

イラン・イスラム共和国
省エネルギー推進プロジェクト
運営指導（中間評価）報告書

平成 17 年 8 月
（2005 年）

独立行政法人 国際協力機構
経済開発部

経 済
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序 文

イラン・イスラム共和国では石油が重要な輸出物であり、同国は外貨収入の75%以上を石油の輸出に頼っています。現在、イラン国内のエネルギー総消費量は、エネルギー総産出量の44%に達しており、石油消費量も増加傾向にあります。今後エネルギー消費量の増加が年率6%で推移すると、2018年にはエネルギー輸入国に転じる可能性もあり、エネルギーの効率的利用（省エネルギー）による石油輸出量の確保は同国における重要な課題となっています。

このため、イラン政府は第3次5カ年計画期間（2000年～2005年）において、①エネルギー価格への市場価格の導入、②省エネルギーの啓発と助言、③省エネルギーに係るデモ・プロジェクトの実施、④省エネルギープロジェクトへの資金支援、⑤法制度整備などの施策の実施を検討しています。

かかる背景のもと、イラン政府は特にエネルギー消費の約25%を占める工業セクターのエネルギー効率化に係る技術の移転と普及を目的とするプロジェクト方式技術協力を我が国に対し要請してきました。

これに対して我が国では、2001年から2002年にかけて計4回の短期調査団を派遣し、プロジェクト方式技術協力事業としての実施可能性・協力内容・詳細計画及び供与機材の内容について調査を行い、これらの調査結果を踏まえ、本プロジェクト「イラン省エネルギー推進プロジェクト」を、2003年3月より4年間の予定で実施する旨を合議議事録（R/D）に取りまとめ、JICA及びイラン・イスラム共和国側とで合意、署名・交換しました。

本報告書は、協力期間の中間時点を迎えた本プロジェクトの活動実績、カウンターパートへの技術移転の進捗状況や達成度に関して、Project Cycle Management（PCM）手法に基づいた評価5項目（妥当性、有効性、効率性、インパクト、自立発展性）の観点から日本・イラン・イスラム共和国側双方で中間評価を行い、プロジェクト後半の活動について協議した結果を取りまとめたものです。

本報告書が今後のプロジェクトの展開や類似案件の実施に広く活用されることを願うとともに、本調査団の派遣に対してご協力いただいた外務省、経済産業省など内外関係機関の方々に深甚の謝意を表します。

平成17年8月

独立行政法人国際協力機構

経済開発部

部長 佐々木 弘世

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略 語 表

AHERC	The Azerbaijan Higher Educational and Research Complex	アゼルバイジャン高等教育研究センター
EEO	Energy Efficiency Office, Ministry of Energy	エネルギー省省エネルギー局
GDP	Gross Domestic Production	国内総生産
IFCO	Iran Fuel Consumption Optimization Organization	イラン燃料消費最適化公社
JCC	Joint Coordinating Committee	プロジェクト合同評価委員会
JICA	Japan International Cooperation Agency	国際協力機構
M/M	Minutes of Meeting	会議議事録
MPO	Management and Planning Organization	行政企画庁
NIOC	National Iran Oil Company	国立イラン石油会社
NTCEM	National Training Center for Energy Management	国立省エネルギー訓練センター
ODA	Official Development Assistance	政府開発援助
OJT	On the Job Training	オンザジョブトレーニング (現任訓練)
PCM	Project Cycle Management	プロジェクト・サイクル・マネージメント
PDM	Project Design Matrix	プロジェクト・デザイン・マトリックス
R/D	Record of Discussions	合意議事録
SABA (IEEO)	SABA (Iran Energy Efficiency Organization)	イラン省エネルギー機構 (SABA はペルシャ語略称)
SEC	Specific Energy Consumption	エネルギー消費原単位
SERI	Sharif Energy Research Institute	シャリフ工科大学 シャリフエネルギー研究所

第1章 中間評価の概要

1-1 運営指導調査の概要

運営指導調査の主な目的は以下のとおり。

- (1) プロジェクトの実施期間前半の達成状況を、プロジェクト・デザイン・マトリックス (Project Design Matrix : PDM) 及び活動計画表 (Plan of Operations : PO) 等に示された当初計画に基づき評価すること。
- (2) プロジェクト実施に際しての問題を明らかにし、必要な対応案を示すこと。
- (3) PDM と PO の見直しと改訂を必要に応じて実施すること。

1-2 調査団及び合同評価委員会の構成

(1) 日本側

<調査団>

氏名	分野	所属
芦野 誠	団長・総括	JICA 経済開発部第二グループ 資源・省エネルギーチーム長
千原 大海	技術協力計画	JICA 国際協力専門員
渋谷 浩志	省エネルギー技術	財団法人省エネルギーセンター 国際エンジニアリング部長
東野 英昭	評価分析	株式会社レックス・インターナショナル シニアコンサルタント
足立 倫海	協力企画	JICA 経済開発部第二グループ 資源・省エネルギーチーム

(2) イラン国側

氏名	所属
Mr. Kambiz Rezapour	Manager of Training and Awareness, エネルギー省省エネルギー局 (Energy Efficiency Office, Ministry of Energy : EEO)
Mr. AKba Safari	Expert, EEO
Mr. Alireza	Expert, EEO
Mr. Alireza i	Expert, EEO
Mr. Alireza Shirazi	Expert, EEO
Mr. Khalil Jannat Doust	Head of Energy Group, アゼルバイジャン高等教育研究センター (The Azerbaijan Higher Educational and Research Complex : AHERC)
Mr. Ali Zeerat Parvar	Member, Energy Group, AHERC
Mr. Ramin Hamati	Expert, イラン省エネルギー機構 [Iran Energy Efficiency Organization : SABA (IEEO)]
Mr. Behnam Haghjoo	Expert, SABA

Mr. Mohammad H. Zarbakhsh	Manager of Training Group, SABA
Mr. Davood Sephari	Manager, Energy Planning, 行政企画庁 (Management and Planning Organization : MPO)
Ms. Afkham Zarvani	Manager of Energy Conservation, Ministry of Petroleum

1-3 調査日程

		芦野団長	千原、渋谷、足立団員	東野団員
7/7	木			羽田 20:40 → 21:55 (JL1319) 関空 23:15 → ドバイ 5:10 (JL5099)
7/8	金			ドバイ 7:45 → テヘラン 10:15 (EK971) PM テヘラン専門家のインタビュー
7/9	土			AM SABA、EEO 関係者インタビュー PM テヘラン近郊の研修修了者インタビュー (EEO に修了者を集める)
7/10	日		羽田 20:40 → 21:55 (JL1319) 関空 23:15 → ドバイ 5:10 (JL5099)	AM 資料整理 PM テヘラン 15:45 → タブリーズ 16:55 (IR445)
7/11	月	羽田 20:40 → 21:55 (JL1319) 関空 23:15 → ドバイ 5:10 (JL5099)	ドバイ 7:45 → テヘラン 10:15 (EK971)	AM 専門家インタビュー PM カウンターパート、AHERC 関係者インタビュー
7/12	火	ドバイ 12:40 → テヘラン 15:10 (IR658)	AM JICA イラン事務所 表敬 PM IFCO 表敬	AM 前日の続き PM タブリーズ近郊工場のインタビュー
7/13	水	8:00 EEO 表敬 10:00 SABA 表敬 12:00 イラン国側評価メンバー表敬 15:00 在イラン日本大使館表敬		AM タブリーズ近郊工場のインタビュー PM 評価報告書 (案) 作成
7/14	木	テヘラン 9:10 → タブリーズ 10:20 (IR449)		AM 評価報告書 (案) 作成 PM 評価内容について打合せ
7/15	金	今後の対策について打合せ		
7/16	土	9:00- プロジェクト関係者と打合せ		
7/17	日	AM タブリーズ 8:00 → テヘラン 9:10 (IR446) 11:00 EEO と評価案についての打合せ 14:30 SABA と評価案についての打合せ		
7/18	月	終日 日本側及びイラン国側の評価メンバーと評価報告の打合せ		
7/19	火	8:30- JCC サイン		
7/20	水	AM JICA イラン事務所、在イラン日本大使館報告 PM 専門家と打合せ シャリフエネルギー研究所訪問		
7/21	木	テヘラン 22:15 → ドバイ 23:45 (EK978)		
7/22	金	ドバイ 2:50 → 関空 17:20 (JL5090) 関空 18:40 → 羽田 19:45 (JL1316)		

1-4 評価方法及び項目

(1) 評価の方法

評価をできるだけ正確に、効率的に行うために、プロジェクト・サイクル・マネージメント (Project Cycle Management : PCM) 手法を用いた。

評価チームのメンバーは、プロジェクトの各要素の進捗の度合い (投入、活動、成果、プロジェクト目標の進捗の度合い) を PDM に記述された指標、あるいは PO との比較によって実施し、実施のプロセスについても検証した。さらに、検証の結果を基に、評価5項目による評価を行った。具体的な内容は以下のとおりである。

(2) 評価項目

プロジェクトの評価は以下の項目について、実施した。

1) 達成度の確認

プロジェクトの評価時点までの実績 (投入、活動の実績、成果の発現程度、プロジェクト目標の達成見込み) を、収集した関連データ、情報を基に PDM の指標との比較によって確認する。必要なデータの収集のために、プロジェクト関係者への質問票の配布・回収、インタビュー、現場視察、文献調査等を実施した。

2) プロジェクト実施のプロセスの確認

プロジェクトを実施する過程で何が起きたのかを把握し、成果や目標の達成にどのような影響を与えたか、主に PDM の外部条件を中心に検証する。

3) 以下に示す評価5項目の観点からの評価

a) 妥当性 (Relevance)

プロジェクトの目指している効果 (プロジェクト目標や上位目標) が、受益者のニーズに合致しているか、問題や課題の解決策として適切か、相手国と日本側の政策との整合性はあるか、プロジェクトの戦略・アプローチは妥当か、公的資金である ODA で実施する必要があるかなどの「援助プロジェクトの正当性・必要性」を問う。

b) 有効性 (Effectiveness)

プロジェクトの実施により、本当に受益者もしくは社会への便益がもたらされているのか (あるいは、もたらされるのか) を問う。

c) 効率性 (Efficiency)

主にプロジェクトの投入と成果の発現の関係に着目し、資源が有効に活用されているか (あるいはされるか) を問う。投入の質・量・タイミングと、成果の発現に結びついているかどうかを中心に検証する。

d) インパクト (Impact)

プロジェクト実施によりもたらされる、より長期的、間接的効果や波及効果を見る視点。予期していなかった正・負の効果・影響を含む。

e) 自立発展性 (Sustainability)

援助が終了しても、プロジェクトで発現した効果が持続しているか (あるいは持続の見込みはあるか) を問う視点。

第2章 協議結果

2-1 協議結果

「1-3」に示した調査日程のとおり、イラン・イスラム共和国（以下、「イラン国」と記す）の関係者と協議のうえ、合同評価レポート及び会議議事録（Minutes of Meeting : M/M）として協議結果を取りまとめた。

2-2 調査団所感

(1) 中間段階における評価

2003年からのプロジェクト期間4年間のうち、2年3か月が経過し、これまで電気、熱、省エネルギー管理一般の分野で総計120名を超える研修生の訓練してきた。

しかし、供与機材納入による遅れ、機材通関による遅れ、研修棟建設工事の遅れ、機材到着後の据付け設置の不具合、計装システム調整遅延等複合的な原因により、当初2004年9月開始予定の研修が約3か月遅延した。

同研修実施の3か月の遅延により、当初プロジェクトの活動指標として設定していた研修修了者による各工場での省エネルギー改善策策定（研修終了後6か月以内に提出することになっている）が未了となっているため、当調査団は省エネルギー効果発現指標資料を収集することができなかった。このため、中間段階における評価は「これまでのところ満足する段階ではない」と判断した。

なお、上記研修機材の不具合にもかかわらず、専門家、カウンターパートは3か月の遅延を取り戻すべく、積極的に技術移転を実施していることは高く評価できる。

(2) 供与機材設置遅れ・機材の不具合による技術移転の遅れ

本プロジェクトの機材調達については、機材調達関連規定に基づき競争入札にて調達を行った。入札の結果、落札した業者は省エネルギー分野での研修用機材の製造についての経験及びノウハウがなく、本プロジェクトにおいて同機材を据付け後多くの不具合が生じている。

また、不具合を調整するための追加経費、投入、落札業者とJICA側関係者の労力は多大なものであるとともに、プロジェクトが効率的に実施されているとは言い難い。

このため、本件機材調達に係る一連の流れを再度確認し、今後このような効率的な技術移転の妨げとなるようなことが生じないようにする必要がある。

(3) 省エネルギー法案の進捗

日本側はプロジェクト実施前から国家エネルギー効率化管理法の早期の法制化について懸念してきた。しかし、今般EEO局長より、既に各セクターの個別法が5カ年計画に法制化されており、各企業は同個別法に則し、省エネルギーを推進することになっているとのことであった。今後、EEOから提出される個別法についての情報を確認する必要があるが、既に各企業は同個別法に従って省エネルギーを促進していることが理解できた。

なお、各個別法のうえに位置づけられ、かつ包括的に省エネルギーを促進する国家エネルギー効率化管理法について、同プロジェクトが国の法制度からも客観的に位置づけられるために、早期法制化をイラン国側に申し入れをした。

(4) 本プロジェクト実施の合理性

イラン国における消費エネルギーの9割が石油省に関係する。しかし、イラン国内の省エネルギー政策・省エネルギー対策に関しては、1994年エネルギー省内にEEOが新設されるなど、石油省と比較してエネルギー省が先行的に実施してきたことを確認した。また、2004年度のエネルギー省予算は前年度比較で8倍に急増したことも確認された。これらのことはイラン国において本プロジェクトを実施することとなった妥当性を再度確認することができた。

2-3 確認事項

(1) 提案事項

1) カウンターパート増員

合意議事録(Record of Discussions : R/D)において8名のカウンターパートを配置するにもかかわらず、現在6名のカウンターパートが配置されている。しかし、今後研修内容・期間の見直しを行う場合、8名のカウンターパートを配置する必要がある。

2) 研修内容・期間の見直し

研修修了者、カウンターパートからの意見を集約すると、研修機材を使用しての実践的な研修の見直し、現場研修盛り込みなど研修内容の質向上が求められていることが判明した。現在、研修は6日間で実施されているが、上記意見を反映するために、場合によっては研修期間の見直しが必要となり、イラン国側及び日本側によるプロジェクト合同評価委員会(Joint Coordinating Committee : JCC)により調整を図りながら見直しを行う必要がある。

3) PDM、POに基づくモニタリング

プロジェクト後半に向け、PDM、POに基づく指標等を常に意識したモニタリング機能をさらに強化するため、専門家とカウンターパートによる定期的な会議を設置する必要がある。

4) PDM 指標

PDMの指標は、研修修了者による省エネルギー提案が各工場で受け入れられる数、提案が低利融資・機材更新の補助金対象となる数などである。今後プロジェクト終了に向け、さらに技術移転を効果的に測定できる指標を追加設定することを提案した。今後、イラン国側及び日本側によるJCCなどにより調整を図る必要がある。

5) アフターケア

プロジェクト関係者によるとPDMに記載されている研修修了者に対するアフターケアについて、誰がどのように実施するのか十分に認識されていないことが判明した。今後、関係者により十分に議論し、アフターケアの実施方法について具体化する必要がある。

6) INTERNAL/EXTERNAL 評価

調査団滞在中、イラン国側関係者間においてINTERNAL/EXTERNAL評価を、誰が、いつ、どのように実施するかについて共通の認識がなかった。このため、イラン国側関係者及び日本側関係者が共通した認識を共有するため、明確な書面による説明がなされた。これにより関係者一同が集まり、共通の認識を持つ第一歩となった。

7) 三者間の連携強化

本プロジェクトはEEO、SABA、AHERCの三者の連携が強化されれば、これまで以上に技術移転を効率的に実施できる。このため今後さらに三者の連携を強化する必要がある。

8) SABA との連携強化

SABA は工場診断経験があるため SABA との連携を図るための方法の一つとして、SABA の職員とともにカウンターパートが工場診断に同行し、現場レベルでの真のニーズを認識し、研修に反映する必要がある。

9) 工場長クラスの省エネルギー意識向上

研修修了者が各工場において省エネルギー改善提案をする場合、工場経営責任者レベルの省エネルギーに対する認識が重要である。このため、工場経営責任者レベルの意識改善セミナー実施を提案した。

(2) プロジェクトの進捗活動の遅れの原因

複数の原因により、プロジェクトの様々な活動が当初計画から平均して2か月ほど遅れていることがプロジェクト関係者の間で認識されている。主な原因とは以下のとおり。

- ・資機材の通関と設置の遅れ
- ・資機材を設置する訓練棟（ワークショップ、講義室等）の建設の遅れ
- ・資機材の設置後の試運転時に発覚した不具合

(3) イラン国における省エネルギー政策について

1) 省エネルギー関連規則と規定

第2次国家開発5カ年計画（1995～1999）以降、イラン産業界の省エネルギー活動は、エネルギー省によって施行された関連法規と規則のもとで急速に推し進められ、その後、石油省により、エネルギー消費に対して設けられたセットポイントや基準を基にした工場の視察を含めた監視活動が行われるようになった。

並行して、エネルギー省の調整のもと、国家全体の視点からの包括的な省エネルギー法や規定の成立への国家的努力が続けられ、エネルギー消費にかかわる全省庁を横断的に巻き込んだ「国家エネルギー管理法」の草案の作成、修正が進められてきている。

今や、同法案の最終草案が、2005年2月に国家書類として、審議・承認を求めて国会に提出されている。この包括法案は、近いうちに議会の承認を得る見込みである。

イラン国内でエネルギー消費量削減問題が焦点の一つとなっていることに加えて、地球温暖化への対策に世界的な関心が高まるなか、（イラン政府は、2005年7月に京都議定書に調印）、省エネルギーの必要性が、第4次国家開発5カ年計画（2005～2009）に明確に謳われていることから、JICAの省エネルギー関連プロジェクトは、政策的にも、技術的にも、広くその妥当性が認識されるものと判断する。

2) エネルギー政策とその施行

イラン国の省エネルギー活動は、実質的に第2次、及び、第3次国家開発5カ年計画のもとで開始された（1995～2004）が、その目的は、国家の最も価値ある資源の一つである石油の輸出量を最大限に確保することにあった。

国内のエネルギー供給と消費は、主に、電力エネルギーを管轄するエネルギー省と石油と天然ガス関連エネルギーを担当する石油省によって運営されている。この区分のもとでは、実質的にイラン国内のほぼ90%のエネルギーは、石油省の管轄であるが、一方、国内の省エネルギーと再生可能エネルギーに関する政策とその執行については、1994年の省エネルギー省と1996

年の SABA の設置以来、エネルギー省の主導で行われてきた経緯がある。

2000 年には、石油省が同省としてははじめて、管轄下に国内エネルギー消費と天然ガスの最大限の利用を中心課題として、イラン燃料消費最適化公社 (Iran Fuel Consumption Optimization Organization : IFCO) を、国立イラン石油会社 (National Iran Oil Company : NIOC) の附属機関のもとに設立した。

(4) NTCEM の訓練コース修了証

訓練コースが 2004 年の 12 月に開始されて以来、2 種類の修了証が作成されている。一つは、訓練コースの出席条件を満たした場合に与えられる修了証であり、他方は、工場のエネルギー管理者として認定された場合の資格認定書である。後者は、コース終了後 6 か月以内に所属先の工場の診断レポートを SABA に提出し、審査にパスした元訓練生のうち、資格試験に合格した訓練生のみ与えられる予定である。SABA は 2005 年の 9 月に最初の資格試験を実施し、その後は、毎年 3 月と 9 月に試験を行うとしている。

(5) 内部及び外部評価

1) 訓練コースの内部評価

訓練コースの内部評価報告書は、訓練生への質問票の配布・回収などから得た情報や、アフターケアの結果等の分析を実施して、国立省エネルギー訓練センター (National Training Center for Energy Management : NTCEM) により半年ごとに取りまとめられる予定である。しかし、内部評価報告書の作成は遅れており、最近 (2005 年 7 月) 第 1 回目の報告書が公式に提出されたが、内容は改善すべき点が残されている。

2) 訓練コースの外部評価

訓練コースの外部評価報告書は訓練生からの報告書、所属工場のエネルギー消費改善結果などを基に、SABA により半年ごとに取りまとめられ予定である。しかし、評価のためのデータ回収や、外部評価の手順確立が、やはり遅れている。

(6) 日本人短期専門家の派遣について

2005 年度、JICA は、以下の 6 名の短期専門家を派遣する予定である。

- ・ミニプラント実習指導 (熱分野) 1 名×1 か月
- ・ミニプラント実習指導 (電気分野) 1 名×0.7 か月
- ・計測システム及びデータ処理指導 1 名
- ・計器及び計測システムの保守指導 (キャリブレーションを含む) 1 名
- ・エネルギー診断技術 (熱) 1 名
- ・エネルギー診断技術 (電気) 1 名

(7) プロジェクト協力期間の確認

調査団は、プロジェクトの協力期間を、正式に 2007 年 3 月 12 日までであることをイラン国側に伝え、イラン国側はこれを了承した。

(8) NTCEM の予算計画

NTCEM の予算は、プロジェクト協力期間中については、確保されていることを、EEO に確認した。協力期間終了後は、イラン国側カウンターパートの給与について、予算を確保する計画である。

(9) その他

1) プロジェクト終了期間

プロジェクトの終了期間を 2007 年 3 月 12 日とすることとした。

2) イラン国側の予算確保

プロジェクトが終了する 2007 年 3 月までのプロジェクトに関係する一切の予算は確保済みであることを確認した。

第3章 評価結果

3-1 プロジェクトの達成度

日本側が供与したミニプラント機材が、仕様不備と納入業者の経験不足等の理由から、設置が遅れたうえに、操作、運転上の問題が依然として残されている。プロジェクトの前半は、これらの問題の対応に多くの時間と労力が費やされ、プロジェクトの進捗に影響を与えることとなった。

3-1-1 日本側投入

(1) 専門家派遣

1) 長期専門家

プロジェクト開始以来、R/Dに記述されたとおり、5名の長期専門家〔チーフアドバイザー、業務調整、省エネルギー（熱）、省エネルギー（電気）、省エネルギー政策、各1名〕が派遣されている。(2005年6月末時点での実績は133.9MM：詳細は付属資料4参照)

2) 短期専門家

2005年6月末までに、9名(6.2MM)の短期専門家が派遣された。内訳は、ESCO(3名)、MAP METHOD(1名)、ミニプラント機器の据付け／試運転(3名)、工場診断(熱1名)、工場診断(電気1名)(詳細は付属資料4参照)

(2) カウンターパートの本邦研修

2005年6月末までに、4名の技術カウンターパートが既に日本での研修に参加している。また、カウンターパートの1名が、JICAの国別特設研修によって日本に派遣されているため、6名の技術カウンターパートのうち、5名が日本での研修を受けたことになる(2005年9月には、残りの1名の本邦研修が予定されている)。

カウンターパート研修の詳細は、付属資料7に示すとおりである。

本邦研修に加えて、2004年6月には、隣国トルコで実施されている省エネルギープロジェクトとの技術交換が行われた。

(3) 機材供与

総額1,208,000ドルの機材が、AHERC内のNTCEMに供与された〔円貨：約1億3,300万円(1ドル=110円換算)〕。主な機材は付属資料5に示すとおりであるが、ミニプラント機器の仕様不備等のために問題が生じ、プロジェクトの進捗に影響を与えた。

(4) ローカルコスト負担

2005年6月末までに、現地業務費として、112,500ドル〔円貨：約1,240万円(1ドル=110円換算)〕が執行され、プロジェクトの進捗に貢献した。

3-1-2 イラン国側投入

(1) カウンターパート配置

2005年6月末時点では、プロジェクトダイレクター、マネージャーと6名の技術カウンターパートの計8名が配置されている(およそ225MM)。R/Dによれば、技術カウンターパートは

8名配置される予定であった。

カウンターパート配置の詳細は付属資料6に示すとおりである。

なお、NTCEMの機器保守のために、2名のテクニシャンが配置されている。また、訓練の内部評価のために、アドバイザーが1名配置されている。

(2) 土地、建物、施設

1) タブリーズ (AHERC/NTCEM)

2004年11月、イラン国側の資金により、NTCEMの訓練棟が、予定より2か月遅れで完成した。完成は遅れたものの、施設はミニプラント設置用のワークショップ、講義室(2)、研修講師用執務室、訓練生の休憩室等を備え、訓練のインフラとして十分な機能を有していると思われる。ただし、ワークショップに設置予定であったLightingシステムはまだ設置されていない。

日本人専門家には、執務室(個室4部屋、什器備品、電話)がAHERC内に提供されている。

2) テヘラン (EEO)

EEO内に、日本人専門家(省エネルギー政策)の執務室(什器備品と電話、ファックス、コピーマシン等有り)が提供されているが、EEOスタッフ3名と共用である。

(3) ローカルコスト負担

総額約57万ドル〔円貨：約6,270万円(1ドル=110円換算)〕の活動経費〔研修費用、スタッフの給与、実験機材、施設、通信(電話)、光熱費、消耗品、旅費、燃料費等を含む〕が、ほぼ予定通りイラン国側から投入された。

投入の実績の詳細については、付属資料2に示すとおりである。

3-1-3 活動

計画に対して遅れている活動がある。活動の進捗度は、全体として中程度と判断する。

活動の実績の詳細は、付属資料2に示すとおりである。

3-1-4 成果

成果は、カウンターパートへの技術移転の面ではある程度発現しているものの、ミニプラント機器の据付けにかかわる問題等により、訓練の実施が遅れることとなり、したがって、訓練の評価活動の開始も遅れている。

成果の実績の詳細は、付属資料2に示すとおりである。

(1) 成果1の達成状況

<成果1>

プロジェクトが有効に役立つよう、政策や関係行政機関が調整される。

<成果1の指標>

訓練センターの活動が、イラン政府の政策及び産業界のニーズと合致する。

イラン政府の政策及び産業界のニーズと合致する NTCEM の活動を確立するために、第4次5カ年計画並びにエネルギー効率管理法案（英語版）等の資料が収集され、分析が実施された。

2003年12月に、イラン国の国会議員5名が、我が国の省エネルギー政策の現状を視察するために日本を訪れた際には、日本人専門家が、事前準備等の局面で、イラン国側に対する協力を行った。

その他、NTCEMへ派遣する研修生の選抜について、SABAに対する助言を行った。

(2) 成果2の達成度

<成果2>

プロジェクトのカウンターパート、すなわち訓練センターのインストラクターたちが、訓練用の施設・機材を操作・保守出来る。

<成果2の指標>

- 2-1. カウンターパートが訓練設備と機材を効率的に活用出来るようになる。
- 2-2. カウンターパートが訓練設備と機材を十分に維持管理出来るようになる。

カウンターパートは、日本人専門家からの技術移転を通じて、訓練用の機器と施設を操作し、維持管理する基本的な知識、技能を身に付けている。

技術移転は具体的には、以下の活動を実施することを通じて行われた。

- 1) 工場診断（オンザジョブトレーニング）
- 2) 訓練コースの指導マニュアルの作成
- 3) 供与機材の操作訓練
- 4) 日本人専門家による講義・授業

日本人専門家による評価では、カウンターパートは、訓練用の機器と施設を操作し、維持管理する基本的な能力を有している。

しかし、訓練用機器の設置遅れと、納入業者による機器使用マニュアルの提出の遅れがあり、訓練の進捗を妨げた。日本人専門家は、プロジェクトの前半において、機器の問題への対処に多くの時間を費やすこととなった。

一方、このような状態のなかで、日本人専門家が暫定的にマニュアルを作成し、カウンターパートはこれを用いることによって、機器の操作を学び、知識を向上させた。

(3) 成果3の達成度

<成果3>

エネルギー関連技術者のための理論・実技両方の訓練が継続的に実施される。

<成果3の指標>

3-1. カウンターパートが訓練用の教材と教科書を開発出来る。

イラン国側カウンターパートは、訓練の内容を深く理解するに足る十分な能力を備えている。しかし、時間の不足から、訓練用教材（テキスト）は、カウンターパートの手で準備することはできなかった。代わりに、SABAのスタッフが、2004年9月に訓練用の教材を作成した。

3-2. カウンターパートが訓練コースを実施出来る。

開始の遅れはあったものの、2004年12月以降、訓練コースは、カウンターパートの手で、計画通り円滑に進められている。2005年5月末の時点で、10回の訓練コース（一般コース5回、電気コース3回、熱コース2回）が開催された。訓練参加者へのインタビューでは、コースは概ね好評であり、勤務先での実務に役立っているという声が聞かれた。

現在のところ、訓練コースの期間は6日間であるが、これは当初R/Dで想定されていたもの（一般コース6日間、電気と熱コースは10日間）より短くなっている。

3-3. 省エネルギーコースを修了したエネルギー関連技師の数が増える。

2005年5月末の時点で、訓練コースの受講者は126名（一般コース77名、電気コース33名、熱コース18名）である。

しかし、訓練開始が遅れたため、訓練受講者のレポート提出も遅れているのが現状であり、資格試験も実施されていないため、コースの修了者はまだ出ていない。SABAによれば、第1回目のエネルギー管理者認定試験を、2005年の9月に行う予定である。

