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URBAN ENERGY SERVICES PROGRAM SUSTAINABLE MUNICIPAL ENERGY SERVICES

Technical Assistance Needs for the Energy Efficiency Incentive Mechanism for Jordan

August 2010
This publication was produced for review by the United States Agency for International Development.
It was prepared by Nexant, Inc. under Contract EIPP-I-02-03-00007-00

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1. OVERVIEW AND OBJECTIVES

This needs assessment report was developed as a continuation of the analytical work that was conducted by Nexant in 2009-2010 under contract with the United States Agency for International Development (USAID) in Jordan. The contract comprised two phases: Phase I was to evaluate the economic and institutional viability of developing an energy efficiency regulatory incentive mechanism to encourage the transmission and distribution companies in Jordan to increase demand-side efficiency, while Phase II was to assess the technical assistance needs for the key stakeholders in the electricity sector if they are to adopt such an incentive mechanism.

Phase I, which began in August 2009 included elaborate investigation efforts and discussions with all stakeholders including the Electricity Regulatory Commission (ERC), the National Electric Power Company (NEPCO), the three private distribution companies (JEPCO, EDCO and IDECO), the Ministry of Energy and Mineral Resources (MEMR) and USAID. As a result, Nexant completed an evaluation of the economic and institutional viability of a regulatory incentive mechanism customized to the Jordanian context. A "Discussion Paper on the Economic Viability of Energy Efficiency Regulatory Incentives" was distributed to all stakeholders, and was presented and discussed with all at an ERC-hosted workshop in late April 2010.

The key results of the workshop was reaching consensus on the concept of adopting a regulated shareholder incentives to the transmission and distribution companies provided that some key implementation issues and questions be resolved prior to the development of the program. A request was made to include some examples in other parts of the world where such a mechanism has been implemented.

In August 2010, Nexant finalized the above mentioned paper into a report titled "Energy Efficiency Regulatory Incentive Mechanism for Jordan" and added a section about international experiences with shareholders' incentive mechanisms.

This Phase 2 report provides an assessment of the type of assistance and support that is required in order to raise the ability of the relevant stakeholders to be part of the proposed rate incentive mechanism should it be considered for implementation in Jordan.

2. KEY REQUIREMENTS FOR ENERGY EFFICIENCY IMPLEMENTATION

In order for energy efficiency programs to be effectively implemented, a few key aspects have to be present. First, an adequate institutional framework has to be established to facilitate market development including policy development, goal setting, program design, implementation and evaluation. Second, economic and or other incentives have to be there for energy end-users to consider either replacement of existing energy systems or acquiring higher efficiency systems in new establishments. Third, it is critical to have the knowledge and expertise in the form of human resources be trained and ready for implementation of programs and other market activities.

A. Institutional Setting for Energy Efficiency

The current institutional setting of the Jordanian electricity sector in Jordan does not provide the necessary framework to meet the country's energy efficiency objectives mentioned in the 2007 update of Jordan's National Energy Strategy. A review of the energy sector and its institutional, policy and regulatory settings indicates that adopting an EE incentive mechanism such as the one proposed in Phase I is possible but will require strengthening the knowledge and skills of the existing institutions with clear definition of roles and responsibilities among the relevant stakeholders.

Electricity generation and distribution are almost fully operated and managed by private investors, and transmission is under NEPCO's jurisdiction. Both ERC and MEMR are entrusted with wider responsibilities for the entire electricity sector.

ERC is an independent entity responsible for setting electricity prices, subscription fees and costs of the necessary services, issuing licenses to the companies generating, transmitting and distributing electricity, monitoring their compliance with these licenses as well as provision of high quality safe services to end users. Their interest in increasing demand-side efficiency is fueled by the need to mitigate future rate increases as a result of demand increases.

MEMR is responsible for comprehensive policy planning for the sector with one of its most important responsibility is energy security. Therefore, it seeks to provide energy to all end-users in the most reliable, efficient and cost-effective approaches. MEMR also seeks to develop energy security policies including diversification of supply options such as increasing the contribution of

renewable energy sources to meet Jordan's energy demands. Energy efficiency activities are currently being coordinated by a relatively small size unit (Alternative Energy and Energy Efficiency unit) at MEMR.

B. Incentives to Encourage Demand-Side Efficiency

The lack of incentives for the electricity distribution companies to invest in demand-side efficiency and the disincentives that exist as a result of the current rate methodology are key barriers for the growth of the energy efficiency practice in Jordan. While the rate methodology decouples the distribution companies' profits from electricity sales, there is an implicit but obvious prevailing culture that encourages selling more energy.

