３．Afsin-A 発電所視察報告

１．視察の目的

今回の事前調査団派遣前のテレビ会議（2006 年６月５日開催）において EUAS 本部より、Afsin-A 発電所の若手エンジニアへの技術移転も、研修の対象に加えてもらいたいとの要望を受けた。

一方、今回のプロジェクトの予算規模から研修を２箇所のサイトで実施することは困難であることから、Afsin-A 発電所がプロジェクトの実施場所として適しているか、また若手エンジニアの実態を把握し、エンジニアへの技術移転が現在想定しているプロジェクトで対応可能であるかを見極めることを目的に視察訪問した。

なお、Afsin-A 発電所は世界銀行の融資により発電所の大規模なリハビリ工事の実施が決定している。

２．発電所の概要

（１）設備の概要

発電容量は３×340MW＋１×335MW＝1335MW である。ただし、335MW（No. ２）はタービン故障のため 2002 年より運転停止している。年間発電量の目標は 800 万 kWh であるが、現在は 260 万 kWh であり、リハビリの目標は 800 万 kWh の達成である。現在のところ、通常２基運転。各ユニットの状況は下記のとおりである。

表１　各発電ユニットの状況

No. １	ボイラーチューブ漏れが問題。240MW 以上に発電量を増加させるとチューブが漏れる。240MW でも連続 15 日程度しか運転できない。３日～１週間でトラブル発生してしまうこともある。
No. ２	タービン、発電機のトラブルにより 2002 年より運転を休止している。（一番の問題は発電機のコイルの更新。部分更新か、全面更新の結論が出なかったが全面更新するという結論がようやく出た。）2007 年を目処に修理完成予定。この項目はリハビリではなく、通常メンテナンスの範囲で実施する。
No. ３	定期点検に入っている。７／15 運用開始予定。
No. ４	No. ３定期点検終了後、定期点検に入る予定。

（２）組織の概要

Afsin-A 発電所の組織概要を図１に示す。エンジニアは、所長を含め、24 名。そのうち９名が若手エンジニア（入社１年目）、２～３名が３年以下の経験年数であり、約半数が若手エンジニアで構成されている。Afsin-B 発電所もほぼ同様な数字であり、彼らの育成が大きな課題である。現在 EUAS 本部は彼らを対象としたトレーニングを実施していない。

