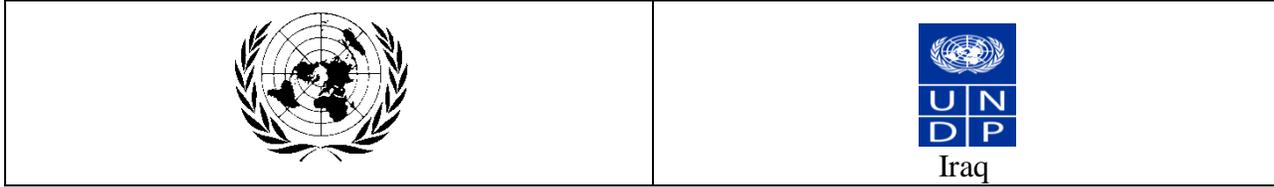


## End of Project Report



[Iraqi Trust Fund]

### END OF PROJECT NARRATIVE PROGRESS REPORT

**REPORTING PERIOD: END OF PROJECT REPORT MAY 2004- 31 DECEMBER 2009**

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<p><b>Programme No:</b> E4-02 <b>ATLAS Award No:</b> 54979 <b>MDTF Office Atlas No:</b> UNDG 66979 <b>Programme Title:</b> Rehabilitation of the National Dispatch Centre in Baghdad Stage 2</p>	<p><b>Participating Organization(s):</b> UNDP</p>
<p><b>Implementing Partners:</b></p> <ul style="list-style-type: none"><li>• UNDP</li><li>• Ministry of Electricity</li></ul>	<p><b>Programme Budget (from the Fund):</b> <i>For Joint Programme provide breakdown by UN Organization</i></p> <p>UN Org A: UNDP, USD 11,947,978</p>

<sup>1</sup> E.g. Priority Area for the Peacebuilding Fund; Thematic Window for the Millennium Development Goals Fund (MDG-F); etc.

***Programme Duration (in months): 67***

Start date<sup>2</sup>: May 2004

End date:

- *Original end date:* July 2006
- *Revised end date,* 30 December 2009
- *Operational Closure Date Initiated*  
30 December 2009

Budget Revisions/Extensions:

First Extension: from 10 January 2007 to 31 December 2008.

Second extension until 31 July 2009,  
approval date 8 January 2009.

Third extension until 31 December 2009,  
approval date 2 September 2009.

OPERATIONALLY CLOSED  
END OF PROJECT REPORT

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<sup>2</sup> The start date is the date of the first transfer of funds from the MDTF Office as Administrative Agent.

## I. Purpose

- Main outputs and outcomes/objectives of the programme.

<b>Development Goal and Immediate Objectives</b>	
1. Enhanced adaptability to monitor and remotely control major power generation plants and 400 kV substations as well as 132kV tie-line substations, enabling their efficient and effective interaction with the National Dispatch Centre for reliable system control and management of the national electricity grid.	

<b>Outputs, Key activities and Procurement</b>	
<b>Outputs</b>	1.1. Installed state-of-the-art RTUs with associated peripherals at 19 major power plants, all existing 400 kV and 132kV tie-line substations.
<b>Activities</b>	1.1.1 Finalize the technical specifications of the RTUs and associated sub-systems to be included and integrated in the SCADA/EMS bid document. 1.1.2 Manage the implementation contract and supervise the installation and commissioning of the SCADA/EMS system in relation to scope identified in November 2006.

- The Programme in relation to the Strategic (UN) Planning Framework guiding the operations of the Fund.

### **UN Assistance Strategy for Iraq**

#### UN Cluster 4 Infrastructure and Results Matrix Housing

Within the UN Assistance Strategy it is clearly articulated the desire for efficient operation, management and maintenance of an electric network, with increased availability of electricity to the population through rehabilitation of the grid and overall electric generation capacity. This sector further elaborates that the Ministry of Electricity has the capacity built to control and monitor the flow of power.

The Assistance Strategy further describes the need to rehabilitate the National Dispatch Centre and develop SCADA and RTUs. This project has completed the construction and capacity built for operation with RTUs connected.

### **UN Millennium Development Goals (MDG):**

MDG 7 Target 4 states significant improvement in the lives of at least 100 million slum dwellers. This project addresses the coordination of all electricity generation through the national grid, including the control, monitoring and flow of reliable power to consumers.

