス

[TOP]

1．テーマ選定の理由

当工場は、大型溶鉱炉の原料製造プラントで30,000t/日の焼結鉱を製造している。工程は粉鉄鉱石に石灰粉・コークス粉を混合し水分添加、ガスで着火焼成し固めた物を破砕・整粒し成品としている。製造過程には種々（焼成用，成品冷却用，集塵用等）の電力消費量が多い大型ブロワーが複数ある。
H9年頃よりブロワーの使用目的に合わせ省エネ活動を進めた結果、入口ダンパーを絞り操業出来るようになった。そのブロワー特性から見ると、効率の悪い運転を行っている。そこで風量をコントロール出来るVVVFへの改造を行い更なる省エネ活動推進を目標に取り組む事にした。

6. Comprehensions and Analysis of Current Situation

2. 現状の把握および分析

(1) 現状の把握

鹿島製鉄所
平成8年～10年平均実績
電力使用量
2,642,093MWH／年
燃料使用量
3,396,459KL／年

製鉄原料工場
平成8年～10年平均実績
電力使用量
316,401MWH／年
当工場の使用比率
12%

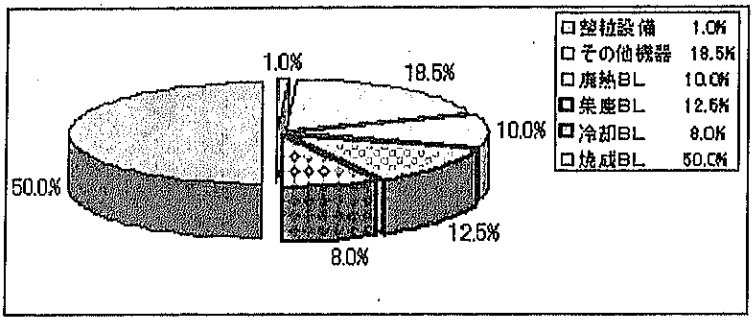


図2 H9年実績 焼結電力使用割

焼結工場の電力消費個所の内訳を大別すると、ブロワー・整粒設備・その他機器(ベルトコンベア、スクリーン、ミキサー等)となっている。
ブロワーは粉鉄鉱石を焼成する【吸引ブロワー】、焼結鉱を風冷する【冷却ブロワー】、原料・成品搬送時の発塵を防止する【集塵ブロワー】、廃熱を蒸気回収する【廃熱ブロワー】に分けられる。その中で今回ダンパーを絞って操業している集塵(8.0%)・冷却(12.5%)ブロワーを対象に省エネ活動に取組む事にした。

7. Process of Activity

3. 活動の経過

(1) 取組み体制

平成11年2月	:製鉄原料工場内で職場代表者が日頃考えている省エネ・コスト改善案件を出し合って討議
平成11年4～6月	:省エネ W/G結成 活動開始 工場で発掘した案件について 〔株〕住金マネジメント(省エネ診断業務委託)で現状ブロワーダンパー開度での電力風量測定
平成11年7～10月	:設備・工事費見積もり算出(インバーター購入費・電気室改造費・ケーブル配線工事費)
平成11年9～10月	:集塵個所周辺の降下粉塵測定
平成11年11月	:起業申請
平成11年12月～平成12年2月	:インバーターの競争見積もり
平成11年12月～平成12年10月	:改造工事実施(インバーター導入)
平成12年12月	:ブロワー共振点測定
平成13年1月～平成14年10月	:回転数制御による騒音改善実施

(2) 目標の設定

表1 各ブロワーにインバーター設置による削減目標

No	設 備 名	台数	削減量目標(MWh/年)
1	2焼結 1防塵ブロワー	1	2,755
2	2焼結 3・4クーラーブロワー	2	3,828
3	2焼結 排鉱ブロワー	1	1,689
4	2焼結 押し込みブロワー	1	2,663
5	3焼結 2・3防塵ブロワー	2	3,662
6	3焼結 7・8クーラーブロワー	2	3,291
合 計		9	17,888MWh/年

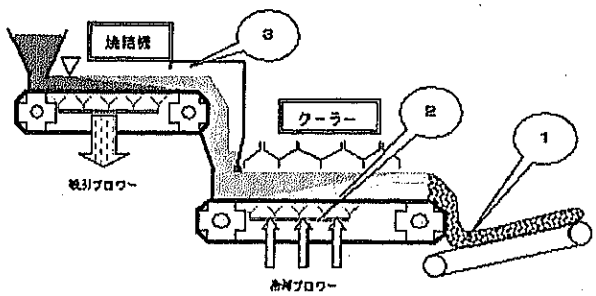
工場総使用電力量 316,401MWh/年
目標削減率 5.65%

インバーター設置により吸引風量・環境を変化させないでダンパーを全開にし回転数を下げブロワーの使用電力を削減する。

(2) 問題点とその検討

	問題点	その検討
操業関係	・発塵防止の為にキッチリ焼き込んだ場合に 生産量はキープ出来るのか？ ・急激な温度変化が発生した場合にベルト焼損 事故は起きないのか？	・生産性の向上改善案検討(給鉱部通気性の向上) ・ベルト温度管理の検討(温度センサー取り付け、ベルト温度管理方案作成)
冷却効率	・冷却ゾーンで完璧に冷却出来るのか？ ・急激な温度変化が発生した場合に冷却しきれるのか？ ・バグ焼損防止用冷風ダンパー全開にして入口温度が90℃以下を確保出来ないか？	・冷却集合ダクトの有効活用案の検討(仕切板撤去による風量ムラの改善) ・排ガス温度が一定になるような制御装置設置検討(温度監視装置設置) ・集塵ダクトの効率的使用方法検討 (保温材の取り外し)
発塵関係	・防塵ブロワー改造後の吸引風量で環境対策に問題はないのか？ ・現状の集塵率は適正なのか？また改善により更に高効率集塵は出来ないのか？ ・工場運転・停止時の発塵は ないのか？	・吸引風量測定と環境測定実施 ・発塵個所の発塵防止対策 (発塵個所の密閉化)・クーラー発塵対策 (クーラー押込みブロワーの 圧力制御実施)
運用方法	・省エネになるブロワーの運転、停止方法が 解らない ・VVVFブロワーの共振点が良く解らない ・ブロワー温度設定の設定温度が解らない	・ブロワーについての周知徹底(運転・停止の勉強会実施)・共振点測定 (回転数と共振点の明確化)・設定温度の取り決め実施 (使用方法の勉強会実施)

4. 対策の内容



9. Result of Project Implementation

5. 対策後の効果

(1) 設備別電力削減量と削減率

表2 削減量と削減率

No	改善項目	改善前→改善後の削減率	削減量(MWh/年)
1	2焼結 1防塵BL	49%	2,755
2	2焼結 3,4クーラーBL	54%	3,828
3	2焼結 排鉱BL	83%	1,689
4	3焼結 2,3防塵BL	37%	3,662
5	3焼結 7,8クーラーBL	66%	3,291
6	2焼結 押込みBL	63%	2,663
7	3焼結 クーラー集合ダクト仕切板改造	53%	1,179
8	3焼結 クーラーフード密閉化	12%	724
9	3焼結 BL運用改善	7%	90
10	2焼結 焼結機フード改善	4%	116
合計			19,990

