IRAQ MINISTRY OF ELECTRICITY EXECUTIVES PARTICIPATE IN IEEE TRANSMISSION & DISTRIBUTION CONFERENCE AND EXPOSITION & ENTERGY CORPORATION

by Jason Hancock, Senior Program Coordinator, United States Energy Association

From Left to right: John Hammond, USEA; Yahya Jabir, MOE; Amer Al Douri, MOE; Cmdr. William Mayes, U.S. Navy; Khaleel Al Yasri, MOE; Dennis Dawsey, Entergy Corp; George Bartlett, Entergy Corp; Ibrahim Karim, IRD; Ray Yates, Entergy Corp; and Mukund Chander, Entergy Corp.

The **United States Energy Association (USEA)** coordinated the second professional exchange for the Iraq Ministry of Electricity under the partnership funded by the **U.S. Department of State** through **International Relief and Development, Inc. (IRD)** from April 17 to 24, 2010. USEA provided logistical support for the professional exchange. Three executives from the **Ministry of Electricity of Iraq (MOE)** traveled to New Orleans, Louisiana to meet with **Entergy Corporation** and to attend the **IEEE PES Transmission and Distribution Conference and Exposition**.

BACKGROUND

The U.S.-Iraq Professional Exchange Program for the Ministry of Electricity of Iraq (MOE) was established to provide Iraqi Ministry of Electricity senior and mid-level managers with the opportunity to travel, visit and meet with their American counterparts to learn best practices. The Professional Exchange Program aims to build a solid foundation for future commercial and technical exchanges between the two countries by exposing Iraqi utility managers and executives to American utility operations and maintenance programs and showcasing how American power plants are operated.

The in the IEEE Transmission and Distribution Conference and Exposition gave the MOE delegation the opportunity to meet with its U.S. counterparts as well as to interact directly with vendors regarding currently installed equipment and equipment that will be required for future development.

By supplementing the conference and exposition with meetings with Entergy Corporation, the regional utility, the delegates were able to interact directly with a utility to discuss the day-to-day issues of reliable, stable operations and to visit an operational substation.

MEETINGS WITH ENTERGY CORPORATION

Participants: *George Bartlett, Director, Transmission Engineering; Mukund Chander, Policy Consultant, Transmission Operations; Dennis Dawsey, Vice President T&D Operations, LA; Sharma Kolluri, P.E., Manager, Transmission Planning and Transmission Operations, Ray Yates, Supervisor, Substation Operations; and David Zulauf, Supervisor, Metro Substations*

Entergy Corporation is an integrated electric utility that serves load in the states of Louisiana, Arkansas, Mississippi and part of Texas. Entergy generates 30,000 MW delivers energy to 2.7 million consumers. Entergy is the largest natural gas generator and the second largest nuclear generator in the United States.

The Entergy Corporation was formed in 1993 when several regional utilities merged in order to better serve load in the region. Since that time, Entergy has overcome some of the obstacles associated with merging dissimilar utilities into a single system. One of the main obstacles was dealing with the different voltage levels of the original utilities. In order to maximize efficiency, Entergy decided to gradually phase out certain distribution and transmission voltage levels and conform to several set voltage levels. By doing this, Entergy is able to more efficiently manage its stock of spare and replacement parts and also operate its system in a more uniform manner.

EMERGENCY RESTORATION

The devastation left in the wake of the **Hurricanes Katrina and Rita** severely impacted Entergy's system. During the storm event, over 1.1 million customers were left without power and much of Entergy's system was flooded. The overwhelming disaster caused by the storms was met with an unprecedented response from Utilities throughout the United States. Nearly 14, 000 employees from over 100 utility companies from 29 states converged on the storm damaged region and worked tirelessly to restore the energy system.

Innovative restoration techniques were developed and deployed to aid in the restoration effort. The U.S. Government authorized the use of unmanned **Predator drone aircraft to fly transmission lines**. These unmanned aircraft could peer through the dense cloud cover and report back any faults so that repair crews could be dispatched directly to the problem area. Helicopters were also utilized significantly to reach areas that were now inaccessible by land.

In spite of the frantic efforts to restore a decimated energy system, Entergy and the other utilities always put safety first. Tent cities were erected to provide shelter and much needed rest for the crews working on the restoration. As the restoration process was completed, Entergy made the best of the situation, using restoration process to take a comprehensive look at their system, determine what worked well and what did not and take the appropriate measures to make the required improvements.

ENTERGY CORPORATION SYSTEM PLANNING

Entergy's overall goal is to provide its customers with reliable serves at a reasonable cost. In order to maintain its system to provide this reliability, Entergy must ensure that its system grows in synch with customer load growth while maintaining the ability of the system to continue serving this load even in the event of the loss of a major system component. In order to do this, Entergy's planning department is continually analyzing the system and developing plans for future development.