### **Iraq National Development Strategy**

The NDC is based on Pillar 2 10 that prioritizes increasing electricity generation and distribution to meet current and projected needs. Within the document it is acknowledged that there is a shortage caused by numerous problems such as sabotage, looting, lack of security for workers, lack of training and obsolete technologies. It is also acknowledged that Baghdad accounts for over 40% of the Iraqi power load. One of the planned goals on

page 38 refers to two actions specific to this project, which are: 1) Reconstruct power network, increase power generation and guarantee a continuous supply, and 2) Update power distribution.

### **The International Compact with Iraq (ICI):**

The rehabilitation of the National Dispatch Centre (NDC) is to manage the electricity grid in Iraq. The NDC links into several components of the ICI. Section 4 Realising the Vision: the Socio-Economic Context in point 2; Revitalize the Private Sector particularly through the creation of an enabling environment; and point 3; Improve the “Quality of Life” starting with the provision of basic services. This is further elaborated in the section 4.5 Energy (Oil, Gas and Electricity).

The 4.5 Energy Goal is: “The Government will develop an energy sector that meets Iraq’s needs and maximizes the benefits of hydrocarbons for all Iraqis and reinforces national unity and institutions.” The goal further elaborates that the Government of Iraq will develop an Energy Master Plan on the basis of an Energy Balance for the electricity sector, the Government will formulate a plan for least cost development of the power system. The National Dispatch Centre links directly into these actions, which are activities within the larger UNDP infrastructure projects that are now transitioning to completion.

### **The Draft National Development Plan**

The draft National Development Plan is the Government of Iraq’s priorities for 2010-2014. At present this project is aligned.

### **The Draft UNDAF**

The draft UNDAF is for 2011-2014 therefore this does not affect this project, but this project is aligned and has served as a foundation for UNDAF.

### **The Draft UNDP Country Programme Document**

UNDP has submitted a draft Country Programme Document for 2011-2014 to the UNDP Board Secretariat and this project serves to support the development of outcome 5.

## **II. Resources**

### *Financial Resources:*

Funding allocated to this project:

- UNDG ITF donation of US\$ 11,947,978

### *Human Resources:*

- National Staff & Consultants:

One National Project Engineer and  
One National Database Specialist  
Support functions in procurement and operations co-shared on pro-rated basis.

- International Staff:  
One International Technical Advisor and pro-rated share for Head of the Unit  
Temporary contracting utilized to access specialist technical expertise

### **III. Implementation and Monitoring Arrangements**

- Implementation mechanisms utilized to achieve maximum impact.

Both Phase One and Two to rehabilitate the National Dispatch Centre have been completed. The NDC is located in greater Baghdad and has unique security conditions. The National Dispatch Centre monitors the national electric grid with customised computer programmes. International capacity building has involved six (6) Ministry of Electricity engineers trained on basic Remote Terminal Units (RTU) maintenance in Germany and six (6) Ministry of Electricity engineers trained on advanced RTU maintenance in Germany and Sweden. Additionally, (2) engineers have been trained on SCADA hardware and software in USA, as capacity to develop and maintain the software is core to the success of the project.

During 2009 there were five training in highly specific areas, which involved:

- Six MoE engineers on Network Manager System Administration Workshop
- Five MoE engineers on the SCADA System Maintenance Workshop
- Three MoE technicians and one engineer on the Dispatcher Workshop
- Six MoE engineers at a Specialist Dispatcher Workshop
- Five MoE engineers on Hardware Maintenance

The Ministry of Electricity has throughout both Phase I and Phase II had ownership of the NDC and been actively involved in the processes.

- Procurement procedures utilized and variances in standard procedures;

All procurement activities included in this project were implemented according to UNDP procurement rules and regulations;

A pre-qualification notice was advertised;

Companies requested documents before deadline for submission of PQ documents;

Companies who expressed their intention complied with the pre-qualification requirements;

During the bidding process, one bidder out of the three withdrew due to a worsening security situation in Iraq, leaving only two;

Therefore, prequalification notice had to be re-started to attract a minimum UNDP requirement of three competitive bidders;  
The process was completed according to UNDP rules and regulations.

- Monitoring system(s) used and lessons learned into the ongoing project.

The core components of the National Dispatch Centre Stage II have been completed which are; the development, installation and commissioning of the SCADA/EMS system of the software, building capacity and setting up the Remote Units for monitoring the national grid.