(2) 工場消費電力と生産量年度別推移表

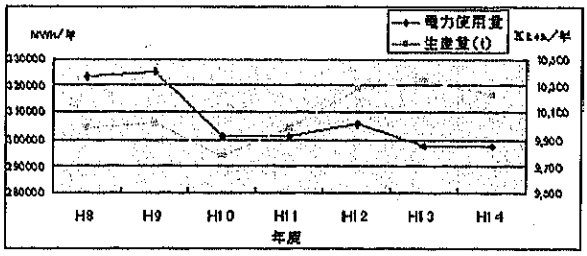


図4 電力使用量と生産量

活動前の平成8，9年は、約325000MWh/年の電力使用であった。
平成10年は生産量の減産により吸引ブロワーを数ヶ月間、低出力モーターで使用した。
平成11年より省エネ取組み推進により生産量が大幅に増加しても電力使用量は300000MWh/年以下で推移している。

Sample of evaluation criteria

No.	Criteria	Allotted Score
1	Originality	10
2	Applicability to Others	10
3	Effect	40
4	Environmental Impact	10
5	Occupational Safety and Health	5
6	Involvement of Management	5
7	Technological Difficulty	10
8	Consistency and Future Development	10
Total		100

6. EC Campaign

(1) Program Name

EC Campaign

(2) Objective

- Raising energy conservation awareness of all consumers
- Check of annual energy conservation activities
- Strengthening a connection between private sector and government sector to promote EC technology

(3) Outline of the Scheme and Each Phase

Overall Scheme	Contents	
	(Existing Program) - MOWE has already implemented the "National EC Campaign", but it is not periodically. - MOWE launched the water and electricity exhibition, "WE-Power" at 2003. The 4th Exhibition holds in April 2008. **(New Program to be merged into the Existing Program)** - Establishment of "Saudi Energy Conservation Month (the EC Month)" in annual basis - Special EC events concentrated in the EC Month as follows: ➢ "3 Days Big Fair" which can be merged into the existing WE-Power. ➢ Workshop for Mosque Campaign ➢ EC Education for Schools, etc. - Holding the "3 Days Big Fair (to be merged into the WE Power)" including EC technology exhibition, announcement of some campaign, award ceremony, workshop/seminar, etc.	
Phase 1 (Final Stage)	Task	Responsible Agency
	(1) Establishment of "Saudi Energy Conservation Month (the EC Month)" in annual basis	MOWE
	(2) Coordination of the existing "National EC Campaign" with the EC Month	MOWE
	(3) Allocation a budget for the National EC Campaign and special events in the EC Month by annual basis	MOF
	(4) Start of the National EC Campaign at the same timing of the EC Month	MOWE
	(5) Strengthening the National EC Campaign in the EC Month	MOWE
	(6) Special EC events concentrated in the EC Month as follows: ➢ "3 Days Big Fair" which can be merged into the existing WE-Power. ➢ Workshop for Mosque Campaign ➢ EC Education for Schools, etc.	MOWE
	(7) Holding the "3 Days Big Fair (to be merged into the WE-Power)" including EC technology exhibition, announcement of some campaign, award ceremony, workshop/seminar, etc.	MOWE
	(8) Monitoring and awareness survey for the campaign	MOWE

(4) Executing Agency

Name of Agency	Ministry of Water and Electricity (MOWE)
Expected Role	- Establishment of "Saudi Energy Conservation Month (Saudi EC Month)" in annual basis - Coordination of the existing "National EC Campaign" with the EC Month - Start of the National EC Campaign at the same timing of the EC Month and strengthening the National EC Campaign in the EC Month - Special EC events concentrated in the EC Month - Holding the "3 Days Big Fair (to be merged into the WE Power)" including EC technology exhibition, announcement of some campaign, award ceremony, workshop/seminar, etc. - Monitoring and awareness survey for the campaign
Name of Agency	Saudi Energy Efficiency Center (SEEC)
Expected Role	- Joint implementation with MOWE's campaign

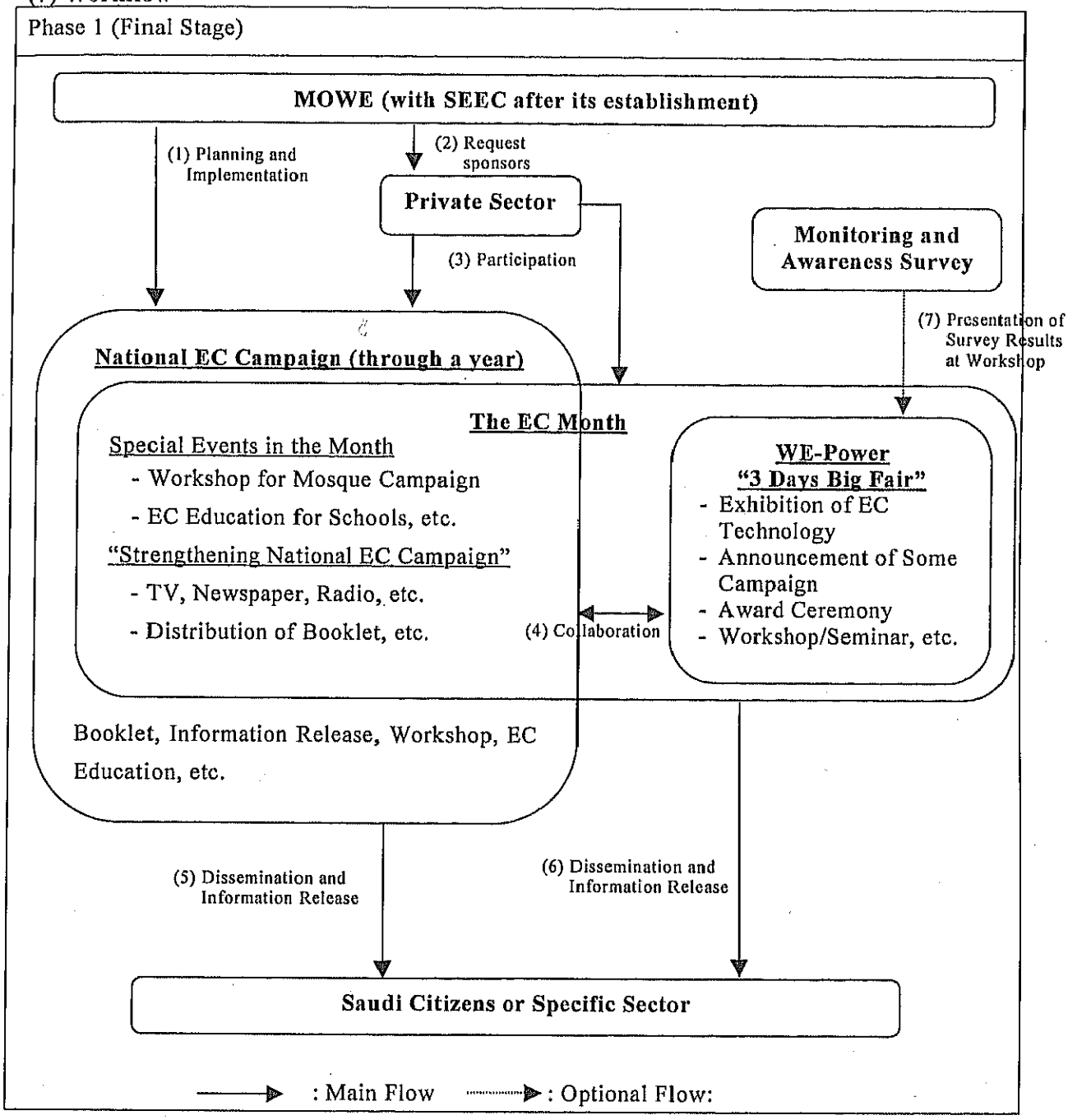
(5) Relating Agency

Name of Agency	Ministry of Finance (MOF)
Expected Role	- Allocation a budget for the National EC Campaign and special events in the EC Month by annual basis
Name of Agency	Saudi Electricity Authority (SEC)
Expected Role	- Cooperation for the activities of MOWE's campaign - Synchronizing SEC's campaign and MOWE's campaign
Name of Agency	Ministry of Islamic Affairs (MOIA)
Expected Role	- Cooperation for the activities relevant to Mosque campaign
Name of Agency	Private Sector
Expected Role	- Sponsor for campaign and 3 Days Big Fair