Unless there are economic or other incentives to enhance profitability and or operational conditions, electricity distribution companies will find it difficult to justify investment in energy efficiency to their shareholders. Investors in electricity distribution were attracted to this line of business due to its low risk profile and relative protection against market volatility. Therefore, expecting them to take unnecessary risks may be unreasonable, and it would only be natural that they would be expecting a higher than usual reward to consider venturing into demand-side efficiency. In summary, the risk-averse culture of the electricity distribution sector poses some challenges for energy efficiency – a fact that should be kept in perspective when considering the adoption of an incentive mechanism.

C. Energy Efficiency Implementation Knowledge and Expertise

Currently, the knowledge base for developing, implementing and administering programmatic energy efficiency is not in abundance in Jordan. Most activities over the past decade were donor-funded programs that required only engineering expertise and administration of already developed programs. Most of the energy efficiency services have been provided to the market through the National Energy Research Center (NERC) or by a limited number of energy services companies (ESCOs). Currently, there are less than a half dozen ESCOs providing energy efficiency related services in Jordan. In fact, service side of energy efficiency showed that the existing service provider base is relatively small due to the current insignificant demand on efficiency.

Increasing demand on efficiency will certainly require not only an organized approach to expand the supply side of services, but more importantly building and growing the knowledge base within the institutional setting. It was therefore, important to assess this knowledge base of the key

stakeholders such as ERC, NEPCO and the three (3) distribution companies, JEPCO, EDCO and IDECO.

3. EVALUATING STAKEHOLDERS' CAPABILITIES

➢ Soliciting Feedback from Stakeholders

In order to properly assess the current and future readiness of the relevant stakeholders to adopt the proposed energy efficiency incentive mechanism, Nexant's lead consultant, Dr. Fawwaz El Karmi developed a questionnaire in Arabic and sent it to ERC, NEPCO, JEPCO, EDCO and IDECO. The questionnaire was intended to facilitate Given the novelty of the topic and the lack of experience with energy efficiency within some of these organizations, individual meetings were held with various staff and management members of these entities so that the outcome can be more meaningful and reflecting issues that could not be identified through filling up the questionnaire form.

The results of the survey along with the personal experience and knowledge of the Nexant with the energy sector helped in developing the final recommendations of this needs assessment.

The questionnaire was organized into the following five (5) groups of questions:

- The first group is focused on the level of importance of energy efficiency activities to the organization.
- The second group was related to the human resource availability for energy efficiency activities.
- The third group of questions is related to previous experiences with energy efficiency.
- The fourth set of questions focused on the availability of tools to help engage in implementing and monitoring energy efficiency programs.
- The fifth area was offered to assess availability of financial resources for energy efficiency activities.

➢ Stakeholders' Responses

A. National Electric Power Company (NEPCO)

This is the only entity in the electricity sector in Jordan that has a dedicated energy efficiency unit. This unit reports to Assistant General Manager for Planning and it includes in its activities load research and demand-side management. There are currently only two staff members of this unit but future plans are there to increase its staffing level. While currently there is no formal training provided to the staff, there is a plan to offer some in the future. The desired budget for this unit is

168,000 JD covering 62,000 JD for load resource studies, 21,000 JD for training, and 85,000 JD for expert consultation.

NEPCO has participated in various energy efficiency activities, including developing both load research and load management database. Their interest and knowledge levels were self-evaluated to be 'medium'. NEPCO believes that energy efficiency is feasible though barriers exist and to overcome those, the following activities are needed:

1) Training
2) Financial incentives and financing schemes
3) Establishing an independent EE unit at ERC and MEMR
4) Updated policy

Surprisingly, NEPCO characterized their interest on the questionnaire form as 'medium', whereas all other organizations indicated an interest level of 'high'. Energy efficiency was considered a top concern even over renewable energy, and a concern was raised about current economic conditions and how it would affect investment in efficiency.

