



Russian/American Smart Grid Partnership Initiative: Initial Exchange Visit

USAID Cooperative Agreement EEE-A-00-02-00054-00

Austin, Texas
Houston, Texas
Washington, DC
November 29 – December 8, 2010



USAID
FROM THE AMERICAN PEOPLE

11/23/2010



RUSSIAN/AMERICAN SMART GRID PARTNERSHIP INITIAL EXCHANGE VISIT

November 29 – December 8, 2010

**Austin, Texas
Houston, Texas
Washington D.C**

Introduction

The REA is charged with developing a Smart Grid Initiative/Roadmap under Law No. 261 on Energy Efficiency. The Russian/American Smart Grid Partnership will support REA's effort by providing access to smart grid specialists from U.S. transmission companies, system operators, distribution companies, technology vendors, standard setting organizations and federal and state policy and regulatory authorities. As part of the REA Smart Grid Initiative/Roadmapping process, the partners will consider opportunities to support regional smart grid pilot project initiatives in Russia.

The United States is seeking to transmit wind power resources located mid-continent to load centers on the east coast. Accordingly, Russian experience constructing and operating long distance transmission lines of 750 kV and above is of interest to the United States. Partnership activities will include the exchange of information on long distance, high voltage transmission.

Objectives

This is the first exchange visit to be conducted under the Russian/American Smart Grid Partnership Initiative. The objectives of the exchange visit are to:

- Discuss the motivations for implementation of smart grid technologies in distribution and transmission utilities and Regional Transmission Operators (RTOs) for smart grid projects
- Review the policy, legal and regulatory bases for implementation of distribution and transmission network and consumer based smart grid projects;
- Examine the implementation of smart grid projects for consumers and transmission and distribution networks, including the goals and objectives for each; project economics; project consortia; technologies employed; and preliminary results;
- Conduct a workshop on the smart grid to further understanding of incentives for, and technical and economic challenges to, implementation of the smart grid; and

- Review and finalize a workplan in support of the objectives of the Russian/American smart grid initiative.

Participants

The following organizations will be invited to participate in the exchange visit:

Russian Organizations

Ministry of Energy
Ministry of Industry & Trade
Russian Energy Agency
Federal Grid Company
Innovations in Electric Power Industry (INVEL)
MRSK (IDGC-Interregional Distribution Grid Company)
R&D Center of Electric Power
City of Zelenograd
IT Company
Atomstroy Engineering
Fortum

American Organizations

Austin Energy
Blue Bonnet Electric Cooperative
CenterPoint Energy
Center of the Commercialization of Electric Technologies
Carnegie Mellon University
Duke Energy
Edison Electric Institute
Echelon Corporation
General Electric
Gridwise Alliance
IBM
National Institute of Standards and Technology
North American Electric Reliability Corporation
Pacific Northwest National Laboratory
Public Utility Commission of Texas
U.S. Agency for International Development
U.S. Department of Energy

This study tour is made possible by the support of the American people through the United States Agency for International Development (USAID).

Agenda

Saturday November 27, 2010

Depart Moscow & Arrive Austin, Texas

Check in to the
Omni Hotel
700 San Jacinto at 8th Street
Austin, Texas 78701

Sunday November 28, 2010

AM

Orientation

- Review Goals & Objectives
- Agenda Overview
- Logistical Issues
- Questions & Answers

PM

On your Own

Monday November 29, 2010

9:00 a.m. Meeting with Center for the Commercialization of Electric Technologies (CCET)

CCET
114 West 7th Street, Suite 1210
Austin, Texas 78701

Milton Holloway, President & Chief Operating Officer, Center for the Commercialization of Electric Technologies
Fred Huang, Electric Reliability Council of Texas (ERCOT)
Jian Che, Electric Reliability Council of Texas (ERCOT)

The Center for the Commercialization of Electric Technologies (CCET) facilitates electric industry and university collaboration and accelerates economic development.

Many of the largest utilities, technology companies, and educational institutions in Texas recognized the opportunity to work together to enhance the security, reliability, and efficiency of the electric infrastructure in Texas through research, development, demonstration, and commercialization of advanced technologies. Under this initiative they formed CCET, a Texas non-profit, in 2005. Today, CCET is made up of 21 Texas electric and high tech companies joined with five universities in a collaborative effort to modernize the Texas electric system.