(6) Target of the Scheme

Name of Target	All sectors
Expected Action	- Participation in the EC Campaign and the "3 Days Big Fair"
Name of Target	Private Sectors
Expected Action	- Participation in the "3 Days Big Fair" by exhibition of their products - Presentation in workshop/seminar in the "3 Days Big Fair"

(7) Workflow


Phase 1 (Final Stage)
MOWE (with SEEC after its establishment)
(1) Planning and Implementation
(2) Request sponsors
Private Sector
(3) Participation
Monitoring and Awareness Survey
(7) Presentation of Survey Results at Workshop
National EC Campaign (through a year)
The EC Month
Special Events in the Month
- Workshop for Mosque Campaign
- EC Education for Schools, etc.
"Strengthening National EC Campaign"
- TV, Newspaper, Radio, etc.
- Distribution of Booklet, etc.
(4) Collaboration
WE-Power
"3 Days Big Fair"
- Exhibition of EC Technology
- Announcement of Some Campaign
- Award Ceremony
- Workshop/Seminar, etc.
Booklet, Information Release, Workshop, EC Education, etc.
(5) Dissemination and Information Release
(6) Dissemination and Information Release
Saudi Citizens or Specific Sector
: Main Flow
: Optional Flow:

(8) Required Permanent Human Resources

	Human Resources	Financial Resources
Phase 1 (Final Stage)	MOWE No incremental staff SEEC HQ Dissemination and publication: 1	Standard Cost: 300,000 SR/year/person 0.3 x 1 = 0.3 million SR/year

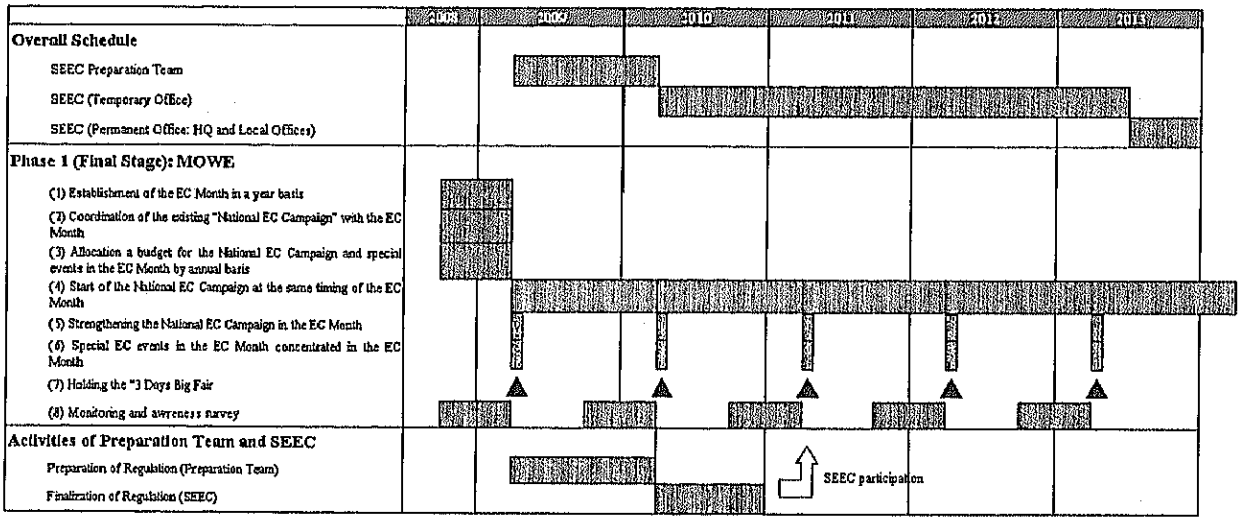
(9) Required Items

	Item	Budget
Phase 1 (Final Stage)	Cost of national campaign, EC month and exhibition is expected to be covered by sponsors (private sector).	0 SR (No special budget is needed because expenditure is covered by sponsor)

(10) Expected Legislation for Enforcement

	Items to be stipulated in Act	Relating Order/Regulation
Phase 2 (Final Stage)	-	-

(11) Expected Action Plan



(12) Attachment

- Implementation plan for the "Mosque Campaign"

Attachment 6. EC Campaign

Implementation plan for the "Mosque Campaign"

1. Objective of EC Campaign in the Mosque Sector

- Enhancing EC awareness of the KSA national
- Disseminating EC activity to the residential sector through Imam and mosque