Entergy utilizes planning tools to aid and improve the analysis performed by the planning department. Entergy has been using software developed by **SynerGEE** to perform its distribution planning. The software allows planners to run load flow analysis, fault current calculation, breaker and downstream device coordination and other functions to accurately model the system. These models are based on actual real time data found in Entergy's GIS system and allow planners to see where upgrades will be most beneficial in as loads change.

Entergy planners have developed a database (**SQRT**) for storing substation, transformer, and feeder load data including capacity limitations. Reports can be generated that show historical information that can be imported into the SynerGEE program to track historical growth rates.

Entergy also uses a database (**CPTrac**) that stores project information including cost tracking data. The database provides a repository for new projects, completed projects, on-going projects and future projects. The data stored in CPTrac is accessible to other Entergy groups such as Work Management and Design and can be used for tracking both planning and non-planning work.

ENTERGY CORPORATION SUBSTATION SITE VISIT

The meetings with Entergy Corporation concluded with a visit to a 230kV transmission to 30kV distribution substation that was severely flooded during Hurricane Katrina. As a result, much of the substation had to be rebuilt and equipment had to be replaced. Entergy once again used disaster as a means of modernizing and making improvements to increase system reliability.

IEEE TRANSMISSION AND DISTRIBUTION CONFERENCE AND EXPOSITION

The 2010 IEEE PES Transmission and Distribution Conference and Exposition in New Orleans was designed and organized to provide the international power-delivery community with the information and details necessary to manage technology and business solutions now and in the decades ahead.

IEEE PES EXPOSITION HALL

The delegates from the Ministry of Energy of Iraq were able to both interact with attendees from around the world, and be exposed to the latest innovations and technologies from the most informed manufacturers and services providers across the broad spectrum of product categories.

Hundreds of exhibitors from around the world were present to exhibit their best technological offerings. These included the most advanced IT and automation systems to other related suppliers and service companies. The exposition gave manufacturers a venue to showcase their products and gave the delegation from Iraq the opportunity to make valuable contacts and gain information that will be critical as they continue to rehabilitate the energy infrastructure of Iraq.

On the Exposition floor, the delegation from Iraq met with vendors from **GE** to discuss issues related to several generation facilities in Iraq as well as a recent training program GE conducted for the previous delegation from Iraq earlier in the year. The Iraq delegation was interested in talking with **3M** representatives to discuss light weight transmission conductors for use in transmission system expansion in Iraq. The delegates also briefly met with **ABB** to discuss SCADA control and other ABB systems currently in use in the Iraq power sector.

EDUCATION TRACK- ADVANCED TOPICS: MOISTURE IN TRANSFORMERS

PRESENTED BY RICH SIMONELLI, FIELD MANGER, WAUKESHA ELECTRIC SYSTEMS; ATTENDED BY MOE DELEGATES

Top five reasons transformers fail

1. Busing failure
2. Load Tap Changer (LTC) failure
3. Mysterious failure after maintenance
4. Switching transient failure
5. Short Circuit failure

Transformer life is adversely affected by any contamination inside the transformer. Ideally, the transformer interior should be oxygen free (less that 2% oxygen of total volume) and needs to be dry (less than 0.5% moisture content). Once moisture enters a transformer, it is quickly absorbed by the cellulose (paper). 99% of moisture in a transformer will be found in the cellulose with the remaining 1% in the oil. Drying cellulose without completely removing the transformer oil can take months to years and is very difficult to do. Increasing moisture content in a transformer from 0.5% to 1% will effectively decrease the operational life of the transformer by half. Due to the damaging effect of moisture in a transformer, it may be economical to drain the transformer and allow it to properly dry.

Transformer cooling equipment needs to be inspected and cleaned regularly. Decreased transformer cooling can lead to increased operating temperatures. When transformer temperatures rise above 150 degrees Centigrade for extended periods of time the sulfur content in the oil becomes corrosive. This problem can only be detected though physical inspection of the transformer. It is critical that transformers with cooling issues are inspected as corrosion damage cannot be undone and can require rewinding or replacement of the transformer.

One technology that was discussed that may be of use at remote substations in Iraq is the nitrogen blanket system that strips nitrogen from the air rather than relying on bottled nitrogen which has to be periodically replenished. The nitrogen blanket system uses nitrogen, an inert gas to displace oxygen inside transformers. Using a system that strips nitrogen from the air would eliminate the need to have a person manually change nitrogen bottles at remote substations.

PARTICIPANTS

1. Amer Ahmed Abdul Majeed Al Douri, Deputy Minister for Distribution Affairs
2. Khaleel Ibraheem Mohammed Salih Al Yasri, Director General of Distribution South of Iraq
3. Yahya Abbas Jabir, Deputy Director General of Communication

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