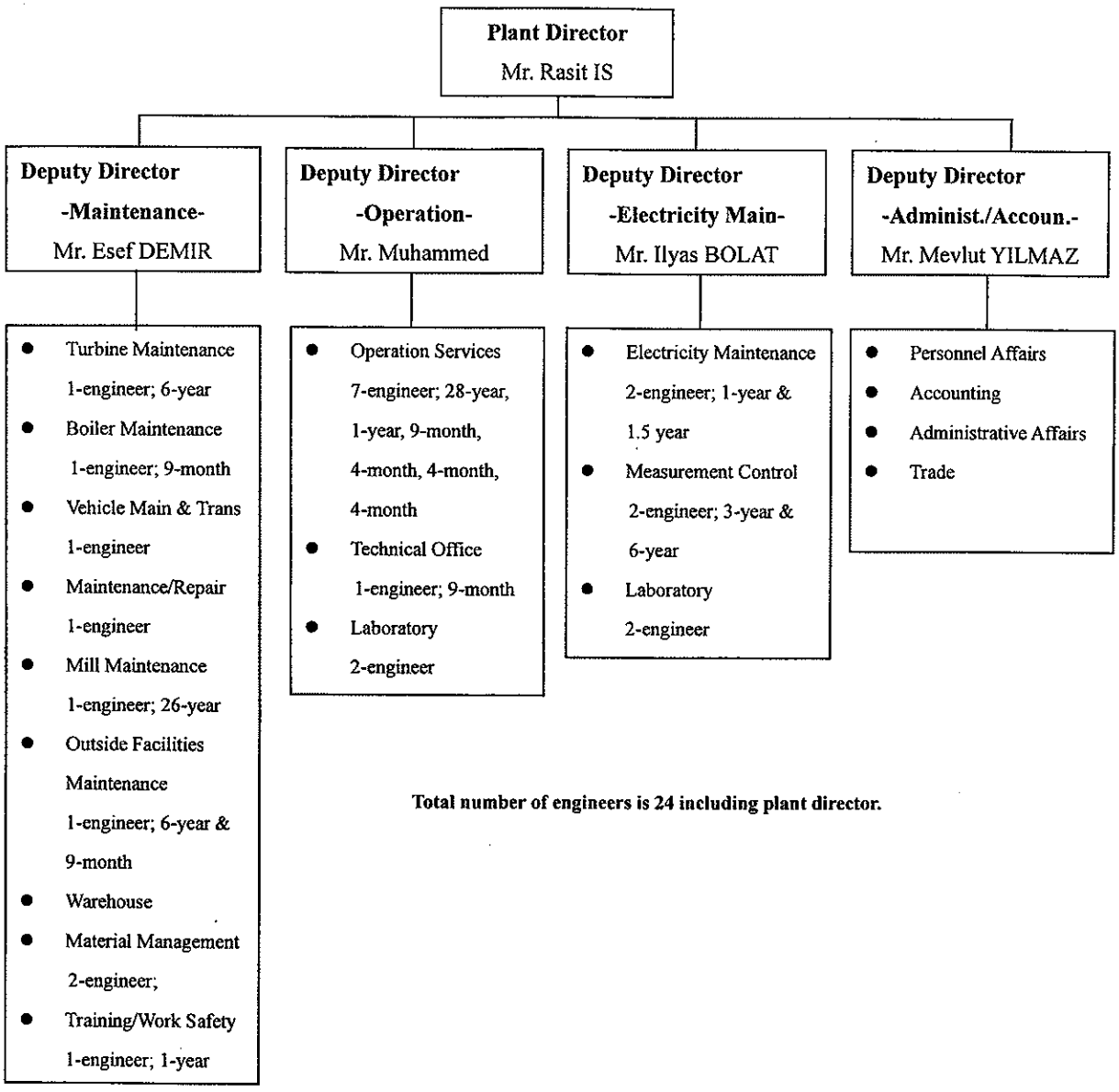


図１　**Afsin-A** 発電所組織図

（３）機械／環境設備の状況

Afsin-A 発電所で計画しているリハビリの主な項目は下記のとおりとのことであった。ただし、リハビリの計画は EUAS 本部で計画しており、詳細な情報は Afsin-A 発電所にはきていないため、一部実際と異なる可能性はある。

表２　設備リハビリ計画

石炭ミル（６基／ユニット）	・ミル本体には特に問題なし。 ・乾燥の排気系統のファン能力増強 ・集塵機（EP）更新（乾燥の排気煙突から茶色の煙が出ている）
ボイラ	・灰だし装置（湿式から乾式へ）灰の粒度が細かいため灰が排出されず詰まる。 ・ボイラーチューブ（エコ含む)、管寄せ更新 ・石炭バーナ改造：燃焼完了点が地上から 90m とフレームが長いため、排ガス温度が高い。（設計では 61m） ・スタートアップ用オイルバーナ更新：突然燃料遮断される。原因不明。（６基／ユニット） ・蒸気式スートブロー：更新
EP	更新
煙突	補修
制御盤	旧式の盤であるが、機能的に問題なく予備品も入手可能とのこと。リハビリ対象外としているが信じられない。実際の計画には入っている可能性あり。

その他設備に対する特記事項

１）ボイラー効率、ボイラーEP 性能については稼動当初から仕様を満足していなかった。

２）ボイラー排ガス温度：設計＝160℃、テストラン＝180℃

＊上記結果よりボイラーチューブの増設等行ったが、計画値を達成できずペナルティーで処理した。（運用開始は 1985 年、検収 1995 年）

３）発電原単位：1980kcal/kWh、現状 2900kcal/kWh

＊低負荷運転の影響が大きいと思うが差異分析はできていない。

＊参考：排ガス温度（A/H 後）設計 160℃、実績 200℃以上（排ガス O_2 濃度は５％）。

４）周波数制御：49.2～50Hz、電圧変動：21.0kV±10％（仕様）実績は不明。

５）脱硫設備は今回のリハビリ計画に入っていないが、設置はリハビリ完了後再度検討する。

（４）電気計装設備の状況

１）制御システム

①制御システムの現状

・ドイツ製の制御装置が納入されており、Orhaneli 発電所のボイラー制御装置の若干旧式版と判断された。

・制御上のトラブルについて問題（主蒸気温度変化等の変動等）がないか確認したところ制御上の問題はないとの回答であった。

・タービン起動時の速度上昇は自動化されておらず、日本の 40 年以上前の状況。

②主な課題

・制御装置の DCS 化により、運転・設備維持管理に必要な監視・記録の充実が望まれる。このために、若手エンジニアに対する DCS システム技術の火力発電所への適用研修は期待されている。

２）電気システムの現状

電気設備の大きなトラブルは特にないとの説明であった。

（５）調査団所見

１）設備

設備の劣化は著しく定格の 70%程度の負荷でしか運転できないこと、ボイラー関係のトラブルが頻発している点など、劣化の程度は Orhaneli に比較しても深刻である。訪問した日も No. 4 はトラブルで停止しており、復旧作業中のようであった。また、発電所内の環境についても、石炭粉塵の飛散など非常に劣悪であった。

以上より EUAS がリハビリ実施の第１号として、Afsin-A を選択したのは妥当な結論と考えられる。

２）人材

工場案内役の Mr. Esef は稼動当初から機械設備のメンテナンスを担当しており、設備の機能、問題点などをよく把握している。しかしながら、プラントの特性、劣化状態などを解析／調査するところまではいっていないようである。現在エンジニアの半数が経験の浅い若手エンジニアであることを考えると、リハビリ後のプラントの効率的な運用のためにも人材育成は急務である。

３）Afsin-A 発電所へのプロジェクトの対応について

設備が安定的に稼動していないこと、若手エンジニアが多すぎること（今回のプロジェクトでは中堅エンジニアを対象と考えている）ことから、プロジェクト実施場所として Afsin-A 発電所は適当ではないと考えられる。一方、Afsin-A 発電所の若手エンジニアの育成へのバックアップとしては、間接的ではあるが本部研修部の人材育成計画のサポートという形でプロジェクトでも対応可能ではないかと考えられる。