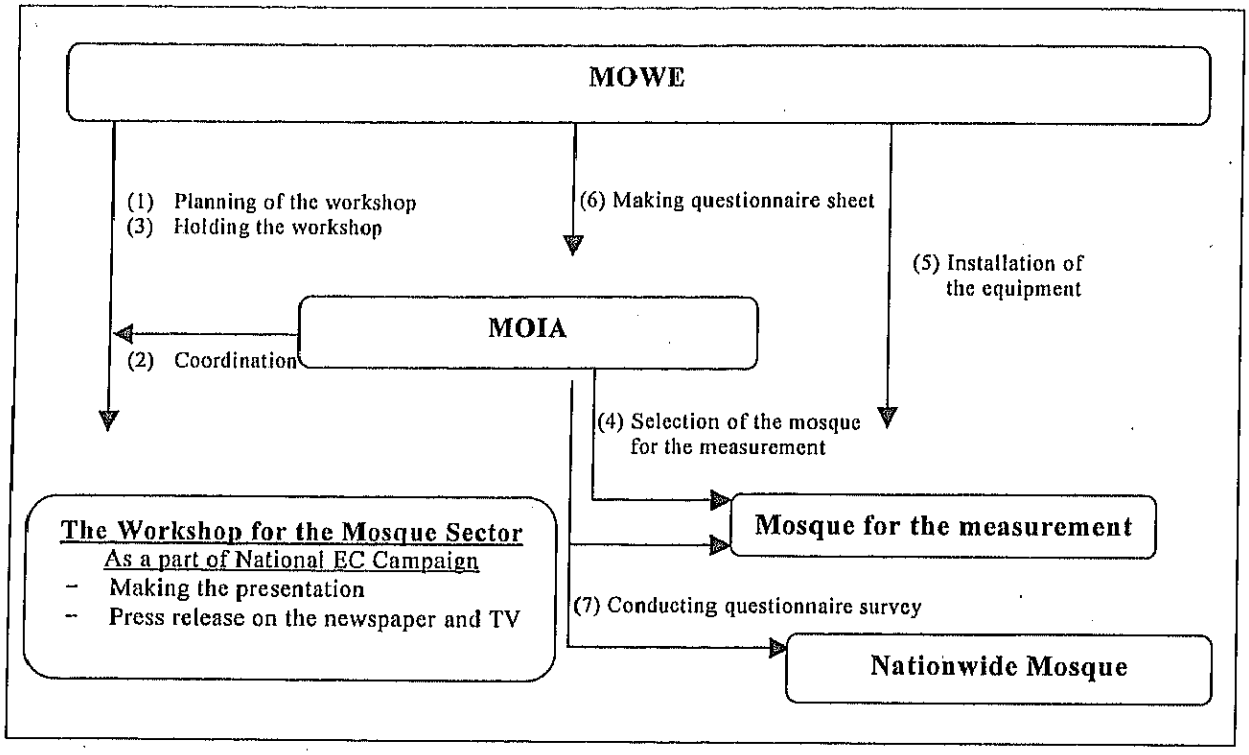
2. Content

- Request Imam to make speech for disseminating EC
- Request mosque to practice EC to initiate EC practice by prayers
- Measurement of electricity consumption of selected 9 mosques
  (Riyadh: 3 Eastern province 3 Western province 3)
- Monitoring and check of speech by Imam and EC activity on a year cycle

3. Outline of the Scheme

Overall Scheme	Task	Responsible Agency
	(First 1 year)	
	(1) Planning of the workshop for the mosque sector during 3 Days Big fair in the EC month • Situation of power supply and demand in the KSA • Necessity of EC activity • Introduction of power load survey at the mosque • Request the Imam to make a speech to disseminate EC • Request the mosque to practice EC • Introduction of Monitoring & check in a year cycle etc.	MOWE
	(2) Coordination of holding the workshop in Riyadh, Jeddah and Dammam in cooperation with MOWE • Inviting the Imam and the mosque staff	MOIA
	(3) Holding the workshop for the mosque sector during 3 Days Big Fair • Introduction of Saudi energy situation and its necessity • Request Imam to make a speech for EC • Request mosque to practice EC activity • Press release on the newspaper and TV to the nationwide	MOWE MOIA
	(4) Selection of the mosque to be installed the measurement equipment (3 mosques should install the equipment in each region, Riyadh, Jeddah and Dammam)	MOWE
	(5) Installation of the measurement equipment at the selected mosque including procurement of the equipment	MOWE
	(6) Making a questionnaire sheet for monitoring the speech by Imam and EC activity by mosque	MOIA
	(7) Conducting the questionnaire survey	MOWE
	(After 1 year)	MOIA
	(8) Same as (1)	MOWE
	(9) Same as (2)	MOIA
	(10) In addition to (3), the following content is introduced at the workshop • Introduction of the result of the questionnaire survey & EC practice at the mosque	MOWE
	(11) Same as (4) (5) (6) & (7)	MOWE/ MOIA

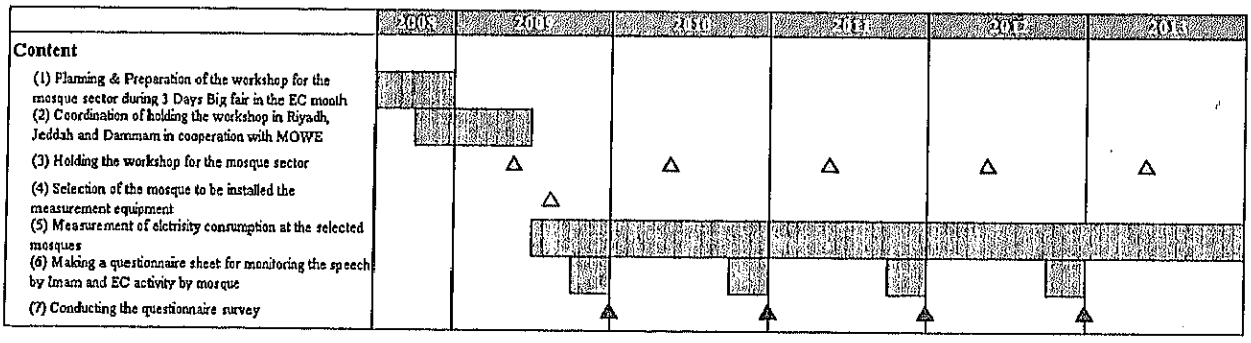
4. Workflow



5. Required Items

Item	Budget
- Procurement of 9 sets of Electricity Measurement Equipment	Approx. 72,000 SR (8,000SAR * 9 sets)

6. Overall Schedule



7. Check System of Customer Records

(1) Program Name

Check System of Customer Records

(2) Objective

- Raising energy conservation awareness of all customers
- Grasping the past electricity consumption easily
- Grasping customers' behavior and needs through internet survey

(3) Outline of the Scheme and Each Phase

Overall Scheme	Contents	
	(Existing System) - SEC has already formulated monthly bill access system (past 18 months) by internet. But it is Islamic calendar. **(New System)** - Making check system of customer records by revising the current system - Making a list of customers who access to the SEC's Check System site (for internet survey) - Implementation of internet survey to collect opinions and needs using the customer's list - Feedback of the questionnaire survey results to the cooperative customers	
Phase 1 (Check System)	Task	Responsible Agency
	(1) Making accumulated database in Gregory calendar for all customers records	SEC
	(2) Making website access system by revising the current system	SEC
	(3) Designing website screen for dissemination of energy conservation, CO2 emission reduction, etc.	SEC
	(4) Operation and dissemination of the system to customers	SEC
	(5) Making a list of customers who access to SEC's Check System site (for internet survey)	SEC
Phase 2 (Internet Survey)	Task	Responsible Agency
	(To be added to Phase 1)	
	(1) Designing internet survey	SEC
	(2) Implementation of internet survey to collect opinions and needs using customer's list	SEC SEC
	(3) Feedback of the internet survey results to the cooperative customers	

(4) Executing Agency

Name of Agency	Saudi Electricity Company (SEC)
Expected Role	**(Check System)** - Making accumulated database in Gregory calendar for all customers records - Making website access system by revising the current system - Designing website screen for dissemination of energy conservation, CO2 emission reduction, etc. - Operation and dissemination of the system to customers - Making a list of customers who access to SEC's Check System site (for internet survey) **(Internet Survey)** - Designing internet survey - Implementation of internet survey to collect opinions and needs using customer's list - Feedback of the internet survey results to the cooperative customers