3-4. カウンターパートが卒業生のアフターケアを行う事が出来る。

アフターケアの具体的な内容、実施、協力機関の担当事項などが、まだ明確に決められていないのが現状である。

3-1-5 プロジェクト目標達成度

<プロジェクト目標>

省エネルギー管理訓練センター（NTCEM）が、産業界のエネルギー管理に貢献する。

<プロジェクト目標の指標>

1. 訓練生所属の工場におけるエネルギー消費原単位が向上する。
2. 訓練生のプロポーザルが工場にて実際に採用される。
3. 省エネルギー活動のための融資を受ける工場が増える。

中間評価の時点では、プロジェクト目標の達成見込みを判断するデータ、情報がまだ不足しているのが現状である。

1. エネルギー消費原単位（Specific Energy Consumption：SEC）の向上

エネルギー消費原単位のデータはまだ訓練生からの報告を待っている段階である。訓練コースは、2004年末に開始された。しかし、SABAとAHERCによれば、初期（2004年12月から

2005年4月まで)の訓練コースは、いわば試行期間であり、大半の訓練生は、SABA、MPO (Management and Planning Organization)、RPO (Regional Power Organization) 等、公的機関からの派遣であった。

工場からの訓練生の派遣は、実質的に2005年の4月以降であり、したがって、エネルギー消費原単位に関する報告も、今後徐々に提出されると思われる。

2. 訓練生のプロポーザルが工場にて実際に採用された数
3. 省エネルギー活動のための融資を受ける工場の数の増加

現在のところ、これらの指標のデータを収集している状況であり、達成見込みを判断する段階に至っていない。

3-2 評価5項目による評価

評価項目	評価結果	主な理由
妥当性	高い	<ul style="list-style-type: none"> ・イラン国、日本国の政策に対する整合性 ・日本国の技術的優位性
有効性	中～低い	<ul style="list-style-type: none"> ・プロジェクトの進捗の遅れ (訓練コース開始の遅れと、内部、外部評価活動の遅れ)
効率性	中～低い	<ul style="list-style-type: none"> ・ミニプラント機器の設置・運転に関するトラブルと、対応のための専門家の派遣 ・訓練コース開始の遅れ
インパクト	正のインパクトが見られる／負のインパクトは見られない	<ul style="list-style-type: none"> ・技術的なインパクト (ミニプラント機器を使った実習を含む訓練コースの実施)
自立発展性	高い	<ul style="list-style-type: none"> ・イラン国の政府からの支援の継続 ・イラン側カウンターパートの能力

(評価の詳細は、付属資料3に示すとおりである)

3-2-1 妥当性

プロジェクト実施の妥当性は高いものであると評価する。理由は以下のとおりである。

(1) イラン国の政策との整合性

イラン国は、世界有数の産油国であり、900億バレルの石油埋蔵量を有する。イラン国は、外貨収入のおよそ8割を石油産品輸出に依存している。

しかし、近年、経済の回復、人口の増加などにより、イラン国のエネルギーの国内消費は急速に増加しており、エネルギー総算出の44%に達している。人口の36%が15歳以下であるイラン国は、将来的にも石油消費量が増加傾向にある。今後エネルギー消費が年率6%で推移すると、イラン国は2018年にはエネルギー輸入国に転じるという試算もある。

エネルギー問題は、1990年代に入って、それまでの経済の停滞が回復するにつれて、国の重要課題としてとりあげられるようになった。第2次国家開発5カ年計画では、燃料の合理的な利用と環境の保全政策の重要性が強調されている。

2001年3月に、最高指導者ハメネイ師が、各分野の公的機関に対して行った政策指示書の1

項目として含まれ、エネルギー消費抑制の重要性を国家の優先事項として位置づけられている。

エネルギー消費削減は、具体的には、現法制化作業中の「エネルギー消費管理法」で規定され、省エネルギー政策は国家レベルで推進される予定である。

一方、イラン国における産業セクターのエネルギー利用効率の低さについては、長年の課題とされてきた事実がある。

本プロジェクトは、タブリーズの AHERC 内に、省エネルギー管理センターを設置し、省エネルギー技術の普及のために必要な訓練を実施し、産業セクターのエネルギー管理を担う人材の育成を通じて、最終的にはイラン国のエネルギー利用の改善をもたらそうと意図するものであり、イラン国の政策との整合性は高い。

(2) 日本の政策との整合性

日本政府は、中東地域の政治的安定を図る見地から、イラン国との友好関係の維持に努めてきており、域内の大国である同国の社会・経済の安定を重要視してきた。

日本の石油総輸入量中、11%がイラン国から輸入されている。イラン国の石油輸出入を確保することは、エネルギー輸入国である日本にとっても、エネルギーの安定確保の観点からも重要であり、日本の政策との整合性も高い。

(3) 日本の技術的優位性

日本は省エネルギー分野での技術は、世界最高の水準に到達している。イラン国と比較した場合、日本のエネルギー消費原単位（GDP100 万ドル当たり）は、96 石油換算トンであり、イラン国の 1,037 石油換算トンに対し、格段の差がある。

二度の石油危機を乗り越えてきた歴史を含め、産業部門での省エネルギー対策の技術と経験について、日本は特に優れており、イラン国に対して、省エネルギー分野での技術移転を行う上での技術的優位性・妥当性は高い。

(4) ターゲットグループのニーズとの整合性

上記(1)～(3)の項目と対照的に、ターゲットグループのニーズとの整合性は若干弱い。イラン国における、燃料価格の低さもあり、工場の経営者の省エネルギーに対する意欲は必ずしも強いものではない。

3-2-2 有効性

中間評価時点でのプロジェクトの有効性は、中程度からやや低いものと判断する。プロジェクトの活動と成果の発現の遅れから、現在のところ、プロジェクトの達成状況を判断する情報（元訓練生からのレポート等）が集まっていない。

(1) 成果の発現状態

成果の発現状態は、当初期待されたレベルには到達していない。カウンターパートに対する技術移転は日本人専門家の指導のもとに達成されていると思われるが、ミニプラント用機材の不具合から繰り返して生じたトラブルで訓練活動の進捗が遅れ、したがって成果の発現も遅れている。

(2) プロジェクト目標の達成度合い

プロジェクト全体の進捗が遅れており、SABA による訓練コースの外部評価は、いまだに本格的な開始に至っていない。エネルギー消費原単位の向上、プロポーザルが工場にて実際に採用された訓練生の数や、省エネルギー活動のための融資を受けた工場の数についても、データの収集が着手されていないのが現状である。

元訓練生が、所属工場のエネルギー管理についてレポートを作成し、SABA に送り、さらに試験を受けてエネルギー管理者として認定されるには、かなりの時間（6か月以上）がかかることが想定される。したがって、中間評価の時点で、これらのデータの収集に本格的に着手されていないことは、今後のプロジェクトの達成度合い・見込みを判断するうえで、好ましくない状態である。

3-2-3 効率性

プロジェクトの効率性は、中程度からやや低い水準であると判断する。理由は以下のとおりである。

(1) 投入実績

イラン国側の投入はほぼ適切に行われたが、日本側投入については、ミニプラント機器の据付け・設置に際して、仕様の不備、納入業者の経験不足などから、繰り返してトラブルが生じており、現在まで問題が持ち越されている部分もある。

1) 日本側投入（詳細は付属資料2参照）

専門家の派遣、予算の執行など、当初 R/D に記載されていたとおりに適切に実施されたが、ミニプラント機器の据付け・設置に際して、仕様の不備、納入業者の経験不足などから繰り返してトラブルが生じており、現在まで問題が持ち越されている部分もある。トラブルの解決のため、2名の短期専門家が追加派遣されたほか、長期専門家〔省エネルギー（熱及び電気）〕は、対応に多くの時間と労力を費やした。

2) イラン国側投入（詳細は付属資料2参照）

イラン国側で配置されたカウンターパートの能力と技術の点で適切なものであった。しかし、R/D に記載された8名の技術カウンターパートの配置予定に対し、2004年の4月以来、6名の技術カウンターパートしか配置されていない。

NTCEM における訓練コースは2004年12月から開始され、2005年の4月からは定期に実施されている状態である。コースは、6日間、1日当たり8時間、集中的に行われており、訓練の準備、評価を含め、講師を務めるカウンターパートへの負荷は大きくなっている。また、このコースの実施が将来的にはルーティンとして定着していくと思われるため、現在の6名の配置では不足する懸念がある。

(2) 成果の達成状況

成果の発現度合いは、当初の期待より低い。原因としては、ミニプラント機器の設置にかかわるトラブルの発生である。プロジェクトの前半における投入の成果への転換は、必ずしも効率的には行われなかった。

3-2-4 インパクト

中間評価の時点では、上に述べた経緯から、まだ本格的に成果の発現を見ておらず、したがってインパクトの有無を厳密に評価する段階にない。以下には、訓練生のインタビューなどを通じて得た情報を基に、インパクトの見込みについて記述する。

(1) 上位目標の達成見込み

訓練コースの開始が2004年4月であり、現時点では、上位目標の達成見込みを判断する情報が不足している。

1) 組織面でのインパクト

現在の訓練コースを継続することで、NTCEMは、省エネルギーに関して、理論だけでなく、実習も含めた、高い水準の訓練機会を提供する組織としての定評を獲得すると予想される。

2) 技術面でのインパクト

イラン国で、省エネルギーの理論、実習の訓練を行うのは、本プロジェクトが最初の試みである。

プロジェクトの実施によって、イラン国側カウンターパートは、トラブルは残るものの、訓練用のミニプラント機器を活用して、日本人専門家から直接の指導を受け、理論だけでなく、実習を含めた省エネルギーの技術移転を受けることとなった。

また、ミニプラント機材を通じた実習訓練が行われるようになり、訓練生への技術移転の面で、より効果的でレベルの高いものとなった。

3-2-5 自立発展性

中間評価の時点では、プロジェクトの自立発展性は高い水準にあると思われる。しかし、終了時評価の時点で、より詳細な調査が必要である。

(1) 政策面

プロジェクトは、NTCEMを設置し、産業部門のエネルギー管理者への訓練を通じて、イラン国の省エネルギー政策の実現を担っていく人材を育成し、最終的には、エネルギーの効率的な使用を目指すものであり、同国の政策と高い整合性を有している。したがって、イラン国の政府からの政策的支援は協力機関終了後も、基本的に維持されるものと考えられる。

(2) 組織・制度面

NTCEMが、イラン国内で、省エネルギー関係の研修機関としての評価を得つつあること、研修機関として既に確立されているAHERCのスタッフの陣容や運営の実績から、プロジェクト活動を自力で運営していくための基盤を十分に有していると思われる。しかし、今後の自立発展性を確かなものにするためには、関連組織間の連携をより強固なものにする必要がある。

(3) 財政面

2004年度のエネルギー省の予算では、省エネルギーと再生可能エネルギーに関する活動に対して、前年度比8倍の増額を実施されるなど、イラン国の省エネルギー活動への取り組みへの期待は高い。

実際に、プロジェクト活動においても、監督機関であるEEOを通じて、訓練コース費用（受講料への補助金を含め）のほとんどが負担されており、現在までのところ、プロジェクト活動について、予算に関する問題は生じていない。

また、イラン国は、これまでも人材開発を国の優先的課題として取り組んできており、省エネルギーを担う人材育成を目指すプロジェクトは、人材開発の視点からも、国の政策との整合性が高い。

このため、同国の経済状況が急激に悪化しない限り、協力期間終了後も、現状のプロジェクト活動を継続する財政的な基盤は確保されるものと思われる。

(4) 技術面

本プロジェクトが実施される前には、イラン国では、省エネルギーの理論面だけの研修が実施されていた。

プロジェクトの実施によって、イラン国側カウンターパートは、トラブルは残っているものの、訓練用のミニプラント機器を使用して、日本人専門家から直接の指導を受け、理論だけでなく、実習を含めた省エネルギーの技術移転を受けることとなった。

優先的に大規模工場から派遣された技術者達も、理論と実習の両面で、省エネルギーの技術を学び、所属先の工場で省エネルギーに応用していくと思われる。

(5) オーナーシップ

プロジェクトの監督官庁であるEEO、実施機関であるNTCEM・AHERC及び協力機関であるSABAは、それぞれの立場から、省エネルギー活動の推進に対する使命感を有し、省エネルギー体制の確立に努力している。

第4章 結 論

NTCEMでの最初の訓練コースは、2004年の12月に参加者19名で開始された。以来、2005年の5月までに、10回の訓練コースが開催され、参加者の合計は126名となった。元訓練生は、コース終了後6か月以内に所属先の工場の診断レポートをSABAに提出することとなっている。SABAによるレポート審査にパスした元訓練生は、資格試験の受験資格を得る。この試験に合格した訓練生がエネルギー管理者として認定される予定である。

訓練コースの受講者は、2005年の3月までは、試行期間と位置づけられ、SABA等、主に公的機関からの派遣が多く、2005年4月の中旬以降に、工場からの訓練生の派遣が本格的に開始されている。したがって、SABAは、元訓練生からのレポートの提出を待っている状況であり、中間評価時点では、審査は開始されていない。

2005年6月末までに、日本政府によって供与された機器のほとんどについては、設置・試験運転は終えたものの、一部の機器に不具合が残っており、訓練コースへの影響が生じているため、迅速な対応が必要な状況である。

これらの状況のもと、評価調査団は、プロジェクトの達成状況は「中程度～低い水準」であると判断した。

4-1 プロジェクトの進捗

プロジェクトは、イラン国との政策的な整合性が高く、同国政府の強い政策的な支援のもと、2003年3月に開始された。

しかし、日本側で供与した、訓練用ミニプラント機器の設置・据付けの遅れが主な原因となり、プロジェクトの進捗が阻害され、効率性が低いものとなった。

日本人専門家の対応により、これらのトラブルはほぼ解決された結果、研修は計画より2か月遅れの2004年12月に開始され、日本人専門家の指導のもと、イラン国側カウンターパートの手により運営されている。以来、2005年の5月までに、10回の訓練コースが開催され、参加者の合計は126名となった。

訓練コースの外部・内部評価については、訓練コース開始の遅れ、評価業務の具体的な内容がまだ明確でなく、プロジェクトの進捗を判断するための指標データの収集が開始されていない。

プロジェクトチーム（日本人専門家と、イラン国側カウンターパート）は、連携して、イラン国の省エネルギー政策の施行に向けて努力しているが、この点については、今後更なる調査が必要である。

4-2 プロジェクトの運営管理

プロジェクトの前半において、プロジェクトのモニタリングシステムが有効に機能していなかった。

2004年度の中頃までは、週間、あるいは隔週間ごとに、プロジェクトチーム（日本人専門家と、イラン国側カウンターパート）内のミーティングが実施され情報が共有されていたが、それ以降ミーティングが中断されており、プロジェクト活動の現状、進捗状況の共有がなされていない。

この結果、現在のプロジェクトの進捗状況と当初計画（PDM・PO）との比較、比較結果の分析、問題に対するフィードバック等のモニタリング活動が十分に機能していなかった。

第5章 提 言

(1) PDMの一部変更

- 1) 指標（目標値）の設定。プロジェクトの前半の実績を参考に、残りの協力機関を考慮して、PDMの指標を、できるだけ定量的な指標として設定し、関係者で共有することが望ましい。
- 2) 成果1の記述の変更

成果1の記述が適切さに欠けるため、評価調査団は、例えば、「プロジェクトが、イラン国の省エネルギー政策とその実施の方向性に一致して、効果的に実施される」等に変更することを提言する。

これらの変更は、2002年11月16日に調印されたR/Dに定められているように、JCCの場で承認を受けることが必要である。

(2) カウンターパート配置の見直し

NTCEMにおいて、今後、本格的、定常的に訓練コースを実施していくためには、現在配置されている6名の技術カウンターパート（訓練コース指導員）は、十分な数ではないと考えられる。イラン政府は、R/Dに記載されているとおり、8名の技術カウンターパート（熱分野：1名、電気分野：1名）の配置を実現すべきである。

(3) 訓練用供与機材

NTCEM内のミニプラント機器は、既に設置済みであるが、一部の機器は、不具合を生じており、いまだに本来の機能を発揮できず、訓練の円滑な実施に支障を来している。日本政府は、これらの問題の解決に可及的速やかに対応すべきである。

R/Dと2004年12月1日に調印された議事録によれば、訓練用の照明ユニットはイラン国側が設置することとなっており、イラン政府は、迅速な対応を行うべきである。

(4) 訓練コース期間について

NTCEMで、現在行われている3種類の訓練コースは、いずれも、6日間のコースである。R/Dによれば、当初、これらのコースは一般コース：8日間、電気、熱コースは10日間のコースとして計画されていたが、1週間以上の長期間にわたる訓練に技術者を送ることが難しいとするイラン国の工場経営者の意見を考慮し、訓練期間を短縮した経緯がある。

しかし、研修の質の向上を考慮すると、特に、実習訓練については、現状に2～3日程度の上乗せが必要であると判断される。日本・イラン国側の両者が、質の向上の重要性についての認識が一致しており、また、元訓練生とのインタビューでも、現行の朝8時から夕方6時まで（8時間/日）のカリキュラムに関して、研修期間を延長し、一日当たりの負荷の軽減を望む声が聞かれた。

このため、プロジェクトチームとイラン政府は、訓練コースの期間延長について、再度打合せの機会を持ち、例えば一つのコースを2單元より構成し、それぞれの単元の期間を6日間以内とし、2単元の合計を10日以内とするなどの案を検討するべきである。

(5) プロジェクトのモニタリングシステムの構築

プロジェクトチームは、日本人専門家と、イラン国側カウンターパートの出席による、定期的な打合せの機会を再開し、PDM と PO を参照して、プロジェクト全体のモニタリング活動を実施するべきである。

ここで言うプロジェクトのモニタリングシステムとは、「現状の進捗の確認」「当初計画と実際の進捗との比較・検討」「比較検討結果の分析」そして、「軌道修正のためのフィードバック」からなり、これらのプロセスは、プロジェクトチーム内の情報、意見の共有と、合意の形成によって運営されていく一連の活動である。

(6) PDM におけるアフターケア活動（活動 3-4）の明確化

元訓練生へのインタビューへの回答等から、評価調査団は、活動 3-4 にある「訓練生へのアフターケア」の具体的な内容が不明確であると判断した。調査団は、訓練コースのフォローアップシステムについて、関係機関が協議することを提言する。例えば、SABA は元訓練生に“energy friends network” に加入を呼びかけ、年に 4 回ほどの会合を開催する案を持っている。

(7) トレーニングコースの内部評価

NTCEM のスタッフによる訓練コースの内部評価活動は、当初計画より遅れている。2005 年 7 月に、第 1 回目の報告書が EEO とプロジェクトチームに正式に送られたが、内容については基本的に改善すべき点も多く、例えば訓練生の訓練コースに対するコメントをどう分析するか、報告書の構成の仕方などについて、プロジェクト関係者で協議する必要がある。

(8) トレーニングコースの外部評価

SABA による外部評価活動も、内部評価同様当初計画より遅れている。評価調査団はプロジェクトチームに対し、SABA の外部評価活動について、活動の進捗を改善するための支援を行うことを提言する。

(9) EEO、AHERC/NTCEM、SABA の連携の強化

2003 年の 12 月 14 日に署名された議事録に基づき、SABA のタブリーズ事務所が、およそ 2 年前に設置されている。

また、EEO、AHERC/NTCEM 及び SABA は、それぞれ、三者間の協力の重要性を認識し、より緊密な連携を築くことを目指してきたという理解のもと、評価調査団は以下を提言する。

- 1) プロジェクトの運営方針と重要課題を協議・決定するために、上記 3 機関に加え、日本人専門家の参加による、合同定期会議を開催すること。
- 2) 元訓練生が訓練終了後半年以内に SABA に提出する予定の省エネルギーレポートのコピーを、AHERC/NTCEM にも並行して送るようにし、SABA による外部評価の結果を入手するまで半年間待たなければならないという現状の手順を改善すること。
- 3) NTCEM の訓練コースでは、SABA による省エネルギー活動のための低金利融資制度の利用に関する講義を行い、訓練生が当該の融資制度の利用に関する知識を深められるようにする。
- 4) EEO 局長と、日本人専門家（省エネルギー政策）のより頻繁な打合せの機会の確保。

(10) SABA との協力

NTCEM の訓練をより効果的なものにするためには、SABA の今までの経験の蓄積と情報の提供が不可欠である。R/D に記載されているように、SABA のスタッフは工場診断の実施で NTCEM のスタッフに協力し、SABA の実施する工場診断に NTCEM のカウンターパートが参加できるようにすること。

(11) 工場経営者への啓蒙セミナー

元訓練生のインタビューでの回答から、工場経営者の省エネルギー活動への意識の低さのために、訓練生の提言が工場で受け入れられない、実施につながらないなどのケースが懸念される。調査団は、省エネルギー活動にかかわる機関が、工場経営者への啓蒙セミナーを開催することを提言する（SABA は、プロジェクトの省エネルギー活動に関連して、2004 年度に 52 回のセミナーを開催し、10,000 部のパンフレットを配付している）。

付 属 資 料

1. 評価用 PDM
2. プロジェクトの達成グリッド
3. 評価グリッド
4. 日本人専門家リスト
5. 供与機材リスト（主要機材のみ）
6. カウンターパート配置
7. カウンターパートの本邦研修実績
8. 面談者リスト
9. プロジェクト組織図
10. 協議議事録（M/M）
11. 技術協力団員報告
12. 省エネルギー技術団員報告

ANNEX 1 Project Design Matrix (PDM) for Mid-term Evaluation**Project Name:** Project on Energy Management Promotion in the Islamic Republic of Iran**Project Area or Location:** Azarbaijan Higher Education and Research Complex for Water and Electrical Industry (AHERC) and EEO office in Tehran**Target Group:** Energy related engineers in industrial sector (Priority is given to larger factories with more than 2MW demand or 2000m³ of oil equivalent energy consumption per year.)**Project Period:** From March 2003 to February 2007 (4years)**Prepared in:** June 2005

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.</p>	<p>1. SEC^[*1] of each industrial sub-sector is improved to the extent defined separately^[*2] by 2010.</p>	<p>Government statistics (by the Ministry of Energy)</p>	
<p>Project Purpose The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.</p>	<p>1 SEC^[*1] of the factories where ex-trainees work is improved to the extent defined separately^[*2] by the end of the project. 2 Number of ex-trainees' proposals accepted by factories. 3 Number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.</p>	<p>1 Records of audit for the factories where ex-trainees work (by SABA) 2 Questionnaire (by SABA) 3 Records of approved proposals for financial facilities</p>	<p>- The Iranian Government keeps supporting the energy management activities. - Energy cost does not become cheaper significantly. - Economic condition does not worsen significantly.</p>
<p>Outputs</p> <p>1. Policies and administration structures for energy management of the industrial sector are coordinated so that the contribution of the project becomes effective.</p> <p>2. C/P are able to operate and maintain the training facilities and equipment.</p> <p>3. Both theoretical and practical training for energy related engineers are maintained and managed.</p>	<p>1 NTCEM's activities meet the government policies and requirements of the industrial sector. 2-1 C/P are able to utilize training facilities and equipment efficiently. 2-2 C/P are able to maintain training facilities and equipment sufficiently. 3-1 C/P are able to develop training materials and textbooks. 3-2 C/P are able to implement training courses. 3-3 Number of certified energy related engineers is increased. 3-4 C/P are able to manage aftercare of the ex-trainees</p>	<p>1 Information from factory managers, ex-trainees, JICA experts, and EEO & SABA officials 2-1 Information from trainees and JICA experts 2-2 Information from trainees and JICA experts 3-1 Evaluation of developed training materials and textbooks by trainees 3-2 Evaluation of training courses by the trainees 3-3 List of certified engineers and evaluation by the factory owners 3-4 Evaluation of ex-trainees who requested aftercare</p>	<p>- C/P remain in NTCEM.</p>

Activities	Inputs		- Machinery and equipment provided by the Japanese side will obtain easy custom clearance.
	The Japanese Side	The Iranian Side	
1-1 Analyze on-going policies of energy management in the industrial sector 1-2 Propose effective policy for energy management to the relevant agencies so that the training in the center makes maximum effect 1-3 Manage to offer training programs that best meet the needs of the industry and the nation 1-4 Carry out necessary dissemination activities for energy management 2-1 Elaborate a plan on maintenance of the facilities and equipment 2-2 Install facilities and equipment 2-3 Carry out the technical training on its operation and maintenance 2-4 Make rules and manuals for operation and maintenance 3-1 Collect and analyze up-to-date information for appropriate training program. 3-2 Formulate curriculum for the training courses (three separate courses for general, heat and electricity) and prepare materials 3-3 Implement the C/P training in NTCEM 3-4 Implement the training courses 3-5 Examine & evaluate trainee's reports (energy management audit and improvement plan) to issue certificates 3-6 Take necessary action for the aftercare of the ex-trainees 3-7 Monitor the efficiency of training courses and improve them	1. Personnel 1) Long-term experts - Chief Advisor [48m/m] - Coordinator [48m/m] - Expert on Energy Conservation Technology (Heat) [48m/m] - Expert on Energy Conservation Technology (Electricity) [48m/m] - Expert on Energy Conservation Policy 2) Short-term experts Short-term experts will be dispatched as necessity arises. 2. Training of C/P in Japan Approx. 2-3 personnel per year 3. Machinery and Equipment as agreed separately	1. C/P staff - Project Director - Project Manager - Project Coordinator - Professors - Administrative Staff - Technical specialists - Secretaries - Drivers 2. Land, buildings, rooms and facilities - Office & necessary facilities for the Japanese experts and Iranian C/P. - Meeting rooms for the transfer of technology. - Buildings, facilities and space necessary for the equipment and materials to be provided by JICA 3. Local cost - Necessary budget to implement the Project, including the in-land transportation and installation cost for the equipment.	- (Precondition) - Necessity of energy management will not be decreased.

[*1] Specific Energy Consumption (SEC) is defined as [Energy Consumption] / [Product Unit]. SEC varies with every different product.

[*2] Goal of SEC improvement of each industry or factory is attached hereto.