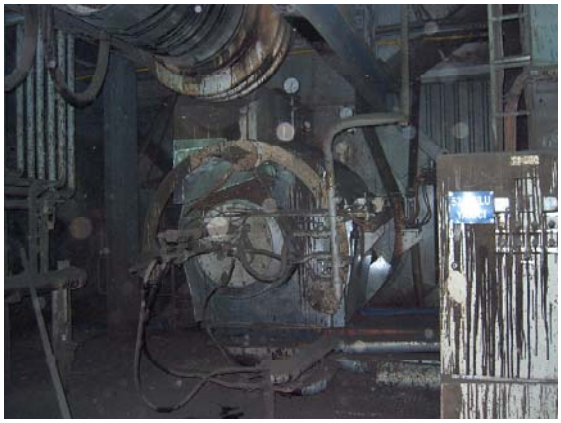
４．発電所関連写真集
（１）Orhaneli 発電所

Orhaneli 発電所
（発電所内ゲストハウス食堂より）

冷却水ポンプ

冷却水ポンプ（グランドからの水漏れが激しい）

ボイラー棟



バーナー

石炭ミル

タービン

発電機

給水ポンプ

コンデンサ

EP（電気集塵機）

脱硫装置

脱硫装置操作用 CRT

復水器及び循環水ポンプ

主変圧器

タービン建家現場計器（左端）

給水ポンプ・モーター（３台）

高圧タービン（手前）、中圧タービン（油圧〔サーボ系統改造後の確認中でタービンカバー外し〕

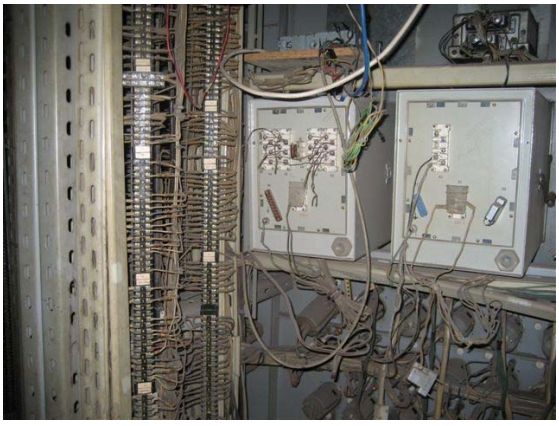
高圧タービン（右）油圧（サーボ）系部分改造

発電機（奥）と励磁用交流発電機（手前）

中央制御盤（左半分／ボイラ：右半分／タービン）
設計思想が全く異なる盤の組み合わせ

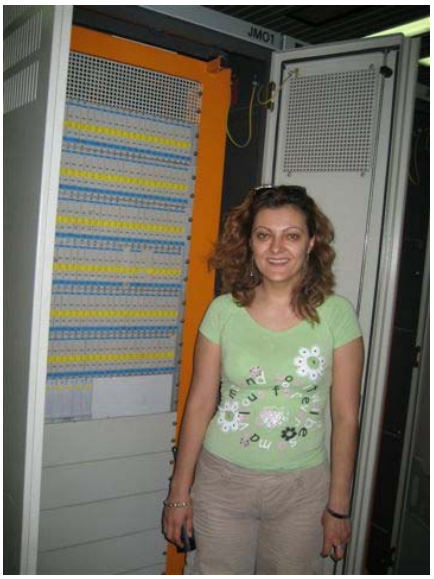
中央制御盤（ボイラデスク盤側）

Primary Frequency Control 用モニター（Scoda）
タービン及び一部ボイラデータ監視



中央制御室タービン制御直立盤裏側

タービン保護リレー盤（ロシア製）



自動ボイラ制御装置（Siemens 製 Teleperm C）

自動バーナ制御装置（Siemens 製）

高圧電源盤（ロシア Elektro Sila 社製）

所内電源フィーダ保護リレー
（ロシア Elektro Sila 社製）

低圧電源盤

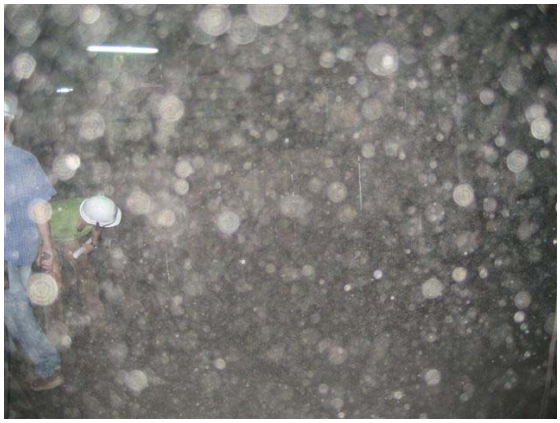
AVR 盤（ロシア Elektro Sila 社製）

整流器盤

発電機遮断機（１相分）

ボイラバーナー部

ボイラ建屋内塵埃



ボイラ建屋１階部塵埃噴出

脱硫装置

脱硫装置監視制御モニター

２回目訪問時の朝（集塵機停止）

発電所内会議室（プロジェクトの専門家用執務室に予定している。）

（２）Afsin-A 発電所

ボイラ Ash 搬送用チェーンコンベア
（Ash の粒径が細かく搬送できない）

石炭ミル：ボールミル（特に不具合なし）

石炭ミル排気用煙突（集塵機機能劣化）

Ash 捨て場（白い部分）

ボイラ建屋屋上からの遠景
（黒い部分は石炭採掘場か）

ボイラ煙突（上部が損傷している。内部も腐食の可能性あり）

No.2 ユニットボイラ内部（過熱器）長期間停止しているが、チューブ表面汚れている。

No.2 ユニットタービン

Boiler Ash 湿式処理

中央制御室操作盤（１）

中央制御室操作盤（２）

（３）Orhaneli 炭鉱、Ash ダム

Ash ダム（発電所から車で５分程度）

Ash ダム下流の池（水はフィルタリングされており、再利用される。）

炭鉱：露天掘りであるが、数年前に大規模な土砂崩れがあり、現在の採掘量 50 万 T/年に対して、500 万 T の表層土砂を撤去している。

（４）Orhaneli 発電所ゲストハウス

ゲストハウス２階集会所（ワークショップのセミナールームに予定）

宿泊室

シャワー、トイレ付き

ゲストハウス周辺の社宅

５．収集資料リスト

No.	資料名	入手先	言語
1	EUAS 会社パンフレット(2006)	EUAS	トルコ語 英語
2	Electricity Generation Map in Turkey 2005	EUAS	トルコ語 英語
3	EUAS 発電所の容量、配置、トルコの電力需給、電力分野の見通しなどの資料	EUAS	英語
4	Energy Policies of IEA Countries (Turkey 2005)	MENR	英語
5	Orhaneli Power Plant 年報 (2003､2004､2005)	Orhaneli 発電所	トルコ語
6	発電所の日報	Orhaneli 発電所	トルコ語
7	設備フロー、単線結線図	Orhaneli 発電所	トルコ語
8	発電所フロー図	Orhaneli 発電所	英語
9	ボイラー給水ポンプ仕様書	Orhaneli 発電所	英語
10	石炭分析表 (2006 年 2,3 月)	Orhaneli 発電所	トルコ語
11	ボイラー機器仕様書 (メーカ仕様書)	Orhaneli 発電所	英語
12	Orhaneli 発電所概要	Orhaneli 発電所	トルコ語
13	タービンプラント運転マニュアル	Orhaneli 発電所	トルコ語
14	ボイラ制御系統図	Orhaneli 発電所	英語
15	タービン計装系統図	Orhaneli 発電所	英語
16	励磁装置／AVR 系統図	Orhaneli 発電所	ロシア語
17	励磁装置　Questionnaire Data For dynamic system simulations	Orhaneli 発電所	英語