(5) Relating Agency

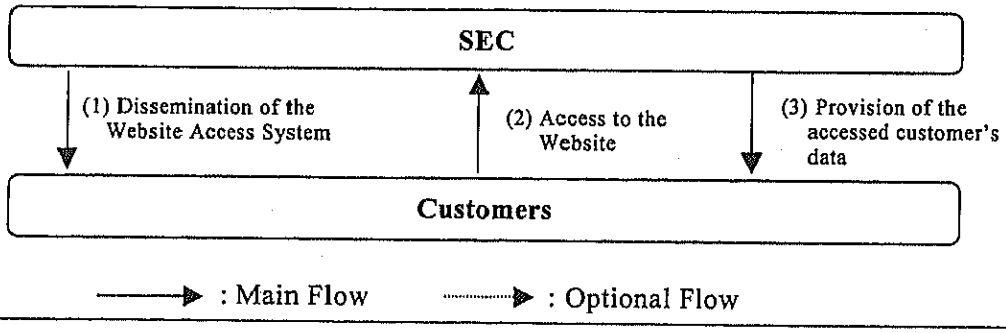
Name of Agency	-
Expected Role	-

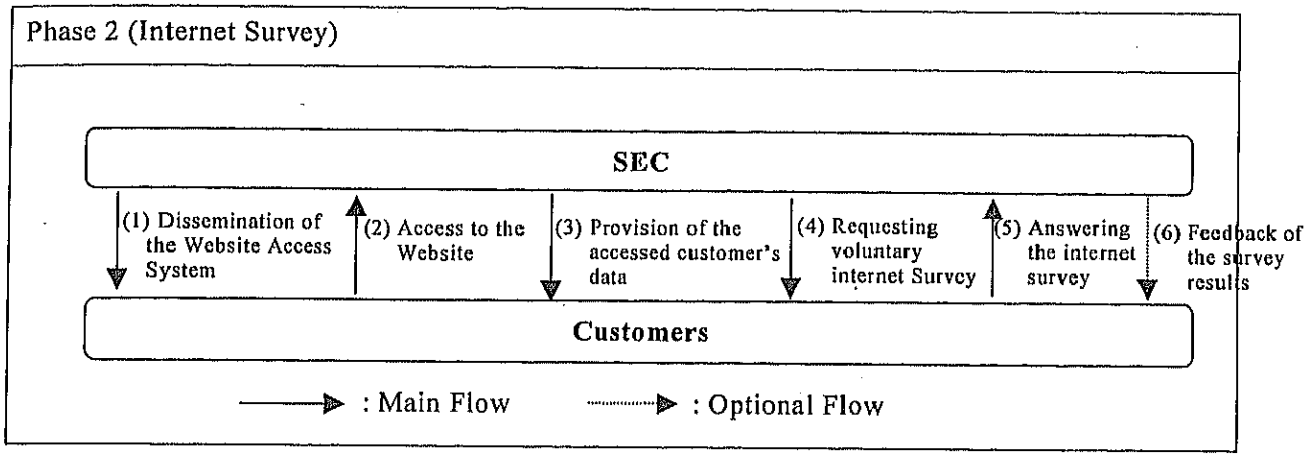
(6) Target of the Scheme

Name of Target	All sectors (especially residential sector)
Expected Action	- Checking their electricity consumption in the past by customer - Participating in internet survey

(7) Workflow

Phase 1 (Check System)





(8) Required Permanent Human Resources

Phase 1 (Check System)	Human Resources	Financial Cost for Human Resources
	SEC (Database) No incremental staff	No incremental cost
	SEC (Campaign) No incremental staff	No incremental cost
Phase 2 (Internet Survey)	Human Resources	Financial Resources
	SEC (Internet Survey) Data collection, making report and publication: 1	Standard Cost: 300,000 SR/year/person 0.3 x 1=0.3 million SR/year

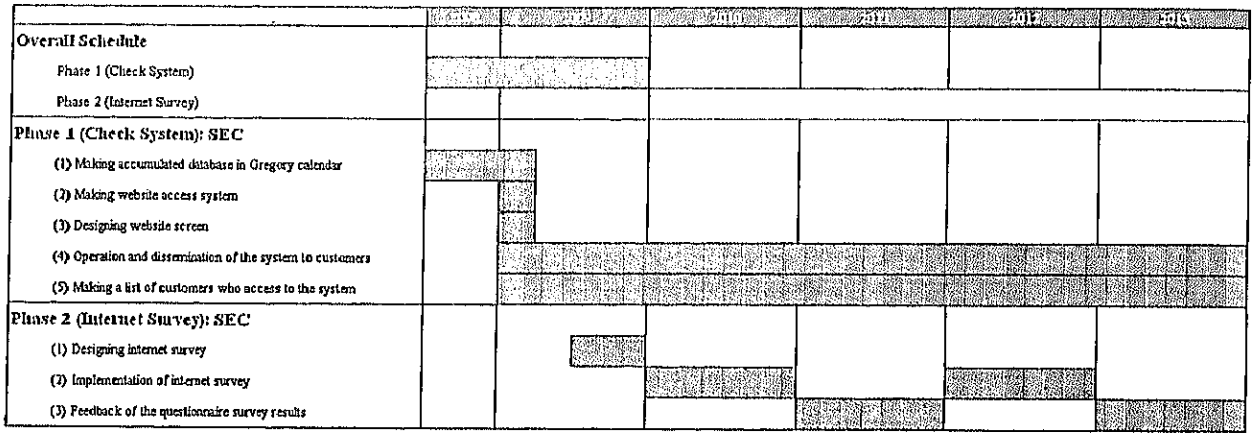
(9) Required Items

Phase 1 (Check System)	Item	Budget
	- Database (outsourcing by SEC) - Internet access system (outsourcing by SEC)	1 million SR/time 0.5 million SR/time
Phase 2 (Internet Survey)	Item	Budget
	-	-

(10) Expected Legislation for Enforcement

Phase 1 (Check System)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 2 (Internet Survey)	Items to be stipulated in Act	Relating Order/Regulation
	-	-

(11) Expected Action Plan



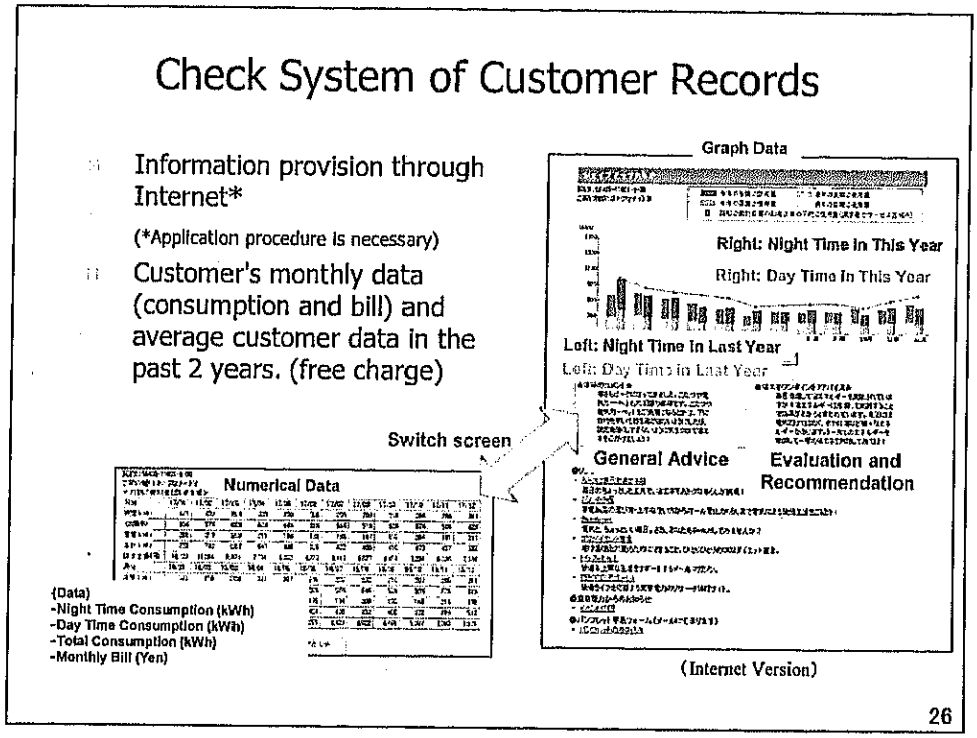
(12) Attachment

- Japan's sample of check system screen in internet
- Japan's sample of questionnaire sheet in internet survey