CCET's objective is to develop and capture the benefits of advancing technologies in electric energy transmission, distribution and end use by bringing together the extensive existing facilities and technical capabilities of electric

utilities, high technology leaders, and Texas universities and colleges. CCET facilitates industry and university collaboration and accelerates economic development through activities such as:

- * Research, development and demonstration,
- * Commercialization of emerging technologies,
- * Supporting the development of new, and /or expansion of existing, businesses,
- * Business workforce training.

CCET Smart Grid Demonstration Project

The Center for the Commercialization of Electric Technology (CCET) was awarded \$13.5 million from the U.S. Department of Energy (DOE) on November 24 for a demonstration project aimed at better integrating the vast Texas wind energy resources into the state's electric transmission, distribution, and metering system.

The total project size is \$27 million and includes a three-pronged effort that includes the use of synchrophasor technology to monitor conditions on the Texas grid; the enhancement of real-time use of direct load control allowed by the advanced metering information collected by the state's major transmission and distribution utilities, and the development for a model for electric distribution system behavior under a model "smart grid community of the future" that includes central system solar, distributed generation of roof top photovoltaic on each home in the community, extraordinary high building envelope efficiencies, battery storage, and demand response programs. The three components address different aspects of wind integration within the ERCOT grid.

Technologies and Programs to be demonstrated:

- Use of synchrophasors to address reliability concerns from adding large quantities of high variable wind generation
- Design development of an enhanced SMT Portal that could eventually provide direct load control capability and potentially an extra ancillary service for ERCOT in using demand response to balance load from highly variable wind generation
- Demand response programs in residences equipped with distributed generation and battery storage and ultra high efficiency appliances and building shells
- Community level battery storage for on-site solar photovoltaic and purchased remote wind generated power
- Individual and community PHEV charging from solar distributed generation and grid purchased power

AM

Synchrophasor Project Overview

- **Overview of CCET**
- **CCET's Energy's Goals & Objectives for Implementation for Synchrophasor Project**
- **Project Timeline**
- **Consortia Structure**
- **Making the Business Case -- Estimated Project Costs and Cost Benefits Analysis**

Remote Demonstration of ERCOT's control systems

- **Synchrophasor Deployment in ERCOT Service Territory**

- **Phasor Data Concentrator Deployment in Transmission Owners & ERCOT**
- **Communication Infrastructure between Transmission Owner and ERCOT**
- **Cyber Security**

12:00 p.m. Site Visit to Bluebonnet Electric Cooperative

Bluebonnet Electric Cooperative serves nearly 80,000 meters and owns and maintains about 11,000 miles of power lines, located across more than 3,800 square miles within 14 southeastern Texas counties. Bluebonnet's service area stretches from Travis County to Washington County and from Milam County down to Gonzales County.

Bluebonnet is a member of CCET and is progressively implementing smart grid technologies. They have already installed a two-way grid along all 11,000 miles of power lines and have replaced all 80,000 meters with smart meters.

Tuesday November 30, 2010

9:30-11:30 a.m. Austin Energy

Austin Energy - Green Building
721 Barton Springs Road
Austin, Texas

Austin Energy is the nation's 9th largest community-owned electric utility. It serves 388,000 customers and a population of more than 900,000. It provides service within the City of Austin, Travis County, and a small portion of Williamson County.

The Austin Energy electric system serves a 437 square mile area. That includes Austin and portions of Travis and Williamson counties. It consists of:

- Over 5,000 miles of overhead primary and secondary power lines
- Over 4,000 miles of underground primary and secondary lines
- 48 substations

Austin Energy powers the capital city of Texas through a diverse generation mix. Its portfolio includes nuclear, coal, natural gas, and renewable energy sources. That's just over 2,600 megawatts (MW) of total generation. The City of Austin has not built or expanded a fossil power plant in nearly 30 years. It has integrated grid management, increasing efficiency. The city has implemented building standards and planning guidelines based on energy performance. It has reduced its carbon output and other air pollutants beyond targeted goals.