18	流体継手メーカー比較書 Comparison of NEM MG2-600 with VOITU Type SVL	Orhaneli 発電所	英語
19	トルコの環境規制 (発電所に関係する大気、水)	EUAS	トルコ語
20	EUAS 研修計画パンフレット (2006 年)	EUAS	トルコ語
21	EUAS Laboratory 分析項目単価表	EUAS	トルコ語
22	EUAS Laboratory　詳細 (分析機器他) (CD)	EUAS	トルコ語
23	タービン制御系統図	Orhaneli 発電所	英語
24	Scoda 製 Monitor 画面 (Primary Frequency control 用に追加した Monitor)	Orhaneli 発電所	トルコ語
25	Boiler 通風系 Diagram	Orhaneli 発電所	英語
26	Alarm Log 印字リスト	Orhaneli 発電所	英語

27	人材育成イメージ図（EUAS の Dept. of education and information technology の Mr. Tani が構築を目指す人材育成システム	EUAS	トルコ語
28	Orhaneli 発電所環境管理月報（Orhaneli から本部へ提出した資料）	EUAS	トルコ語

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE REPUBLIC OF TURKEY
ON
JAPANESE TECHNICAL COOPERATION
FOR
THE PROJECT FOR ENERGY EFFICIENCY IMPROVEMENT OF POWER PLANT

Japan International Cooperation Agency (hereinafter referred to as "JICA") and Electricity Generation Company (Elektrik Uretim A.S., hereinafter referred to as "EUAS") signed the Record of Discussions (hereafter referred to as "R/D") on the Project for Energy Efficiency Improvement for Power Plant.

The attached document hereto is intended to specify the contents of the Project agreed between both sides in regard to the descriptions stipulated in the R/D

Ankara, October 10, 2006

中村光夫

Mr. Mitsuo Nakamura
Resident Representative, Turkey Office
Japan International Cooperation Agency
(JICA)

Mr. Sefer Butun
Chairman of the Board
Electricity Generation Company
(EUAS)

Mr. Muzaffer Basaran
Deputy Director General
Electricity Generation Company
(EUAS)

THE ATTACHED DOCUMENT

1. Placement of the Previous Minutes of Meeting

Both sides agreed that the understanding of the items other than those mentioned in this Minutes of Meetings remains unchanged from the one mutually confirmed in the Minutes of Meetings signed on 30 June, 2006.

2. Materials for Project Planning and Management

Both sides confirmed and agreed on the following materials to be used for the purpose of project planning and management.

(1) Project Design Matrix (PDM) (Annex 1)
(2) Organization chart for the Project Implementation (Annex 2)
(3) Plan of Operation (PO) (Annex 3)

3. List of Main Attendance

A list of Main Attendance is shown in Annex 4.