ANNEX 2

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Achievement of the Project (1) Inputs from the Japanese Side

Input (1)	Categories	Base for Judgment	Data Source	Summary for Inputs Accomplishments until July 2005	Assessment (-Good -Moderate -Low)
	Input from Japanese Side	Verification of Inputs from Japanese Side on both timing and quality.	- Progress Reports - C/P and J/E - Questionnaire		
	1. Experts	-Ditto-	-Ditto-	- As of the end of June 2005, five (5) long-term experts (134.9 M/M; Chief Advisor, Project Coordinator, Energy Conservation (Heat), Energy Conservation (Electricity), Energy Conservation Policy) have been assigned to the Project as scheduled in R/D. - In addition, nine (9) short-term advisors (6.2M/M in total; Energy Saving by ESCO (2), MAP Method, Setup/Operation of Mini Plant Equipment (2), Setup /Operation and Instruction on Boiler Equipment, Energy Saving Company (Technical/Financial), Factory Audit (Heat), and Factory Audit (electricity)) were dispatched for the Project activities.	Good
	2. Training in Japan	-Ditto-	-Ditto-	- Until the end of June 2005, four (4) C/Ps have been dispatched to Japan for training. - 2003: Four (4) C/Ps - In September 2005, one technical C/P is scheduled to be sent to Japan for training. - The training in Japan is, in general, favorably evaluated by the C/Ps. However, there is a room for improvement of the contents. - In addition to the training in Japan, Technical Exchange Program was conducted between with "Energy Conservation Project in Ankara, Turkey" from June 21 to 27, 2004, and five(5) J/Es and five(5) C/Ps visited to Turkey to exchange technical information.	Good-Moderate
	3. Provided Equipment	-Ditto-	-Ditto-	- Until the end of June 2005, equipment of USD 1,208,000 (approximately equivalent to JPY 132,880,000, and IRR 10,751,000,000 ((USD1.00 = JPY110=IRR8,900)) in value has been installed in the Project site in AHERC. - Major items include: combustion furnace, pump unit, fan unit, air compression unit, etc. (details are in ANNEX5 : Provided Equipment) - Due to technical problems, full operation or utilization of provided equipment was not made until April 2005, around 10 months after the installation had started. Although major problems have been solved by now, minor malfunctions remain with data analysis system of combustion furnace, etc. and further countermeasures should be taken immediately by the suppliers.	Moderate-Low
	4. Operational Cost	-Ditto-	-Ditto-	- Until June 2005, USD 112,500 (approximately equivalent to JPY: 12,375,000, and IRR: 1,001,250,000 (USD1.00 = JPY110=IRR8,900)) have been spent as operational cost. This assistance contributed to the achievement of the Project significantly. - JPFY 2003: USD 54,000 - JPFY 2004: USD 54,000 - JPFY 2005: USD 4,500 (as of the end of June 2005) (JPFY: Japanese Fiscal Year (from April to March))	Good
	5. Others	-Ditto-	-Ditto-		

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry,

SABA: Iran Energy Efficiency Organization

Achievement of the Project (2) Inputs from the Iranian Side

Input (2)	Categories	Base for Judgment	Data Source	Summary for Inputs Accomplishments until July 2005	Assessment (-Good -Moderate -Low)
	Input from the Iranian Side	Verification of Inputs from the Iranian Side on both timing and quality.	- Progress Reports - C/P and J/E - Questionnaire		
	1. C/P allocation	-Ditto-	-Ditto-	<ul style="list-style-type: none"> - As of the end of April 2005, eight (8) C/Pstaff (225 M/M), including the Project Director, Project Manager, six(6) Technical C/Ps are assigned for the Project. - In addition to the above eight (8) C/Ps, the Iranian side allocated two technicians for operation and maintenance of facilities and equipment as well as one staff for evaluation of the training. - In the R/D, however, eight (8) Technical C/Ps were scheduled to be allocated. - In October 2003, two additional technical C/Ps were allocated and the as in described in R/D, eight (8) C/Ps were assigned. However, the two new C/Ps left the Project in one year and since, only six (6) technical C/Ps have been assigned to the Project. 	Moderate
	2. Building and Facilities	-Ditto-	-Ditto-	<ul style="list-style-type: none"> - In November 2004, construction of NTCEM building (administration and experiment buildings) were completed by the Iranian side. Although the completion was two months behind the original schedule, the building is considered to have satisfactory training environment with a workshop space for a mini plant, two lectures rooms, and offices for Iranian C/Ps, etc. - For J/Es, in AHERC, four rooms with office facilities (desks, chairs, telephones, etc.) are provided for the Japanese Experts. - In EEO in Tehran, one room, shared with three EEO staff, is provided for J/E (energy conservation policy). 	Good
	3. Operational Cost	-Ditto-	-Ditto-	<ul style="list-style-type: none"> - Operational cost includes staff salary, field and laboratory equipment, facility expenses, communication expense (telephone), utilities, consumables, travel allowances, and fuel, etc., in total, USD 570,000 (approximately equivalent to JPY:62,700,000, and IRR: 5,000,000,000 ((USD1.00 = JPY110=IRR8,900))) have been provided almost as scheduled by the Iranian side. 	Good
	4. Others	-Ditto-	-Ditto-		

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry, SABA: Iran Energy Efficiency Organization

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
 Achievement of the Project (3)-1 Performance of Activities

Activities	Questions	Data Source	Summary for Activity Performance until July 2005	Assessment (-Good -Moderate -Low)
Performance of Activities				
1-1 Analyze on-going policies of energy management in the industrial sector. 1-2 Propose effective policy for energy management to the relevant agencies so that the training in the center makes maximum effect. 1-3 Manage to offer training programs that best meet the needs of the industry and the nation. 1-4 Carry out necessary dissemination activities for energy management.	Were activities implemented appropriately both in timing and quality?	- Progress Reports - C/P and J/E - Questionnaire - Interviews	1-1 & 1-2: Collection of Iranian Act of the 4 th fiveYear Development Plan and the Bill of National Energy Efficiency Management (English version) were conducted. The Japanese Experts and Iranian Counterparts discussed the contents of the Act and the Bill, such as the policy of energy manager system, the tariff of energy price at present and in future, etc. Recommendations for Iranian energy conservation policy will be made in the next half year. 1-3: The first NTCEM training course (general) was conducted on December 2004 with 19 participants. As of May 2005, 10 courses were conducted with total 126 participants. Advice on the training programs from the standpoint of industry and the nation will be made intensively in the next term. J/E advised SABA staff on the selection of trainees from industries. 1-4: Review of the current dissemination activities and the study of effective dissemination measures were conducted. For the purposes, Japanese energy management policy and ESCO activities were introduced to Iranian industry people including C/P Organization through the regular meeting and ESCO seminars held in February 2005 in Mashhad. Also, promotion seminars were conducted in Tabriz in September 2003 with 130 participants. NTCEM pamphlet (5,000 copies) were prepared. Also, SABA prepared 10,000 copies of brochures and distributed to Industry sector.	Moderate
2-1 Elaborate a plan on maintenance of the facilities and equipment. 2-2 Install facilities and equipment. 2-3 Carry out the technical training on its operation and maintenance. 2-4 Make rules and manuals for operation and maintenance (O&M).	- Ditto -	- Input Record -	2-1: Basic annual plan of operation and maintenance was prepared by SABA. C/Ps partly modified the plan and conducted the trainings based on the modified plan. 2-2: Due to the delay of procurement, installation of facilities and equipment started two months behind the original schedule. Besides, due to improper design and aftercare works by the suppliers, troubles occurred many times repeatedly, and J/Es (energy conservation) have spent major part of the time taking countermeasures to settle the problems until now. As of the end of June 2005, most of the pre-installation works of facilities and equipment were completed, however, there still remain troubles with some devices such as a data analysis system of the furnace, etc. J/Es and C/Ps have made notable efforts to settle the problems. 2-3: C/P training on operation and maintenance of facilities was carried out according to the documents prepared by J/Es with reference to the documents utilized in the energy management project in Turkey. 2-4: O&M manuals are yet to be provided by the suppliers of the equipment based on the contract documents. Accordingly, making rules and manuals for operation and maintenance were delayed. Meanwhile, under the circumstance, J/Es prepared the necessary materials in parallel paying attention to the progress of the supplier's task.	Moderate

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry,
 SABA: Iran Energy Efficiency Organization

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation

Achievement of the Project (3)-2 Performance of Activities

Activities	Questions	Data Source	Summary for Activity Performance until July 2005	Assessment (-Good -Moderate -Low)
<p>3-1 Collect and analyze up-to-date information for appropriate training program.</p> <p>3-2 Formulate curriculum for the training courses (three separate courses for general, heat and electricity) and prepare materials</p> <p>3-3 Implement the C/P training in NTCEM</p> <p>3-4 Implement the training courses</p> <p>3-5 Examine & evaluate trainee's reports (energy management audit and improvement plan) to issue certificates</p> <p>3-6 Take necessary action for the aftercare of the ex-trainees</p> <p>3-7 Monitor the efficiency of training courses and improve them.</p>	<p>- Ditto -</p>	<p>- Ditto -</p>	<p>3-1: Necessary information for appropriate training programs was collected and analyzed based on the experiences in Japan.</p> <p>3-2: Formulation of the curriculum and preparation of the training materials were completed and used for the training courses.</p> <p>3-3: Since April 2003, a series of discussions on energy conservation technology, and, lectures and practical trainings on energy conservation measures, etc. was conducted under the guidance of the Japanese long-term and short-term experts, in total 51 times until March 2005. In addition, site visits to industries and organizations concerned, were conducted 10 times, in total. However, according to the interview and questionnaire results, mainly due to delay of the installation of the equipment, it was not possible for J/Es to spend sufficient time on the C/Ps training in NTCEM since July 2004.</p> <p>3-4: In the original plan, the first training was scheduled to start in September 2004. Due to delay of the equipment installation, and preparation of text books, etc., the training was commenced on November 28, 2004, with about two months behind the original schedule. Since, the trainings are conducted smoothly. (ten (10) times and 126 trainees from December 2004 to May 2005)</p> <p>3-5: At the initial stage of the training until April 2005, trainees were mainly accepted from governmental organizations, such as TAVANIR (Public Electric Cooperation) , SABA, RPO (Research and Planning Organization) , MPO (Managing and Planning Organization) , etc., not factories. Consequently, as of July 2005, reports from the ex-trainees have not been submitted as were expected</p> <p>- In order to establish the procedure of external evaluation, two short-term experts were dispatched in February 2005, and prepared the format of the evaluation of trainees' reports and handed to SABA.</p> <p>3-6: No specific activities were not reported yet.</p> <p>3-7: Monitoring of the training courses is being conducted by NTCEM and a report based on questionnaires to trainees was submitted to EEO and the Project team recently (July 2005) by EEO. However, there is a room of improvement with the method of evaluation and analysis. AHERC assigned one (1) advisor for the evaluation of the trainings.</p>	<p>Moderate</p>
<p>Process of Activities</p>	<p>Has the decisions been made without delay or obstacles? (Including establishment of a monitoring system)</p>	<p>- Progress Reports - C/P and J/E - Interviews</p>	<p>- Monitoring system of the Project has not been functioning properly.</p>	<p>Moderate</p>

	Were coordination among implementing and collaborative agencies sufficient?	- Ditto -	<p>- There are three principal relevant organizations for the Project, namely, EEO, NTCEM/AHERC, and SABA. These organizations take charge in different but important activities of the Project.</p> <p>- According to the questionnaires and interviews to the stakeholders, there is a room for improvement in coordination and communication among these organizations.</p>	Moderate
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Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry,
SABA: Iran Energy Efficiency Organization

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Achievement of the Project (4) Performance of Overall Goal, Project Purpose and Outputs

Narrative Summary of PDM	Verifiable Indicators	Data Source	Summary of Performance until July 2005	Assessment (-Good -Moderate -Low)
Overall Goal Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.	SEC ^{1*1]} of each industrial sub- sector is improved to the extent defined separately ^{1*2]} by 2010.	- Progress Reports - C/P and J/E -Questionnaire - Interviews	- It is still too early to evaluate the prospect of Overall Goal achievement. (According to the information by EEO, SABA and IFCO (Iran Fuel Consumption Optimizing Organization) etc., the prospect of SEC improvement of each industrial sector is considered positive)	/
Project Purpose The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.	1 SEC of the factories where ex-trainees work is improved to the extent defined separately by the end of the project. 2 Number of ex-trainees' proposals accepted by factories. 3 Number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.	- Ditto -	At the moment, there is not sufficient information to judge the prospect of the Project Purpose. <u>1. SEC improvement</u> - SEC data of the factories has not been collected sufficiently yet. - The trainings started at the end of 2004. However, according to the information of the stakeholders, the initial stage from the beginning of the training until April 2005 was positioned as the preliminary stage and the trainees were collected from public organizations such as MPO, SABA, RPO, etc. <u>2. Number of ex-trainees' proposals and 3. the factories that obtained financial facilities</u> -Trainees from factories were dispatched to Tabriz from April 2004, and the first external evaluation is going to start in August 2005. - Therefore, the indicator, namely, the improvement of SEC will be verified from August 2005. - At the moment, similarly, sufficient information has not been collected yet neither on the number of ex-trainees' proposals accepted by factories nor number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.	Moderate
Outputs 1. Policies and administration structures for energy management of the industrial sector are coordinated so that the contribution of the project becomes effective.	NTCEM's activities meet the government policies and requirements of the industrial sector	- Ditto -	-In order to establish appropriate activities of NTCEM to meet the Iranian government policies and requirement of the industrial sector, collection and analysis of Iranian Act of the 4 th Five-year Development Plan and the Bill of National Energy Efficiency Management (English version) were collected. - J/E assisted the Iranian side to send five (5) parliament members to Japan in December 2003 for acceleration of energy management policies in Iran. - Also advice was made by J/E to SABA in selecting trainees to NTCEM.	Moderate
2. C/P are able to operate and maintain the training facilities and equipment..	2-1 C/P are able to utilize training facilities and equipment efficiently. 2-2 C/P are able to maintain training facilities and equipment sufficiently.	- Ditto -	<u>C/Ps are able to operate and maintain the training facilities and equipment.</u> - C/Ps were trained through the followings: (1) OJT on factory audit, (2) Preparation of instruction manuals for training courses, (3) Trainings on operation of provided equipment, and, (4) Lectures and course works by the J/Es, etc. - According to the observation results of the J/Es, C/Ps are able to operate and maintain the training facilities and equipment -Delay of the equipment installation and submission of complete manuals hampered the progress of the trainings, and imposed a burden on the J/Es. -However, provisional manuals were effective to improve the knowledge of C/Ps.	Good-Moderate
3. Both theoretical and practical training for energy related engineers are maintained and	3-1 C/P are able to develop training materials and textbooks.	- Ditto -	3-1: C/Ps understand well the contents of the training. However, due to lack of time, textbooks, were prepared by SABA staff in September 2004, and have been used for trainings 3-2: Although there was a delay of the commencement, trainings have been carried out smoothly by C/Ps.	Moderate

managed.	<p>3-2 C/P are able to implement training courses.</p> <p>3-3 Number of certified energy related engineers is increased.</p> <p>3-4 C/P are able to manage aftercare of the ex-trainees</p>		<p>- Until the end of May 2005, ten (10) training courses have been held: five(5) general courses, three (3) electricity courses and two (2) heat courses. According to the hearings from ex-trainees, in general, the training courses were effective and helpful for their duties.</p> <p>3-3 :Total participants amounted to 126 (77 for general, 31 for electricity and 18 for heat courses, respectively) However due to delay of the training commencement, the first examination for certificate will be held in coming September 2005.</p> <p>3-4 :Roles and functions of the relevant organizations of the actions for aftercare have not been clearly decided yet.</p>	
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Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry,
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ANNEX 3

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation

Evaluation Grid (1/ 5): Relevance

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)
	Question	Sub-question			
Relevance -To examine the justifiability or necessity for project implementation	Is the effect that the Project is aiming for in line with the national policy of Iran?	To what extent, has enhancement in the industrial sector achieved through promotion of rational use of energy? (Specific energy consumption of each industrial sub-sector is improved to the extent defined separately by 2010.)		<u>The Project has high relevance with the needs of Iranian society based on the followings:</u> <ul style="list-style-type: none"> - Iran is one of the world's biggest oil producing countries with 90 billion barrels of oil deposit and earns about 80% of its foreign currency from oil and related products. - However, domestic energy consumption has been growing rapidly in recent years and a study estimated that Iran would be an energy importing country by 2018 if the tendency continues. - Energy became an important issue in the 1990's, since Iran began its economic recovery from the declined situation in 1990's. The 2nd Five-year National Development Plan has emphasized policies for rational use of energy and environmental conservation. - In March 2001, the Supreme Leader, Ayatollah Khameneie mentioned the necessity of the reduction of energy consumption as issues with national priority. - Specifically, this subject is to be prescribed in the prospective "Law on management of Energy Consumption" and promoted at a national level. - Meanwhile, improper energy efficiency in the industrial sector has long been recognized in Iran. - The Project attempts to establish a training center where human resources are developed for support of this policy, to train energy managers in industry sector, which may result in effective use on energy in Iran. 	High
	Was the selection of the target group adequate?	Are the needs for cooperation high from the energy related engineers in industrial sector?		<u>The needs of the target group is considered moderate and necessary to secure incentive for the training.</u> <ul style="list-style-type: none"> - The Project target group is the Iranian industrial sector, more specifically, engineers related to energy management of large-scale factories. - Some 80% of the large-scale factories in Iran are state owned enterprises, managed in advantageous circumstances, with energy subsidy and little competition. - However, in the long perspective, revitalization of the state enterprises and elimination of energy subsidy are expected, which spur the factories to strengthen their competitiveness. - Therefore, in general, factory managers are interested in appropriate energy management as it has an effect on cost reduction. - In addition, as it is difficult for each factory to conduct energy management training individually in terms of cost, scale and expertise, concentrated and large-scale training by public sector would be more practical and effective. - Therefore, from theoretical and long-term point of view, the Project should have relevance with the needs of the target groups. - However, in reality, some factory managers with insufficient understanding of the necessity and significance of energy management are reluctant to send their staff to training courses because of the expenses and time spent on the course. 	Moderate
		Is the size of the target group adequate?		<u>The size of the target group is considered appropriate.</u> <ul style="list-style-type: none"> - In Iran, there are 539 factories with electricity demand equal or more than 2MW or with an annual energy consumption of more than 2,000m³ oil equivalent energy consumption, which consume the major part of the energy in the industrial sector. - Based on the performance of the training during the past half-year (126 trainees from December 2004 to May 2005), it is reasonable to estimate that more than 500 trainees will participate in the training during the 	High

			<p>remaining two years.</p> <ul style="list-style-type: none"> - Since the total number of trainees will be more than 600, during the remaining two years of cooperation period, from large-scale factories, the size of the target groups will be practical and effective for the energy management purpose. 	
Is The Project consistent with the Japan's foreign assistance policy?	Does the Project address the focus issues for aid?		<p><u>The Project addresses the focus issues of aid policy of Japan.</u></p> <ul style="list-style-type: none"> - Japan has been making constant effort to maintain a good relationship with Iran for the stability of Middle East region through solidity of the power. -Especially, after the taking over of the current government, Japan kept its policy to support reformation efforts. -Importing 11% of its oil from Iran, it is crucial to secure energy availability for energy security of Japan. -The Project, through energy management promotion, will contribute to the sustainable development of Iran and is highly in accordance with the Japan's aid policy to Iran. 	High
Relevance of the Project as a Means	Does Japan have technical advantage compared to other countries?		<p><u>Japan has sufficient technical advantages.</u></p> <ul style="list-style-type: none"> - Japan has world's highest-level technologies in energy management promoted through two oil crises. - Comparing with Iran, Japan needs much less energy per GDP (one million USD); 96 toe (ton oil equivalent) while Iran requires 1,037 toe. - Japanese practice and technology in energy management have great advantage in the industrial sector and it is reasonable for Japan to cooperate in this field. 	High

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Evaluation Grid (2/ 5): Effectiveness

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Poor)
	Question	Sub-question			
Effectiveness -To examine the Project effects	To which degree have the Outputs been achieved?			(as per "ANNEX 2")	Moderate
	To which degree has the Project Purpose been achieved?	To which extent have the National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector?	1. Has specific energy consumption (SEC) of the factories where ex-trainees work is improved to the extent defined separately?	- The training course by NTCEM started in December 2004. - However, during the early stage, from December 2004 to April 2005, majority of the trainees were from public or governmental organizations. Trainees from factories increased from April 2005. - During the three months from April 2005 up until now, SEC data of the factories where ex-trainees work has not been fully collected or analyzed yet due to limitation of time. - Therefore, it is still too early to evaluate the Project Purpose based on this indicator.	Low
			2. Number of ex-trainees' proposals accepted by factories	- Since the training course started in December 2004, 126 trainees (as of the end of May 2005) took the courses. -However, at the moment, there is not sufficient data about the numbers of ex-trainees whose proposals were accepted by factories.	
			3. Number of factories with ex-trainees that succeeded to obtain financial facilities for energy efficiency activities.	- At the moment, there is not sufficient data about the numbers of factories with ex-trainees that succeeded to obtain financial facilities for energy efficiency activities.	
	Were there any external factors that contributed to the achievement of the Project Purpose?	Verification and monitoring of important assumptions indicated in PDM	- Machinery and equipment provided by the Japanese side will obtain easy custom clearance.	- There was a delay of custom clearance for machinery, however did not hamper seriously the progress of the Project	Moderate
			-C/P remain in NTCEM.	- Eight technical C/Ps were assigned at the initial stage of the Project. However, two of them left the Project and although a request for supplemental allocation of C/P staff was made, no supplemental allocation has not been made yet.	
	Is coordination maintained among concerned agencies in Iran?		- Based on the information from the stakeholders, there is a room of improvement for coordination among concerned agencies in Iran as well as with the Project (JICA Experts)	Moderate	

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The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation

Evaluation Grid (3/ 5): Efficiency

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)
	Question	Sub-question			
Efficiency -To examine the Project efficiency	Appropriateness of the Inputs (Seen from the achieved Outputs, were the quality, quantity and timing of Inputs appropriate?)	Were the number of experts dispatched, their fields of expertise and the timing of dispatch appropriate?	Comparison of the actual achievement with the plan	- As of the end of June 2005, five (5) long-term experts (134.9 M/M; Chief Advisor, Project Coordinator, Energy Conservation (Heat), Energy Conservation (Electricity), Energy Conservation Policy) have been assigned to the Project as scheduled in R/D. - In addition nine (9) short-term advisors (6.2M/M in total; Energy Saving by ESCO (2), MAP Method, Setup/Operation of Mini Plant Equipment (2), Setup /Operation and Instruction on Boiler Equipment, ESCO (Technical/Financial), Factory Audit (Heat), and Factory Audit (electricity))were dispatched for the Project activities. - As a whole, assignment of personnel by the Japanese side is considered appropriate in terms of timing and the fields of expertise.	High
		Were the types, quantity, and timing of the installation of provided equipment appropriate?		<u>The delay of the installation of the provided equipment by the Japanese side hampered the achievement of the Outputs.</u> - Due to lack of experience of the supplier, full operation or utilization of provided equipment was not made until April 2005, around 10 months after the installation had started. Although major problems have been solved by now, minor malfunctions remain with data analysis system of combustion furnace, etc. and further countermeasures should be taken immediately.	Poor
		Were the numbers of accepted trainees, the field of the training, contents, and the timing of the trainee acceptance appropriate?		- Until the end of June 2005, five (5) C/Ps, out of six (6) currently allocated, have been dispatched to Japan for training (one C/P dispatched to Japan on country focused training program by JICA). - In addition, the remaining one(1) C/P is scheduled to be dispatched to Japan for training in September 2005. - According to the questionnaire survey and interview to the five (5) Iranian C/Ps dispatched to Japan, the training in Japan is effective their duties in the Project activities. However, the training can be improved by focusing on more practical training curriculum rather than site visits.	High
		Were the numbers, placement, and skills of C/Ps appropriate?		- Trial was made to allocate eight (8) C/Ps in the early stage of the Project. - However, two (2) of them left the Project in 2003 and no supplementary assignment has not been made yet despite a request from the Project. - In order to intensively conduct training courses in NTCEM, six(6) C/Ps are not considered to be sufficient. - The skills and experiences of the C/Ps are considered appropriate. - In addition to the C/Ps, NTCEM/AHERC assigned two technicians for the mini-plant and one (1) advisor for evaluation of the trainings.	High-Moderate
		Are there any problems in quantity, size, and convenience of the buildings and facilities?		<u>Tabriz</u> - Buildings for administration and trainings were newly constructed by the Iranian side for the Project. For the Project activities, four office spaces for J/E and C/P are provided and conference rooms, etc. are available. As a whole, working environment of the buildings are satisfactory. <u>Tehran</u> -Office space is provided for a J/E (energy conservation policy) in EEO, Teheran.	High

		Was the Project budget of an appropriate size?		- Both the Japanese and Iranian sides have secured an appropriate size of budget.	High
	What are the factors that inhibit or contribute to the efficiency of the Project implementation process?	Are there any factors that contributed to the efficiency of the Project?	Opinion of C/Ps and J/Es	- Sufficient knowledge and experiences of Iranian C/Ps - Secured budget by the Iranian government - Technical exchange program to the Energy Conservation Project in Ankara, Turkey" in June 2004	High
		Are there any factors that inhibited the efficiency?	Opinion of C/Ps and J/Es	- Due to delay of the setup and installation of the min-plant equipment, the progress of the Project was hampered significantly. - Custom clearance of the Project equipment took more than three months in the past, with exception of plant equipment which cleared the procedure in about a month.	Low

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The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Evaluation Grid (4/5): Impact

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)	
	Question	Sub-question				
Impact -To examine the Projects effects including the ripple effects in the long terms	Are there prospects that the Overall Goal	Specific Energy Consumption of each industrial sub-sector is improved to the extent defined separately by 2010.	-Comparison of status before and after the Project.	<u>It is still premature to evaluate the prospect of the Overall Goal Achievement.</u> - If the training courses by NTCEM continue at the present pace, namely, 20 trainees per month, the total trainees will be more than 600 by the end of the Project cooperation period and 1,300 by March 2010, which will cover the major part of the large-scale factories in Iran. - Therefore, if the current training activities under the Project continues, and the energy management in each factory where each ex-trainee belongs to in Iran is enhanced, theoretically, there will be good prospect of the Overall Goal achievement. -However, at the time of mid-term evaluation, when six months have passed since the training course began, it is still premature to evaluate the prospect of the Overall Goal	N/A	
	Is there any influence (expected, unexpected, positive, and negative) including ripple effects?	Were there any impacts on the energy management policies of Iran through the implementation of the Project?			<u>It is still premature to evaluate the prospect of the Impacts on energy management policy.</u> -At the moment of the evaluation, no impacts on the energy management policies have been observed yet.	N/A
		Were there any institutional impacts?			- As the current training courses progress, NTCEM will have good reputation offering high-level energy management training courses both in theoretical and practical subject.	High
		Were there any technical impacts?			<u>Iranian C/Ps and ex-trainees are considered to have obtained basic skills to proceed energy management.</u> - Iranian C/Ps obtained direct technical transfer from Japanese Experts using the specially designed mini-plant equipment. - Engineers from factories that consume bigger energy consumption were accepted to the training program with priority and learned knowledge and skills to manage energy of their factories. - Trainees will become core staff for energy management of factories - In order to secure dissemination of energy management technologies to the factories in Iran, it is necessary to promote awareness program targeting the managers of the factories.	High-Moderate
		Were there any economic or social impacts?			<u>Theoretically, economic and social impacts are expected. However, no sufficient data has not been collected yet.</u> - The beneficiary of this project is the industrial sector, i.e. factories. Only 2,200 out of 30,000 factories in Iran have more than 50 employees. These larger factories comprise only 7.2% of the total factory number, however, they employ 68% of the total work force and consume 81% of the total energy in the industrial sector. - Thus, intensive execution of energy management in the large-scale factories is effective and will bring about economic and social impacts.	N/A

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The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Evaluation Grid (5/5): Sustainability

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)
	Question	Sub-question			
Sustainability -To examine the sustainability after the termination of the JICA cooperation	Are there any factors that inhibit or contribute to the appearance of the benefits of the implementation of the Project?	<u>Policy Aspect</u> Is political support for implementing agencies sustained by the government of Iran?		- Political support for energy management is not likely to drastically, since the energy management policy is highly consistent with the needs of the nation's society. - According to the Iranian government officials, energy saving policies is strengthened in the fourth five-year national plan and will be prioritized under the new administration.	High
		<u>Institutional Aspect</u> Does the implementing organization have the capacity to carry out activities?		-NTCEM/AHERC has been recognized as the best training institutions in terms of the relevant fields and has sufficient potential to carry out the Project activities by themselves. -However, in order to secure sustainability in institutional aspect, it is inevitable to strengthen the coordination among the relevant organizations, namely EEO and SABA	High
		<u>Financial Aspect</u> -Is financial situation good?		- At the moment, almost all the training course fees are born by the Iranian government. - Iranian government has put priority in human resources development. - The Project aims at develop human resources to take charge in energy saving which is another prioritized issue for the government. - Therefore, budget for the current Project activities will be secured after the cooperation period. - However, from the long-term perspective, NTCEM/AHERC should secure its budget by charging training course fees. - Accordingly, efforts should be made continuously to improve the quality of training courses.	High-Moderate
		<u>Technical Aspect</u> -Is technical transfer sufficiently achieved?		- Technical transfer was sufficiently executed to C/Ps in order to continue the current training activities under NTCEM. - In addition, through the training courses at NTCEM, trainees are considered to obtain useful knowledge and skills to conduct energy management activities in the factories they belong to. - In order to secure dissemination of energy management technologies to the target group of the Project, it is necessary to promote awareness program toward the managers of the factories.	High-Moderate
		<u>Ownership</u> Is the ownership of implementing agencies and related ministries assured?		- Implementing organizations, namely, EEO, AHERC/NTCEM and SABA are considered to have high ownerships for the energy saving activities.	High

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

4. 日本人専門家リスト

ANNEX 4 The List of Japanese Experts

	2003												2004												2005												
	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
	28	31	30	31	30	31	31	30	31	30	31	31	29	31	30	31	30	31	31	30	31	30	31	31	28	31	30	31	30	31	31	30	31	30	31		
Long-term Expert	M/M (end of June '05)																																				
Chief Advisor																																					
Mr. Takeho Sakata ('03.6.16-'05.6.15)	24.3	15												14																							
Mr. Hiroaki Ohkubo ('05.5.30-'07.3.12)	1.1													2												30											
Project Coordinator																																					
Mr. Hidekazu Harima ('03.3.6-'05.3.5)	23.7	6												5																							
Mr. Yasuhiro Kimura ('05.2.23-'07.2.21)	4.3													6																							
Energy Conservation (Heat)																																					
Mr. Yasunori Serizawa ('03.6.16-'06.3.5)	27.6	6																																			
Energy Conservation (Electricity)																																					
Mr. Kiyoshi Kamiya ('03.3.13-'06.3.12)	28.0	19																																			
Energy Conservation Policy																																					
Dr. Mitsuo Ninomiya ('03.6.16-'05.6.15)	24.3	15												14																							
Dr. Shiro Matsumoto ('05.6.15-'07.3.12)	0.5													16																							
	133.87																																				
Short-term Expert																																					
(1) Energy Saving by ESCO																																					
Mr. Norio Fukushima ('04.2.20-'03.3)	0.4													■																							
(2) Energy Saving by ESCO																																					
Mr. Norio Fukushima ('04.6.4-'06.21)	0.6													■																							
(3) MAP Method																																					
Mr. Akira Kobayashi ('04.7.16-'07.29)	0.5													■																							
(4) Operation and Setup of Mini-plant Equipment																																					
Mr. Yasunori Endo ('04.7.17-'07.30)	0.5													■																							
(5) Setup/Operation and Instruction on Boiler Equipment																																					
Mr. Yasuji Kato ('04.8.1-'09.14)	1.5													■																							
(6) Operation and Setup of Mini-plant Equipment																																					
Mr. Kazuo Okazaki ('04.9.1-'09.14)	0.5													■																							
(7) Energy Service Company (Technical/financial)																																					
Mr. Hiroshi Murata ('05.2.6-'02.19)	0.5																									■											
(8) Factory Audit (Heat)																																					
Mr. Norio Fukushima ('05.2.6-'03.4)	0.9																									■											
(9) Factory Audit (Electricity)																																					
Mr. Hisashi Amano ('05.2.6-'03.4)	0.9																									■											