During 2009 three actions to monitor were orchestrated. This involved: 1) The building of capacity to monitor this system within the Ministry of Electricity. This was completed through the replication of the system at a training site with five different specific training of staff members of the Ministry of Electricity on practical aspects of management, monitoring and problem solving to keep the grid functioning at maximum level and other aspects of the Energy Management System and SCADA. 2) The computer software was upgraded and expanded during 2009. This software is specific to Iraq and manages the electricity generation from power plants throughout the country and the energy being purchased from other neighboring countries. Both the software and training of staff are essential for maximum use of electricity generation. 3) This monitoring of electricity generation was not possible without the installation of the Remote Terminal Units. At the end of 2009 thirty nine (39) Remote Terminal Units had been connected, monitored and tested. These actions resulted in the completion of the project, thus, operational closure was initiated.

The implementation works have been monitored regularly. This ensures that the sub-contractors for various technical works comply with the Bill of Quantities and contracted scope of the projects. In addition, UNDP's technical team was fully engaged in advising and guiding contractors throughout the implementation phase. The implementing agents were paid by UNDP in arrears based on predetermined milestones, which are independently verified by UNDP's Consultant upon receipt of payment request invoices from the Contractor.

Monitoring has also been conducted through frequent telephone conversations, e-mail and meetings in Amman.

Payments are subject to the progress of works and the submission of all supporting documentation by the contractor, including monthly progress reports, quarterly reports, before, during and after photographs of the works, and the ability to view the grid through the replication system.

Some lessons learned.

This project is nationwide with highly complicated logistics and security of significant concern. For this project to move ahead has required active involvement within the

Ministry especially for the development of the software and prioritization of the rural areas for the national grid. Therefore, it has been essential to keep multiple areas going simultaneously and ensure that there was comprehensive understanding of the tasks required for completion of the project.

Projects should attempt to be self contained and independent of other projects as far as possible in a post-conflict situation: This lesson is because this project had to pick up multiple additional mandates not realized by other international companies/agencies. The lack of completion or departure from Iraq by other agencies created delays and massive gaps within the project that had to be filled for the project to complete.

A brain drain resulted as staff within the Ministry of Electricity gained expertise and technical skills. Therefore, within this project as some engineers are highly trained to manage this sophisticated system there have been discussions on how to retain this staff.

- Assessments, evaluations or studies undertaken.

*An Outcome Evaluation of UNDP Governance, Crisis Prevention and Recovery and Poverty Reduction Initiatives in Iraq* in June 2009 was conducted. One of the outcomes addressed was electricity. Within Recovery and Crisis Prevention twenty-seven projects were assessed, with thirteen of the projects within the electricity sector. It was noted that an output regarding the severity of infrastructure damage in 2003 was that the power plants could generate only a fraction of the power supplied previous to this time. It was noted that electricity production was higher in the second half of 2008 than two years earlier, but the gap between demand and production may have significantly increased. The Evaluation stated that “it appears there may have been some habituation...it would appear that availability of service increased, particularly in Baghdad”. Building capacity and national ownership was an area elaborated in the Evaluation, noting that in the ministries when training of technical skills and capacity was developed that persons departed the position going to other international agencies or shifted to other positions. This fluidity of brain drain impacted several of the RCP projects but most notably the electricity projects.

#### **IV. Results**

- Summary of programme progress in relation to planned outcomes and outputs; variance and planned outputs.

The objective of this project was to rehabilitate the National Dispatch Center, which monitors and controls the national electricity grid in Iraq and to place Remote Terminal Units (RTUs) at field locations. Installation of hardware and software at NDC has been achieved as well as training of Ministry of Electricity staff and completion of project databases.

The core components of the National Dispatch Centre Stage 2 have been completed which are; the development, installation and commissioning of the SCADA/EMS system

of the software, building capacity and setting up the remote units for monitoring the national grid.

Main achievements summarized as end of the project include:

This project has had highly complicated logistics and to build expertise and a system to maximize the electricity power generation through the national electricity grid. Results have been:

- 86 MoE personnel trained in various fields of highly technical expertise.
  - 43 RTUs were delivered, with 39 positioned, erected connected, assessed and monitored throughout the grid areas.
  - More than 100 personnel gained experience with new supervisory control and data acquisition (SCADA) technology during field work.
  - Development of a software system to monitor electricity availability and maximize usage.
  - Completion of network modeling and database population.
- Key outputs achieved in the reporting period including percentage of completion.
    - Spare parts and equipment procured, 100% of planned;
    - Computing equipment procured, 100%;
    - Drawings, manuals and test certificates including functionality tests of SCADA system. 96%;
    - Training of Trainers including training on database population, 100%;
    - Handover of equipment including software final version, 95%;
    - Delivery of remote terminal units, 100%;
    - Erection and connection of RTUs ,97%;
    - Training for field support at terminal units, 100%;
    - Computer system SCADA software commissioned, 100%;
    - Application and running of computer system completed, 100%;
    - EMS running and capacity built, 100%.