The Project for Energy efficiency improvement of power plant in Target area : Orhaneli, Bursa province

Period : Dec.2006 - Nov.2008 (Tentative)

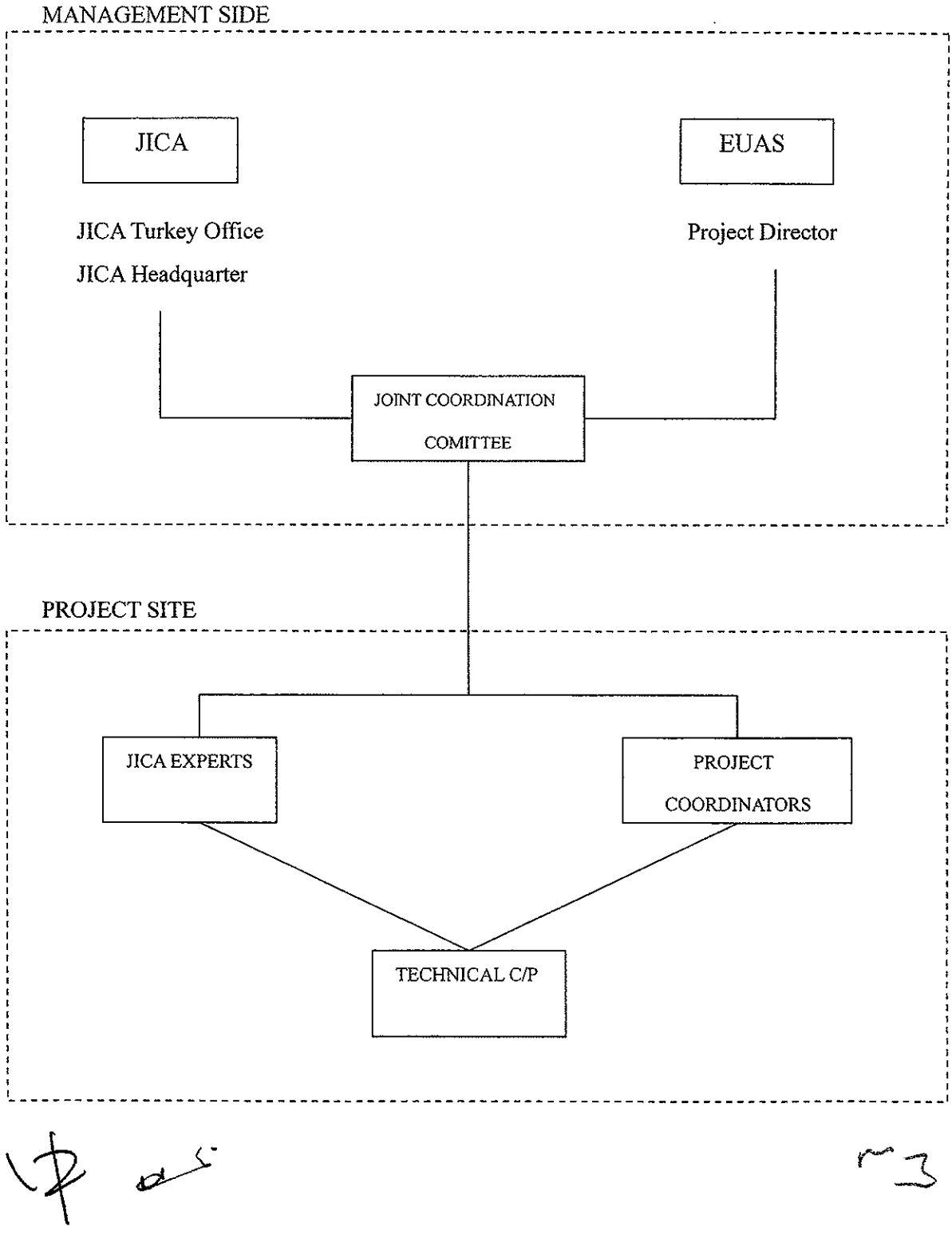
Target Group: EUAS

PDM version: No.1
Revised date :
Oct. 2006

Project overview	Indicator	Access to Indicator	Assumption
(Overall goal) The energy efficiency of model power plant (Orhaneli) is improved.	(1) The energy efficiency of model power plant (Orhaneli) improve by XX%. (2) Rehabilitation is conducted according to rehabilitation plan made by the project at model power plant (Orhaneli).	(1) Operation record (2) Hearings with officials at model power plant (Orhaneli)	
(Project purpose) The capacity for energy efficiency improvement at model power plant (Orhaneli) is improved.	(By end of the project) (1) At model power plant (Orhaneli), equivalent or better cost-performance rehabilitation plan is developed compared to outsourcing rehabilitation plans of same size power plants (2) The reports ,plans, specifications and manuals which are made by the project are adopted by EUAS.	(1) Annual generation report issued by EUAS and hearings with officials (2) Hearings with officials	The rehabilitation is carried out by EUAS according to rehabilitation plan made by the project.
(Output) (1) The skills of C/Ps for equipment diagnosis are developed (2) The skills of C/Ps for environmental measure are developed (3) The skills of C/Ps for planning of rehabilitation are developed (4) The skills of C/Ps for designing of rehabilitation are developed (5) The skills of C/Ps for operation and maintenance of power facility are developed (6) The training system of EUAS for energy efficiency improvement is enhanced.	(1) The report of equipment diagnosis at model power plant (Orhaneli) is developed. (2) The report of environmental measure at model power plant (Orhaneli) is developed. (3) The rehabilitation plan at model power plant (Orhaneli) is developed. (4) The rehabilitation specification at model power plant (Orhaneli) is developed. (5) The manual for rehabilitation plan and design is developed. (6) The manual for fire optimization in boiler is developed. (7) The O & M manual for generator excitation system is developed. (8) The training enhancement plan for energy efficiency improvement is formulated.	(1) The report of equipment diagnosis at model power plant (Orhaneli) (2) The report of environmental measure at model power plant (Orhaneli) (3) The rehabilitation plan at model power plant (Orhaneli) (4) The rehabilitation specification at model power plant (Orhaneli) (5) The manual for rehabilitation plan and design (6) The manual for fire optimization of boiler (7) The O & M manual for generator excitation system (8) The training enhancement plan for energy efficiency improvement	The organization of model power plant (Orhaneli) for the project doesn't change.
(Activity) (1) Transferring the skills for equipment diagnosis at model power plant (Orhaneli) by OJT and developing report of equipment diagnosis. (2) Transferring the skills for environmental measure at model power plant (Orhaneli) by OJT and developing report of environmental measure. (3) Transferring the skills for rehabilitation plan and design at model power plant (Orhaneli) by OJT and developing rehabilitation plan, specification and manual. (4) Studying of the problems regarding maintenance system at each power plant in Turkey and examination of countermeasure. (5) Transferring the skills for fire optimization in boiler by OJT and developing manual for fire optimization in boiler. (6) Transferring the skills for O & M of generator excitation system by OJT and developing O & M manual for generator excitation system. (7) Reviewing and planning of the training enhancement plan for energy efficiency improvement.	**Input** **Japan side** **(1)Dispatching of Experts** The area of expertise is as follows. - Boiler design and planning - Control system design and planning - Electrical system design and planning - Environmental equipment and planning - Training plan formulation **(2)Provision of Equipment** Equipments for training will be provided. **(3)Training in Japan** Three (3) or four (4) members of the C/Ps will join the training.	**Turkey side** **(1)Assignment of C/Ps** - Project Director - Project Coordinators - Technical Counterparts - Administrative Assistance - Technical Supporting Staff - Other Supporting Staff necessary for the implementation of the project **(2)Equipment and facility** - Model power plant (Orhaneli) for training - Adequate office space and supplies for Japanese experts - The workshop facility and accommodations for participants - Other equipment agreed by both side **(3)The local cost** - Expenses for collection of data - Expenses for business trip of the C/Ps - Expenses for workshops and seminars - Expenses for consumable, electricity and etc - Expenses for maintenance of the equipments	**Prior condition** C/Ps at model power plant (Orhaneli) are prepared by EUAS.

