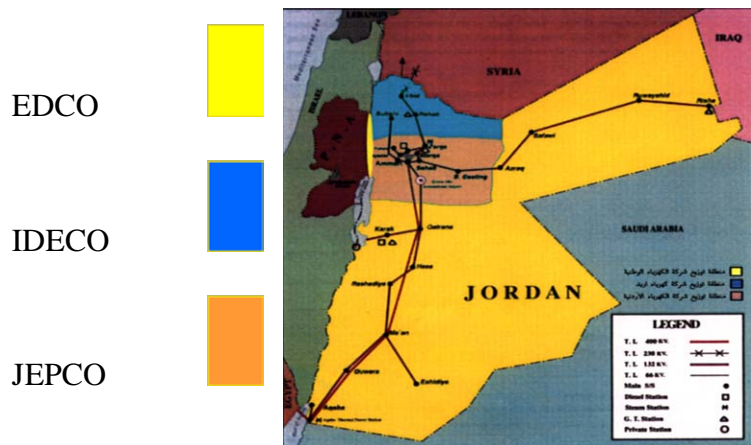




JORDANIAN DISTRIBUTION COMPANIES ASSESS U.S. ENERGY EFFICIENCY PROGRAMS AND REGULATIONS

by Tricia C. Williams, Senior Program Coordinator, United States Energy Association

The **United States Energy Association (USEA)** conducted the second executive exchange to Amman, Jordan under the partnership funded by the **United States Agency for International Development (USAID)** from October 5-9, 2009. Three U.S. executives from **National Grid** and the **Sacramento Municipal Utility District (SMUD)** met with the Electricity Distribution Company (EDCO), the Irbid District Electricity Company (IDECO), the Jordan Electric Power Company (JEPCO) and the Kingdom Electricity Company (KEC) to continue discussions on energy efficiency programs, regulatory affairs and distribution system upgrades. **Mr. Ross Hagan, Director, Energy Office, USAID/Jordan**, opened the session by highlighting the need to improve energy efficiency in the country.



BACKGROUND

The objective of the partnership is to discuss policy and regulatory initiatives and incentives for energy efficiency programs, the U.S. regulatory process, and reducing distribution system losses through system design and upgrades. Meetings centered on:

- Energy efficiency programs for residential, commercial and industrial customers.
- Equitable tariff setting, providing incentives for energy efficiency and conservation,

incentive based performance measures and indicators, creating regulatory departments, and regulatory relationships.

- Optimizing network efficiency by improved planning and system design.



Delegation at EDCO Headquarters. From left to right: Saad Abu Odeh, KEC; Mohammad Frieihat, EDCO; Lawrence Reilly; Mike Rudek, SMUD; Reem Hamdan, EDCO; Fouad Dagher, National Grid; and Ahmed Thainat, IDECO.



ENERGY EFFICIENCY PROGRAMS



Mr. Fouad Dagher of National Grid.

Jordan needs to have regulations, policies and incentives for utilities and consumers to adopt energy efficiency measures, energy conservation and DSM programs. The Updated Master Strategy of Energy Sector in Jordan for the period (2007-2020) simply contains recommendations to have such programs with no details on the structure or policies. The Jordanian utilities are currently working on a plan to create an energy efficiency program.

Mr. Fouad Dagher of National Grid discussed both state policies regarding energy efficiency and National Grid's various programs which began in the late 1970s. Questions from the

audience centered on several key points regarding energy savings, paying for energy efficiency programs and verification associated with the programs. Participants were concerned their utilities would take a risk if they accepted manufacturers' claims of energy savings and those savings did not materialize. Mr. Dagher emphasized that the program is paid for upfront through a \$0.0025 per kwh charge on consumers' bills approved by the regulatory commission so the only risk is how much revenue the utility will receive from achieving energy savings. Mr. Dagher also reviewed the verification of energy savings in detail as there were many concerns that consumers might state they installed equipment but actually sell it for a profit and keep their existing equipment in place – a practice that apparently has occurred with Compact Florescent Lamp (CFL) lighting. National Grid company representatives inspect facilities based on a random sample before and after installation to verify equipment was installed and savings were achieved. All facilities installing new technology are measured for energy savings.

Beginning an Energy Efficiency Program – CFLs

In response to questions about whether the Jordanian utilities could begin a similar program. Mr. Dagher cautioned that the utilities should start with a smaller program such as CFL lighting as National Grid’s energy efficiency program might be too complex to implement immediately. However, several audience members questioned the technical impact of CFLs and wondered if problems with harmonics would lead to a need for more protection as it will add losses and heating on equipment. Mr. Dagher pointed out IEEE Standard 519 which reviews harmonic standards and stated that for large customers, part of the energy efficiency technical assessment is a harmonic investigation. In general, he stated this is not a problem, but if the transformer is more than 80% capacity and harmonic loads are added, there may be a problem. If the customer goes above the harmonic limits, National Grid asks the customer to put a filter on their side and National Grid shares the cost.



U.S. delegation outside EDCO offices.

REGULATION OF UTILITIES – DETERMINING THE RATES



Mr. Lawrence Reilly

Mr. Lawrence Reilly, former Executive Vice President of Legal and Regulation for National Grid, outlined how rates are designed in the U.S. The majority of audience questions centered on what can be included in the rate base, especially certain types of operating expenses, cost allocation between customer classes and assets.