B. Electricity Distribution Company (EDCO)

EDCO has been involved in water pumping peak demand reduction. The distribution company still rates itself as having a 'low' knowledge level of EE at present. In addition to the water pumping project, EDCO has developed a load research and load management database that would be helpful for energy efficiency. The interest in energy efficiency is considered to be 'high', because of the economic and financial return possibilities. They believe that one of the major market barriers is customer perception. They also believe that energy efficiency is feasible and the following is needed in order to overcome the existing market barriers:

1) Incentives
2) An independent EE unit at sector level
3) Staffing
4) Training
5) Technical
6) Financial (lost revenue and risks)

EDCO recognizes that higher efficiency is simply good, as there can be economic and operational benefits for them while reducing customers' bills. Their concern about adopting the proposed incentive mechanism is mainly on the risks borne by the utility due to the unknown implementation

problems that could lead to reduction in projected savings, and hence lower return on capital.

They recommended that the mechanism be introduced through a pilot project and to focus on capacity building and testing market potential.

C. Irbid Distribution Electricity Company (IDECO)

There is no current energy efficiency unit at IDECO although the interest in this field is generally high. The reason for this heightened interest is related to the potential financial return that can be made through the incentive mechanism. They believe that energy efficiency is feasible though incentives are needed. The two elements that were discussed in terms of needs assessment were: building the infrastructure within the company as well as at the national level. And have the proper training of staff. Additionally, two challenges they see as critical are customer support and funding. Overall, IDECO recognizes that EE is very important at the national level.

D. Jordan Electric Power Company (JEPCO)

While there was no response to the questionnaire, conversations with the managing director and his deputy revealed that management is rather cautious and would like to reduce any potential risk for failure. They also indicated that the current knowledge base of energy efficiency and its market implementation at their staff level is rather limited. This obviously means that the company would require full support in building an internal energy efficiency unit, staff training and help with program planning, design, implementation and evaluation.

E. Electricity Regulatory Commission (ERC)

Similar to most stakeholders, no energy efficiency unit or related expertise are present. They view energy efficiency as a priority given it's the lowest cost option to meet future demand which seems to be increasing on an aggressive pattern. They also recognize that barriers exist in the market to grown the energy efficiency practice. Their specific needs to adopt the incentive mechanism are basically focused on the following items:

1. Demand forecasting
2. Calculations of Long-Run Marginal Costs
3. Program design and the associated rate impacts
4. Relationship to tariff setting and revenue requirements
5. Program monitoring and evaluation

Some suggestions offered by ERC were to: a) review the distribution licensing procedures and tariff making, b) identify possible government financing, c) support the distribution companies, d) provide incentives and e) encourage technology transfer.

- **General Recommendations from Stakeholders**

The following issues have also been raised either from the questionnaire or through meetings:

- Low customer awareness can be an obstacle
- Fear that savings potential might not be sufficient
- Local economic conditions may be a problem
- A national energy efficiency unit should be created at the national level to provide guidance
- Energy efficiency should be placed at a higher priority than renewable energy
- Start with a pilot project
- Perform a market assessment to establish a realistic and achievable set of goals
- Establish regulatory procedures such as licensing and tariff making
- Utilize the experience of others through technology transfer

- **Conclusions**

Based on the results of the above mentioned questionnaire and the associated discussions with senior members of the stakeholder organizations, it was rather simple and straightforward to draw the conclusion that none of the stakeholders reviewed is capable of the role expected of them in the proposed energy efficiency incentive mechanism. While NEPCO currently has an energy efficiency unit, it is neither ready, nor properly staffed to implement a national program for the medium voltage level customers.

Due to never having to engage in energy efficiency activities in the past with the exception of limited donor-funded projects, none of the three (3) electricity distribution companies could effectively develop and deliver energy efficiency programs to the market under the propose incentive mechanism. They need to build the capacity within their organizations to be able to:

- assess the market potential for energy efficiency activities in their service territory
- design energy efficiency programs that respond to the assessed demand profile
- deliver and implement energy efficiency programs to end users
- evaluate the impacts of these programs

While the above areas of expertise are well understood by the management representatives of all three utilities and NEPCO, it is clear that the current knowledge base of the energy efficiency practice further down in the organization and specifically at the staff level is inadequate to assume the implementation role. Obviously, this will make it rather difficult for the management of these companies to consider investing in energy efficiency activities until this organizational capacity is acquired and tested.

There was consensus however among all stakeholders that a key driver to consider investing in demand-side efficiency is the possibility of increasing profitability through the proposed shareholder incentive mechanism. However, all agreed that some key implementation issues and questions need to be resolved prior to the development of the mechanism.

The current organizational structure of ERC needs to be amended to include an energy efficiency unit capable of addressing energy efficiency as a resource and to monitor the development of the energy efficiency activities and their impact on future investment in power generation.