ANNEX 2

Organizational Chart for the Project implementation



THE PROJECT FOR ENERGY EFFICIENCY IMPROVEMENT OF POWER PLANT
PLAN OF OPERATION (TENTATIVE)

Japanese Fiscal Year	2006					2007												2008												2009			A person in charge	Inputs	
Calendar Year	2006					2007												2008												2009				Japanese side	Turkish side
Calendar Month	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	1	2	3					
Duration of Project																																		
I Work in Japan																																		
1. Collection of Necessary Data/Information and Review																															LE	Ex	
2. Preparation and Discussion on Detailed Work Plan																															LE	Ex	
II Work in Turkey																																		
1 Capacity Development on Rehabilitation at Orhaneli Power Plant																																		
1.1 Improvement of Skills on Equipment Diagnosis																																		
(1) Guidance on Theory and Practice of Rehabilitation																															PC/LE	Ex	C/P
(2) Monitoring and Assessment of Actual Plant Operation Data																															PC/LE	Ex	C/P
(3) Preparing of Equipment Diagnosis Report																															PC/LE	Ex	C/P
1.2 Improvement of Skills on Environmental Measure																																		
(1) Monitoring and Assessment of Environmental facility																															PC/LE	Ex	C/P
(2) Preparing of Environmental Measure Report																															PC/LE	Ex	C/P
1.3 Improvement of Skills on Rehabilitation Planning and Design																																		
(1) Comparison of Options for Repair, Replacement, and Upgrade																															PC/LE	Ex	C/P
(2) Preparing of Rehabilitation Report																															PC/LE	Ex	C/P
(3) Preparing of Rehabilitation Specification																															PC/LE	Ex	C/P
1.4 Homework Study of Rehabilitation Plan and Design by C/P																															PC		C/P
1.5 Seminar for C/Ps from Other Power Plants																															PC/LE	Ex	C/P
2 Capacity Development on O&M of Power Plant																																		
2.1 Improvement of Skills on Maintenance of Power Plant																																		
(1) Review and Assessment of Current Maintenance System																															PC/LE	Ex	C/P
(2) Guidance on Theory and Practice of Maintenance System																															PC/LE	Ex	C/P
2.2 Improvement of Skills on Fire Optimization in Boiler																																		
(1) Review and Assessment of Current Combustion Control and Fuel Management																															PC/LE	Ex	C/P
(2) Guidance on Theory and Practice of Combustion Control, Fuel Management and Inspection on Firing System																															PC/LE	Ex	C/P
(3) Preparing of Fire Optimization Manual																															PC/LE	Ex	C/P
2.3 Improvement of Skills on Generator Excitation System																																		
(1) Review and Assessment of Current O & M system of Generator Excitation System																															PC/LE	Ex	C/P
(2) Guidance on Theory and Practice of O & M system of Generator Excitation System																															PC/LE	Ex	C/P
(2) Preparing of O & M manual for Generator Excitation System																															PC/LE	Ex	C/P
2.4 Homework Study for O& M of Power Plant by C/P																															PC		C/P
2,5 Seminar for C/Ps from Other Power Plants																															PC/LE	Ex	C/P
3 Enhancement of training system for energy efficiency improvement																																		
(1) Review and Assessment of Current training system of EUAS																															PC/LE	Ex	C/P
(2) Study and Preparing of Training enhancement Plan for Energy Efficiency Improvement																															PC/LE	Ex	C/P
4 Training in Japan																															PC/LE	Ex	C/P
5 Japanese Experts in Turkey																															LE	Ex	