Mr. Reilly stated that in the U.S. rates are set to cover operating costs and provide an opportunity to earn a reasonable rate of return on property devoted to the business. The calculation is usually for a 12 month period –either historic or projected. The operating costs include wages, maintenance, advertising, and taxes. A public utility can determine the amount it spends for these purposes, but the regulator may not allow reimbursement for ratemaking purposes so the utility should ensure it has strong documentation and justification for these costs.

Any disallowed expenditures are effectively charged to the company's shareholders instead of its customers. The Jordanian utilities stated concerns over potential disallowable expenses. Mr. Reilly emphasized that a good relationship with the regulator is critical and that the utility could certainly ask the regulator prior to investment if there are any potential reasons why it



Mr. Lawrence Reilly meets with EDCO, IDECO, JEPCO and KEC management to discuss operating expenses.

would not be allowed. He also mentioned that as the relationship progresses over time, the utilities will have a much better idea of allowable expenditures. Mr. Reilly also described the discounted cash flow and capital asset pricing models used in the U.S. to determine rate of return and cost based versus performance based ratemaking.

Another key point that raised some questions was over the issue of "used and useful"

property that can be included in the rate base. In Jordan, only equipment in the field is allowed in the rate base, but in the U.S. inventory in the warehouse is considered used and useful and is allowed in the rate base.

The Regulatory Process for Rate Cases

The Jordanian participants found the presentations on how rate cases are processed in the U.S. to be highly informative and an example they would like to emulate in the future. The typical rate cases lasts 9-12 months and involves a regulatory filing, discovery, staff case rebuttal, hearings settlement, judgment and final rate order. One item of note was that U.S. utilities usually propose their own rates and submit it for review by the regulatory commission as opposed to the current practice in Jordan in which the regulators create the rates and send it to the utilities for comments.

Mr. Reilly also detailed the functions and staffing needs of a utility rate department, which was extremely useful to EDCO and IDECO who just created these departments. He highlighted that the staff should come from accounting, legal, finance and economic backgrounds. However, he cautioned that during rate case filings, the utility may need to bring in other employees and experts to assist. He also emphasized utility rate department staff should be very good at multi tasking and project management and should have very close ties with upper management.

Mr. Reilly concluded his presentations with a discussion on the general principles of good regulatory relationships:

- Focus on the customer,
- Look for common ground,
- Keep open lines of communication, and
- Constantly look to improve good will between parties.

He expressed confidence that with time the relationship between the utilities and regulators in Jordan will improve and stressed the need to give thorough documentation and justification for requests.

DISTRIBUTION SYSTEM PLANNING AND DESIGN

The design of the distribution system adopted in Jordan (network configuration) has become inefficient and creates additional technical losses, since it was initially designed for low density cities. JEPSCO wants to reconfigure the system to reduce technical losses and meet the growing needs of consumers. Currently in Jordan, the medium/low voltage transformers serve between 1-200 consumers and the distance between the transformer and end user is about 3000 feet of low voltage cable. In contrast, utilities in the U.S. have about 5 consumers per medium/low voltage transformer with less than 300 feet of low voltage cable. In addition, to serve large customers such as high rise buildings, the Jordanian distribution utilities would like to increase their distribution voltages to 33 kv or above from 0.4 kv which would result in fewer losses and allow for the supply of electricity to high rise buildings which is currently very difficult with low voltage cables.



Mr. Mike Rudek of SMUD.

Improved Transformer Efficiency

Mr. Mike Rudek of SMUD discussed SMUD's network and looped radial system designs based on N-1 criteria. SMUD has 80,000 transformers that are loaded at 18 MVA during peak times and can be overloaded up to 20%. The transformers are only put on laterals, not switches, in the looped radial system and are protected by fuses. SMUD uses Cooper and ABB fluids that have high temperature points and can self extinguish in their transformers. The Jordanian distribution utilities were very interested in the pole mounted and pad mounted transformers. Mr. Rudek questioned why the Jordanian system uses so many step down transformers because this type of system design increases electrical losses. Based on the suggestion by SMUD, JEPSCO will consider using fewer step down transformers in new designs. Most questions on SMUD's system design centered on protection and equipment, in particular transformers.

Mr. Rudek also detailed SMUD's conversion from 4 to 21 kv which they determined was cheaper to convert than run the 4 kv system. SMUD modeled the system in SynerGEE to determine the loss reduction from the conversion and created a case in 2003 outlining the conversion benefit. The Jordanian utilities asked for a copy of this analysis to assist them in justifying their conversion to the regulators. The conversion is currently 75% complete.



Mike Rudek, SMUD; Fouad Dagher, National Grid and Lawrence Reilly visit a 33 kv substation near the Dead Sea.

RESULTS

- EDCO and IDECO have formed regulatory new departments and are currently working on staffing.
- JEPCO will consider the possibility of upgrading the distribution system to more than 4kv as 4 kv is being phased out in the U.S., and they do not want to install a system that is becoming obsolete.
- EDCO and IDECO are working on justifications of operating expenses to present to the regulatory commission.
- EDCO, IDECO and JEPCO are considering beginning an energy efficiency program for CFLs.

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