ANNEX 5 List of the Provided Equipment

Name of Item	Description	Quantity	JPY
Combustion Furnace Equipment		1	
	Combustion Furnace body		26,000,000
	Natural Gas Burner		5,600,000
	Waste Heat Recovery Unit		3,800,000
	Open Burner		3,600,000
	Metering and Control System		23,500,000
	Others		2,000,000
Steam Trap Training Unit		1	
	Trap Unit		6,500,000
	Steam Trap Checker		2,500,000
	Others		500,000
Fan Unit		1	
	Turbo Fan		2,300,000
	Variable Speed Control of Motor by Inverter		3,600,000
	Others		1,400,000
Pump Unit		1	
	Volute Pump		2,300,000
	Variable Speed Control of Motor by Inverter		3,800,000
	Others		1,400,000
Compressor		1	
	Rotary Type Compressor		8,500,000
	Variable Speed Control of Motor by Inverter		3,200,000
	Others		1,400,000
Power Box			1,800,000
Energy Economizing Navigator		1	2,000,000
Factory Diagnostic System		1	1,202,000
Uninterruptible Power Supply		2	1,130,000
Radiation thermometer (IR-AHT2)		1	279,000
Radiation Thermometer (IR-AHS2)		1	214,000
Thermal Wind Sensor		1	875,000
Multi-media Projector		2	800,000
Others			22,680,000
Total		JPY	132,880,000
		US\$	1,208,000
		RLR	10,751,200,000

6 . カウンターパート配置

ANNEX 6 Allocation of Counterparts as of June 2005

		2003												2004												2005											
		3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
		31	30	31	30	31	31	30	31	30	31	31	29	31	30	31	30	31	31	30	31	30	31	31	28	31	30	31	30	31	31	30	31	30	31		
Project Director	M/M																																				
Dr. S. Mohammad Sadeghzade ('03.3~)	28.0																																				
Project Manager																																					
Dr. Esmail Khoshnavan ('03.3~'04.5)	15.0																																				
Mr. Ahmad Rashtchizadeh ('04.5~)	14.0																																				
Technical Counterpart																																					
<u>Heat/Boiler</u>																																					
Mr. Khalil Jannat Doust, ('03.3~)	28.0																																				
<u>Heat/Furnace</u>																																					
Mr. Ali Partoniya ('03.3~)	28.0																																				
<u>Heat/Steam</u>																																					
Mr. Mohammad Valizadeh ('03.3~)	28.0																																				
<u>Heat</u>																																					
Mr. Aidin Sekhavati ('03.10~'03.11)	1.0																																				
<u>Electricity/Lighting</u>																																					
Mr. Ali Zeraat Parvar ('03.3~)	28.0																																				
<u>Electricity/Pump & Fan</u>																																					
Mr. Khalil Banan Ali Abbassi ('03.3~)	28.0																																				
<u>Electricity/Compressor</u>																																					
Mr. Ali Farsi ('03.10~)	21.0																																				
<u>Mechanical</u>																																					
Mr. Mehrdad Danaei Yeghaneh ('03.10~'04.3)	6.0																																				

7. カウンターパートの本邦研修実績

ANNEX 7 Counterpart Training in Japan

	Course of Training	Period	Trainee's Name/Position
JFY 2002			
1	Energy Managemen	2003.02.25~2003.03.18	Mr. Kambiz REZAPOUR
2	Energy Managemen	2003.02.25~2003.03.18	Mr. Khalil Jannat Doust
JFY 2003			
1	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Ali Zeraat Parvar (AHERC)
2	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Ali Partoniya (AHERC)
3	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Khalil Banan Ali Abbassi (AHERC)
4	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Mohammad valizadeh (AHERC)
JFY 2004			
	None		
JFY 2005			
1			
2			

8. 面談者リスト

ANNEX 8 List of Interviewees

Japanese Experts

Mr. Hiroaki Ohkubo, Chief Advisor
Mr. Yasuhiro Kimura, Project Coordinator
Mr. Yasufumi Serizawa, Energy Conservation (Heat)
Mr. Kiyoshi Kamiya, Energy Conservation (Electricity)
Dr. Shiro Matsumoto, Energy Conservation Policy

EEO

Dr. S. Mohammad Sadeghzadeh, Director General, EEO
Mr. Kambiz Rezapour, Manager of Training and Awareness, EEO
Mr. Alireza Shirazi, Expert, Awareness and Training Office
Mr. Akbar Safari, Awareness and Training Group, EEO

SABA

Dr. Abdolreza Karbassi, Managing Director
Mr. Majid Saffarinia, Member of Board and Deputy for Planning and Awareness
Mr. Mohammad H. Zarbakhsh, Manager, Training Office, Mechanical Engineer

AHERC

Mr. Ahmad Raschtchizadeh, Chancellor, NTCEM, AHERC
Mr. Ali Zerrat Parvar, Vice Chancellor, AHERC
Khalil Jannat Doust, Head of Energy Group, NTCEM, AHERC
Mr. Ali Partounia, Staff, Energy Group, NTCEM, AHERC
Mr. Khali Banan, Staff, Energy Group, NTCEM, AHERC
Mr. Valizadeh, Staff, Energy Group, NTCEM, AHERC
Mr. Ali Farsi, Staff, Energy Group, NTCEM, AHERC

Ex-trainees

Tehran

Mr. M. Shahbodhaghi, TCT
Mr. Abbas Beheshifi Pour, SABA
Ms. Mastoneh, Jooshani, SAIPA
Mr. Davood Firouzi, SAIPA, AZIM
Mr. Mohammad Sadeghzadeh, SAIPA AZIM
Mr. Niroumand Abbas, SAIPA AZIM
Mr. Moazzmay, Mohammad, MEHVAR SAZAN
Mr. Mehdi Zolghadri, MEHVAR SAZAN
Mr. Mohsen Jabbar, Tavanir Company
Mr. Hamid Reza Shahravi, University of Tehran, Aero Space

Tabriz

Mr. Hasan Elmi, Bonyan Dissel

Mr. Nima Mohammady, SABA

Mr. Kazem Sefidi, MOTOGEN

Mr. Nader Yasuie, Tabesh Rayan Energy

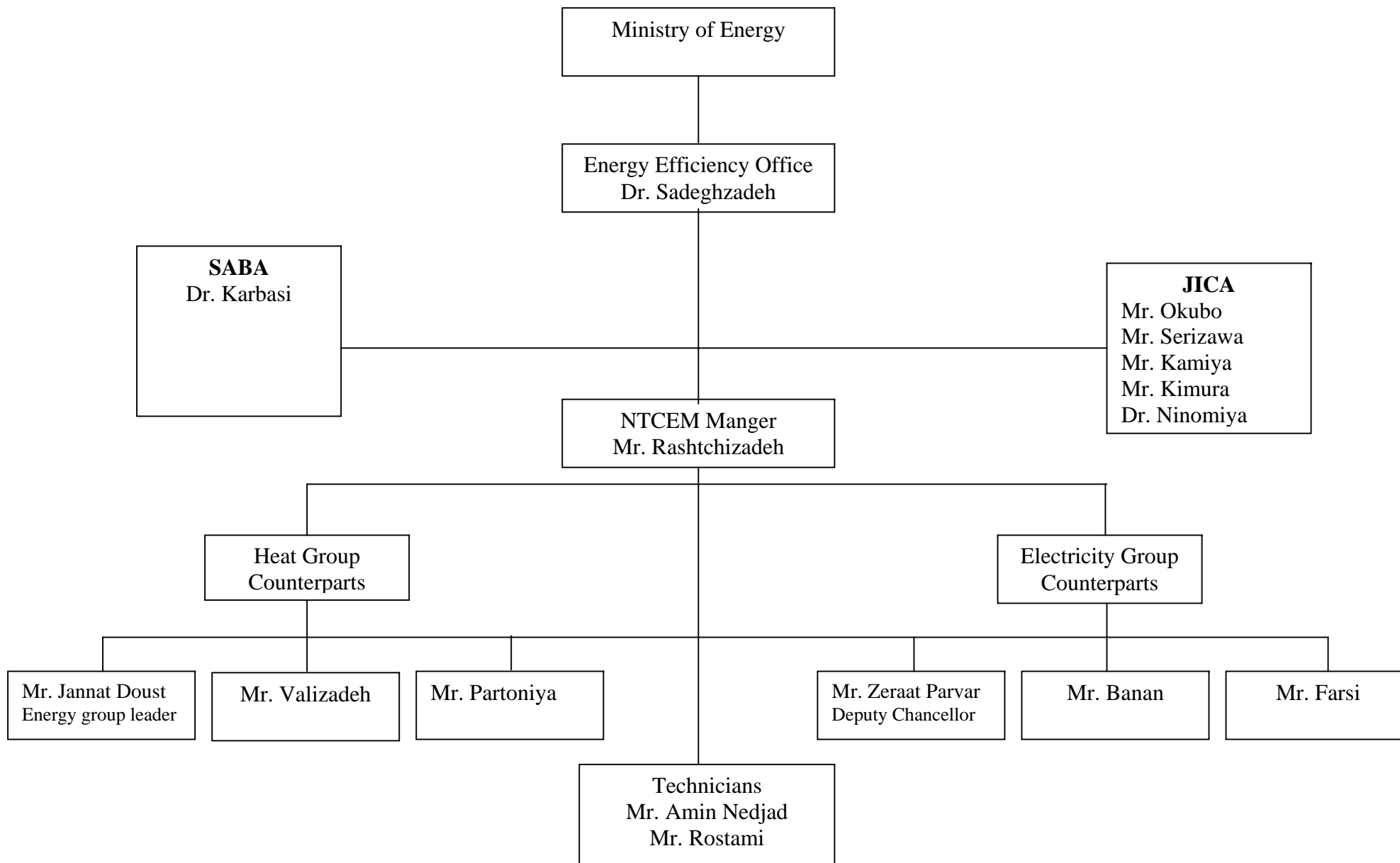
Mr. Yousef Nazeri, Industries and Mines, Head office in E. Azerbaijan

Mr. Musa Ghazanfar, Tabriz Foundation

Mr. R.Setareh, Vice President, Engineeering Div. MOTOGEN

ANNEX9. Organization Chart of JICA Project on National Training Center for Energy Management

14 July 2005



**MINUTES OF MEETING BETWEEN
THE MID-TERM EVALUATION TEAM
AND
CONCERNED AUTHORITIES OF THE GOVERNMENT OF
ISLAMIC REPUBLIC OF IRAN
FOR THE PROJECT ON ENERGY MANAGEMENT PROMOTION**

The Japanese Mid-term Evaluation Team organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Makoto ASHINO visited Islamic Republic of Iran (hereinafter referred to as "IR.Iran") from July 8 to July 20 2005 for the purpose of conducting the mid-term evaluation of the Project on Energy Management Promotion (hereinafter referred to as "the Project") with the Iranian Mid-term Evaluation Team.

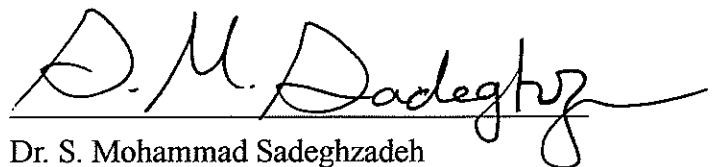
The Mid-term Evaluation Team composing the Japanese and the Iranian Evaluation Teams (hereinafter referred to as "the Study Team") had a series of discussions and exchanged views with the concerned authorities of the government of IR.Iran for the successful implementation of the Project.

As a result of the discussions, the Study Team and the Iranian concerned authorities agreed to report to their respective Governments the matters referred to in the document attached hereto.

Tehran, July 19 2005

芦野 誠

Mr. Makoto ASHINO
Leader
Mid-term Evaluation Team
Japan International Cooperation Agency
Japan



Dr. S. Mohammad Sadeghzadeh
Director General,
Energy Efficiency Office
Ministry of Energy
Islamic Republic of Iran

ATTACHED DOCUMENT

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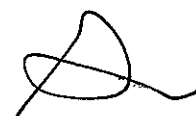
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ATTACHMENT

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Abbreviations

AHERC	The Azarbaijan Higher Education and Research Complex
EEO	Energy Efficiency Office
GDP	Gross Domestic Products
IFCO	Iran Fuel Conservation Organization
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
NTCEM	National Training Center for Energy Management
ODA	Overseas Development Aid
OJT	On the Job Training
PCM	Project Cycle Management
PDM	Project Design Matrix
SABA/IEEO	Iran Energy Efficiency Organization
SEC	Specific Energy Consumption
SERI	Sharif Energy Research Institute



Chapter 1 INTRODUCTION

1.1 Objective of the Evaluation

The mid-term evaluation activities were performed for the following objectives:

- (1) Evaluating the degree of achievement based on the present version of Project Design Matrix (hereinafter referred to as “PDM”) and the Plan of Operations (hereinafter referred to as “PO”) during the first half of the Project
- (2) Identifying problems on any aspects of the Project implementation and proposing necessary solutions, and,
- (3) Reviewing and revising the PDM and the PO, if necessary.

1.2 Members of the Mid-term Evaluation Study Team

1.2.1 Japanese Members

(1) Mr. Makoto ASHINO (Leader)
Team Leader, Natural Resources and Energy Conservation Team, Group 2,
Economic Development Department
Japan International Cooperation Agency (JICA)

(2) Mr. Hiromi CHIHARA (Planning (Energy Policy))
Senior Advisor, Japan International Cooperation Agency (JICA)

(3) Mr. Hiroshi SHIBUYA (Energy Conservation Technology)
General Manager, International Engineering Department, The Energy
Conservation Center, Japan

(4) Mr. Hideaki HIGASHINO (Evaluation Analysis)
Senior Consultant/Environmental Specialist
RECS International Inc.

(5) Mr. Tomomi ADACHI (Cooperation Planning)
Natural Resources and Energy Conservation Team, Group 2, Economic
Development Department
Japan International Cooperation Agency (JICA)

1.2.2 Iranian Members

(1) Mr. Kambiz Rezapour, Manager of Training and Awareness, EEO

(2) Mr. AKbar Safari, Expert, EEO

(3) Mr. Alireza Shirazi, Expert, EEO

(4) Mr. Khalil Jannat Doust, Head of Energy Group, AHERC

- (5) Mr. Ali Zeerat Parvar, Member, Energy Group, AHERC
- (6) Mr. Ramin Hemati, Expert, SABA
- (7) Mr. Behnam Haghjoo, Expert, SABA
- (8) Mr. Mohammad H. Zarbakhsh, Manager of Training Group, SABA
- (9) Mr. Davood Sepehri, Manager, Energy Planning, MPO
- (10) Ms. Afkham Zarvani, Manager of Energy Conservation, Ministry of Petroleum



1.3 Schedule of the Study

		Mr. ASHINO	Mr. CHIHARA, Mr. SHIBUYA, Mr. ADACHI	Mr. HIGASHINO
7th July	Thu			Haneda 20:40 → Osaka 21:55 (JL1319) Osaka 23:15 → Dubai 5:10 (JL5099)
8th July	Fri			Dubai 7:45 → Tehran 10:15 (EK971) PM : Discussion with the expert in Tehran
9th July	Sat			AM : Interview with the concerned persons in SABA and EEO PM : Interview with ex-participants of NTCEM training around Tehran Area
10th July	Sun		Haneda 20:40 → Osaka 21:55 (JL1319) Osaka 23:15 → Dubai 5:10 (JL5099)	AM: Preparation of the related documents PM : Tehran15:45→ tabriz16:55 (IR445)
11th July	Mon	Haneda 20:40 → Osaka 21:55 (JL1319) Osaka 23:15 → Dubai 5:10 (JL5099)	Dubai 7:45 → Tehran 10:15 (EK971)	AM : Interview with experts in Tabriz PM : Interview with counterparts
12th July	Tue	Dubai 12 : 40 → Tehran 15:10 (IR658)	12:30 : Visit to JICA Office 15:00 : Interview with the related person in IFCO	AM : Interview with counterparts PM : Interview with ex-participants of NTCEM training around Tabriz Area
13th July	Wed	8:00 : Courtesy calls on EEO 10:00 : Courtesy calls on SABA 12:00 : Courtesy calls on Iranian Evaluation Team 15:00 : Courtesy calls on Embassy of Japan		AM : Interview with ex-participants of NTCEM training around Tabriz Area PM : Preparation of the draft of the Evaluation Report
14th July	Thu	AM : Tehran 9:10→tabriz 10:20 (IR449)		AM : Preparation of the draft of the Evaluation Report
		PM : Discussion on the evaluation contents		
15th July	Fri	All Day : Discussion on the problem and its countermeasure from now on		
16th July	Sat	9:00 : Discussion with the concerned staff members in the Project		
17th July	Sun	AM : Tabriz 8:00 → Tehran 9:10 (IR446) 11:00 : Discussion with EEO 14:30 : Discussion with SABA		
18th July	Mon	8:30 : Discussion on the Draft of Evaluation Report with Japanese and Iranian Evaluation Team		
19th July	Tue	8:30 : Joint Evaluation Committee and signing the Evaluation Report		
20th July	Wed	AM : Report to the JICA Office 11:00 Report to Embassy of Japan PM : Discussion with experts Visit to Sharif University		
21st July	Thu	Tehran 22 : 15 → Dubai 23 : 45 (EK978)		
22nd July	Fri	Dubai 2 : 50 → Osaka 17 : 20 (JL5090) ,Osaka 18 : 40 → Haneda 19 : 45 (JL1316)		

Chapter 2 OUTLINE OF THE PROJECT

2.1 Background of the Project

IR.Iran is one of the world's biggest oil producing countries with a 9% share of the world oil deposit (90 billion barrel) and Japan imports 11% of its oil from IR.Iran.

Meanwhile, in recent years, domestic energy consumption in IR.Iran has been growing rapidly and reached about 44% of the total energy production. A study predicted, in case the trend continues from now on, that IR.Iran would become an energy importing country by 2018.

Approximately 75% of IR. Iran's foreign currency earnings depends on the petroleum products and if the trend is not evaded, a significant impact will be brought up on the national economy as well as the society of IR.Iran.

It is, therefore, an important issue for IR.Iran to secure oil export through establishing efficient energy utilization.

In order to solve the problems, the government of IR.Iran, as stated in the 3rd five-year national development plan (2000-2004), is preparing to execute the following countermeasures:

- (1) Introduction of energy pricing system by market prices
- (2) Enlightenment activities on energy conservation
- (3) Implementation of demonstration projects for energy conservation
- (4) Financial assistance to energy conservation projects
- (5) Enhancement of legal systems relevant to energy management
- (6) Increase the share of renewable energy in electricity basket.

Under the circumstances, the government of IR.Iran conveyed its request of international cooperation to the Japanese government on 18th September 2000.

The proposed project aimed for improvement of energy efficiency in the industrial sector of IR.Iran. Upon receiving this request, the Japanese side made four rounds of preliminary studies and discussions, and on 16th November 2002, both parties signed the Record of Discussion for this Project. In March 2003, the Project was commenced with four year cooperation period and five Japanese long-term experts have been dispatched.

2.2 Summary of the Project (according to the PDM)

2.2.1 Overall Goal

Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.

2.2.2 Project Purpose

The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.

2.2.3 Outputs

Output 1: Policies and administration structures for energy management of the industrial sector are coordinated so that the contribution of the project becomes effective.

Output 2: Counterparts are able to operate and maintain the training facilities and equipment.

Output 3: Both theoretical and practical training for energy related engineers are maintained and managed.

2.2.4 Activities

Activity 1-1: Analyze on-going policies of energy management in the industrial sector.

Activity 1-2: Propose effective policy for energy management to the relevant agencies so that the training in the center makes maximum effect.

Activity 1-3: Manage to offer training programs that best meet the needs of the industry and the nation.

Activity 1-4: Carry out necessary dissemination activities for energy management.

Activity 2-1: Elaborate a plan on maintenance of the facilities and equipment.

Activity 2-2: Install facilities and equipment.

Activity 2-3: Carry out the technical training on its operation and maintenance.

Activity 2-4: Make rules and manuals for operation and maintenance.

Activity 3-1: Collect and analyze up-to-date information for appropriate training program.

Activity 3-2: Formulate curriculum for the training courses (three separate courses for general, heat and electricity) and prepare materials.

Activity 3-3: Implement the Counterparts training in NTCEM.

Activity 3-4: Implement the training courses.

Activity 3-5: Examine & evaluate trainee's reports (energy management audit and improvement plan) to issue certificates.

Activity 3-6: Take necessary action for the aftercare of the ex-trainees.

Activity 3-7: Monitor the efficiency of training courses and improve them.

CHAPTER 3 METHODOLOGY OF EVALUATION

3.1 Items of the Evaluation

The Project Evaluation was conducted on the following items:

Item 1: Examination of Achievement.

The degree of accomplishments of the Project namely, Inputs, Activities, Outputs and the Project Purpose were verified with reference to indicators described in PDM. For this purpose, data and information were obtained through questionnaires, interviews, and site inspections, etc.

Item 2: Examination of the process for the Project implementation

The process of the Project was examined mainly on important assumptions described in PDM.

Item 3: The evaluation was conducted from the viewpoints of five evaluation criteria as shown below:

(1) Relevance: Relevance is referred to the validity of the Project Purpose and the Overall Goal in compliance with the development policy of the Government of IR.Iran as well as the needs of beneficiaries.

(2) Effectiveness: Effectiveness is referred if the expected benefits of the Project have been achieved as planned and if the benefit was brought about as a result of the Project (not of the external factors).

(3) Efficiency: Efficiency is referred to the productivity of the implementation process and examined if the input of the Project was efficiently converted into the output.

(4) Impact: Impact is referred to direct and indirect, positive and negative impacts caused by implementing the Project including the extent of the prospect of the achievement of the Overall Goal.

(5) Sustainability: Sustainability is referred to the extent that the Project can be further developed by the recipient country and the benefits generated by the Project can be sustained under the recipient country's policies, technology, systems, and financial state.

3.2 Methodology of the Evaluation

In order to conduct the Project evaluation precisely and efficiently, the PCM (Project Cycle Management) method was applied.

The members of the Study Team verified the progress of the Project according to the



degree of accomplishments of the Project components, namely, Inputs, Activities, Outputs and the Project Purpose with reference to the indicators described in the PDM.

Information was collected through questionnaires, individual interviews to the Japanese experts, Iranian counterparts and ex-trainees, site inspections, and a series of evaluation meetings.

In the meetings, the degree of accomplishments mentioned above were verified with reference to the indicators described in PDM, PO (timing and expected results) and relevant Project reports (Progress Reports, Technical Reports, etc.) as well.

CHAPTER 4 Accomplishment of the Project

As regards the inputs from the Japanese side, there were repeated troubles with installation and setup of mini-plant equipment. Inputs by the Iranian side were made almost appropriately and contributed to the progress of the Project.

4.1 Inputs from the Japanese Side

4.1.1 Experts

(1) Long-term experts

As of the end of June 2005, five (5) long-term experts (133.9 M/M; Chief Advisor, Project Coordinator, Energy Conservation (Heat), Energy Conservation (Electricity), and, Energy Conservation Policy) have been assigned to the Project as scheduled in R/D.

List of the Long-term Experts are attached as ANNEX 4.

(2) Short-term experts

As of the end of June 2005, nine (9) short-term experts (6.2 M/M in total; Energy Saving by ESCO (2), MAP Method, Setup/Operation of Mini Plant Equipment (2), Setup /Operation and Instruction on Boiler Equipment, ESCO (Technical/Financial), Factory Audit (Heat), and Factory Audit (electricity)) were dispatched for the Project activities.

List of the Short-term Experts are attached as ANNEX 4.

4.1.2 Training of the Iranian Counterparts in Japan

Until the end of June 2005, four (4) Iranian technical counterparts have been dispatched for training to Japan under the Project. Meanwhile, one (1) technical counterpart was sent to Japan to participate in the country focused training program by JICA.

Therefore, in total, five (5) out of six (6) technical counterparts had already



been sent to Japan. (In September 2005, the remaining one (1) technical counterpart is scheduled to be sent to Japan.)

Items of counterpart training are attached as ANNEX 7.

4.1.3 Provision of Equipment

The equipment which valued in USD 1,208,000 (approximately equivalent to JPY:132,880,000, IRR:10,751,200,000, under the rate of USD:1.00 = JPY:110 = IRR:8,900) has been installed in the Project site in NTCEM, AHERC.

Main equipment provided by JICA is listed in in ANNEX 5.

4.1.4 Operation Cost

A total of USD:112,500 (approximately equivalent to JPY: 12,375,000, IRR:1,001,250,000, under the rate of USD:1.00 = JPY:110=IRR: 8,900) has been disbursed to support the achievement of the Project until June 2005.

4.2 Inputs from the Iranian Side

4.2.1 Assignment of Counterparts

A total of eight (8) counterparts comprising of the Project Director, Project Manager, and six (6) technical counterparts are assigned for the Project as of the end of June 2005. The total assignment of the Iranian counterparts from the commencement of the Project amounted to 225 M/M.

Allocation of counterparts as of June 2005 is as shown in ANNEX 6.

In addition, two (2) technicians, and one (1) advisor for the internal evaluation of the training are allocated by the Iranian side.

4.2.2 Provision of Land, Building and Facilities

Tabriz

In November 2004, the construction of the training building was completed under the budget of the Iranian side. Although the completion was two (2) months behind the original schedule, the building is considered to be reasonable training infrastructures comprising of a workshop space with a set of mini plants, two lecture rooms, and offices for Iranian counterparts, etc.

Four (4) rooms with office facilities (desks, chairs, telephones, etc.) for the Japanese experts were provided in AHERC building.

Lighting system for the training was not installed in the training building yet.

Tehran



One (1) room with office facilities (desks, chairs, telephones, etc.) is provided and shared by the Japanese expert and three (3) EEO experts in EEO, Tehran.

4.2.3 Operation Cost

Operational cost, comprising of staff salary, field and laboratory equipment, facility expenses, communication expense (telephone), utilities, consumables, travel allowances, and fuel, etc., in total USD:570,000 (approximately equivalent to JPY:62,700,000, and IRR: 5,000,000,000 ((USD1.00 = JPY110=IRR8,900)), under the rate of USD1.00 = IRR: 8,900= JPY:110), has been provided almost as scheduled by the Iranian side.

Accomplishments of Inputs are summarized in ANNEX 2.

4.3 Activities

Overall accomplishment of the activities of the Project is considered moderate. Some of the activities are behind the schedule.

The accomplishments of the activities are summarized in ANNEX 2.

4.4 Outputs

Expected Outputs have been moderately generated but delayed (see 5.4 (1)) mainly due to the problems with the setup and installation of the mini-plant equipment.

More detailed accomplishments of Outputs are shown in ANNEX 2.

Achievement of Output 1

Output 1: Policies and administration structures for energy management of the industrial sector are coordinated so that the contribution of the project becomes effective.

Indicators of output 1: NTCEM's activities meet the government policies and requirements of the industrial sector

In order to establish appropriate activities of NTCEM to meet the Iranian government policies and requirements of the industrial sector, collection and analysis of Iranian Act of the 4th Five-year Development Plan and the Bill of National Energy Efficiency Management (English version) were conducted.

The Japanese expert assisted the Iranian side to send five (5) parliament members to Japan in December 2003 for better understanding of energy management policies in Japan.

Also, the Japanese expert made advice to SABA in selecting trainees to NTCEM.

Achievement of Output 2



Output 2: Counterparts are able to operate and maintain the training facilities and equipment.

Indicators of output 2:

2-1. Counterparts are able to utilize training facilities and equipment efficiently.

2-2. Counterparts are able to maintain training facilities and equipment sufficiently.

The counterparts have acquired basic knowledge to utilize, operate and maintain the training facilities and equipment through the following activities under the guidance of the Japanese experts:

- (1) OJT on factory audit,
- (2) Preparation of instruction manuals for training courses,
- (3) Trainings on operation of provided equipment, and,
- (4) Lectures and course works by the Japanese experts, etc.

According to the observation of the Japanese experts, counterparts are able to operate and maintain the training facilities and equipment.

Delay in the installation of equipment and submission of complete manuals by the suppliers hampered the progress of the trainings, and much time was spent on countermeasures by the Japanese experts.

However, tentative manuals prepared by the Japanese experts were used effectively to improve the knowledge of counterparts.

Achievement of Output 3

Output 3: Both theoretical and practical training for energy related engineers are maintained and managed.

Indicators of output3:

3-1. Counterparts are able to develop training materials and textbooks.

Counterparts are well qualified to appreciate in-depth the contents of the training. However, due to lack of time, training materials (textbooks) were not prepared by counterparts. In stead, SABA staff prepared them in September 2004 for training.

3-2. Counterparts are able to implement training courses.