The National Dispatch Centre controls the national electricity grid, which affects every person with electricity in Iraq. Therefore, this is considered a highly significant project in regards to difficulty and impact.

- Reasons for delays in programme implementation, the nature of the constraints, actions taken to mitigate delays and lessons learned in the process.

Overall: Significant delays, totaling 34 months, were experienced as the security situation hampered completion of work on Remote Terminal Units. The security situation restricted progress and slowed the rate. Poor security at the NDC location in Baghdad limited the contractor's ability to upgrade software.

**Issue causing delay:** Due to poor security and missing communication links, part of the field works, training and commissioning were removed from the scope late in 2006 as further progress was unable to be made at that juncture.

**Issue causing delay:** Institutional capacity of the counterpart has been weak, with high staff turnover, brain drain and management capacity issues, leading to slowdown within the MoE.

**Remedial actions:** A number of initiatives have been taken as measures of mitigation to expedite project implementation. Multiple actions have been taken to support capacity development at the ministerial level to resolve the causes of delays. This included additional workshops to cover capacity gaps to develop required expertise. Activities to develop the software required included database population and network modeling. During November 2007, a project conference was held to discuss issues on communications links, training needs and supporting infrastructure, including the establishment of Regional Control Centres (by other projects that are not within the UN mandate), as well as to identify bottlenecks in completing the National Dispatch Centre Project.

**Issue causing delay:** This project is nationwide with highly complicated logistics and security of significant concern. This complexity required full participation at multiple levels within the Ministry of Electricity/NDC, which was not always possible especially with the occurrence of brain drain. Keeping this complex project prioritized at times proved challenging. The availability of trained Ministry staff within the project and other key Ministry staff, was key to meet implementation timelines.

**Issue causing delay:** The Ministry needed to ensure that trained staffs were available for the life of the project.

**Delay:** Essential communications links from a United States of America (USA) funded project failed to materialize, thus impeding the implementation.

On 26 November, 2009, a final major ceremony event took place, finalizing the capacity development activities. Both Asea Brown Boveri and the United Nations Development Programme awarded certificates to NDC/MoE trainees, with attendance by the Embassy of Japan, the Advisor of the Ministry of Electricity and senior UNDP staff.

Linked to this ceremony was a demonstration of the system that controls the national electricity grid. This demonstration and following question and answer session were completely facilitated by those who will be responsible for the system in Iraq.

- Lessons learned: Projects should be able to be managed efficiently by a delegated project team independent of other projects as far as possible; as this project has had to pick up additional mandates not realized by other agency partners.

- Lessons learned: To advance the project it has been essential to have active participation at multiple levels within the Ministry, especially in the development of the database and in prioritizing works in the rural areas, when Ministries are under pressure from multiple other international partners and within the GoI.
- Key partnerships and collaborations, and impact on the achievement of results.

The Ministry of Electricity has been the primary partner and will continue to provide the service delivery in the future.

The trained staff at the Ministry of Electricity and the National Dispatch Centre will be held accountable for the continuation of the project, future maintenance and data population for long-term impact on NDC operability and maximum use of electricity to the people of Iraq.

- Other highlights and cross-cutting issues pertinent to the results being reported on.

Electricity is part of MDG 7 for improvements of people living in slums who are not or partially connected to services such as water, sanitation and electricity.

Electricity and the management of the national grid is a critical development issue that affects gender, security and the economy. Electricity affects quality of life and assists in improving the safety of women and assists women with work and safety from accidents within the household. Electricity is critical for pumping water, health interventions and communications. Security, including lighting and tools such as alarms, requires reliable electricity supply. The availability of reliable electricity is a pre-requisite to private sector investment, development and job creation. Jobs were created for Iraqi engineers and technicians through sub-contractors.