Attachment 7. Check System

Japan's sample of check system screen in internet

Sample Screen of Check System of Customer Records



Japan's sample of questionnaire sheet in internet survey (Internet Survey for Customer Record Members)

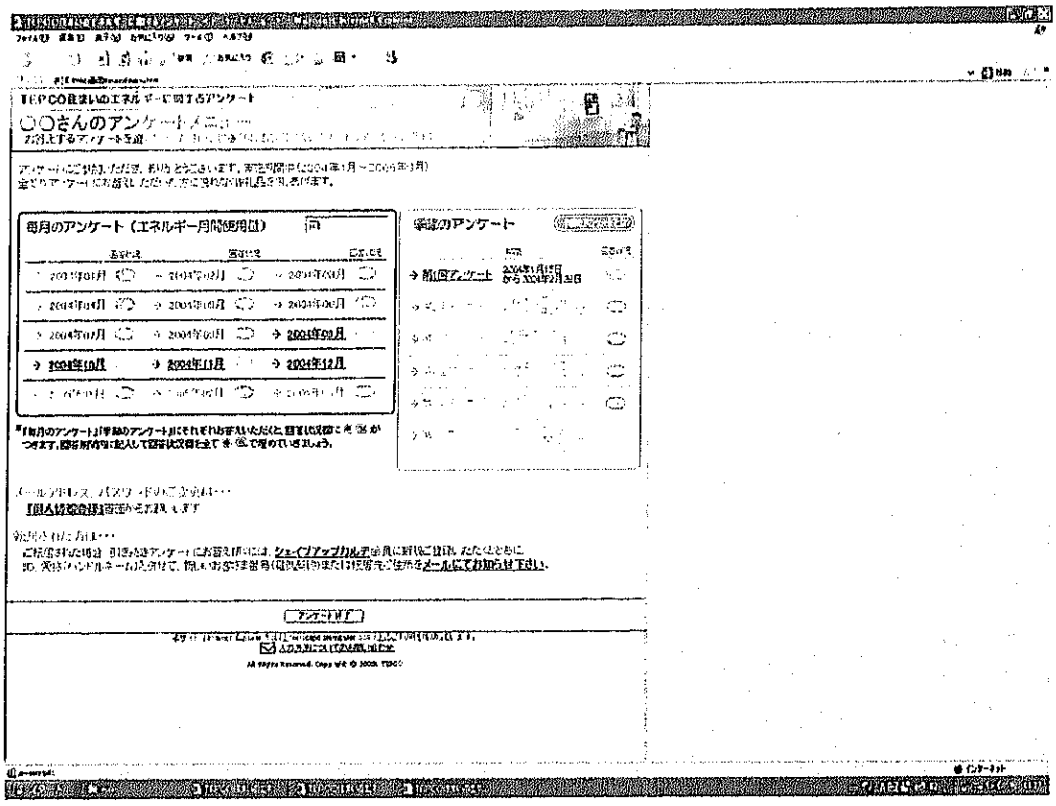
(1) Sample of Questionnaire Design

Energy Use Data (15 month) (every time)	Electricity	Consumption, Bill, Reading date
	Other	Utility gas consumption, Bill, Reading date
		LPG consumption, Bill, Purchae date
		Water consumption, Bill, Reading date
		Oil consumption, Bill, Purchase date
		Absent duration (from ## to ##)

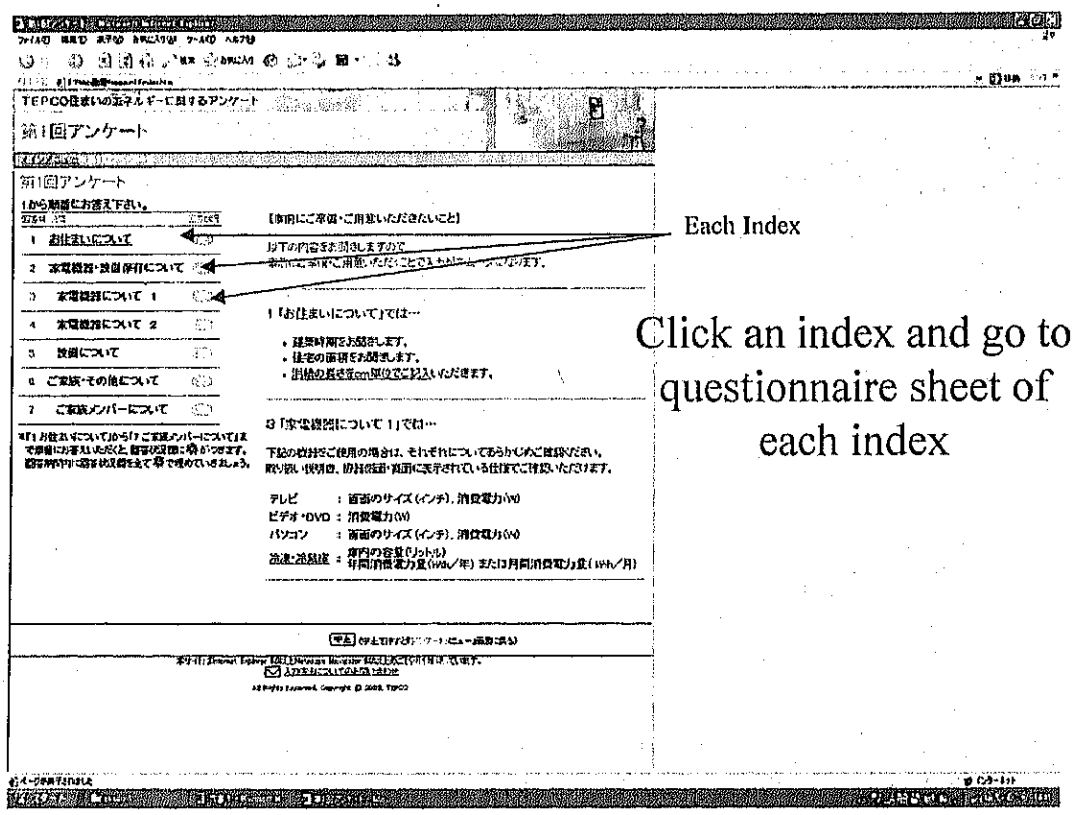
Basic Information (1st time)	House data (structure, age, etc.)
	Use of Room (user, purpose, feature)
	Appliances and Equipment
	Family Structure

Seasonal Survey (4 times)	Change of Basic Information (every time)	Change of house structure, appliances, equipment (if any)
		Purchased and waste appliances
		Coming and outgoing person
	Lifestyle (1 time)	Room specification (temperature of AC, sunshine, ventilation)
		Lighting
		Custom such as washing dishes, bathing, etc.
		Kitchen equipment and washing equipment
		Bathroom facility, bathing/shower, toilet, etc.
		Meal and house work
	Heating (winter)	Heater and AC equipment and their number
		Use of each heating equipment
		Specification of each heating equipment
		Starting day and end of day of each heating equipment
	Cooling (Summer)	Number of cooling AC
		Use of each cooling equipment
		Starting day and end of day of each cooling equipment
	Awareness (1 time)	Awareness for AC
		Awareness for cooking tools
		Priority points when purchase an equipment
		Interest for environment