As regards training course implementation, although there was a delay of commencement, trainings have been carried out smoothly as planned by the counterparts since December 2004. By the end of May 2005, ten (10) training courses have been held; five (5) general, three (3) electricity and two (2) heat courses. According to the ex-trainees, in general, the training courses were



effective and helpful for their duties.

Currently, the duration of the training courses are six (6) days, which is shorter than was described in R/D (eight (8) days for general course, and 10 days for heat and electricity courses)

3-3. Number of certified energy-related engineers is increased.

By the end of May 2005, the total participants amounted to 126 (77 for general, 31 for electricity and 18 for heat courses, respectively).

However due to delay of the training commencement, submissions of reports by the ex-trainees are also behind the schedule. According to SABA, the first examination for issuance of technical certificate will be held in September 2005.

3-4. Counterparts are able to manage aftercare of the ex-trainees

Roles and functions of the relevant organizations and the framework of "aftercare" have not been clearly decided yet.

4.5 Achievement of the Project Purpose

Project Purpose: The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.

Indicators of the Project Purpose are as follows:

1. SEC (Specific Energy Consumption) of the factories where ex-trainees work is improved to the extent defined separately by the end of the project.

2. The number of ex-trainees' proposals accepted by factories.

3 The number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.

At the moment, there is not sufficient information to judge the prospect of the Project Purpose.

1. SEC improvement

SEC data of the factories are yet to be reported.

The trainings started at the end of 2004. However, according to the information of SABA and AHERC, the trainings from December 2004 to March 2005 were regarded as a trial and preliminary stage with the participants in major from the public organizations such as SABA, MPO (Management and Planning Organization) and RPO (Regional Power Organization).

The training courses participated in from factories were virtually started from April 2005 and consequently SEC data of the factories are yet to be reported.

2. Number of ex-trainees' proposals accepted by factories

3. The factories that obtained financial facilities for energy efficiency activities.

At the moment, under the circumstances explained above, data are under collection in terms of “number of ex-trainees' proposals accepted by factories” and “number of factories with ex-trainees that succeeded to obtain financial facilities for energy efficiency activities”.

CHAPTER 5 EVALUATION BASED ON FIVE EVALUATION CRITERIA

5.1 Evaluation Results based on Five Evaluation Criteria

Criteria	Evaluation Results	Main Reasons
Relevance	High	<ul style="list-style-type: none">• Consistency with the national policy of IR. Iran and Japan• Technical advantage of Japan
Effectiveness	Moderate ~ Low	<ul style="list-style-type: none">• Delay of the progress of the Project (delay of the training and related evaluation activities) (see 5.4 (1))
Efficiency	Moderate ~ Low	<ul style="list-style-type: none">• Troubles with mini-plant equipment and additional dispatch of experts to take countermeasures.• Delay of the training courses(see 5.4 (1))
Impacts	Some positive impacts /No Negative Impacts observed	<ul style="list-style-type: none">• Technical impacts (practical training using mini-plant equipment)
Sustainability	High	<ul style="list-style-type: none">• Support from the government of IR.Iran is expected.• Capability of Iranian counterparts is high.

(Detailed information for evaluation is as shown in ANNEX 3.)

5.1.1 Relevance

Relevance of the Project is evaluated high based on the following reasons:

(1) Consistency with the National Policies of IR.Iran

IR.Iran is one of the world's biggest oil producing countries with 90 billion barrels of oil deposit and earns about 75% of its foreign currency from oil and related products.

However, domestic energy consumption has been growing rapidly in recent years and a study estimated that IR.Iran would be an energy importing country by 2018 if the same trend continues.

Energy became an important issue in the 1990's, since IR.Iran began its economic recovery from the declined situation in 1990's. The 2nd Five-year National Development Plan has emphasized policies for rational use of energy and environmental conservation.

In March 2001, the Supreme Leader, Ayatollah Khameneie mentioned the necessity of the reduction of energy consumption as issues with national priority.

Specifically, this subject is to be prescribed in the prospective " Law on management of Energy Consumption" and promoted at a national level.

Meanwhile, improper energy efficiency in the industrial sector has long been recognized in IR.Iran.

The Project attempts to establish a training center where human resources are developed for support of this policy, to train energy managers in industrial sector, which may result in effective use on energy in IR.Iran

(2) Consistency with the Japanese Policy

Japan has been making constant effort to maintain a good relationship with IR.Iran for the stability of Middle East region through solidity of the power.

Importing 11% of its oil from IR.Iran, it is crucial to secure energy availability for energy security of Japan. The Project, through energy management promotion, will contribute to the sustainable development of IR.Iran and is highly in accordance with the Japan's aid policy to IR.Iran.

(3) Technical Advantages of Japan

Japan has world's highest-level technologies in energy management which is promoted through two oil crises. Comparing with IR.Iran, Japan needs much less energy per GDP (one million USD); 96 toe (ton oil equivalent) while IR.Iran requires 1,037 toe.

Japanese practice and technology in energy management have great advantage in the industrial sector and it is reasonable for Japan to cooperate in this field.

(4) Consistency with the needs of the target groups

In contrast to the above 1)-3), consistency with the needs of the target groups is considered slightly lower. Currently, the prices of fuel and electricity are rather low in IR.Iran, and managers of the industry sectors do not put much priority on energy saving.

5.1.2 Effectiveness

The Effectiveness of the Project at the time of mid-term evaluation is considered between moderate and low. Being affected by the delayed progress of the



Activities (see 5.4 (1)), and Outputs, at the moment, data (verifiable indicators) to judge the prospect of the Project Purpose are yet to be reported by ex-trainees.

(1) Achievement of Outputs

Outputs have not been accomplished to the extent that was expected. Although technical transfer was executed successfully under the guidance of the Japanese experts, repeated mechanical problems with the provided mini-plant equipment hindered the progress of the Project activities conducted in NTCEM, and consequently Outputs, as well.

(2) Achievement of the Project Purpose

The Project is behind the schedule and has not reached the phase to start the regular basis external evaluation of the post training courses by SABA. Data collection has not started in terms of “SEC improvement of the factories where ex-trainees work”, “the number of ex-trainees’ proposals accepted by the factories” and “the number of the factories that obtained financial facilities”.

It may take long time for ex-trainee to fulfil the requirements for qualification as a certified energy manager by sending reports to SABA with the results of improvement of energy management in their factories. Therefore, at least, data collection in terms of the above two indicators should have been started by the time of the mid-term evaluation study.

5.1.3 Efficiency

Efficiency of the Project is moderate and low based on the following reasons.

(1) Achievement of Inputs

As regards the inputs from the Japanese side, there were repeated troubles with installation and setup of mini-plant equipment. Inputs by the Iranian side were made almost appropriately and contributed to the progress of the Project.

The Japanese side (see details in ANNEX 2)

Dispatch of the experts, allocation of budget and counterpart training in Japan, etc. were executed appropriately. However, as regards the equipment for the mini-plant provided, there were repeated troubles with installation and setup of mini-plant equipment and hampered the progress of the Project and necessitated additional dispatch of two (2) short-term experts.

The Japanese experts taking in charge of energy conservation (heat and electricity) were forced to spend most of the time taking countermeasures against the troubles.

The Iranian side (see details in ANNEX 2)



Capability and skills of the counterparts are satisfactory. However, since April 2004, only six (6) counterparts, two (2) counterparts short of description in R/D, have been allocated.

Training courses started in December 2004 and conducted on the regular basis since April 2005. The courses are intensively conducted (6 days x 8 hours/day), and the workload of the counterparts, including preparation and review of the courses is rather heavy. That will be a routine job in near future.

(2) Achievement of Outputs

Outputs of the Project have not been generated as expected, due to the delay of the installation of the mini plant equipment (see 5.4 (1)). The inputs have not been converted to Outputs efficiently.

5.1.4 Impacts

At the moment of the mid-term evaluation study, it is still premature to evaluate impacts of the Project. However, some positive impacts are reported.

(1) Prospect of Overall Goal achievement:

It is still premature to judge the prospect of the Overall Goal of the Project in mid-term evaluation since the training courses started in December 2004, and sufficient data have not been collected yet by SABA.

Institutional impact

As the current training courses progress, NTCEM have good reputation offering high-level energy management training courses both in theoretical and practical subjects.

Technical impact

Before the Project implementation, only theoretical training courses were held in terms of energy management. Under the Project, Iranian counterparts obtained direct technical transfer from the Japanese experts using the specially designed mini-plant equipment and acquired practical skills and knowledge of energy management.

Engineers from factories that consume bigger energy consumption were accepted to the training program with priority and learned knowledge and skills to manage energy of their factories.

5.1.5 Sustainability

Sustainability of the Project is considered to be satisfactory in the mid-term evaluation. However, it should be verified in more detail at the final evaluation.



Policy aspect

The project has high relevance with the national policy of IR.Iran since the Project attempts to establish a training center where human resources are developed for support of the energy policy, to train energy managers in industry sector, which may result in effective use on energy in IR.Iran. Therefore, it is considered that Project will have political support from the Iranian government.

Institutional aspect

NTCEM/AHERC has been recognized as the best training institutions in terms of the relevant fields and has sufficient potential to carry out the Project activities by themselves. However, in order to secure sustainability in institutional aspect, it is inevitable to strengthen the coordination among the relevant organizations.

Financial aspect

Iranian government has put priority in human resources development and the Project aims at developing human resources to take charge in energy saving which is another prioritized issue for the government.

At the moment, through EEO, the responsible organization of the Project, the Iranian government allocates budget for the training including subsidies to trainees to cover almost all of the course fees.

Therefore, as long as the economic situation does not get worsened, the budget for the current Project activities will be secured even after the cooperation period.

Technical aspect

Before the Project implementation, there was no training center to offer practical energy management training courses using mini-plant equipment specially designed for trainings.

Through the practical and theoretical training courses, the level and effectiveness of transfer of knowledge to trainees have been upgraded to a great extent.

Ownership

EEO, the responsible organization, NTCEM, implementing organizations, and SABA, the cooperation organization of the Project, have high degree of ownership and commitment toward the establishment of energy management activities from the standpoints of each organization.

5.2 Conclusions

The first NTCEM training course was conducted on December 2004 with 19 participants. By May 2005, 10 courses were conducted with total numbers of



126 participants. The Ex-trainees from factories are expected to submit the Study Reports to SABA within 6 month after the end of the training course. SABA is supposed to give evaluation on those reports. By March 2005, the trainees were mostly from government organizations and only after 15th April, 2005, participants from factories were accepted, therefore SABA has so far not finished the evaluation of any Study Reports and being awaited for completion in due course.

By the end of June 2005, most of the equipment and facilities to be provided by JICA were completed for installation and tested, however there still remains some deficiencies and troubles with some devices, which have to be corrected on the fast-track basis.

Having conducted the evaluation study, the Study Team verified that the performance of the Project was not satisfactory so far.

(1) Achievement of the Project

The Project has high relevance of implementation with the needs of the Iranian society and started in March 2003 with strong support from the Iranian government.

However, mainly due to the delay of the set-up and installation of the mini-plant equipment for training activities, provided by the Japanese side, the progress of the Project was hampered and the efficiency of the Project reduced.

Through the efforts by the Japanese Long-term experts, most of the troubles were settled, and, in December 2004, two (2) months behind the original schedule, training courses started and conducted by the hand of Iranian counterparts, under the guidance of the Japanese experts. Until the end of May 2005, the number of the participants amounted to 126 in total.

As regards the external and internal evaluation of the training courses, due to the delay of the training course implementation (see 5.4 (1)), establishment of the evaluation procedures is delayed, and data to judge the performances of the Project has not been evaluated yet.

The Project team has been making efforts to contribute effectively in a good coordination with the policies and administration for the energy conservation of IR. Iran. This aspect of the Project is still to be investigated.

As such, the effectiveness of the Project is evaluated ranging from moderate to low.

(2) Project Management

In the former half of the Project, the monitoring system of the Project has not functioned effectively.

Before the middle of 2004, regular internal meetings, either on weekly or

bi-weekly basis, participated in by both the Japanese experts and Iranian counterparts have been held at NTCEM. However, since then, these meetings have not been conducted. Under the circumstance, information on the “present conditions“ of the Project was not shared among the Japanese experts and Iranian counterparts.

The Project monitoring system including the process of “compare the present conditions with the original plan (PDM or PO)”, “analysis” and “response” have not been always properly functioned because of suspension of the regular meeting between the Japanese experts and Iranian counterparts.

5.3 Recommendations

(1) Revision of PDM

1) It is recommended that indicators should be set up clearly and described in PDM preferably with quantitative figures based on the past performances of the Project and the remaining cooperation period, etc.

2) Modification of Output 1

The Study team pointed out that the description of Output 1 is misleading and the expression may be modified as for example; “The Project is operated to contribute effectively in coordination with the policies and administration for the energy conservation effort designed by IR.Iran”.

The modification of the PDM shall be formalized through the Joint Coordination Committee in accordance with the Record of Discussions signed at November 16th, 2002 (hereinafter referred to as “R/D”).

(2) Review of the Counterparts Allocation

In order to conduct intensively training courses of NTCEM, six (6) technical counterparts are not considered sufficient. The Iranian side is strongly recommended to increase the number of the technical counterparts to eight (8) as described in R/D by allocating one (1) heat and one (1) electrical engineer, respectively.

(3) Maintenance of the Provided Training Equipment

The mini-plant equipment has already been installed in NTCEM. But some of the equipment has not yet been properly operated due to some deficiencies in their performance, resulted in hampering, especially, a smooth implementation of the practical trainings. The Japanese side will try to make best efforts to rectify these problems as soon as possible.

According to R/D, Minutes of Meeting signed at December 1st 2004, the lighting units should have been prepared by the Iranian side, so that these units must be installed as early as possible.

(4) The Time Period of Each Training Course



In NTCEM, three (3) categories of training courses are conducted. The time period of each course is six (6) days. According to R/D, the periods of original curriculum are as eight (8) days for the general course and ten(10) days for the electricity and heat courses. But it was difficult for the factory managers in IR.Iran to dispatch energy engineers for more than seven (7) consecutive days. Thereby, the Project shortened the period of the training courses.

But taking into consideration of the quality of the training courses, especially practical courses need a few more days for the training course. The both sides agreed that the quality of the training courses is more important than the quantity and some ex-trainees also hoped the extension of the training courses due to fully packed curriculum from 8:00 to 18:00 a day.

Therefore, the Project Team and the Iranian side shall discuss this issue again. For example, one course is divided into two terms. The period of each term is less than six (6) days, and total of training period is around ten (10) days.

(5) Establishing the Monitoring System of the Project

The Project Team is recommended to resume the meeting with participation of the Japanese experts and Iranian counterparts and monitoring of the Project should be conducted with reference to the PO and PDM.

The monitoring system of the Project should include the process of “understanding of the present conditions”, “comparison with the original plan”, “analysis” and “response” based on the shared information, opinions and consensus within the Project team (The Japanese experts and Iranian counterparts and persons concerned).

(6) Definition of “Aftercare” in PDM

According to the ex-trainees answers, the Study Team found that aftercare for ex-trainees is unclear. The Study Team suggested that the relevant parties should meet to discuss the follow-up system of the training. For example, SABA would admit them into their energy friends network and have four meetings in a year with them.

(7) Internal Evaluation of the Training Courses

The preparation of internal evaluation reports by NTCEM has delayed about two (2) months. Though the first internal evaluation report was submitted to EEO and the Project Team in July 2005, a room for improvements is recognized such as about “how to analyze the comments of the trainees” and “how to compile those reports”, etc.

(8) External Evaluation of the Training Courses

Data collection and establishment of the evaluation system by SABA have also delayed two (2) months. The Project Team (the Japanese experts, Iranian



counterparts and persons concerned) is recommended to take necessary actions to assist SABA in accelerating the progress.

(9) Strengthening of Coordination among EEO, AHERC and SABA

Based upon the Minutes of Meeting on December 14, 2003, The Study Team understood that the branch of SABA had established in TBRIZ last two years.

EEO, SABA and AHERC have recognized that the cooperation among three parties is significantly important, and will be promoted to construct the closer relationship.

The Study Team suggested the followings:

- 1) Joint regular meetings with the participation of three organizations including Japanese experts will be held to discuss the Project strategy for deciding on how to handle the hot issues, etc.
- 2) A copy of the Study Report, ex-trainee's proposal to improve the energy efficiency to SABA, will be sent to NTCEM in parallel, so that NTCEM does not have to wait 6 monthly external report sent from SABA.
- 3) In NTCEM course, a lecture on a low interest loan for the improvement of efficiency will better be delivered by SABA so that trainees will be enlightened on how to apply the loan, etc.
- 4) The Director General of EEO and the JICA Expert are recommended to have more frequent contacts.

(10) Cooperation with SABA

To make the training program in NTCEM more effective, the experience and information of SABA are essential. Therefore in accordance with R/D, SABA staff members shall cooperate as trainers on energy audit at NTCEM and counterparts shall join energy audit conducted by SABA.

(11) Manager Awareness Raising Seminar

According to the answers of ex-trainees, the Study Team found that due to the lack of factory manager's awareness for energy conservation, the ex-trainees proposal have not been materialized. The Study Team recommended that the related parties should arrange the seminar to raise the awareness to the factory manager level. SABA conducted 52 seminars and distributed 10,000 brochures related to energy conservation activities of the Project in 2004.

5.4 Others and Findings

(1) Reason for a delay of the progress of the Project

It is generally recognized that the two (2) months delay in average has been



observed for a complex of multiple reasons such as;

- delay of the delivery and installation of the equipment and materials,
 - delay of the provisions of the building for accommodation of the equipment,
- and
- the mechanical problems found after test operation of the facilities.

(2) Energy Conservation in IR.Iran

Rules and Regulations concerning Energy management

Since the 2nd five-year national development plan (1995~1999) has been set forth, the energy management in industries have been evolved by the laws and regulations progressively put in force by the Ministry of Energy, and later the Ministry of Petroleum including inspection industries based on the standards and set points of energy consumption. In parallel, the national efforts have been continued to launch a comprehensive laws and regulations, drafted and revised, namely “The National Energy Management Law” across the relevant ministries consuming energy, with the coordination of the Ministry of Energy. And now its final version was passed on to the Cabinet of IR.Iran as the “National Document” about four (4) months ago. This comprehensive law is expected to be approved by the Parliament in the future. With ongoing focus on the national energy conservation and the counter measures against international concerns on global warming as well (the Government of IR.Iran has just ratified the Kyoto Protocol in July 2005), the needs for energy conservation are explicitly stipulated by the 4th five-year national development plan (2005~2009), therefore the sustainability of the present JICA energy conservation project can be generally considered as comfortable politically and technically.

Energy Policy and Administration

The Iranian energy conservation activities have virtually started during the 2nd and 3rd five-year national development plan (1995~2004) with its mounting concerns of securing as much as its oil for exports, which is one of the most valuable national assets for wealth of the country. The domestic energy supply and consumption is managed principally by the two ministries, the Ministry of Energy in charge of electric energy and the Ministry of Petroleum in charge of oil and natural gas. This means that almost 90% energy is accounted for by the Ministry of Petroleum, while the policies and administrations of domestic energy consumption and development of renewable energy as well have been devised with much initiatives of the Ministry of Energy since its establishment of the Energy Efficiency Office (EEO) in 1994 and of the Iranian Energy Efficiency Organization (SABA) in 1996. In the year 2000, the Ministry of Petroleum set up within its premises the first organization focusing on domestic fuel consumption and the promotion of maximum use of natural gas, namely Iranian Fuel Conservation Organization (IFCO) under its affiliate of the National Iranian Oil Company (NIOC).

(3) Certification of the Training Course in NTCEM



The training courses have been conducted since December 2004. There are two (2) kinds of certificates to be issued to ex-trainees. One is the certification of participation and the other is the certification of recognizing energy managers of the factories. The latter certification will be granted only to the ex-trainees by submitting the Study Reports to SABA within six (6) months after the courses, and passing the examination to be conducted by SABA, the first of which will start in September 2005. This examination will be held in September and March every year.

(4) Internal and External Evaluation

Internal Evaluation of the Training Courses

The internal evaluation report is supposed to be prepared by NTCEM every six (6) months based on results of questionnaires for ex-trainees, results of aftercare, etc. But the internal evaluation report has been delayed. Although recently, the first report has been submitted to the Project Team, there is a room for improvement.

External Evaluation of the Courses

The external evaluation report is supposed to be prepared by SABA every six (6) months based on the Study Report from the ex-trainees, results of improvement result of factories energy consumption, etc. But the data collection and the establishment of the evaluation system have also delayed two (2) months. It is recommended that the Project should take necessary actions to assist SABA in accelerating the progress.

(5) Dispatch of Short-Term Experts from Japan

In the 2005 fiscal year, JICA dispatch six (6) short-term experts.

- One expert on practical training of heat training equipment with maintenance of mechanical equipment for one (1) month.
- One expert on practical training of electrical training equipment with maintenance of mechanical equipment in around three (3) weeks.
- One expert on operation and calibration of instrumentation and data analysis by computer
- One expert on maintenance of instrumentation equipment
- One expert on audit technology for factories in the field of heat
- One expert on audit technology for factories in the field of electricity

(6) Date of the Project Termination

The Study Team explained that the date of the Project Termination would be on March 12, 2007 and agreed so by the Iranian side.

(7) Budgetary Plan of NTCEM

According to EEO, the budget plan of NTCEM is secured up to the termination



of the Project. As regards post cooperation period, EEO has a plan to secure the salary of the counterparts.

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ANNEX 1 Project Design Matrix (PDM) for Mid-term Evaluation

Project Name: Project on Energy Management Promotion in the Islamic Republic of Iran

Project Area or Location: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry (AHERC) and EEO office in Tehran

Target Group: Energy related engineers in industrial sector (Priority is given to larger factories with more than 2MW demand or 2000m³ of oil equivalent energy consumption per year.)

Project Period: From March 2003 to February 2007 (4years)

Prepared in: June 2005

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.</p>	<p>1. SEC^{(1)*1} of each industrial sub-sector is improved to the extent defined separately^{1,*2} by 2010.</p>	<p>Government statistics (by the Ministry of Energy)</p>	
<p>Project Purpose The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.</p>	<p>1 SEC^{(1)*1} of the factories where ex-trainees work is improved to the extent defined separately^{1,*2} by the end of the project. 2 Number of ex-trainees' proposals accepted by factories. 3 Number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.</p>	<p>1 Records of audit for the factories where ex-trainees work (by SABA) 2 Questionnaire (by SABA) 3 Records of approved proposals for financial facilities</p>	<p>- The Iranian Government keeps supporting the energy management activities. - Energy cost does not become cheaper significantly. - Economic condition does not worsen significantly.</p>
<p>Outputs</p> <p>1. Policies and administration structures for energy management of the industrial sector are coordinated so that the contribution of the project becomes effective.</p> <p>2. C/P are able to operate and maintain the training facilities and equipment.</p> <p>3. Both theoretical and practical training for energy related engineers are maintained and managed.</p>	<p>1 NTCEM's activities meet the government policies and requirements of the industrial sector. 2-1 C/P are able to utilize training facilities and equipment efficiently. 2-2 C/P are able to maintain training facilities and equipment sufficiently. 3-1 C/P are able to develop training materials and textbooks. 3-2 C/P are able to implement training courses. 3-3 Number of certified energy related engineers is increased. 3-4 C/P are able to manage aftercare of the ex-trainees</p>	<p>1 Information from factory managers, ex-trainees, JICA experts, and EEO & SABA officials 2-1 Information from trainees and JICA experts 2-2 Information from trainees and JICA experts 3-1 Evaluation of developed training materials and textbooks by trainees 3-2 Evaluation of training courses by the trainees 3-3 List of certified engineers and evaluation by the factory owners 3-4 Evaluation of ex-trainees who requested aftercare</p>	<p>- C/P remain in NTCEM.</p>

Activities	Inputs	
	The Japanese Side	The Iranian Side
<p>1-1 Analyze on-going policies of energy management in the industrial sector</p> <p>1-2 Propose effective policy for energy management to the relevant agencies so that the training in the center makes maximum effect</p> <p>1-3 Manage to offer training programs that best meet the needs of the industry and the nation</p> <p>1-4 Carry out necessary dissemination activities for energy management</p> <p>2-1 Elaborate a plan on maintenance of the facilities and equipment</p> <p>2-2 Install facilities and equipment</p> <p>2-3 Carry out the technical training on its operation and maintenance</p> <p>2-4 Make rules and manuals for operation and maintenance</p> <p>3-1 Collect and analyze up-to-date information for appropriate training program.</p> <p>3-2 Formulate curriculum for the training courses (three separate courses for general, heat and electricity) and prepare materials</p> <p>3-3 Implement the C/P training in NTCEM</p> <p>3-4 Implement the training courses</p> <p>3-5 Examine & evaluate trainee's reports (energy management audit and improvement plan) to issue certificates</p> <p>3-6 Take necessary action for the aftercare of the ex-trainees</p> <p>3-7 Monitor the efficiency of training courses and improve them</p>	<p>1. Personnel</p> <ul style="list-style-type: none"> - 1) Long-term experts - Chief Advisor [48m/m] - Coordinator [48m/m] - Expert on Energy Conservation Technology (Heat) [48m/m] - Expert on Energy Conservation Technology (Electricity) [48m/m] - Expert on Energy Conservation Policy - 2) Short-term experts <p>Short-term experts will be dispatched as necessity arises.</p> <p>2. Training of C/P in Japan</p> <p>Approx. 2-3 personnel per year</p> <p>3. Machinery and Equipment as agreed separately</p>	<p>Machinery and equipment provided by the Japanese side will obtain easy custom clearance.</p> <p>(Precondition)</p> <ul style="list-style-type: none"> - Necessity of energy management will not be decreased. <p>1. C/P staff</p> <ul style="list-style-type: none"> - Project Director - Project Manager - Project Coordinator - Professors - Administrative Staff - Technical specialists - Secretaries - Drivers <p>2. Land, buildings, rooms and facilities</p> <ul style="list-style-type: none"> - Office & necessary facilities for the Japanese experts and Iranian C/P. - Meeting rooms for the transfer of technology. - Buildings, facilities and space necessary for the equipment and materials to be provided by JICA <p>3. Local cost</p> <ul style="list-style-type: none"> - Necessary budget to implement the Project, including the in-land transportation and installation cost for the equipment.

[*1] Specific Energy Consumption (SEC) is defined as [Energy Consumption] / [Product Unit]. SEC varies with every different product.

[*2] Goal of SEC improvement of each industry or factory is attached hereto.