Toward this end, Austin Energy has been preparing its "Smart Grid 1.0" for several years. In addition to existing power sources and transmission lines, its building blocks include:

- A telecommunications network—combining fiber and wireless.
- Hardware—meters, sensors, network gear, computers, servers, and storage
- Software—applications, databases, and integration and management tools

It:

- Encompasses 1 million consumers and 43,000 businesses
- Covers 440 square miles
- Includes 500,000 devices
- Involves 100 terabytes of data

It focuses on:

- Systems integration
- Communication
- Safety and reliability
- Improved customer service

Austin Energy already manages 86,000 smart thermostats in homes and businesses, which at peak times can aggregate to about 90 MW of load. In the future, the smart grid will be interactive and “self-healing,” and will:

- Manage distributed generation—for example, solar photovoltaic and micro wind
- Build and manage energy storage
- Power and communicate with smart consumer appliances
- Charge plug-in hybrid and electric vehicles

For customers, it will mean:

- Quicker outage restoration
- Greater convenience—no more unlocking gates and tying up dogs for meter reads
- Better control over how much energy you use and when you use it
- Timelier, clearer, and more accurate and easily managed bills
- Easier participation in energy efficiency programs

For Austin Energy and the City of Austin, Smart Grid 2.0 will mean:

- Improved operations and procurement—lower costs
- Less energy theft
- Better planning and management of load distribution
- Reduced need for extra generation and transmission capacity

AM Smart Grid Project Overview

- **Overview of Austin Energy**
- **Austin Energy’s Goals & Objectives for Implementation of Smart Grid Technology**
 - **Improved Customer Service**
 - **Energy Efficiency**
- **Smart Grid Technology Selection & Communications Network**
- **Consortia Structure**
- **Making the Business Case -- Estimated Project Costs and Cost Benefits Analysis**
- **Lessons Learned to Date**

12:00 p.m. Lunch

1:30 p.m. Greater Austin Chamber of Commerce Presentation on Smart Grid
Jose Beceiro, Director of Economic Development

Austin City Hall
Council Chambers
301 W. Second Street

2:30 p.m. Site Visits to Examine Smart Grid Technology
Mueller Energy Center
4550 Mueller Blvd.

- **Smart Meter & Meter Installation**
- **Communications Network**
- **Distribution Network Sensors**
- **Smart Meter Interaction with Customer Information Systems**

Site Visit to the Pecan Street Project Mueller Smart Grid Demonstration Project

Headquartered at the University of Texas at Austin, Pecan Street Project Inc. is a research and development organization focused on developing and testing advanced technology, business model and customer behavior surrounding advanced energy management systems.

The initiative began in 2008 as a community collaboration to reinvent the energy system. Representatives of the founding members – the City of Austin, Austin Energy, The University of Texas, the Austin Technology Incubator, the Greater Austin Chamber of Commerce and Environmental Defense Fund – enlisted the participation of nearly a dozen private companies to explore the technical, economic and policy implications of an energy system that relies on better energy efficiency, locally generated renewable energy and a new economic model for electricity utilities. The result of the group's initial effort was a March 2010 report of recommendations to the Central Texas community.

The new organization's first objective was a successful application for a U.S. Department of Energy stimulus grant for a Smart Grid Demonstration Project at Austin's Mueller community. The grant was awarded in November 2009, and the demonstration project is currently being implemented.

Wednesday December 1, 2010

9:30 a.m. Meeting with the Public Utility Commission of Texas

1701 N. Congress Ave.
Austin, Texas
512-936-7000

David Featherton, Director, Infrastructure and Reliability Division, and Homeland Security Coordinator
Christine Wright, Senior Market Policy Analyst, Competitive Markets Division
Brian Davison, Oversight and Enforcement Analyst

The mission of the Public Utility Commission of Texas is to protect customers, foster competition, and promote high quality infrastructure. The PUC is responsible for:

- Regulating rates and terms for intra-state transmission service and for distribution service in areas where customer choice has been introduced.
- Oversight of the ERCOT market, including market monitoring and the ERCOT administrative fee.
- Adopting and enforcing rules relating to retail competition, including customer protection, and the renewable energy goal.
- Licensing of retail electric providers and registration of power generation companies, power marketers and aggregators.
- Reviewing proposals for the construction of new transmission facilities.
- Regulation of rates and service for integrated utilities.

In response to customer and media complaints over perceived billing errors associated with the deployment of advanced meters in three Texas distribution companies, the PUC commissioned an Evaluation of Advanced Metering Systems Deployment in Texas. The evaluation was completed in June 2010.