4. PROPOSED TECHNICAL ASSISTANCE NEEDS

Based on the conclusions drawn from the assessment of the capabilities of NEPCO, JEPCO, EDCO, IDECO and ERC, the following technical assistance needs are suggested for consideration by USAID if it is to support future efforts to adopt the proposed energy efficiency incentive mechanism provided in Phase I.

A. Development of a Market Potential Study

This will require commissioning an analysis of the existing potential for efficiency achievements in key electricity consuming sectors in order to assess whether the 1% target that was used in the conceptual approach phase for the incentive mechanism in Phase I is reasonable to adopt.

B. Program Design Support

This will involve taking the proposed incentive mechanism from its current conceptual form into a full fledge design by refining its features. Elements of the program design could include some or all of the following:

- Target energy savings and priority target segments as identified in the Market Potential study
- Long Run Marginal Costs (LRMC) need to be revisited and updated based on the most recent information
- Time-differentiated avoided costs
- Program implementation period and funding
- Average energy efficiency measure life
- Program implementation administrative costs including how much would be directed as rebates
- Implementation work plan
- Measurement, verification and Evaluation protocols
- Net benefit sharing plan and methodology
- Funding mechanism

C. Organizational Development Assistance to Stakeholders

A key element to developing the organizational ability of each of the participating stakeholders is to develop the enabling environment within its organization. This will require a modification to its

organizational structure to allow for effective implementation of energy efficiency activities or for monitoring of market development.

Technical assistance support could include the provision of organizational development expertise to help NEPCO, JEPCO, EDCO and IDECO with the establishment of an energy efficiency unit or group within the organization to handle design and implementation of energy efficiency and demand-side programs. Assistance in the case of ERC will focus on the development of the regulatory functions within the organization necessary to develop, facilitate and monitor the mechanism including its integration into ratemaking and evaluating the financial and operational impacts of the implemented activities on the system.

F. Training and Capacity Building Support to Stakeholders

In order for each of the stakeholders to have a sustainable energy efficiency operation after the development of an organizational setting, it is critical to develop a capacity building program to develop the human capital that is capable of either delivering energy efficiency activities as is the case with the transmission and distribution companies, or capable of overseeing the entire incentive mechanism and assessing its effectiveness in the case of ERC.

Technical assistance is need in the following functions:

For the transmission and distribution companies:

- Program Planning and establishment of overall goals and targets – this will involve providing tools and training on the development and updating of the LRMC and the avoided costs of transmission and distribution.
- Program design with specific target end-use sectors and promotion of certain energy efficient technologies – this will involve the development of economic and other incentives to encourage end-users to increase efficiency.
- Program administration, market delivery and customer interface – including the development of operational manuals, tools assisting the field staff in supporting customers, provision of information to end users, etc.
- Program monitoring and verification of savings including technical, economic and behavioral assessment of how programs are effective.

For ERC:

- Integrated resource planning

- Overall planning and establishment of goals and targets for the incentive mechanism.
- Developing and updating of the LRMC and the avoided costs of the entire electricity sector.
- Evaluation of cost-effectiveness
- Monitoring and verification of savings
- Program evaluation of economic and operational impacts
- Integration of Program Planning and establishment of overall goals and targets – this will involve providing tools and training on the development and updating of the LRMC and the avoided costs of transmission and distribution
- the incentive mechanism into the rate-making and rate recovery mechanism
- Program reporting

G. Support to the Implementation of a Pilot Project

This will involve support to the design of a limited pilot for testing the incentive mechanism to validate the concept and identify any market challenges. Support will be similar to the items listed above but on a limited scale.

H. Assistance to the Independent Monitoring and Evaluation Activities

An independent evaluation report assessing the effectiveness and the impact of the incentive mechanism will be necessary and will be implemented by a specialized firm but under the responsibility of ERC. Therefore, assistance to ERC will be necessary in the area of development of the TOR, selection of a qualified firm, and review of the final evaluation to amend changes to the mechanism according to market impacts.

I. Support to the Development and Maintenance of an Energy Efficiency Database

One element that has been a challenge in most developing countries is the availability of information. Some projects fail due to the lack of data to guide initial planning, design and or implementation. It will be necessary to use this program to collect as much data on the energy end-use for future program planning and policy development.

J. Support to a National Awareness Campaign

Assuming that the Government of Jordan would be interested in launching a national awareness campaign to promote energy efficiency, a technical assistance component can be designed to support the effort.

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