SEPECIFIC ENERGY CONSUMPTION IN IRAN

NO.	Industry	NOW (2002)		TARGET (2009)	
		SECE [*]	SECF ^{**}	SECE	SECF
1	Cement	117 kwh/ton cement	1000 kcal/kg clinker	105.3 kwh/ton cement	900 kcal/kg clinker
2	Textile	0.98 kwh/m ²	4650 kcal/m ²	0.88 kwh/m ²	4180 kcal/m ²
3	Casting	2080 kwh/ton	1890 MJ/ton	1870 kwh/ton	1700 MJ/ton
4	Aluminium (profile)	1.4 kwh/kg	17.9 MJ/kg	1.25 kwh/kg	16.1 MJ/kg
5	Sugar	70.2 kwh/ton	3.51 GJ/ton	63.2 kwh/ton	3 GJ/ton
6	Ceramic tile	4 kwh/m ²	130 MJ/m ²	3.6 kwh/m ²	117 MJ/m ²

* Electrical specific energy consumption (kwh/production unit)

** Thermal specific energy consumption (fuel energy unit/production unit)

ANNEX 2

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation Achievement of the Project (1) Inputs from the Japanese Side

Categories	Base for Judgment Verification of Inputs from Japanese Side on both timing and quality.	Data Source		Assessment (-Good -Moderate -Low)
		Input from Japanese Side	Progress Reports - C/P and J/E - Questionnaire	
1. Experts	-Ditto-	-Ditto-		Good
2. Training in Japan	-Ditto-	-Ditto-		Good-Moderate
3. Provided Equipment	-Ditto-	-Ditto-		Moderate-Low
4. Operational Cost	-Ditto-	-Ditto-		Good
5. Others	-Ditto-	-Ditto-		

Summary for Inputs Accomplishments until July 2005

- As of the end of June 2005, five (5) long-term experts (134.9 MM); Chief Advisor, Project Coordinator, Energy Conservation (Heat), Energy Conservation (Electricity), Energy Conservation Policy) have been assigned to the Project as scheduled in R/D
- In addition, nine (9) short-term advisors (6.2MM in total; Energy Saving by ESCO (2), MAP Method, Setup/Operation of Mini Plant Equipment (2), Setup /Operation and Instruction on Boiler Equipment, Energy Saving Company (Technical/Financial), Factory Audit (Heat), and Factory Audit (electricity)) were dispatched for the Project activities
- Until the end of June 2005, four (4) C/Ps have been dispatched to Japan for training.
- 2003: Four (4) C/Ps
- In September 2005, one technical C/P is scheduled to be sent to Japan for training.
- The training in Japan is, in general, favorably evaluated by the C/Ps. However, there is a room for improvement of the contents.
- In addition to the training in Japan, Technical Exchange Program was conducted between with "Energy Conservation Project in Ankara, Turkey" from June 21 to 27, 2004, and five(S) J/Es and five(S) C/Ps visited to Turkey to exchange technical information.
- Until the end of June 2005, equipment of USD 1,208,000 (approximately equivalent to JPY 132,880,000, and IRR 10,751,000,000 (USD1.00 = JPY 110=IRR8,900)) in value has been installed in the Project site in AHERC.
- Major items include: combustion furnace, pump unit, fan unit, air compression unit, etc. (details are in ANNEX5 : Provided Equipment)
- Due to technical problems, full operation or utilization of provided equipment was not made until April 2005, around 10 months after the installation had started. Although major problems have been solved by now, minor malfunctions remain with data analysis system of combustion furnace, etc. and further countermeasures should be taken immediately by the suppliers.
- Until June 2005, USD 112,500 (approximately equivalent to JPY: 12,375,000, and IRR: 1,001,250,000 (USD1.00 = JPY 110=IRR8,900)) have been spent as operational cost. This assistance contributed to the achievement of the Project significantly.
- JPFY 2003: USD 54,000
- JPFY 2004: USD 54,000
- JPFY 2005: USD 4,500 (as of the end of June 2005) (JPFY: Japanese Fiscal Year (from April to March))

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry, SABA: Iran Energy Efficiency Organization

Achievement of the Project (2) Inputs from the Iranian Side

Input (2)	Categories		Base for Judgment Verification of Inputs from the Iranian Side on both timing and quality.	Data Source - Progress Reports - C/P and J/E - Questionnaire	Assessment (-Good -Moderate -Low)
	Input from the Iranian Side	Input from the Japanese Side			
Input (2)	1. C/P allocation		-Ditto-	-Ditto-	Moderate
	2. Building and Facilities		-Ditto-	-Ditto-	Good
	3. Operational Cost		-Ditto-	-Ditto-	Good
	4. Others		-Ditto-	-Ditto-	

Summary for Inputs Accomplishments until July 2005

- As of the end of April 2005, eight (8) C/Ps left (25 M/M), including the Project Director, Project Manager, six (6) Technical C/Ps are assigned for the Project.
- In addition to the above eight (8) C/Ps, the Iranian side allocated two technicians for operation and maintenance of facilities; and equipment as well as one staff for evaluation of the training.
- In the R/D, however, eight (8) Technical C/Ps were scheduled to be allocated.
- In October 2003, two additional technical C/Ps were allocated and the as in described in R/D, eight (8) C/Ps were assigned. However, the two new C/Ps left the Project in one year and since, only six (6) technical C/Ps have been assigned to the Project.
- In November 2004, construction of NTCM building (administration and experiment buildings) were completed by the Iranian side. Although the completion was two months behind the original schedule, the building is considered to have satisfactory training environment with a workshop space for a mini plant, two lectures rooms, and offices for Iranian C/Ps, etc.
- For J/Es, in AHERC, four rooms with office facilities (desks, chairs, telephones, etc.) are provided for the Japanese Experts.
- In EEO in Tehran, one room, shared with three EEO staff, is provided for J/E (energy conservation policy).
- Operational cost includes staff salary, field and laboratory equipment, facility expenses, communication expense (telephone), utilities, consumables, travel allowances, and fuel, etc., in total, USD 570,000 (approximately equivalent to JPY 62,700,000, and IRR: 5,000,000,000 ((USD1.00 = JPY110=IRR8,900))) have been provided almost as scheduled by the Iranian side.

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry, SABPA: Iran Energy Efficiency Organization

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Achievement of the Project (3)-1 Performance of Activities

Activities	Questions	Data Source	Summary for Activity Performance until July 2005	Assessment (-Good -Moderate -Low)
<p>Performance of Activities</p> <p>1-1 Analyze on-going policies of energy management in the industrial sector.</p> <p>1-2 Propose effective policy for energy management to the relevant agencies so that the training in the center makes maximum effect.</p> <p>1-3 Manage to offer training programs that best meet the needs of the industry and the nation.</p> <p>1-4 Carry out necessary dissemination activities for energy management.</p>	<p>Were activities implemented appropriately both in timing and quality?</p>	<p>- Progress Reports - C/P and J/E - Questionnaire - Interviews</p>	<p>1-1 & 1-2: Collection of Iranian Act of the 4th five Year Development Plan and the Bill of National Energy Efficiency Management (English version) were conducted. The Japanese Experts and Iranian Counterparts discussed the contents of the Act and the Bill, such as the policy of energy manager system, the tariff of energy price at present and in future, etc. Recommendations for Iranian energy conservation policy will be made in the next half year.</p> <p>1-3: The first NITCEM training course (general) was conducted on December 2004 with 19 participants. As of May 2005, 10 courses were conducted with total 126 participants. Advice on the training programs from the standpoint of industry and the nation will be made intensively in the next term. J/E advised SABA staff on the selection of trainees from industries.</p> <p>1-4: Review of the current dissemination activities and the study of effective dissemination measures were conducted. For the purposes, Japanese energy management policy and ESCO activities were introduced to Iranian industry people including C/P Organization through the regular meeting and ESCO seminars held in February 2005 in Mashhad. Also, promotion seminars were conducted in Tabriz in September 2003 with 130 participants. NITCEM pamphlet (5,000 copies) were prepared. Also, SABA prepared 10,000 copies of brochures and distributed to industry sector.</p>	<p>Moderate</p>
<p>2-1 Elaborate a plan on maintenance of the facilities and equipment.</p> <p>2-2 Install facilities and equipment.</p> <p>2-3 Carry out the technical training on its operation and maintenance.</p> <p>2-4 Make rules and manuals for operation and maintenance (O&M).</p>	<p>- Ditto -</p>	<p>- Input Record -</p>	<p>2-1: Basic annual plan of operation and maintenance was prepared by SABA. C/Ps partly modified the plan and conducted the trainings based on the modified plan.</p> <p>2-2: Due to the delay of procurement, installation of facilities and equipment started two months behind the original schedule. Besides, due to improper design and aftercare works by the suppliers, troubles occurred many times repeatedly, and J/Es (energy conservation) have spent major part of the time taking countermeasures to settle the problems until now. As of the end of June 2005, most of the pre-installation works of facilities and equipment were completed, however, there still remain troubles with some devices such as a data analysis system of the furnace, etc. J/Es and C/Ps have made notable efforts to settle the problems.</p> <p>2-3: C/P training on operation and maintenance of facilities was carried out according to the documents prepared by J/Es with reference to the documents utilized in the energy management project in Turkey.</p> <p>2-4: O&M manuals are yet to be provided by the suppliers of the equipment based on the contract documents. Accordingly, making rules and manuals for operation and maintenance were delayed. Meanwhile, under the circumstance, J/Es prepared the necessary materials in parallel paying attention to the progress of the supplier's task.</p>	<p>Moderate</p>

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry, SABA: Iran Energy Efficiency Organization

**The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Achievement of the Project (3)-2 Performance of Activities**

Activities	Questions	Data Source	Summary for Activity Performance until July 2005	Assessment (-Good -Moderate -Low)
3-1 Collect and analyze up-to-date information for appropriate training program.	- Ditto -	- Ditto -	3-1: Necessary information for appropriate training programs was collected and analyzed based on the experiences in Japan.	
3-2 Formulate curriculum for the training courses (three separate courses for general, heat and electricity) and prepare materials	- Ditto -	- Ditto -	3-2: Formulation of the curriculum and preparation of the training materials were completed and used for the training courses.	
3-3 Implement the C/P training in NTCEM	- Ditto -	- Ditto -	3-3: Since April 2003, a series of discussions on energy conservation technology, and, lectures and practical trainings on energy conservation measures, etc. was conducted under the guidance of the Japanese long-term and short-term experts, in total 51 times until March 2005. In addition, site visits to industries and organizations concerned, were conducted 10 times, in total. However, according to the interview and questionnaire results, mainly due to delay of the installation of the equipment, it was not possible for J/Es to spend sufficient time on the C/Ps training in NTCEM since July 2004.	
3-4 Implement the training courses	- Ditto -	- Ditto -	3-4: In the original plan, the first training was scheduled to start in September 2004. Due to delay of the equipment installation, and preparation of text books, etc., the training was commenced on November 28, 2004, with about two months behind the original schedule. Since, the trainings are conducted smoothly. (ten (10) times and 126 trainees from December 2004 to May 2005)	Moderate
3-5 Examine & evaluate trainee's reports (energy management audit and improvement plan) to issue certificates	- Ditto -	- Ditto -	3-5: At the initial stage of the training until April 2005, trainees were mainly accepted from governmental organizations, such as TAVANIR (Public Electric Cooperation), SABA, RPO (Research and Planning Organization), MFO (Managing and Planning Organization), etc., not factories. Consequently, as of July 2005, reports from the ex-trainees have not been submitted as were expected	
3-6 Take necessary action for the aftercare of the ex-trainees	- Ditto -	- Ditto -	- In order to establish the procedure of external evaluation, two short-term experts were dispatched in February 2005, and prepared the format of the evaluation of trainees' reports and handed to SABA.	
3-7 Monitor the efficiency of training courses and improve them.	- Ditto -	- Ditto -	3-6: No specific activities were not reported yet.	
Process of Activities	Has the decisions been made without delay or obstacles? (Including establishment of a monitoring system)	- Progress Reports - C/P and J/E - Interviews	3-7: Monitoring of the training courses is being conducted by NTCEM and a report based on questionnaires to trainees was submitted to EEO and the Project team recently (July 2005) by EEO. However, there is a room of improvement with the method of evaluation and analysis. AHERC assigned one (1) advisor for the evaluation of the trainings.	Moderate
	Were coordination among implementing and collaborative agencies sufficient?	- Ditto -	- Monitoring system of the Project has not been functioning properly.	Moderate

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry,

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Achievement of the Project (4) Performance of Overall Goal, Project Purpose and Outputs

Narrative Summary of PDM	Verifiable Indicators	Data Source	Summary of Performance until July 2005	Assessment (-Good -Moderate -Low)
<p>Overall Goal Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.</p>	<p>SEC¹, J² of each industrial sub-sector is improved to the extent defined separately¹, *2) by 2010.</p>	<p>- Progress Reports - C/P and J/E - Questionnaire - Interviews</p>	<p>- It is still too early to evaluate the prospect of Overall Goal achievement. (According to the information by EEO, SABA and IFCO (Iran Fuel Consumption Optimizing Organization) etc., the prospect of SEC improvement of each industrial sector is considered positive)</p>	
<p>Project Purpose The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.</p>	<p>1 SEC of the factories where ex-trainees work is improved to the extent defined separately by the end of the project. 2 Number of ex-trainees' proposals accepted by factories. 3 Number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.</p>	<p>- Ditto -</p>	<p>At the moment, there is not sufficient information to judge the prospect of the Project Purpose. L-SEC improvement - SEC data of the factories has not been collected sufficiently yet. - The trainings started at the end of 2004. However, according to the information of the stakeholders, the initial stage from the beginning of the training until April 2005 was positioned as the preliminary stage and the trainees were collected from public organizations such as MPO, SABA, RPO, etc. 2- Number of ex-trainees' proposals and 3. the factories that obtained financial facilities - Trainees from factories were dispatched to Tabriz from April 2004, and the first external evaluation is going to start in August 2005. - Therefore, the indicator, namely, the improvement of SEC will be verified from August 2005. - At the moment, similarly, sufficient information has not been collected yet neither on the number of ex-trainees' proposals accepted by factories nor number of factories with ex-trainees which succeeded to obtain financial facilities for energy efficiency activities.</p>	Moderate
<p>Outputs 1. Policies and administration structures for energy management of the industrial sector are coordinated so that the contribution of the project becomes effective. 2. C/P are able to operate and maintain the training facilities and equipment..</p>	<p>NTCEM's activities meet the government policies and requirements of the industrial sector</p>	<p>- Ditto -</p>	<p>- In order to establish appropriate activities of NTCEM to meet the Iranian government policies and requirement of the industrial sector, collection and analysis of Iranian Act of the 4th Five-year Development Plan and the Bill of National Energy Efficiency Management (English version) were collected. - J/E assisted the Iranian side to send five (5) parliament members to Japan in December 2003 for acceleration of energy management policies in Iran. - Also advice was made by J/E to SABA in selecting trainees to NTCEM. C/Ps are able to operate and maintain the training facilities and equipment. - C/Ps were trained through the followings: (1) OJT on factory audit, (2) Preparation of instruction manuals for training courses, (3) Trainings on operation of provided equipment, and, (4) Lectures and course works by the J/Es, etc. - According to the observation results of the J/Es, C/Ps are able to operate and maintain the training facilities and equipment - Delay of the equipment installation and submission of complete manuals hampered the progress of the trainings, and imposed a burden on the J/Es. - However, provisional manuals were effective to improve the knowledge of C/Ps. 3-1: C/Ps understand well the contents of the training. However, due to lack of time, textbooks, were prepared by SABA staff in September 2004, and have been used for trainings 3-2: Although there was a delay of the commencement, trainings have been carried out smoothly by C/Ps. - Until the end of May 2005, ten (10) training courses have been held: five(5) general courses, three (3) electricity courses and two (2) heat courses. According to the hearings from ex-trainees, in general, the training courses were effective and helpful for their duties. 3-3: Total participants amounted to 126 (77 for general, 31 for electricity and 18 for heat courses, respectively) However due to delay of the training commencement, the first examination for certificate will be held in coming September 2005. 3-4: Roles and functions of the relevant organizations of the actions for aftercare have not been clearly decided yet.</p>	Moderate
<p>3. Both theoretical and practical training for energy related engineers are maintained and managed.</p>	<p>3-1 C/P are able to develop training materials and textbooks. 3-2 C/P are able to implement training courses. 3-3 Number of certified energy related engineers is increased. 3-4 C/P are able to manage aftercare of the ex-trainees</p>	<p>- Ditto -</p>		Good-Moderate

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex for Water and Electrical Industry, SABA: Iran Energy Efficiency Organization

ANNEX 3
The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
Evaluation Grid (1/5): Relevance

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)
	Question	Sub-question			
Relevance -To examine the justifiability or necessity for project implementation	Is the effect that the Project is aiming for in line with the national policy of Iran?	To what extent, has enhancement in the industrial sector achieved through promotion of rational use of energy? (Specific energy consumption of each industrial sub-sector improved to the extent defined separately by 2010.)		<p><i>The Project has high relevance with the needs of Iranian society, based on the followings:</i></p> <ul style="list-style-type: none"> - Iran is one of the world's biggest oil producing countries with 90 billion barrels of oil deposit and earns about 80% of its foreign currency from oil and related products. - However, domestic energy consumption has been growing rapidly in recent years and a study estimated that Iran would be an energy importing country by 2018 if the tendency continues. - Energy became an important issue in the 1990's, since Iran began its economic recovery from the declined situation in 1990's. The 2nd Five-year National Development Plan has emphasized policies for rational use of energy and environmental conservation. - In March 2001, the Supreme Leader, Ayatollah Khamenei mentioned the necessity of the reduction of energy consumption as issues with national priority. - Specifically, this subject is to be prescribed in the prospective "Law on management of Energy Consumption" and promoted at a national level. - Meanwhile, improper energy efficiency in the industrial sector has long been recognized in Iran. - The Project attempts to establish a training center where human resources are developed for support of this policy, to train energy managers in industry sector, which may result in effective use on energy in Iran. 	High
	Was the selection of the target group adequate?	Are the needs for cooperation high from the energy related engineers in industrial sector?			
	Is the size of the target group adequate?			<p><i>The size of the target group is considered appropriate.</i></p> <ul style="list-style-type: none"> - In Iran, there are 539 factories with electricity demand equal or more than 2MW or with an annual energy consumption of more than 2,000m³ oil equivalent energy consumption, which consume the major part of the energy in the industrial sector. - Based on the performance of the training during the past half-year (126 trainees from December 2004 to May 2005), it is reasonable to estimate that more than 500 trainees will participate in the training during the remaining two years. - Since the total number of trainees will be more than 600, during the remaining two years of cooperation period, from large-scale factories, the size of the target groups will be practical and effective for the energy management purpose. 	High

	Is The Project consistent with the Japan's foreign assistance policy?	Does the Project address the focus issues for aid?	/	<p>The Project addresses the focus issues of aid policy of Japan.</p> <ul style="list-style-type: none"> - Japan has been making constant effort to maintain a good relationship with Iran for the stability of Middle East region through solidity of the power. - Especially, after the taking over of the current government, Japan kept its policy to support reformation efforts. - Importing 11% of its oil from Iran, it is crucial to secure energy availability for energy security of Japan. - The Project, through energy management promotion, will contribute to the sustainable development of Iran and is highly in accordance with the Japan's aid policy to Iran. <p>Japan has sufficient technical advantages.</p> <ul style="list-style-type: none"> - Japan has world's highest-level technologies in energy management promoted through two oil crises. - Comparing with Iran, Japan needs much less energy per GDP (one million USD); 96 toe (ton oil equivalent) while Iran requires 1,037 toe. - Japanese practice and technology in energy management have great advantage in the industrial sector and it is reasonable for Japan to cooperate in this field. 	High
Relevance of the Project as a Means	Does Japan have technical advantage compared to other countries?	/		High	

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
 Evaluation Grid (2/5): Effectiveness

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Poor)
	Question	Sub-question			
Effectiveness -To examine the Project effects	To which degree have the Outputs been achieved?			(as per "ANNEX 2")	
	To which degree has the Project Purpose been achieved?	To which extent have the National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector?	<p>1. Has specific energy consumption (SEC) of the factories where ex-trainees work improved to the extent defined separately?</p> <p>2. Number of ex-trainees' proposals accepted by factories</p> <p>3. Number of factories with ex-trainees that succeeded to obtain financial facilities for energy efficiency activities.</p>	<p>- The training course by NTCEM started in December 2004</p> <p>- However, during the early stage, from December 2004 to April 2005, majority of the trainees were from public or governmental organizations. Trainees from factories increased from April 2005.</p> <p>- During the three months from April 2005 up until now, SEC data of the factories where ex-trainees work has not been fully collected or analyzed yet due to limitation of time.</p> <p>- Therefore, it is still too early to evaluate the Project Purpose based on this indicator.</p>	Moderate
	Were there any external factors that contributed to the achievement of the Project Purpose?	Verification and monitoring of important assumptions indicated in PDM	<p>- Since the training course started in December 2004, 126 trainees (as of the end of May 2005) took the courses.</p> <p>- However, at the moment, there is not sufficient data about the numbers of ex-trainees whose proposals were accepted by factories.</p> <p>- At the moment, there is not sufficient data about the numbers of factories with ex-trainees that succeeded to obtain financial facilities for energy efficiency activities.</p>	<p>- There was a delay of custom clearance for machinery, however did not hamper seriously the progress of the Project</p>	Low
		Is coordination maintained among concerned agencies in Iran?		<p>- Eight technical C/Ps were assigned at the initial stage of the Project. However, two of them left the Project and although a request for supplemental allocation of C/P staff was made, no supplemental allocation has not been made yet.</p> <p>- Based on the information from the stakeholders, there is a room of improvement for coordination among concerned agencies in Iran as well as with the Project (JICA Experts)</p>	Moderate

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
 Evaluation Grid (3/5): Efficiency

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)	
	Question	Sub-question				
Efficiency -To examine the Project efficiency	Appropriateness of the Inputs (Seen from the achieved Outputs, were the quality, quantity and timing of Inputs appropriate?)	Were the number of experts dispatched, their fields of expertise and the timing of dispatch appropriate?	Comparison of the actual achievement with the plan	- As of the end of June 2005, five (5) long-term advisors (134.9 M/M; Chief Advisor, Project Coordinator, Energy Conservation (Heat), Energy Conservation (Electricity), Energy Conservation Policy) have been assigned to the Project as scheduled in R/D. - In addition nine (9) short-term advisors (6.2M/M in total; Energy Saving by ESCO (2), MAP Method, Setup/Operation of Mini Plant Equipment (2), Setup /Operation and Instruction on Boiler Equipment, ESCO (Technical/Financial), Factory Audit (Heat), and Factory Audit (electricity)) were dispatched for the Project activities. - As a whole, assignment of personnel by the Japanese side is considered appropriate in terms of timing and the fields of expertise. <u>The delay of the installation of the provided equipment by the Japanese side hampered the achievement of the Outputs.</u>	High	
		Were the types, quantity, and timing of the installation of provided equipment appropriate?	- Due to lack of experience of the supplier, full operation or utilization of provided equipment was not made until April 2005, around 10 months after the installation had started. Although major problems have been solved by now, minor malfunctions remain with data analysis system of combustion furnaces, etc. and further countermeasures should be taken immediately.			
		Were the numbers of accepted trainees, the field of the training, contents, and the timing of the trainee acceptance appropriate?		- Until the end of June 2005, five (5) C/Ps, out of six (6) currently allocated, have been dispatched to Japan for training (one C/P dispatched to Japan on country focused training program by JICA). - In addition, the remaining one (1) C/P is scheduled to be dispatched to Japan for training in September 2005. - According to the questionnaire survey and interview to the five (5) Iranian C/Ps dispatched to Japan, the training in Japan is effective their duties in the Project activities. However, the training can be improved by focusing on more practical training curriculum rather than site visits.	High	
		Were the numbers, placement, and skills of C/Ps appropriate?		- Trial was made to allocate eight (8) C/Ps in the early stage of the Project. - However, two (2) of them left the Project in 2003 and no supplementary assignment has not been made yet despite a request from the Project. - In order to intensively conduct training courses in NTCEM, six (6) C/Ps are not considered to be sufficient. - The skills and experiences of the C/Ps are considered appropriate. - In addition to the C/Ps, NTCEM/AHERC assigned two technicians for the mini-plant and one (1) advisor for evaluation of the trainings.		
		Are there any problems in quantity, size, and convenience of the buildings and facilities?		Tabriz - Buildings for administration and trainings were newly constructed by the Iranian side for the Project. For the Project activities, four office spaces for J/E and C/P are provided and conference rooms, etc. are available. As a whole, working environment of the buildings are satisfactory. Tehran - Office space is provided for a J/E (energy conservation policy) in EEO, Tehran. - Both the Japanese and Iranian sides have secured an appropriate size of budget.	High	
			Was the Project budget of an appropriate size?			
		What are the factors that inhibit or contribute to the efficiency of the Project implementation process?	Are there any factors that contributed to the efficiency of the Project?	Opinion of C/Ps and J/Es	- Sufficient knowledge and experiences of Iranian C/Ps - Secured budget by the Iranian government - Technical exchange program to the Energy Conservation Project in Ankara, Turkey in June 2004	High
			Are there any factors that inhibited the efficiency?	Opinion of C/Ps and J/Es	- Due to delay of the setup and installation of the min-plant equipment, the progress of the Project was hampered significantly. - Custom clearance of the Project equipment took more than three months in the past, with exception of plant equipment which cleared the procedure in about a month.	

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

The Project on Energy Management Promotion in the Islamic Republic of Iran – Mid-term Evaluation
 Evaluation Grid (4/5): Impact

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)
	Question	Sub-question			
Impact -To examine the Projects effects including the ripple effects in the long terms	Are there prospects that the Overall Goal	Specific Energy Consumption of each industrial sub- sector is improved to the extent defined separately by 2010.	-Comparison of status before and after the Project.	<p>It is still premature to evaluate the prospect of the Overall Goal Achievement.</p> <p>-If the training courses by NTCEM continue at the present pace, namely, 20 trainees per month, the total trainees will be more than 600 by the end of the Project cooperation period and 1,300 by March 2010, which will cover the major part of the large-scale factories in Iran.</p> <p>- Therefore, if the current training activities under the Project continues, and the energy management in each factory where each ex- trainee belongs to in Iran is enhanced, theoretically, there will be good prospect of the Overall Goal achievement.</p> <p>-However, at the time of mid-term evaluation, when six months have passed since the training course began, it is still premature to evaluate the prospect of the Overall Goal</p> <p>It is still premature to evaluate the prospect of the Impacts on energy management policy.</p> <p>-At the moment of the evaluation, no impacts on the energy management policies have been observed yet.</p>	N/A
	Is there any influence (expected, unexpected, positive, and negative) including ripple effects?	Were there any impacts on the energy management policies of Iran through the implementation of the Project?			
		Were there any institutional impacts?			
		Were there any technical impacts?			
	Were there any economic or social impacts?			<p>- As the current training courses progress, AHERC will have good reputation offering high-level energy management training courses both in theoretical and practical subject.</p> <p>Iranian C/Ps and ex-trainees are considered to have obtained basic skills to proceed energy management.</p> <p>- Iranian C/Ps obtained direct technical transfer from Japanese Experts using the specially designed mini-plant equipment.</p> <p>- Engineers from factories that consume bigger energy consumption were accepted to the training program with priority and learned knowledge and skills to manage energy of their factories.</p> <p>- Trainees will become core staff for energy management of factories</p> <p>- In order to secure dissemination of energy management technologies to the factories in Iran, it is necessary to promote awareness program targeting the managers of the factories.</p> <p>Theoretically, economic and social impacts are expected. However, no sufficient data has not been collected yet.</p> <p>- The beneficiary of this project is the industrial sector, i.e. factories. Only 2,200 out of 30,000 factories in Iran have more than 50 employees. These larger factories comprise only 7.2% of the total factory number, however, they employ 68% of the total work force and consume 81% of the total energy in the industrial sector.</p> <p>- Thus, intensive execution of energy management in the large-scale factories is effective and will bring about economic and social impacts.</p>	High-Moderate

Note: J/E: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

The Project on Energy Management Promotion in the Islamic Republic of Iran -- Mid-term Evaluation

Criteria	Evaluation Questions		Criteria and Method for Judgment	Summary for Evaluation	Assessment (High/Moderate/Low)
	Question	Sub-question			
Sustainability -To examine the sustainability after the termination of the JICA cooperation	Are there any factors that inhibit or contribute to the appearance of the benefits of the implementation of the Project?	<u>Policy Aspect</u> Is political support for implementing agencies sustained by the government of Iran?	/	- Political support for energy management is not likely to drastically, since the energy management policy is highly consistent with the needs of the nation's society. - According to the Iranian government officials, energy saving policies is strengthened in the fourth five-year national plan and will be prioritized under the new administration.	High
		<u>Institutional Aspect</u> Does the implementing organization have the capacity to carry out activities?	/	-NTECM/AHERC has been recognized as the best training institutions in terms of the relevant fields and has sufficient potential to carry out the Project activities by themselves. -However, in order to secure sustainability in institutional aspect, it is inevitable to strengthen the coordination among the relevant organizations, namely EEO and SABA	High
		<u>Financial Aspect</u> -Is financial situation good?	/	- At the moment, almost all the training course fees are born by the Iranian government. - Iranian government has put priority in human resources development. - The Project aims at develop human resources to take charge in energy saving which is another prioritized issue for the government. - Therefore, budget for the current Project activities will be secured after the cooperation period. - However, from the long-term perspective, NTECM/AHERC should secure its budget by charging training course fees. - Accordingly, efforts should be made continuously to improve the quality of training courses.	High-Moderate
		<u>Technical Aspect</u> -Is technical transfer sufficiently achieved?	/	- Technical transfer was sufficiently executed to C/Ps in order to continue the current training activities under NTECM. - In addition, through the training courses at NTECM, trainees are considered to obtain useful knowledge and skills to conduct energy management activities in the factories they belong to. - In order to secure dissemination of energy management technologies to the target group of the Project, it is necessary to promote awareness program toward the managers of the factories.	High-Moderate
		<u>Ownership</u> Is the ownership of implementing agencies and related ministries assured?	/	- Implementing organizations, namely, EEO, AHERC/NTECM and SABA are considered to have high ownerships for the energy saving activities.	High

Note: J/IE: Japanese Experts, C/P: Iranian Counterpart Staff, EEO: Energy Efficiency Office, Ministry of Energy, AHERC: Azarbaijan Higher Education and Research Complex

ANNEX 4 The List of Japanese Experts

	2003												2004												2005													
	1			2			3			4			5			6			7			8			9			10			11			12				
	28	31	30	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30	31	31	30
Long-term Expert																																						
Chief Advisor																																						
Mr. Takeho Sakata ('03.6.16-'05.6.15)	24.3																																					
Mr. Hiroaki Ohkubo ('05.5.30-'07.3.1)	1.1																																					
Project Coordinator																																						
Mr. Hidekazu Harima('03.3.6-'05.3.5)	23.7																																					
Mr. Yasuhiro Kimura ('05.2.23-'07.2.2)	4.3																																					
Energy Conservation (Heat)																																						
Mr. Yasunori Serizawa('03.6.16-'06.3.	27.6																																					
Energy Conservation (Electricity)																																						
Mr. Kiyoshi Kamiya('03.3.13-'06.3.12	28.0																																					
Energy Conservation Policy																																						
Dr. Mitsuo Ninomiya ('03.6.16-'05.6.1	24.3																																					
Dr. Shiro Matsumoto ('05.6.15-'07.3.1	0.5																																					
	133.87																																					
Short-term Expert																																						
(1) Energy Saving by ESCO																																						
Mr. Norio Fukushima ('04.2.20-'03.3	0.4																																					
(2) Energy Saving by ESCO																																						
Mr. Norio Fukushima ('04.6.4-'06.21)	0.6																																					
(3) MAP Method																																						
Mr. Akira Kobayashi ('04.7.16-'07.29)	0.5																																					
(4) Operation and Setup of Mini-plant Equipment																																						
Mr. Yasunori Endo ('04.7.17-'07.30)	0.5																																					
(5) Setup/Operation and Instruction on Boiler Equipment																																						
Mr. Yasuji Kato ('04.8.1-'09.14)	1.5																																					
(6) Operation and Setup of Mini-plant Equipment																																						
Mr. Kazuo Okazaki ('04.9.1-'09.14)	0.5																																					
(7) Energy Service Company (Technical/financial)																																						
Mr. Hiroshi Murata ('05.2.6-'02.19)	0.5																																					
(8) Factory Audit (Heat)																																						
Mr. Norio Fukushima ('05.2.6-'03.4)	0.9																																					
(9) Factory Audit (Electricity)																																						
Mr. Hisashi Amano ('05.2.6-'03.4)	0.9																																					