Formation of Project Counterparts
(1) Counterpart Team at Orhaneli Power Plant
- Total seven Engineers from Orhaneli Power Plant
- Three Engineers from Headquarters, Training Department
- One Engineers from Headquarters, Thermal Power Plant & Mining Areas
- One Environmental Specialist from Headquarters, Department of Environment-new and renewable energy resources
- Administrative Assistants

(2) Counterpart from Other Power Plants
- One or Two Engineers from each power plant
(Participates in seminar which will be held at the end of each training at Orhaneli Power Plant)

Turkish side : PC: Project Coordinators, C/P: Technical Counterparts
Japanese side : LE: Lead Expert, Ex:: Experts

···· (Dotted line): Homework study for Engineers

ANNEX 4

List of Main Attendance

(1) Turkey side

Name	Organization	Position and Department
Mr. Sefer Butun	EUAS H.Q	Chairman of the Board
Mr. Muzaffer Basaran	EUAS H.Q	Deputy Director General
Mr. Muzaffer Tani	EUAS H.Q	Director, Presidency for Training and Data Processing Department
Mr. Ertugrul Alper	EUAS H.Q	Director, Presidency for Thermal Power plants and Mining Areas Department

(2) Japan side

Name	Organization	Position and Department
Mr. Mitsuo Nakamura	JICA Turkey Office	Resident Representative
Mr. Satoshi Umenaga	JICA Turkey Office	Deputy Resident Representative
Mr. Ali Bekin	JICA Turkey Office	Program Officer

RECORD OF DISCUSSIONS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE REPUBLIC OF TURKEY
ON JAPANESE TECHNICAL COOPERATION FOR
THE PROJECT FOR ENERGY EFFICIENCY IMPROVEMENT OF POWER PLANT

Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions with the Electricity Generation Company (Elektrik Uretim A.S., hereinafter referred to as "EUAS") with respect to measures to be taken by JICA and Turkish side for the implementation of the above-mentioned Project.

As a result of the discussions, JICA and EUAS agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Ankara, October 10, 2006

Mr. Mitsuo Nakamura
Resident Representative, Turkey Office
Japan International Cooperation Agency
(JICA)

Mr. Sefer Butun
Chairman of the Board
Electricity Generation Company
(EUAS)

Mr. Muzaffer Basaran
Deputy Director General
Electricity Generation Company
(EUAS)

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN JICA AND THE TURKISH SIDE

1. The Turkish side will implement the Project for Energy Efficiency Improvement of Power Plant (hereinafter referred to as "the Project") in cooperation with JICA.

2. The Project will be implemented in accordance with the Master Plan which is given in APPENDIX I.

II. MEASURES TO BE TAKEN BY JICA

In accordance with the laws and regulations in force in Japan, JICA will take, at its own expense, the following measures according to the normal procedures under the Technical Cooperation Scheme of Japan.

1. DISPATCH OF JICA EXPERTS
   JICA will provide the services of the JICA Experts as listed in APPENDIX II.

2. PROVISION OF EQUIPMENT
   JICA will provide such equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in APPENDIX III. The Equipment will become the property of the Turkish side upon being delivered C.I.F. (cost, insurance and freight) to the Turkish authorities concerned at the ports and/or airports of disembarkation.

3. TRAINING OF TURKISH PERSONNEL IN JAPAN
   JICA will receive the Turkish personnel connected with the Project for technical training in Japan.

III. MEASURES TO BE TAKEN BY THE TURKISH SIDE

1. The Turkish side will take necessary measures to ensure that the self-reliant operation of the Project will be sustained during and after the period of Japanese technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.

2. The Turkish side will ensure that the technologies and knowledge acquired by the Turkish nationals as a result of Japanese technical cooperation will contribute to the economic and social development of the Turkish side.

3. The Turkish side bears all the taxes and duties related to the assignment and service of the Japanese Experts in the Republic of Turkey as listed in APPENDIX IV.

4. The Turkish side will ensure that the Equipment referred to in II-2 above will be utilized effectively for the implementation of the Project in consultation with the Japanese Experts referred to in APPENDIX II.

5. The Turkish side will take necessary measures to ensure that the knowledge and experience acquired by the Turkish personnel from technical training in Japan will be utilized effectively in the implementation of the Project.

6. In accordance with the laws and regulations in force in the republic of Turkey, the Turkish side will take necessary measures to provide at its own expenses:

   (1) Services of the Turkish counterpart personnel and administrative personnel as listed in APPENDIX V;

   (2) Buildings and facilities as listed in APPENDIX VI;

   (3) Supply or replacement of machinery, equipment, instruments, vehicles, tools,

spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided by JICA under II-2 above ; and

(4) Means of transport for the JICA experts in the project site.

7. In accordance with the laws and regulations in force in the Republic of Turkey, the Turkish side will take necessary measures to meet:

(1) Expenses necessary for transportation within the republic of Turkey of the Equipment referred to in II-2 above as well as for the installation, operation and maintenance thereof;

(2) Customs duties, internal taxes and any other charges, imposed in the republic of Turkey on the Equipment referred to in II-2 above ; and

(3) Running expenses necessary for the implementation of the Project.