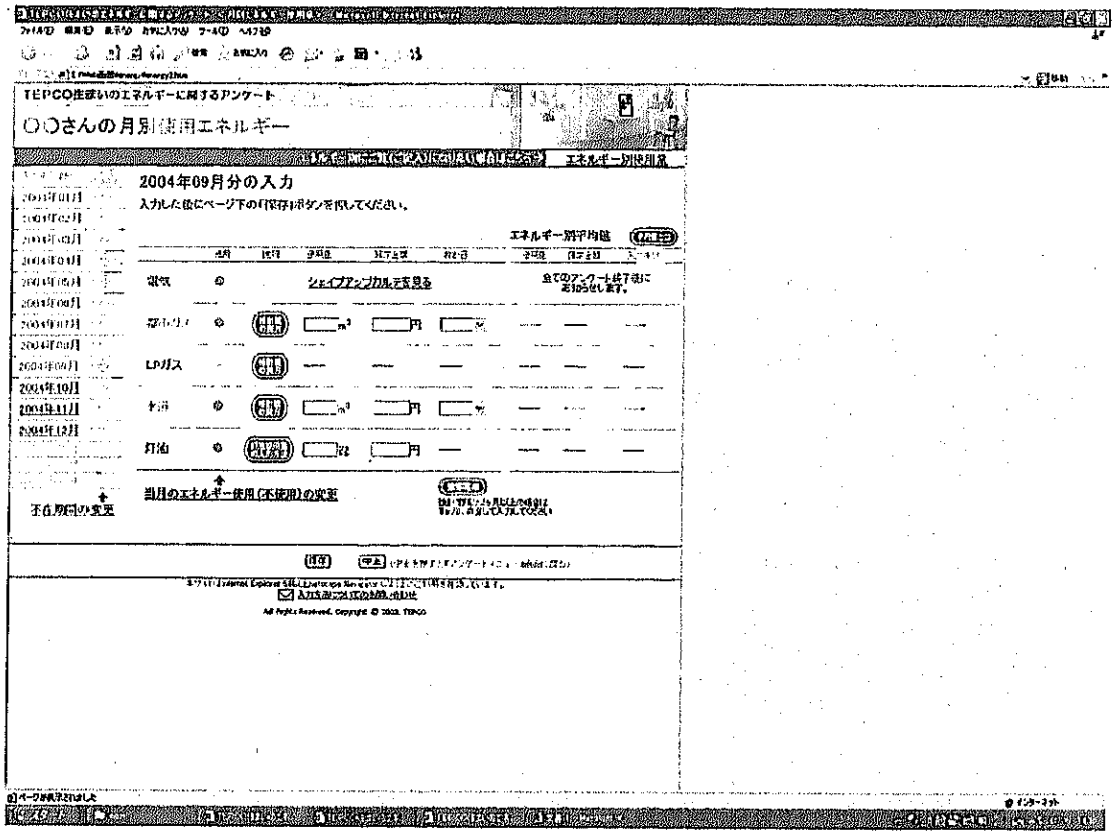
(2) Questionnaire Input Screen (Introduction)



(3) Questionnaire Input Screen (Index Sheet)



(4) Questionnaire Input Screen (Energy Data Input)



8. EC Education for Schools

(1) Program Name

EC Education for Schools

(2) Objective

- Raising energy conservation awareness of primary school students

(3) Outline of the Scheme and Each Phase

Overall Scheme	Task	
	(Existing Scheme) - An Education Team (MOWE/SEC/KACST) dispatches lectures and directly makes a seminar for students and teachers at junior high school. **(DT Scheme)** - Making education materials and teaching standard for primary school students by Direct Teaching (DT) scheme by the Education Team - Implementation of an EC education in a classroom/classrooms in a primary school by the Education Team - Arrangement of SEC's P/S visitation for students as a part of education **(TOT Scheme)** - Making education materials by revising DT scheme - Workshop and demonstration to teachers for TOT (Training of Trainers) scheme - Selection of cooperative teachers and giving a special training seminar - Implementation of an EC education in teachers' classroom by cooperative teacher, supported by the Education Team (only first time)	
Phase 1 (DT Scheme)	Task	Responsible Agency
	(1) Making education materials and teaching standard for primary school students by Direct Teaching (DT) scheme by the Education Team	MOWE
	(2) Selection of primary schools	MOWE/MOE
	(3) Implementation of an EC education in a classroom(s) in a primary school by the Education Team	MOWE
	(4) Arrangement of SEC's P/S visitation for students as a part of education	MOWE/SEC
	(5) Review and evaluation of DT scheme	MOWE
Phase 2 (TOT Scheme)	Task	Responsible Agency
	(1) Making education materials by revising DT scheme	MOWE
	(2) Workshop and demonstration to teachers for TOT (Training of Trainers) scheme	MOWE
	(3) Selection of cooperative teachers and giving a special training seminar	MOWE/MOE
	(4) Preparation of small gift (as a part of education) to students	MOWE
	(5) Implementation of an EC education in teachers' classroom by cooperative teacher, supported by the Education Team	MOWE/MOE

(4) Executing Agency

Name of Agency	Ministry of Water and Electricity (MOWE)
Expected Role	**(DT Scheme)** - Making education materials and teaching standard for primary school students by Direct Teaching (DT) scheme by the Education Team - Selection of primary schools - Implementation of an EC education in classroom(s) in a primary school by the Education Team - Arrangement of SEC's P/S visitation for students as a part of education - Review and evaluation of DT scheme **(TOT Scheme)** - Making education materials by revising DT scheme - Workshop and demonstration to teachers for TOT (Training of Trainers) scheme - Selection of cooperative teachers and giving a training special seminar - Preparation of small gift (as a part of education) to students - Implementation of an EC education in teachers' classroom by cooperative teacher, supported by the Education Team
Name of Agency	Ministry of Education (MOE)
Expected Role	**(DT Scheme)** - Selection of primary schools **(TOT Scheme)** - Selection of cooperative teachers and giving a special training seminar - Implementation of an EC education in teachers' classroom by cooperative teacher, supported by the Education Team

(5) Relating Agency

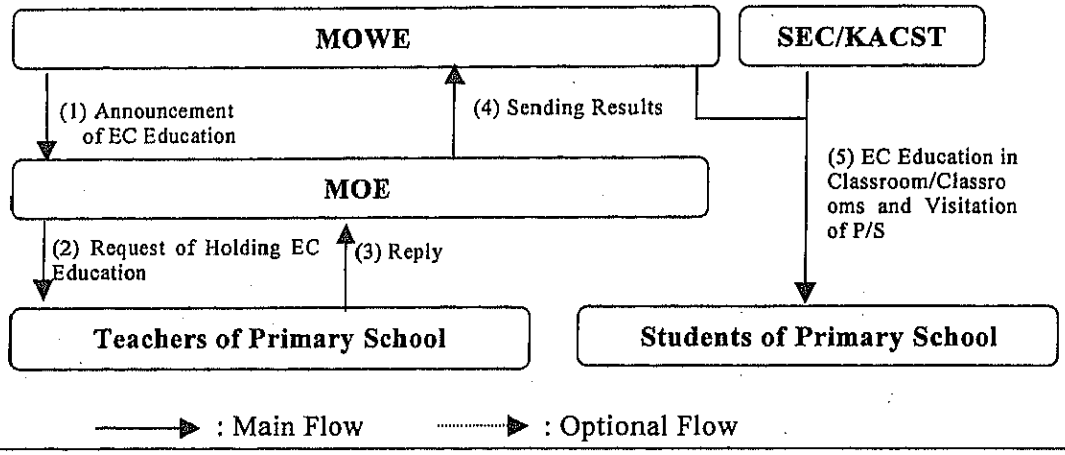
Name of Agency	Saudi Electricity Company (SEC)
Expected Role	- Implementation of an EC education in classroom(s) in a primary school by the Education Team at DT scheme - Arrangement of P/S visitation as a part of education - Support of TOT to cooperative teachers
Name of Agency	King Abdulaziz City for Science and Technology (KACST)
Expected Role	- Implementation of an EC education in classroom(s) in a primary school by the Education Team at DT scheme - Support of TOT to cooperative teachers