ANNEX 5 List of the Provided Equipment

Name of Item	Description	Quantity	JPY
Combustion Furnace Equipment		1	
	Combustion Furnace body		26,000,000
	Natural Gas Burner		5,600,000
	Waste Heat Recovery Unit		3,800,000
	Open Burner		3,600,000
	Metering and Control System		23,500,000
	Others		2,000,000
Steam Trap Training Unit		1	
	Trap Unit		6,500,000
	Steam Trap Checker		2,500,000
	Others		500,000
Fan Unit		1	
	Turbo Fan		2,300,000
	Variable Speed Control of Motor by Inverter		3,600,000
	Others		1,400,000
Pump Unit		1	
	Volute Pump		2,300,000
	Variable Speed Control of Motor by Inverter		3,800,000
	Others		1,400,000
Compressor		1	
	Rotary Type Compressor		8,500,000
	Variable Speed Control of Motor by Inverter		3,200,000
	Others		1,400,000
Power Box			1,800,000
Energy Economizing Navigator		1	2,000,000
Factory Diagnostic System		1	1,202,000
Uninterruptible Power Supply		2	1,130,000
Radiation thermometer (IR-AHT2)		1	279,000
Radiation Thermometer (IR-AHS2)		1	214,000
Thermal Wind Sensor		1	875,000
Multi-media Projector		2	800,000
Others			22,680,000
Total		JPY	132,880,000
		US\$	1,208,000
		RLR	10,751,200,000

ANNEX 7 Counterpart Training in Japan

	Course of Training	Period	Trainee's Name/Position
JFY 2002			
1	Energy Management	2003.02.25~2003.03.18	Mr. Kambiz REZAPOUR
2	Energy Management	2003.02.25~2003.03.18	Mr. Khalil Jannat Doust
JFY 2003			
1	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Ali Zeraat Parvar (AHERC)
2	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Ali Partoniya (AHERC)
3	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Khalil Banan Ali Abbassi (AHERC)
4	Energy Conservation Policy	2003.08.31~2003.10.01	Mr. Mohammad valizadeh (AHERC)
JFY 2004			
	None		
JFY 2005			
1			
2			

ANNEX 8 List of Interviewees

Japanese Experts

Mr. Hiroaki Ohkubo, Chief Advisor
Mr. Yasuhiro Kimura, Project Coordinator
Mr. Yasufumi Serizawa, Energy Conservation (Heat)
Mr. Kiyoshi Kamiya, Energy Conservation (Electricity)
Dr. Shiro Matsumoto, Energy Conservation Policy

EEO

Dr. S. Mohammad Sadeghzadeh, Director General, EEO
Mr. Kambiz Rezapour, Manager of Training and Awareness, EEO
Mr. Alirea Shirazi, Expert, Awareness and Training Office
Mr. Akbar Safari, Awareness and Training Group, EEO

SABA

Dr. Abdolreza Karbassi, Managing Director
Mr. Majid Saffarinia, Member of Board and Deputy for Planning and Awareness
Mr. Mohammad H. Zarbakhsh, Manager, Training Office, Mechanical Engineer

AHERC

Mr. Ahmad Raschtchizadeh, Chansellor, NTCEM, AHERC
Mr. Ali Zerrat Parvar, Vice Chancellor, AHERC
Khalil Jannat Doust, Head of Energy Group, NTCEM, AHERC
Mr. Ali Partounia, Staff, Energy Group, NTCEM, AHERC
Mr. Khali Banan, Staff, Energy Group, NTCEM, AHERC
Mr. Valizadeh, Staff, Energy Group, NTCEM, AHERC
Mr. Ali Farsi, Staff, Energy Group, NTCEM, AHERC

Ex-trainees

Tehran

Mr. M. Shahbodhaghi, TCT
Mr. Abbas Beheshifi Pour, SABA
Ms. Mastoneh, Jooshani, SAIPA
Mr. Davood Firouzi, SAIPA, AZIM
Mr. Mohammad Sadeghzadeh, SAIPA AZIM
Mr. Niroumand Abbas, SAIPA AZIM
Mr. Moazzmay, Mohammad, MEHVAR SAZAN
Mr. Mehdi Zolghadri, MEHVAR SAZAN
Mr. Mohsen Jabbar, Tavanir Company
Mr. Hamid Reza Shahravi, University of Tehran, Aero Space



Tabriz

Mr. Hasan Elmi, Bonyan Dissel

Mr. Nima Mohammady, SABA

Mr. Kazem Sefidi, MOTOGEN

Mr. Nader Yasuie, Tabesh Rayan Energy

Mr. Yousef Nazeri, Industries and Mines, Head office in E. Azerbaijan

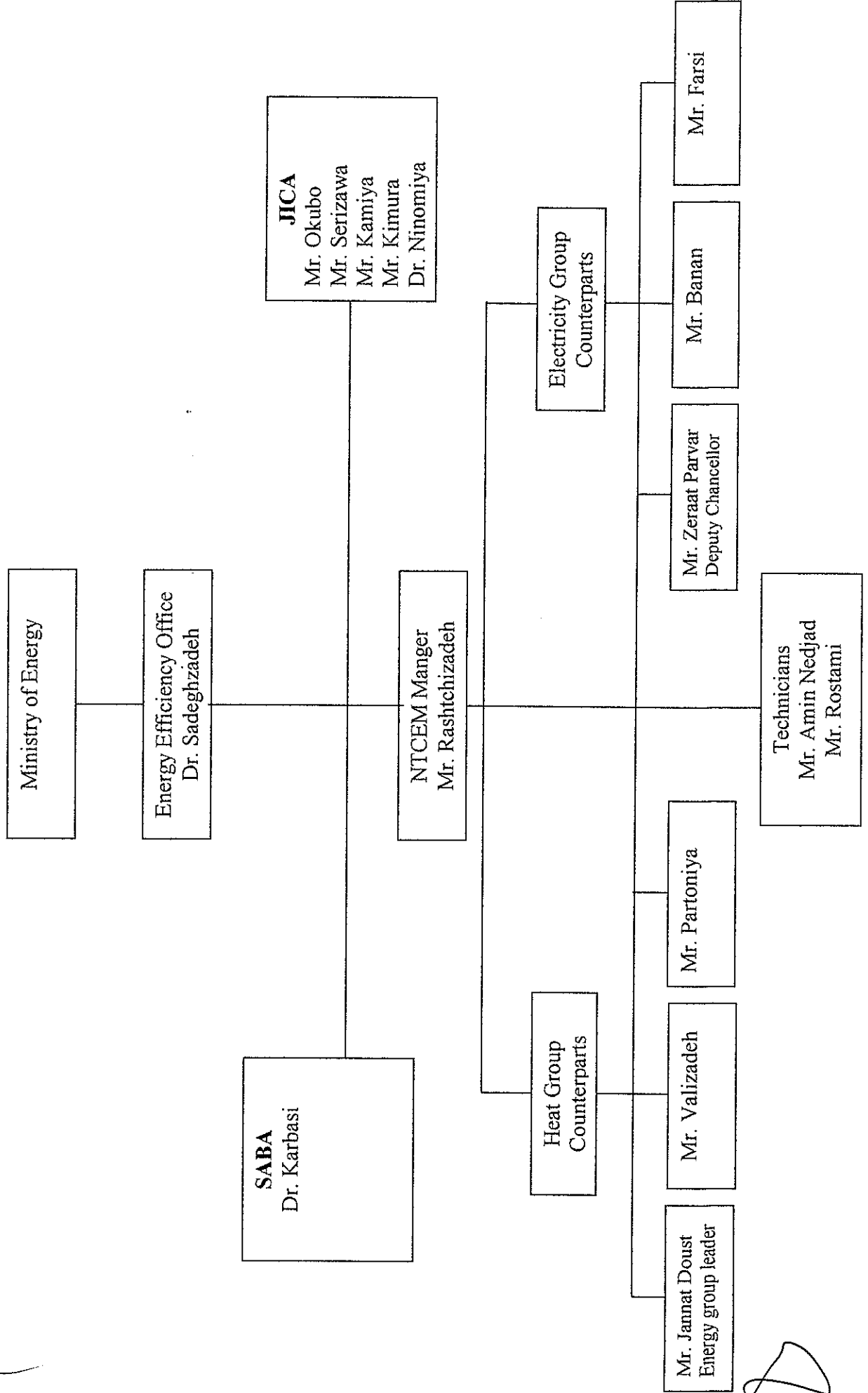
Mr. Musa Ghazanfar, Tabriz Foundation

Mr. R.Setareh, Vice President, Engineering Div. MOTOGEN



ANNEX9. Organization Chart of JICA Project on National Training Center for Energy Management

14 July 2005



11. 技術協力団員報告

国際協力総合研修所国際協力専門員（エネルギー・環境担当）

千原 大海 団員

本中間評価調査段階で判明、確認したイラン国の省エネルギー政策の詳細と進捗状況及び今後の動向を調査・分析したので以下に報告する。

1. イラン国の省エネルギー

1990年代の疲弊した経済状況から立ち直り始めたイランにとって、1990年代はエネルギー問題が重要な課題となり、1990年以降の各五カ年計画においては、エネルギーの合理的使用と環境保護政策を打ち出している。イランのエネルギー消費は1980年代後半にはイラン・イラク戦争の影響からほぼ横這いの時期があったが、1990年代は平均6.3%、2000年から2002年は平均5.7%で増加している。また、電力需要は年率7～8%で増加している。GDP（百万US\$）当りのエネルギー消費原単位は、2002年で1,130石油換算トン（toe）となっており、日本の12.5倍となっている（（財）省エネルギーセンター調べ）。

1. 1 イラン国における省エネルギー政策の意義とその展開

イラン国の省エネルギー関連の政策の策定、立法、行政の概況は、イラン国・エネルギー省・省エネルギー局・局長による現状説明を、Minutes of Meeting P21、(2) Energy Conservation in IR. Iran, Rules and Regulations concerning Energy Management 及び Energy Policy and Administration に、双方が確認した現状認識を記録し、省エネルギーの関連法案や規則を巡る諸事情などもここに要約されている。

包括的かつ基本法の性格を持った省エネルギー法の成立は、依然、日本側の強く要請するところであるが、「本法律の国会承認の遅滞が、イラン国における省エネルギーの必要性が減退するか、進捗がペースダウンする、あるいは政治課題としての重要性和緊急性が後退する決定的な要因ではないこと（1. 2参照）から、省エネルギー人材の育成を中心とする現行 JICA 技術協力プロジェクトの意義及びその将来の自立発展性に特段の不安はない」というのが本調査時点での結論である。

このためには、これまでのイラン国における省エネルギー政策展開の経緯とその今後を探る主に三つの論点を総合的に分析しながら、本 JICA 技術協力及び今後のエネルギー分野協力の方向感を観ておく必要がある。すなわち、1) 1990年第一次五カ年計画策定中に顕現してきた、「国富を担う国際商品・石油生産と輸出余力の長期的な減退傾向の見通し vs 直面する急激な人口増加と経済・産業発展による国内燃料消費の急速な伸び見通し」、2) エネルギー政策に関わる二つの行政組織、“電気エネルギー＝消費の約10%を管掌”エネルギー省と“石油と天然ガス＝消費の約90%を管掌”石油省という有力官庁の確執、社会の福祉・安定化の観点から、内閣（行政府）の進めるエネルギー料金の設定等を含むエネルギー行政に関わる法案チェックの機能を果たす国会（立法府）承認の遅滞、3) 近年の地球温暖化対策に動向と化石燃料消費の抑制という国際政治問題の浮上への対応などと併せ、動的かつ総合的な分析が必要である。例えば、2) については、政権交代の節目を含めて、絶えず“エネルギー省と石油省の合併問題”が政治の話題になるなど、どの要因をとっても、所謂エネルギー高価格の開発途上国が抱える問題とは違った視点からではあるが、「国内エネルギー消費の節約を促す、極めて強い国家的な動機づけ」がある。本 JICA 技術協力は、その人

材育成面では、とくに全エネルギー消費の約28%（2001年現在）を占める産業部門（1995年度 IEEO 推計によると20～30%の削減ポテンシャル）の省エネルギー人材に関わっており、プロジェクト活動の柱の一つである省エネルギーの啓蒙・普及活動と併せて、本プロジェクト実施の意義は、イラン国にとっても、エネルギー消費大国・日本にとっても、将来に向かって、ますますその意義と有効性を増していく途上にある。以下、省エネルギー政策、立法、行政に関する本調査団による分析、見通しについて要約する。

1. 2 省エネルギー法制化の課題

イラン国における省エネルギーの法制化の過程には、大きな二つの流れが混在しながら進んでいる。一つは、省エネルギー法案を、国会の承認を得た、言わば基本法として位置づける動きであり、もう一つは、政府が公表する各次の五カ年計画に示される省エネルギー目標毎の方針を各責任省庁がフォローして、その権限内に、規則や基準を設けながら、行政的な措置を通じて、事業所の省エネルギーを促進していくという実効的なやり方である。現在までは、この後者を拠り所として、官民一体で省エネルギー政策が進展している。イラン国における省エネルギー目標に関する五カ年計画は、下記の参考資料にあるように、“計画とはいいながら、少なくとも第三次五カ年計画（～2004年）まで”は、数値目標の設定など商業ビル、産業分野など対象毎に、相当程度まで具体的な内容に踏み込む明示的なものとなっている。第四次五カ年計画中には、最終ドラフトの形で修正が施された省エネルギー法案が、再度、国会に提出されておりその承認が待たれるが、成立の見通しは依然不透明な状況にある。これらの一連の省エネルギー法制の調整役として主導してきたのはエネルギー省であり、1994年には、省エネルギーと再生可能エネルギーを担当する専任部署として、省エネルギー局を発足させ、1996年には、事業所の省エネ診断など実施するイラン省エネルギー機構（Iran Energy Efficiency Organization、IEEO 又は SABA）を設立した。それまでは、エネルギーの供給面に注力してきた石油省が、エネルギー消費面の国内関与に本格的に取り組むようになったのは、2000年の“Iran Fuel Conservation Consumption, IFCO”の設立からと考えられる。

（基本）法案のドラフト修正の経緯と成立の見通し

“National Document”（イラン側の英語の表現）としての包括的な省エネルギー法案の流れは、当初の“第二次五カ年計画時”、The Law on Energy Management（エネルギー消費管理法）→“第三次五カ年計画時”改正、The Law on Energy Management（エネルギー消費管理法）→“第四次五カ年計画中の成立を期待”、The Bill of National Energy Efficiency Management（国家エネルギー効率管理法）の流れを辿っている。

イラン国は、1990年1月第一次五カ年計画を実施、そのなかでエネルギー最適利用を実現するための政策が策定され、各種エネルギー使用機器の節約を謳うとともに、電気・ガス・石油製品の価格を限界コスト水準に設定する一方、低所得者や農業向けは特別価格を設定し、過剰消費に対しては料金を引き上げるなど消費節減のための具体的な価格政策を盛り込んだ。1996年から始まる第二次五カ年計画（～2000年）では、エネルギー消費削減のためのさらに強い政策を打ち出した。その基本案は、五カ年計画の「Paragraph “V” Note (19)、The Law of Second Five-Year, Economic, Social and Cultural Development Plan of Islamic Republic of Iran」, “Draft of Proposed Law on Management of Energy Consumption”に明示された。実施のための細則は、エネルギー省、石油省、ISIRI (Institute Standard and Industrial Research of Iran)、及び工業省からなる委員会が

策定に当たるなどが決められた。

本プロジェクト事前評価調査及びプロジェクト実施後の複数回の運営指導調査のなかでも、本法案が「国家の省エネルギー政策へ取り組みのコミットメントを明示する包括的かつ基本的な法律」と言う意義から、とくに、その成立の実現を強く要請してきた。本法案は、行政府である内閣の承認（例えば、2001年には、第三次五ヵ年計画 “Article121” 中にドラフトされた実施の細則、「電力消費 5 MW あるいは石油消費 5000 m³以上に該当する事業者は独立した “Energy Management Unit” の設置を義務付ける」等の法案に関する内閣の管理・企画機構の承認文書（Management and Planning Organization, MPO）を得たのち、立法府である国会のエネルギー委員会承認を得たものの、最終的な法案の国会の承認に向けた手続きは滞ったままで放置された。その間、エネルギー省が主導して、石油省、工業省など関連機関を法案の調整と細部の修正を重ねながら、最終ドラフト案が漸く省庁を横断して適用される包括的な省エネルギー法、すなわちイラン側の言う “National Document” として、約4ヶ月前に再度、内閣に提出され、国会の承認を待っている状況であるが、8月からの政権交代の政治日程などもあり、依然、国会承認を待つのが現状で、成立への見通しは立っていない。本調査団と省エネルギー局長との以下のような“やり取り協議”の感触からも、その早期の成立については予断を許せない。例えば、本法の成立の期待の時期を巡る MOM 文書の表現についても、“in future”（当初イラン案文）→“in the near future”（日本側の提示案）→“in the future”（局長の修正案）と変化してきた事情からも分かるように、日本側の期待にすぐに応ぜられるような判断を語れる状況にはないと思料される。

省エネルギーに関する規則、基準と行政の実態について

以上の考察から、イラン国における省エネルギー政策の動機の強さと発展的な展開への期待、国家エネルギー管理の枢軸としての省エネルギー法成立の遅滞の理由の一端も読める一方、実態面では、SABA における対象工場診断数の増加、省エネルギー啓蒙・普及のためのセミナー開催数の増加、JICA 技術協力による AHERC における “National Training Center for Energy Management” における受講生の安定的な確保、2000年8月の石油省による “Iran Fuel Conservation Organization, IFCO” の設立など、確実に省エネルギーに向けた活動の加速の事実がある。このことから、全省庁、国有企業を包括する省エネルギー法の成立は望ましいものの、その遅滞が、実態的に、省エネルギー活動の進展を阻害しているという明示的なものはない。

このように、イラン国において、現在、官民による省エネルギー活動を支え、実効的な機能を発揮しているのは、上記で考察した国家的な省エネルギー法案の成立に向けた動きと併行するように、各五ヵ年計画に詳細に定義された数値目標などを盛り込んだ、エネルギー省、石油省など関連省庁による省エネルギーに関する各種の行政指導・規制、基準や規則、優遇措置などである（例えば、石油省・NIOC 傘下の IFCO ではこれらの一連の省エネルギー政策を、Rule Making Methods, Supporting Methods, Informative Methods, International Cooperation のように整理して、エネルギーの知的な使用、温暖化ガスの抑制の取り組んでいる）。現在、これら行政措置の体系やその実態面の施工状況等について、省エネルギー局に派遣中のプロジェクト政策アドバイザーに詳細な調査を依頼している。

以上

<参考情報>

1. イラン国における第二次～第四次の5ヶ年計画における省エネルギー関連項目の抜粋

〔(財) 省エネルギーセンター、NEDO 資料等から〕

○ 第二次5ヶ年計画（1995年～2000年）^(*)においては、エネルギー消費削減のため以下の政策を打ち出している。

(*)・・・has turned the move towards optimizing energy utilization and promoting sound energy use of the country's resources, into duty for all those responsible positions. The Deputy Minister's for energy affairs, too, within the objectives of this same act and aiming to make the energy utilization rational as well as optimum, began a widespread campaign.

- (1) エネルギー消費システムや機器に関して、製造者及び輸入者に遵守させるべき技術的規格・基準を決めること。実施のための細則は、エネルギー省、石油省、ISIRI、及び工業省からなる委員会が策定すること。
- (2) 上記規格・基準が遵守できない機器の輸入又は製造に関して、その輸入業者が支払うべき特別関税及び国内製造者が支払うべき特別料金を定めること。
- (3) 商務省は、電気等のピーク時における消費量を低減するために、就業時間帯を調整すること。
- (4) 工場においてエネルギー多消費月の消費量を削減するために、季節に対応した規則を策定すること。
- (5) 省エネルギー投資に対する優遇利率を適用した融資制度を策定し実施すること。
- (6) エネルギー販売収入の2%を、関係省庁によるエネルギー節減や管理に関する調査のために充当すること。
- (7) ビルのエネルギー消費基準を策定すること。
- (8) マスメディアや教科書等を活用して、省エネルギーのむだ遣いを避け、節約意識に努めること。
- (9) 一定以上のエネルギーを消費（年間5MW以上（契約電力）の電気又は石油換算5,000 m³以上のエネルギー）を消費する工場や研究所等に対して、エネルギー管理組織の設置を義務付ける規則を策定すること。また、エネルギー省及び石油省は上記エネルギー管理組織を訓練すること。

○ 第3次5ヶ年計画（2000年～2005年）においても、政府は省エネルギーと環境保全対策を推進するため、第二次五ヶ年計画を引き継ぎ下記政策が打ち出されている。

- (1) エネルギー使用機器やシステムのエネルギー消費基準の策定
消費基準は、エネルギー省、石油省、ISIRI、環境保護機構 (Environmental Protection Organization)、その他の関係省庁から構成される委員会によって作成される。
- (2) 通年及び季節による就業時間規制
商務省は、エネルギー省及び内務省と協力し、エネルギー消費のピーク緩和するよう商業及び工業分野の就業時間を規制する対策を立案する。
- (3) 工場における四半期毎の就業時間規制
関係省庁は、エネルギー消費のピークを緩和するように対策を立案する。また、非ピーク時のエネルギー消費者に対してインセンティブを与える政策を検討する。
- (4) ビル設計及び建設にかかる規則の策定

新規ビルだけでなく、既存のビルも含めてエネルギー消費基準を遵守するような政策が盛り込まれることが必要である。

- (5) 一定以上のエネルギー（年間5MW以上（契約電力）の電気又は石油換算5,000 m³以上のエネルギー）を消費する事業者に対して、上記の規則を遵守できなかった場合には、適当な猶予期間を与えた後エネルギー価格を上げる措置をとる。

○ 第4次5ヶ年計画（2006年～2010年）においては、イランの経済発展を促進するための基盤作りを基本政策の一つとしており、産業／鉱業／農業／運輸／サービス部門への投資のための国家財源の確保を目的とした外貨獲得を重点課題としている。そこで、重要な外貨獲得源である石油及び天然ガスの生産性を高めるために、生産面及び消費面での改革を行い、第四次五ヶ年計画の最初から次のような対策を実施していくことを定めている。

A. 重油、軽油、ガソリンの価格をペルシャ湾小売価格をベースとする価格にして、得られる歳入によって以下の対策を講じる。

- (1) 社会保障制度によって貧困層へ直接、補償的な支援を提供する。
- (2) 都市・地方のビル及び住宅の耐震化と、建物のエネルギー効率化を行う。
- (3) 公共輸送（都市及び都市間、鉄道及び道路）の拡張と改善を促進するために、二重燃料方式の自動車の生産、そして都市内公共輸送に対する補助金交付の圧縮天然ガス・ステーションの設置を進める。
- (4) 道路の事故多発場所を減らし、応急処置及び病院の救急医療サービスネットワークを構築する。
- (5) エネルギー消費と大気汚染を削減し、一般にエネルギー低消費型技術を普及するための工場の装置・機器・エネルギー消費ポイントに関する技術改良と促進を目的とするエネルギー効率プログラムを実施する。

但し、農業部門の機械類用の石油ガスの消費については、閣議承認を受けた作業標準に基づく補助金が交付される。

B. 産業用天然ガスの価格は、第4次5ヶ年計画の開始時点における近隣諸国の産業部門での最低価格レベルに基づいて、政府によって決定される。

C. 電力についての低所得者世帯への支援を行う。

但し、商業用及び産業用の石油と液化ガスの供給については、補助金なしの価格がベースである。

第四次5ヶ年計画に基づき、エネルギー省と石油省は共同提議で国家エネルギー効率管理法案（The Bill of National Energy Efficiency Management）を作成し、国会に提出している。エネルギー省及び石油省以外の関係省庁は、行政企画庁（MPO）、標準・産業研究所、内務省、住宅・都市開発省、鉱山・工業省及び運輸省である。

[国家エネルギー効率管理法案]

第1章 概論及び定義

第2章 基本的な政策と手順

第3章 構造、組織

第4章 エネルギー消費のシステム、方法及び設備のエネルギー消費標準

第5章 建設と都市計画部門のエネルギー消費者

第6章 産業のエネルギー消費者

第18条 エネルギー他消費指定工場とエネルギー管理義務

年間燃料消費量 5,000,000 m³（天然ガス発熱量 8,000kcal/m³とすると石油換算 4,000kL 相当）又は契約電力 1 MW（年間 3000 時間稼動で 3,000,000kWh）以上の事業所にエネルギー診断を義務づけ、業種別の平均エネルギー消費原単位を達成すること。

第19条 工場立入調査

第20条 違反に対する罰金

第21条 電力の買取

第22条 エネルギーリサイクル

第24条 電力負荷ピークカット権限

第25条 ESCO 支援

第7章 エネルギー生産者・供給者

第8章 運輸

第9章 教育、啓蒙

第10章 再生可能エネルギー

第11章 他規則

2. イラン省エネルギー機構（Iran Energy Efficiency Organization、IEEO 又は SABA）の設立（1996 年）

・・・Energy Efficiency Office in the Deputy Minister for Energy Affairs was able to fulfill the necessary planning in all foreseen areas within the act, and to began their activities. Carrying out some of these activities were given to Iran Energy efficiency Organization（IEEO）from March 1995, the date of establishment of this organization; which began its functions in the main sectors of; training, awareness, energy and load management, and energy recovery in industries.・・・

- 工場に対するエネルギー診断の実施
- 省エネルギーに関わるコンサルティング
- 省エネルギーに関わる教育、広報活動
- 電力消費の効率化及び廃熱利用に関わる研究開発等

機構の運営資金は、1999 年までは 100%政府出資、2000 年度から政府補助金は 20%、政府受託事業を含めて事業収入 80%となっている。

3. シャリフ・エネルギー研究所（Sharif Energy Research Institute）の設立（1999 年）

本研究所の設立の前身は、1992 年から 1997 年にかけてイラン国の計画予算庁の“開発と計画のための研究所”のエネルギーリサーチグループが実施した以下の一連のエネルギー調査研究である。とくに、研究所設立には、グループ長であった DR. Yadollah Saboohi の「イランにも、日本の通産省が管掌しているような形、(財)日本エネルギー経済研究所のような研究機関を設立したい」との強い動機に遡る。

このエネルギー調査研究は 1992 年～1994 年の計画予算庁（現在の MPO の前身）による

“Comprehensive Energy Development Plan of Islamic Republic of Iran”に端を発する。本件は、JICA の開発調査「イラン国長期エネルギー計画調査」（1992～1994 年）として実施され、その結果、“イランの人口増加、経済発展とエネルギー消費の将来推計、温暖化ガスの排出量の将来予測を通じて、イラン国の中長期のエネルギー需給”の太宗が明らかになった。引き続き、1995 年～1996 年同庁による “Analysis of Rational Use of Energy in the Social and Economic Sector of I. R. Iran” が実施され、同時に JICA 開発調査「イラン国最適エネルギー利用調査」（1995～1997 年）が採択され、工場診断技術など実践的な省エネルギー技術の移転が行われた。前者には、コンサルタントとして、(財) 日本エネルギー経済研究所、後者には (財) 省エネルギーセンターが加わった。

1998 年 DR. Y. Saboohi は、シャリフ工科大学への移籍を機に、石油省及びシャリフ工科大学の財政的な支援を得て、イラン国のエネルギーと環境政策を、理論と実践面から支える学術研究機関を主導することになった。これらの設立経緯に関しては、SERI パンフレットにも、JICA 調査の貢献が記載されている。また、当時、JICA が供与した省エネ診断機材、バスなども、石油省予算による追加機材などととも、現在でも、本研究所で使用されている。さらに、2000 年 11 月の我が国に対するプロジェクト技術協力による「イランエネルギー管理訓練センタープロジェクト」要請の背景を理論面で支持したの、先に述べた二つの JICA 開発調査による提言等の帰結であった。

4. イラン省燃料消費最適化機構 (Iran Fuel Conservation Consumption, IFCO) の設立 (2000 年 8 月)