AM

Evaluation of Smart Meter Deployment in Texas

- **Dynamic Pricing as an Incentive for Energy Efficiency**
- **Legislative & Regulatory History**
- **Expected Benefits of Advanced Meters and Advanced Metering Systems**
- **Implementation of Advanced Metering in Texas**
- **Observations & Findings**

PM

Arrive in Houston

Check in to the JW Marriott Hotel
5150 Westheimer, Houston, Texas 77056

Thursday December 2, 2010

8:00 a.m. Meeting with CenterPoint Energy

CenterPoint Energy, Inc.
1111 Louisiana Street
Houston, Texas 77002
Tel: 713-207-1111

CenterPoint Energy operates in five primary businesses: electric transmission and distribution, natural gas distribution, interstate natural gas pipelines, field services, and competitive natural gas sales and services. CenterPoint's electric transmission and distribution maintains the wires, poles and electric infrastructure serving a 5,000-square-mile electric service territory in the Houston metropolitan area. While CenterPoint Energy ensures the reliable delivery of power from power plants to homes and businesses, it neither generates power nor sells it to customers.

CenterPoint Energy has signed an agreement with the U.S. Department of Energy (DOE) to receive a \$200 million grant for its smart meter and smart grid projects. Of these funds, \$50 million will be used to begin building a self-healing smart grid that will use smart meters, power line sensors, remote switches, and other automated equipment to improve power reliability and restoration in greater Houston. The power outages that have been a fact of life for electric consumers meet their match with the smart grid. Localized outages are largely self-healing in the smart grid. Most breaks in a power line – a tree limb falling, for example – will be detected and communicated by sensors and the associated event data transmitted using wireless and/or other communications technologies. As a result, power will be re-routed around the break or fault and service continues, virtually uninterrupted, while CenterPoint Energy personnel are dispatched to the repair site.

In the event of larger outages, such as a major storm, the smart grid will first employ self-healing techniques to restore power to as much of the system as possible. Then the damage to the system as a whole is diagnosed and mapped. Using that information, CenterPoint Energy will be able to restore the greatest part of the system in the shortest time and then continue on to full restoration. In many cases, the time to restore power through the smart grid in CenterPoint Energy's service area will be a fraction of the current averages.

CenterPoint's smart meters have two-way communication capabilities and Internet addresses, much like computers, with the ability to send usage data every 15 minutes and on demand.

Smart meters will provide for:

- Remote meter reading - CenterPoint Energy will be able to read smart meters remotely, virtually eliminating the need to go house to house to read electric meters
- Smoother transactions - Remote connection and disconnection of electric service should reduce the time it takes to process service orders at most customers.
- Automatic outage notification - Smart meters will automatically notify CenterPoint Energy about power outages to help restore power more quickly.
- Energy efficiency and savings - Consumers will be able to monitor their electricity usage to better manage their energy costs by making small changes such as adjusting the thermostat.
- New products and services - Competitive Retailers can now offer new products and services such as pre-paid service, time-of-use rates, and energy analysis tools.
- Home Area Networks (HAN) – Smart meters can interact with ZigBee -compatible HAN devices such as thermostats or other electric appliances so consumers can better manage their electricity use

AM

Smart Grid Project Overview

- **Overview of CenterPoint Energy**
- **How does Texas’s Market Structure and Regulatory Environment Influence Centerpoint’s Smart Grid Implementation**
- **Centerpoint’s Goals & Objectives for Implementation of Smart Grid Technology**
 - **Improved Customer Service**
 - **Energy Efficiency**
 - **Workforce Management**
 - **Retail Competition**
- **Smart Grid Technology Selection & Communication Network**
- **Consortia Structure**
- **Making the Business Case -- Estimated Project Costs and Cost Benefits Analysis**
- **Regulatory Reporting Requirements for Smart Meter Deployment**
- **Lessons Learned to Date**

PM

Site Visit to Centerpoint’s Energy Insight Center

Energy InSight,SM a system of smart energy technologies from CenterPoint Energy, gives Houston-area consumers a powerful new tool to better understand and manage their electric usage. The ability to monitor energy use will enable consumers to make more informed energy choices. Using less energy can save consumers money and means less power may need to be produced – which is good for consumers and great for the environment.