IV. ADMINISTRATION OF THE PROJECT

1. For the effective and successful implementation of technical cooperation for the Project, Joint Coordination Committee (hereinafter referred to as "JCC") will be established whose functions and composition are described in APPENDIX VII.

2. Deputy Director General of EUAS, as the Project Director, will bear overall responsibility for the administration and management of the Project.

3. Director of Presidency for Thermal Power Plants and Mining Areas Department of EUAS, Director of Presidency for Training and Data Processing Department of EUAS, Manager of Orhaneli Power Plant of EUAS, as the Project Coordinators, will be responsible for the implementation and technical matters of the project.

4. JICA representatives will provide necessary recommendations and advice to the JCC on any matters pertaining to the implementation of the Project.

5. The JICA experts will give necessary technical guidance and advice to the Turkish counterpart personnel on technical matters pertaining to the implementation of the Project.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by JICA and the Turkish authorities concerned, during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JICA EXPERTS

The Turkish side undertakes to bear claims, if any arises, against the JICA Experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the republic of Turkey except for those arising from the willful misconduct or gross negligence of the JICA Experts.

VII. MUTUAL CONSULTATION

There will be mutual consultation between JICA and Turkish side on any major issues arising from, or in connection with this Attached Document.

VIII. MESURES TO PROMOTE UNDERSTANDING OF AND SUPPORT FOR THE PROJECT

For the purpose of promoting support for the Project among the people of the Republic of Turkey, the Turkish side will take appropriate measures to make the Project widely known to the people of the Republic of Turkey.

IX. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be 24 months from December, 2006.

APPENDIX I	MASTER PLAN
APPENDIX II	LIST OF JICA EXPERTS
APPENDIX III	LIST OF EQUIPMENT
APPEDDIX IV	TAXES, DUTIES AND OTHER CHARGES FOR JAPANESE EXPERTS IN THE REPUBLIC OF TURKEY
APPENDIX V	LIST OF TURKISH COUNTERPART AND ADMINISTRATIVE PERSONNEL
APPENDIX VI	LIST OF BUILDINGS AND FACILITIES
APPENDIX VII	JOINT COORDINATION COMMITTEE

APPENDIX I

MASTER PLAN

1. Overall Goal

The energy efficiency of model power plant (Orhaneli) is improved.

2. Project Purpose

The capacity for energy efficiency improvement at model power plant of EUAS (Orhaneli) is developed.

3. Outputs

(1)The skills of C/Ps for equipment diagnosis are improved

(2)The skills of C/Ps for environmental measure are improved

(3)The skills of C/Ps for planning of rehabilitation are improved

(4)The skills of C/Ps for designing of rehabilitation are improved

(5)The skills of C/Ps for operation and maintenance of power facility are improved

(6)The training system of EUAS for energy efficiency improvement is enhanced.

4. Activities

Necessary activities to achieve the above-mentioned outputs will be conducted.

APPENDIX II

LIST OF JICA EXPERTS

1. Boiler design and planning
2. Control system design and planning
3. Electrical system design and planning
4. Environmental equipment and planning
5. Training plan formulation

APPENDIX III

LIST OF EQUIPMENT

1. Equipment necessary for the implementation of the Project.
2. Other equipment and materials regarded as necessary for the effective and smooth implementation of the Project by both sides.

Note: The content, specifications and quality of equipment and materials will be decided through mutual consultation within allocated budget of the Japanese fiscal year.

APPENDIX IV

TAXES, DUTIES AND OTHER CHARGES FOR JAPANESE EXPERTS IN THE REPUBLIC OF TURKEY

1. The Turkish side will bear income tax and other charge of any kind imposed on or in connection with allowances remitted from abroad.
2. The Turkish side will bear customs duties with respect to importation of personal effects by the Japanese expert and their families, as well as importation of machinery and equipment for their activities.

APPENDIX V

LIST OF TURKISH COUNTERPART AND ADMINISTRATIVE PERSONNEL

1. Counterpart Personnel

(1) Project Director

(2) Project Coordinators

(3) Technical Counterparts

2. Administrative Personnel

(1) Administrative Assistance

(2) Technical Supporting Staff

(3) Other Supporting Staff necessary for the implementation of the Project

APPENDIX VI

LIST OF BUILDINGS AND FACILITIES

The following will be prepared by the Turkish side for the implementation of the Project.

1. Model Power Plant (Orhaneli) for Training
2. Office space for the Japanese Experts and Turkish counterpart personnel
3. Workshop facilities and Accommodations for participants
4. Other facilities necessary for the implementation of the project

APPENDIX VII

JOINT COORDINATION COMMITTEE

1. Functions

The Joint Coordinating Committee meeting will be held at least once a year and whenever necessity arises in order to fulfill the following functions:

(1) To discuss and determine the Plan of Operation (PO) and Annual Plan of Operation (APO) of the Project within the framework of the Record of Discussions,
(2) To coordinate necessary actions to be taken by both sides,
(3) To review the overall progress and achievement of the PO and APO, and
(4) To exchange opinions on Major issues that arise during the implementation of the project.

2. Composition

(1) Chairperson

Project Director

(2) Members

(Turkish Side)

1) Project Coordinators
2) Other personnel concerned with the Project designated by the Turkish side, if necessary.

(Japanese Side)

1) JICA representatives
2) JICA experts
3) Other personnel concerned with the Project designated by the JICA, if necessary.

Note. Official(s) of General Directorate of Electrical Power Resources Survey and Development Administration will attend the Committee as observer(s).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