本機構は、石油省が管轄する国営石油会社 “National Iranian Oil Company, NIOC” の関連機関として、石油省が管掌するエネルギー消費に関する活動をする唯一の組織で、その性格は、石油省による省エネルギー政策面の実施など、エネルギー省の EEO に近く、省エネルギーに関する啓蒙、普及のためのエネルギー管理者コースの実施なども行っている。ただし、その職員規模（技術系 150 名、事務系 250 名）も予算規模（石油省から 200 百万ドル、NIOC から 300 百万ドル）も大きく、現在、内外のコンサルタントを駆使して約 700 件のプロジェクトを実施中と言う。喫緊の課題は、輸送部門の燃料転換で、約 60 億ドルを輸入しているガソリンから CNG（圧縮天然ガス）への転換である。産業部門では、産業界の燃料転換、エネルギー消費基準の作成、高効率エネルギー機器への金融支援、エネルギー管理、工場診断技術の専門家研修などを行っている。研修内容は座学のみであるが、工場診断では、上記のシャリフ・エネルギー研究所などが協力している。

以上

12. 省エネルギー技術団員報告

財団法人省エネルギーセンター
渋谷 浩志 団員

NTCEM が管理する研修用設備、研修コース用教材およびコースプログラムの状況、並びに C/P の研修コース実施能力について調査したので下記に報告する。

1. 研修用設備（別添 4－1 参照）

1. 1 一般

2階建ての研修棟概観、講義室（熱）、講義室（電気）、講師控え室、計測機器収納室並びにミニプラント実習室を視察。いずれも十分なスペースが確保されている。日本側の支給機材である研修設備、計測器類、OA 機器類は整然と配置されている。

1. 2 熱エネルギー管理用研修設備（ミニプラント）

燃焼炉、オープンバーナー、ボイラ及びスチームトラップが研修室内に効率よく配置されて、実習研修に使われている。熱エネルギー管理コースの定員は 10 名であるが、研修のために十分なスペースが用意されている。

1. 3 電気エネルギー管理用研修設備（ミニプラント）

ポンプ、ファン、コンプレッサーシステムが研修室内に効率よく配置されて、実習研修に使われている。イラン側の責任範囲であるが、照明設備はまだ用意されていない。熱と同様にコースの定員は 10 名であり、十分なスペースが確保されている。

1. 4 ミニプラントの改善策

熱、および電気の各ミニプラントは実習研修に供されているものの、研修目的に沿う機能を十分に発揮できていない。このため、調査団と現地 JICA チームが協議して別途必要な対策を講じることを確認した。

2. 研修コース用教材と研修プログラム（別添 4－2 参照）

研修コースは一般エネルギー管理、熱エネルギー管理、電気エネルギー管理の 3 コースが運営されている。座学用テキストは開講までに時間が不足したため、AHERC の C/P ではなく急遽 SABA の 12 名が任命されて作成した経緯がある。その後 6 ヶ月を目処に C/P が改定することになっており、日本の SMC の教材をベースに改訂版を作成中である。

一方、実習研修については C/P が作成したテキスト、指導マニュアルにより教育が行われている。

2. 1 一般コース

1) 座学用テキスト

全体で 400 ページ強とぶ厚く、構成は省エネ管理一般、熱管理の基本、電気管理の基本から成り立っている。省エネ管理一般は SMC の教材を全体の 2 / 3 相当、SABA の教材を 1 / 3 相当活用し、熱管理の基本、電気管理の基本は主として SMC 教材を参考にして準備されている。コースの対象者は工場の管理職であるが、十分過ぎる内容である。

2) コースプログラム

R/D の訓練プログラム案に沿う内容である。1 日 8 時間の長時間コースなので適宜、実習を取り入れる等の工夫が見られる。

2. 2 熱エネルギー管理コース

1) 座学用テキスト

全体で 305 ページ。主として SMC 教材を参考にして作成されたが、ビルの省エネに関する記述が多いのが特徴。計測器の基本知識も紹介している。工場で熱エネルギーを管理するエンジニアには適切な項目が含まれているが、内容については見直しが必要と思われる。

2) コースプログラム

概ね R/D の訓練プログラム案に沿う内容であるが、研修日数が R/D で計画された 10 日間に比べて 4 日少なく、研修時間で 12 時間短いので、特に実習やケーススタディの時間が不十分な印象である。

2. 3 電気エネルギー管理コース

1) 座学用テキスト

全体で 377 ページ。ポンプ、ファンおよびコンプレッサーの省エネは SMC 教材から、その他は SMC 及び SABA 教材から引用しているものと判断される。工場で電気エネルギーを管理するエンジニアには適切な項目が含まれているが、内容については見直しが必要と思われる。

2) コースプログラム

概ね R/D の訓練プログラム案に沿う内容であるが、R/D に比べて研修日数が 4 日少ないので熱コース同様、実習やケーススタディの時間が少ない。

2. 4 ミニプラントの実習用テキスト、実習マニュアル

座学用とは別に合計 250 ページの実習用テキスト&マニュアルを用意しているとのことである。これは熱及び電気の長期専門家が燃焼炉、ボイラ、スチームトラップ、ポンプ、ファン、コンプレッサーについて各々準備した英文研修マニュアルをベースとしている。1. 4 で述べたようにミニプラントの改善が実施されれば、それに併せた見直しが必要である。

2. 5 機材保守マニュアル

機材の保守マニュアルの作成は C/P が準備中であるが、急ぐものではないので、中外炉（株）より提出される予備品、消耗品リスト等を参考にしながら準備していけばよいと思われる。

3. C/P の研修実施能力（別添 4-3、4-4a、4-4b、4-4c 参照）

熱担当 3 名、電気担当 3 名の合計 6 名が C/P として配置され、一般、熱、電気の 3 コースの講師に従事している。6 名とも学士あるいは修士の資格を持ち、AHERC での教師経験も一人を除き 11 年から 21 年と長い。電気担当の Mr. Farsi は AHERC 経験が 3 年と短い。研修コースは各コース共 2 時間の時間割で 1 日あたり 4 課程であり、初日のオリエンテーション 2 時間を除くと 6 日間で 23 課程/コース、69 課程/全コースとなる。平均では 1 講師当たり 11.5 課程を担当することになるが、実績では多い講師で 14 課程、少ない講師で 8.5 課程である。比較的ばらつきが少ないことから C/P は 6 人共一定の能力があるものと判断できる。Mr. Farsi は 9.5 課程を担当している。また今年 9 月に日本研修を予定しているので技術的知見や実習指導の能力が高まることが期待される。

一方、NTCEM の研修コースを受講した研修生のアンケート結果によると、講師の指導能力は総じて評価が高い。

以上のことから C/P の研修実施能力は高いと判断される。

加えて、熱、電気夫々にミニプラントの運転および実習研修を支援するテクニシャンが 1 名ずつ配置されており、研修の効率を高めていることも特記される。以上

～研修用設備～

1. 一般

2階建ての研修棟概観、講義室（熱）、講義室（電気）、講師控え室、計測機器収納室並びにミニプラント実習室を視察。いずれも十分なスペースが確保されている。日本側の支給機材である研修設備、計測器類、OA 機器類は整然と配置されている。

研修棟



研修室



2. 熱エネルギー管理用研修設備（ミニプラント）

- ・ 燃焼炉、オープンバーナー、ボイラ及びスチームトラップが研修室内に効率よく配置されて、実務研修に使われている。熱エネルギー管理コースの定員は 10 名であるが、研修のために十分なスペースが用意されている。
- ・ 燃焼炉では燃料ガス流量計、空気流量計発信器、レキュピレーター（空気予熱器）、拔出し可能な冷却用水配管セットを視察し、不具合箇所を視認した。CO/CO₂ 分析計（島津 CGT-700）が中外炉 SV の調整後に動かなくなったとの新情報をもたらされた。
- ・ ボイラー（ヒラカワガイダム製）ではシグナル表示やパネルのフロー表示が日本語である。

3. 電気エネルギー管理用研修設備（ミニプラント）

- ・ ポンプ、ファン、コンプレッサーシステムが研修室内に効率よく配置されて、実務研修に使われている。イラン側の責任範囲であるが、照明設備はまだ用意されていない。熱と同様にコースの定員は 10 名であり、十分なスペースが確保されている。
- ・ ポンプシステムでは高効率モーターと標準モーターが用意されているが、両者の効率差を研修するためにはポンプとモーターのカップリングを外して交換する必要があり、芯出し等の調整作業も含めると 1.5 時間以上を要するとのこと。実研修には使用が困難であることが判明した。
- ・ ファンシステムも同様な問題がある。

4. ミニプラントの改善策

熱、および電気の各ミニプラントは実務研修に供されているものの、研修目的に沿う機能を十分に発揮できていない。このため、調査団と現地 JICA チームが協議して下記の対策を講じることを確認した。

(1) 燃焼炉について

1) バーナーの仕様について

現在設置されているバーナーの容量は、研修目的を考慮すると大きすぎるものである。しかし、バーナーを取り替えるとなると、材料費および据付費が必要となること、さらに発注から現地の据付に半年近くかかることを考えた場合、取替えによるプロジェクトの影響は大きなものとなる。

一方、現地の専門家の更なる尽力が求められるが、燃焼炉の計測制御システムに適切なものが設置され、問題なく稼動すれば、現在設置されているバーナーで研修を実施することは可能である。

したがって、まずはバーナーを交換せずに、下記に示す周辺の計測機器を適切なものと交換し、調整することを最初の対処方法とする。

燃料ガス流量測定用オリフィスを適正サイズのものとの交換し、差圧発信器のレンジを現地にて調整する。

オリフィス式燃焼空気流量計の差圧発信器は現地での調整ができないため、新規にレンジ変更されたものと交換する。

2) レキュペレーターについて

レキュペーターの構造上、内部で空気が漏れていることはほぼ間違いない。たとえ空気が漏れていたとしてもそのこと自体は研修に大きな影響を及ぼさないため、この修繕は行わない。ただしレキュペーターの入り口に設置されている温度計がレキュペーターに近く、漏れた冷たい空気の影響を大きく受けている（燃焼炉から出てきた排ガスの温度を把握できない）。したがって、燃焼炉出口付近に移動させる必要がある。どの位置に温度を設置させることがもっとも適切であるのかという点については、中外炉工業が JICA に対して指示をするように中外炉工業に要求する。温度計の設置位置変更の作業については現地で現地業務費を使って行う。

燃焼炉本体



↓ レキュペレータ 空気入口配管



↑ レキュペレータ入り口排ガス温度計

3) 熱効率 (20%から 50%) の再現について

実測値を用いて、熱効率の算出を行うよう、引き続き JICA から中外炉工業に対して要求を続ける。

4) ガス分析計について

島津製作所の CO/CO₂ ガス分析計については、中外炉の SV が調整作業中に故障が生じて作動していない。これについては中外炉工業もしくは島津製作所の責任で交換もしくは修繕を

行うように JICA から中外炉工業に要求する。

5) 図面について

中外炉工業から最終図面として提出する図面リストを提出させた。このリストを長期専門家が確認し、不足があればその不足分を加えて図面リストを提出するように JICA から中外炉工業に要求する。

6) 補用品リストについて

中外炉工業から補用品リストとしてミニプラントを運転する上で準備しておくことが必要と考えられる消耗品、予備品リストを提出させた。しかし、消耗品・予備品リストは機材のメンテナンスマニュアルとリンクするべきものであり、リストのみの提出では現地では対応することが非常に困難である。したがって、中外炉工業に対して今回の消耗品・予備品リストの選定理由を記載したものを提出するように要求する。

なお、このときには各機器のメーカーならびに連絡先を明記することとする。

7) フロー表示パネルについて

中外炉工業からフローパネルの最終図面を提出させた。この図面を長期専門家が確認し、必要があれば修正し、中外炉工業に連絡をする。ボイラのフローパネル（日本語表示）の交換も要求する。

以上

～研修コース用教材とプログラム～

NTCEM の研修コース教材及びコースプログラムについて調査した。

座学用テキストは開講までに時間が不足したため、AHERC の C/P ではなく急遽 SABA の 12 名が任命されて作成した経緯がある。その後 6 ヶ月を目処に C/P が改定することにしていたので、SMC の教材をベースに改訂版の作成を継続しているが、今もって初版が利用されている。一方、実習研修については C/P が作成したテキスト、指導マニュアルにより教育が行われている。

1. 一般コース

(1) 座学用テキスト

Mr. Mohammad H. Zarbakhsh Manager, Training Office, SABA より聴取。

- ・全体で 400 ページ強と厚い。
- ・構成は省エネ管理一般、熱管理の基本、電気管理の基本から成り立っている。
- ・省エネ管理一般の編集は Mr. Mohammad H. Zarbakhsh が担当し、日本の SMC の教材を全体の 2/3 相当、SABA の教材を 1/3 相当活用したとのこと。
- ・熱管理の基本、電気管理の基本は主として SMC 教材を参考にして準備された。
- ・テキストの目次は次の通りである。

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コースプログラム (第 5 回コースの例)

R/D の訓練プログラム案に沿う内容である。1 日 8 時間のコースなので適宜、実習時間を取り入れる等の工夫が見られる。(注) 着色部 : 実習研修

	08:00-10:00	10:00-12:00	14:00-15:30	16:00-18:00
土	オリエンテーション	省エネの重要性	ボイラの省エネ	エネルギー管理の強化
日	ポンプ&ファンの省エネ	コンプレッサーの省エネ	ポンプ&ファン、コンプレッサーの実習 (A 班、B 班)	電気エネルギー計測
月	伝熱、熱回収の基本	燃焼炉の計測	ボイラの熱勘定	ポンプ&ファン、コンプレッサーの実習 (A 班、B 班)

火	燃焼炉の熱勘定紹介	蒸気系、スチームトラップの省エネ	燃焼炉実習 (A班)	燃焼炉実習 (B班)
水	ビルの省エネ	オープンバーナ実習 (A班、B班)	ボイラ実習 (B班) スチームトラップ実習 (A班)	ボイラ実習 (A班) スチームトラップ実習 (B班)
木	電気料金体系	省エネ発掘 (Map 法)	省エネ発掘 (Map 法) 省エネ法	エネルギーコスト、原単位管理、エネルギー・チェックリスト

2. 熱エネルギー管理コース

(1) 座学用テキスト

- ・全体で 305 ページ。
- ・主として SMC 教材を参考にして準備されたが、ビルの省エネに関する記述が多いのが特徴。計測器の基本知識も紹介している。



(表紙)



(計測器の紹介)

- ・テキストの目次は次の通りである。

<u>Chapters</u>	<u>Page Number</u>
Chapter 1- Basics of Heat Energy Conservation	1
Chapter 2- Energy Management in Steam Production & Distribution Systems	62
Chapter 3- Heat Energy Measurement Methods and Devises	126
Chapter 4- Modern Systems for Energy Conservation	158
Chapter 5- Energy Consumption Management in Buildings	192

(2) コースプログラム (5月28日-6月2日開催の例)

概ね R/D の訓練プログラム案に沿う内容であるが、実習やケーススタディの時間が少ない。

	08:00-10:00	10:00-12:00	14:00-15:30	16:00-18:00
土	オリエンテーション	化石燃料の得失	燃焼の省エネ	伝熱の基礎、排熱回収の基礎
日	蒸気ボイラ	燃焼計算	燃焼のエネルギー管理の推進方法	蒸気系のエネルギー管理
月	熱エネルギー系の計測技術	省エネ法	ボイラの省エネ	オープンバーナーの実習

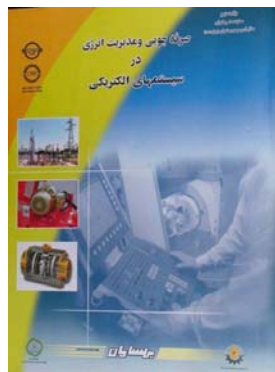
火	エネルギー原単位とコスト管理	燃焼炉の熱勘定計算とその解析	ボイラ実習 (A班) 燃焼炉実習 (B班)	ボイラ実習 (B班) 燃焼炉実習 (A班)
水	スチームトラップの動作原理とその選定	スチームトラップ実習 (A班)	ボイラ実習 (B班) 燃焼炉実習 (A班)	ボイラ実習 (A班) 燃焼炉実習 (B班)
木	排熱回収	スチームトラップ実習 (B班)	ビルのエネルギー管理	省エネチェックリスト

(注) 着色部：実習研修

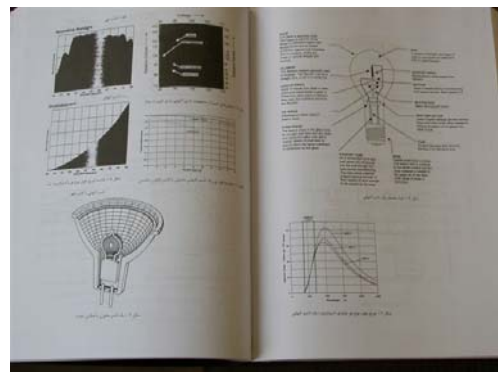
3. 電気エネルギー管理コース

(1) 座学用テキスト

- ・全体で377ページ。
- ・ポンプ、ファン、コンプレッサーの省エネは SMC 教材からその他は SMC 及び SABA 教材から引用しているものと判断される。



(表紙)



(電球の省エネ)

- ・テキストの目次は次の通りである。

<u>Chapters</u>	<u>Page Number</u>
Chapter 1- Electrical Energy Management & Conservation Methods	1
Chapter 2- Energy Conservation of Compressor	125
Chapter 3- Energy Conservation in Fans & Pumps	177
Chapter 4- Energy Conservation in Lighting, Transformers & Air Conditions	235
Chapter 5- Special Subjects in Electrical Energy Management	319

(2) コースプログラム (6月25日～30日開催の例)

概ね R/D の訓練プログラム案に沿う内容であるが、実習やケーススタディの時間が少ない。

	08:00-10:00	10:00-12:00	14:00-15:30	16:00-18:00
土	オリエンテーション	誘導電動機、省エネ法	省エネための電気エネルギー計測方法	電気計測実習 (A班) モーター出力の計測実習 (B班)
日	モーターの回転数制御	コンプレッサーの形式	送電、受配電の省エネ	電気計測実習 (B班) モーター出力の計測実習 (A班)
月	コンプレッサー機能の特性	トランスの省エネ	ポンプ&ファンの省エネ	照明の省エネ
火	ポンプ&ファン機能の特性	コンプレッサーの省エネ	電力料金管理	リアクタンス解析

水	エネルギー管理の改善方法	電気炉等負荷変動の大きい設備	コンプレッサー実習 (A班) ポンプ&ファン実習 (B班)	コンプレッサー実習 (B班) ポンプ&ファン実習 (A班)
木	コンプレッサー実習 (A班) ポンプ&ファン実習 (B班)	コンプレッサー実習 (B班) ポンプ&ファン実習 (A班)	電気料金体系	冷凍システムの省エネ

(注) 着色部：実習研修

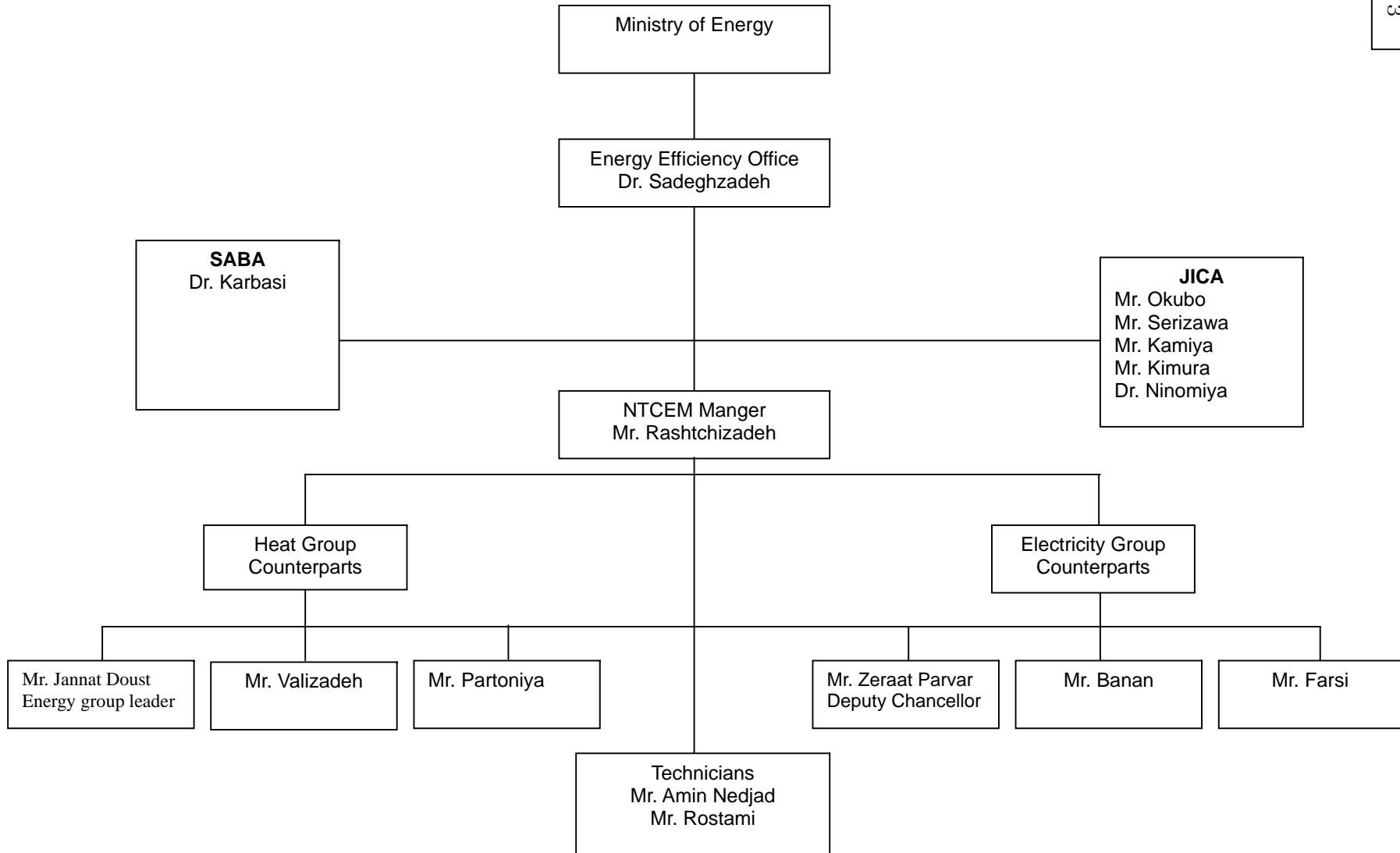
4. ミニプラントの実習用テキスト、マニュアル

Mr. Jannat Doust, Energy Group Leader of NTCEM から聴取したところでは、座学用とは別に合計 250 ページの実習用テキスト&マニュアルを用意しているとのことである。これは熱及び電気の長期専門家が準備した下記の研修マニュアルをベースとしている。

No.	Title	No. of Pages
1	Combustion Furnace	59
2	Combustion Boiler	15
3	Steam Trap	72
4	Fan	28
5	Pump	29
6	Compressor	24

以上

Project organization Chart of JICA Project on National Training Center for Energy Management



National Training Center for Energy Management – Educational Course Program “Fifth General Energy Management”

別添4-4a

Time Weekdays & date	08:00 – 10:00		10:00 – 12:00	12:00 – 14:00	14:00 – 15:30		16:00 – 18:00
Saturday 30 April 05	Enrollment	Preamble	Importance of Energy conservation Mr. Jannatdoust	Prayer and lunch	Energy conservation in steam boilers Mr. Jannatdoust	Methods of enhancing energy management Mr. Zeraat Parvar	
	AHERC training office	Energy engineering group and SABA rep.					
Sunday 1 May 05	Energy conservation in pumps & fans Mr. Banan		Energy conservation in compressors Mr. Farsi	Prayer and lunch	Pump & fan test (Group A) Compressor test (group B) Mr. Banan & Mr. Farsi	Electric energy measurement Mr. Zeraat Parvar	
Monday 2 May 05	Basics of heat transference – Recovery of energy Mr. Valizade		Measurement technology in Furnace Mr. Partoniya	Prayer and lunch	Heat balance of steam boilers Mr. Jannatdoust	Compressor test (group A) Pump & fan test (GroupB) Mr. Banan & Mr. Farsi	
Tuesday 3 May 05	Heat balance of heat Furnace Mr. Partoniya		Heat energy conservation in steam systems - steam traps Mr. Valizade	Prayer and lunch	Furnace test (group A) Mr. Partoniya	Furnace test (group B) Mr. Partoniya	
Wednesday 4 May 05	Energy management in buildings Mr. Partoniya		Open Burner test (group A & B) Mr. Partoniya	Prayer and lunch	Steam boiler test (group B) Steam trap test (group A) Mr. Jannatdoust & Mr. Valizade	Steam boiler test (group A) Steam trap test (group B) Mr. Jannatdoust & Mr. Valizade	
Thursday 5 May 05	Electrical energy tariffs Mr. Farsi		Map method Mr. Banan	Prayer and lunch	Map method Mr. Banan	Energy law Mr. Banan	Cost and energy intensity management Energy checklists Mr. Jannatdoust

Khalil Jannatdoust,
Energy group leader of Complex

National Training Center for Energy Management – Heat Educational Course Program “Energy Management”

別添4-4b

Time Weekdays & date	08:00 – 10:00	10:00 – 12:00	12:00 – 14:00	14:00 – 15:30	16:00 – 18:00	
Saturday 28 May 05	Enrollment	Preamble	Prayer and lunch	Desired combustion	Basics of heat transference and recycle of wasted energy	
	Training office	Energy engineering group & SABA rep.				Advantages and disadvantages of fossil fuels (natural gas and kiln fuels) Mr. Jannatdoust
Sunday 29 May 05	Steam boilers Mr. Jannatdoust		Combustion calculation Mr. Partoniya	Prayer and lunch	Methods of enhancing energy management in combustion Mr. Partoniya	Energy management in steam systems Mr. Valizade
Monday 30 May 05	Measurement technology in heat systems Mr. Partoniya	Energy management law Mr. Banan	Prayer and lunch	Energy conservation in steam boilers Mr. Jannatdoust	Open burner test Mr. Jannatdoust & Partoniya	
Tuesday 31 May 05	Energy intensity and cost management Mr. Jannatdoust	Thermal calculation of furnace and its analysis Mr. Partoniya	Prayer and lunch	Steam boiler test (group A) Furnace test (group B) Mr. Partoniya & Jannatdoust	Steam boiler test (group B) Furnace test (group A) Mr. Partoniya & Jannatdoust	
Wednesday 1 June 05	Principles of work and choosing steam traps Mr. Valizade	Steam trap test (group A) Mr. Valizade	Prayer and lunch	Steam boiler test (group B) Furnace test (group A) Mr. Partoniya & Jannatdoust	Steam boiler test (group A) Furnace test (group B) Mr. Partoniya & Jannatdoust	
Thursday 2 June 05	Wasted heat energy recycle Mr. Valizade	Steam trap test (group B) Mr. Valizade	Prayer and lunch	Building energy management Mr. Partoniya	Energy conservation checklists Mr. Jannatdoust	

Khalil Jannatdoust,
Energy group leader of Complex

National Training Center for Energy Management – Electricity Course Program

別添 4 – 4 c

Time Weekdays & date	08:00 – 10:00		10:00 – 12:00		12:00 – 14:00	14:00 – 15:30	16:00 – 18:00
Saturday 25 June 05	Enrollment AHERC training office	Preamble Energy engineering group and SABA rep. and JICA Chief Advisor	Inductive electro motors 10-12 Mr. Banan	Energy management law 12-13 Mr. Banan	Prayer and lunch	Methods of electrical energy measurement for conservation Mr. Zeraat Parvar	Electric measurement(group A) Check of the output of electro motors (group B) Mr. Zeraat Parvar & Mr. Banan
Sunday 26 June 05	Controlling motors' speed Mr. Banan		Types of compressors Mr. Farsi		Prayer and lunch	Electrical energy conservation in the Electric Net Work Mr. Zeraat Parvar	Electric measurement (group B) Check of the output of electro motors (group A) Mr. Zeraat Parvar & Banan
Monday 27 June 05	Characteristics of compressors' function Mr. Farsi		Electrical energy conservation in transformers Mr. Zeraat Parvar		Prayer and lunch	Electric energy conservation in pumps & fans Mr. Banan	Energy conservation in light systems Mr. Zeraat Parvar
Tuesday 28 June 05	Types of pumps, fans and their functional characteristics Mr. Banan		Electric energy conservation in compressors Mr. Farsi		Prayer and lunch	Electric charge management Mr. Zeraat Parvar	Reactive power analysis Mr. Zeraat Parvar
Wednesday 29 June 05	Methods of improving energy management Mr. Zeraat Parvar		Consumers of special electrical =loads Mr. Zeraat Parvar		Prayer and lunch	Compressor test (group A) Pump & fan test (Group B) Mr. Banan & Mr. Farsi	Compressor test (group B) Pump & fan test (Group A) Mr. Banan & Mr. Farsi
Thursday 30 June 05	Compressor test (group A) Pump & fan test (Group B) Mr. Banan & Mr. Farsi		Compressor test (group B) Pump & fan test (Group A) Mr. Banan & Mr. Farsi		Prayer and lunch	Electrical energy tariffs Mr. Farsi	Energy management in refrigerating systems Mr. Farsi

**Khalil Jannatdoust,
Energy group leader of Complex**