Friday December 3, 2010

8:00 a.m. Meeting with CenterPoint Energy - Continued

AM Site Visits to Examine Smart Grid Technology

- Smart Meter & Meter Installation
- Communications Network
- Distribution Network Sensors
- Smart Meter Interaction with Customer Information Systems

PM Site Visits and Depart for Washington, DC
Arrive in Washington, DC and check in to the Sofitel Hotel
806 15th Street NW
Washington, DC 20005

Saturday December 4, 2010

On your Own

Sunday December 5, 2010

On your Own

Monday December 6, 2010

United States Energy Association
1300 Pennsylvania Ave NW
Washington, DC
202-312-1230

**Russian/American Smart Grid Partnership Initiative
SMART GRID WORKSHOP**

DAY ONE

8:30 a.m. WELCOMING REMARKS & INTRODUCTIONS
United States Agency for International Development
United States Energy Association
Russian Energy Agency

8:45 a.m. Russian Smart Grid Initiatives
Russian Energy Agency
Federal Grid Company
System Operator Unified Power Systems
Inter-Regional Distribution Companies

- 10:00 a.m. Morning Break**
- 10:15 a.m. Smart Grid Research and Development Program**
*Dr. Cary Bloyd, Senior International Research Advisor, Energy and Environment Directorate,
Pacific Northwest National Laboratory*
- 11:00 a.m. Smart Grid Maturity Model**
Austin Montgomery, Grid Maturity Model Manager, Carnegie Mellon University
- 12:00 a.m. National Institute for Standards and Technology**
Dean Prochaska, National Coordinator for Smart Grid Performance, National Institute for Standards and Technology
- 12:30 p.m. Lunch Break**
- 1:30 p.m. Gridwise Alliance**
*Guido Bartels, Chairman, Gridwise Alliance; Chairman Global Smart Grid Federation;
General Manager, Global Energy & Utilities Industry, IBM*
- 2:30 p.m. North American Electric Reliability Corporation**
Mark Lauby, Director, Reliability Assessment and Performance Analysis, North American Electric Reliability Corporation
- 3:30 p.m. Afternoon Break**
- 3:45 p.m. Electric Power Research Institute**
To be Determined
- 4:45 p.m. Edison Electric Institute**
*Chris Eisenbrey, Director, Business Information Group, Edison Electric Institute;
Co-lead EEI Smart Grid Team, Edison Electric Institute*
- 5:30 p.m. Adjourn**
- 6:45 p.m. Reception**

Tuesday December 7, 2010

United States Energy Association
1300 Pennsylvania Ave NW
Washington, DC
202-312-1230

**Russian/American Smart Grid Partnership Initiative
SMART GRID WORKSHOP**

DAY TWO

- 9:00 a.m.** **Duke Energy**
To Be Determined
- 9:30 a.m.** **Echelon Corporation**
Tatiana Kvitka, Global Partner Manager, Echelon Corporation
- 10:00 a.m.** **General Electric**
Dr. Bartosz Wojszczyk, Global Smart Grid Technical Leader
- 10:30 a.m.** **Morning Break**
- 11:30 a.m.** **OSIsoft**
To Be Determined
- 12:30 p.m.** **Workshop Concludes with Lunch**

**RUSSIAN/AMERICAN SMART GRID PARTNERSHIP INITIATIVE
WORKPLAN DEVELOPMENT MEETING**

2:00 p.m. **Russian/American Smart Grid Partnership Initiative Workplan Session I**

Based on the information exchanged between Russian and American smart grid specialists during the exchange visit, a workplan of activities to be conducted under the partnership will be developed and agreed to. A draft workplan will be circulated prior to the departure of the Russian delegation to the United States. The draft will serve as the basis for discussion and will be revised during the planning meeting on the afternoon of December 7 and morning of December 8.

3:30 p.m. Russian/American Smart Grid Partnership Initiative Workplan Session II

5:00 p.m. Adjourn

6:30 p.m. Reception

Wednesday December 8, 2010

United States Energy Association
1300 Pennsylvania Ave NW
Washington, DC
202-312-1230

9:00 a.m. Russian/American Smart Grid Partnership Initiative Workplan Session III

10:30 a.m. Morning Break

**11:00 a.m. Russian/American Smart Grid Partnership Initiative Workplan Session III IV
Finalize Workplan**

12:30 p.m. Conclusions and Lunch Break