(6) Target of the Scheme

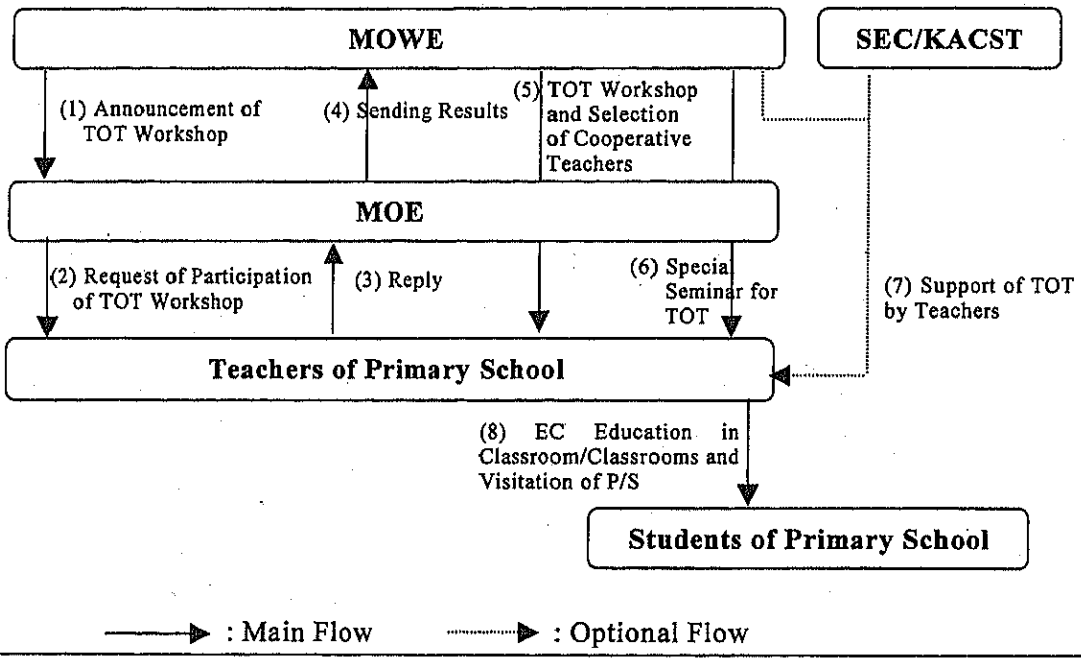
Name of Target	Primary school students (DT Scheme)
Expected Action	- Coordination of contents of DT scheme and P/S visitation between MOWE and teachers
Name of Target	Primary school teachers (TOT Scheme)
Expected Action	- Participation of workshop for TOT scheme - Receiving a special training seminar for cooperative teachers - Implementation of an EC education in classroom and taking students to P/S

(7) Workflow

Phase 1 (DT Scheme)



Phase 2 (TOT Scheme)



(8) Required Permanent Human Resources

Phase 1 (DT Scheme)	Human Resources	Financial Cost for Human Resources
	Education Team (MOWE/SEC/KACST) No incremental staff	No incremental cost.
Phase 2 (TOT Scheme)	Human Resources	Financial Resources
	Education Team (MOWE/SEC/KACST) No incremental staff	No incremental cost

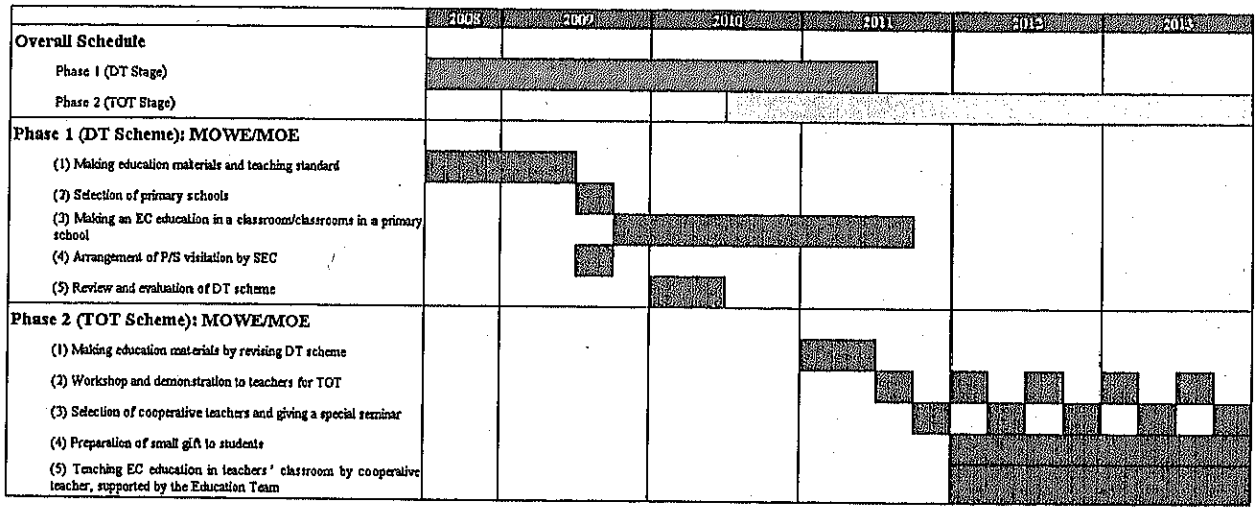
(9) Required Items

Phase 1 (DT Scheme)	Item	Budget
	- Making education materials (MOWE) - Small gifts for students (MOWE) - Transportation costs for visitation of P/S (MOWE)	160,000 SR/year (100,000 SR) (3,000 SR/time x 10 times) (3,000 SR/time x 10 times)
Phase 2 (TOT Scheme)	Item	Budget
	- Workshop and special training seminar (MOWE) - Small gifts for students (MOWE) - Transportation costs for visitation of P/S (MOWE)	126,000 SR/year (3,000 SR/time x 2 times) (3,000 SR/time x 20 times) (3,000 SR/time x 20 times)

(10) Expected Legislation for Enforcement

Phase 1 (DT Scheme)	Items to be stipulated in Act	Relating Order/Regulation
	-	-
Phase 2 (TOT Scheme)	Items to be stipulated in Act	Relating Order/Regulation
	-	-

(11) Expected Action Plan



(12) Attachment

- Japan's sample of education materials
- Japan's sample of EC experiment