Additionally, the National Dispatch Centre is in itself a monitoring tool, which cross-cuts into all parts of the country on the national grid and the results affect multiple other ministries. Therefore, this is the apex action within the UNDP and Ministry of Electricity to date, as it orchestrates who gets electricity and for how long. Due to the magnitude of this responsibility actions have been taken to build technical skills and capacity to meet the demand of these cross-cuts.

## **V. Future Work Plan (Not applicable as it is the “End of Project” Report)**

The project was operationally closed in December 2009.

This is the “End of Project” Report.

- Indicate any major adjustments in strategies, targets or key outcomes and outputs planned.

The Ministry of Electricity has taken the necessary steps to construct their own microwave communications links to replace those not delivered under the USA contracts. Progress has been slow with the links to the South Regional Control Center still pending. The functionality of NDC II is affected by this MoE responsibility which has the capacity developed to realize this communications system connection.

## VI. Performance Indicators<sup>3</sup>

- Fill the table in this section to report on the indicators set at the output level as per the approved results framework in the programme document.

### Performance Indicators Assessment

	<b>Performance Indicators</b>	<b>Indicator Baselines</b>	<b>Planned Indicator Targets</b>	<b>Achieved Indicator Targets</b>	<b>Means of Verification</b>	<b>Comments (if any)</b>
1. IP Outcome: Enhanced adaptability to remote control and monitoring of major power generation plants and 400 kV substations, as well as 132kV tie-line substations, enabling their efficient and effective interaction with the National Dispatch Centre for reliable power management over the national electricity grid.						
IP Output 1.1 Installed state-of-the-art RTU's with associated peripherals at 19 major power plants, all existing 400 kV and 132kV tie-line substations	Indicator 1.1.1	Finalized the technical specifications of the RTUs and associated sub-systems to be included and integrated in the SCADA/EMS bid document	RTUs originally installed in 1980 are obsolete and ineffective  Spare parts no longer available	Installation completed of 39 new RTUs  Monitor the power network	43 RTUs delivered  39 installed  Six (6) MoE Engineers trained on RTU maintenance in Germany Six (6) MoE Engineers trained on advanced RTU maintenance in Germany and Sweden	
	Indicator 1.1.2	Manage the implementation contract and supervise the installation and commissioning of the SCADA/EMS system in relation to scope	Power supply not balanced  System not in place	Built capacity enabling the monitoring of the power network through	Two (2) MoE Engineers trained on SCADA hardware and software in USA Five (5) MoE personnel trained on database population and database	Number of training  Monitoring tasks at NDC

<sup>3</sup> E.g. for the UNDG Iraq Trust Fund and the MDG-F.

		identified in November 2006		monitoring reports	<p>maintenance in USA</p> <p>Three (3) MoE Engineers trained on system hardware and software maintenance, as well as main SCADA functionalities</p> <p>NDC software development system replica (PDS) was installed and commissioned to enable training of MoE personnel</p> <p>PDS replica system used for preparation of databases for SCADA and EMS.</p> <p>Main database completed 1<sup>st</sup> Q 2008</p> <p>Reference look-up tables for links to Regional Control Centers were completed 2<sup>nd</sup> Q 2008</p> <p>Dispatcher training held in 2<sup>nd</sup> Q2008</p> <p>First running of software application in 3<sup>rd</sup> Q 2008.</p> <p>EMS Application training held 3<sup>rd</sup> Q 2008</p> <p>Network Manager System Administration Workshop Training held 4<sup>th</sup> Q 2009 with six MoE engineers</p> <p>SCADA System Maintenance Workshop training held 4<sup>th</sup> Q 2009</p>	
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					with five MoE engineers Dispatcher Training held 4 <sup>th</sup> Q 2009 with one engineer and three technicians from MoE Specialist Dispatcher Training held 4 <sup>th</sup> Q 2009 with six MoE engineers Hardware Maintenance Training held 4 <sup>th</sup> Q for five MoE engineers	
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## VII. Abbreviations and Acronyms

- List the main abbreviations and acronyms that are used in the report.

EMS: Energy Management System  
ICI: International Compact for Iraq  
ITF: Iraqi Trust Fund  
kV: Kilo Volt  
MDG: UN Millennium Development Goal  
MoE: Iraqi Ministry of Electricity  
NDC: National Dispatch Center  
NDS: Iraqi National Development Strategy  
NGO: Non-Governmental Organization  
RTU: Remote Terminal Unit  
SCADA: Supervisory Control and Data Acquisition  
UNDG: United Nations Development Group  
UNDP: United Nations Development Programme