

Discussion FORUM

The Impact of U.S. Transmission & Distribution Policies and Technologies

Washington-area professionals gathered on December 18th for the twelfth session of the IRG Discussion Forum, "The Impact of U.S. Transmission & Distribution Policies and Technologies." Roger Gale of GF Energy outlined the link between innovation and competition and the need for huge investments and innovative financing mechanisms to upgrade existing infrastructure. Ken Malloy of the Center for the Advancement of Energy Markets provided a post-mortem on what has happened in the US regarding competition in a networked industry. Anthony Pasquarella of ALSTOM T&D, Inc. described new low-cost technologies that are being developed and used to increase efficiency in energy transmission and distribution.

A robust and secure power grid that meets customers' ever-increasing demands for reliable and high-quality electricity is an essential foundation for economic growth. Although the potential economic, environmental and national security benefits of an advanced and efficient transmission and distribution system are enormous, the regulatory framework and technological sophistication of the grid system has often not kept pace with the

growing demand for electricity. Recent policy and technology developments in the U.S. can provide lessons learned for emerging economies that are also restructuring their electric utility sectors.

Restructuring the Power Sector

The U.S. electric utility system dates from the mid-1930s and was intended to serve individual local utilities and their customers. Over the years, larger and more efficient generating stations (to replace polluting plants in city centers) were located farther away from consumers. This required larger and longer transmission lines. Meanwhile, utilities also began trading electricity. This trading made the transmission system more reliable and efficient, as utilities were able to take advantage of different load

patterns, time zones, and outages to help each other out in time of need. Today, electricity merchants and marketers not affiliated with utilities use the transmission grid to buy and sell electricity. Consumers, primarily industrial, now desire to choose the electricity supplier that best meets their needs economically, reliably, and efficiently.

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vertically integrated¹ and regulated monopoly to one equipped to function in a competitive market is the result of a number of events, such as the passage of the Public Utility Holding Company Act of 1935, the Public Utility Regulatory Act of 1978 (which opened wholesale markets to non-utility

¹ A vertically integrated industry is one that engages in generation, transmission, and distribution operations

For More Information...

GF Energy: www.gfenergy.com

Center for the Advancement of Energy Markets:
www.caem.org

ALSTOM T&D, Inc: www.tde.alstom.com

Federal Energy Regulatory Commission (FERC):
www.ferc.gov

US Department of Energy:
www.energy.gov/engine/content.do

producers of electricity), the Energy Policy Act of 1992 (which authorized individual utility access to all interstate transmission systems), the appearance of new technologies (such as transformers), and new rules issued by the Federal Energy Regulatory Commission (FERC).

The thought has been that segmenting or “unbundling” the power sector’s three components—generation, transmission, and distribution—and opening them to market forces could achieve greater efficiencies, improved pricing, and technological innovation. It allows other participants to offer retail power generation and customer services in competition with the original companies. These competitive companies thus provide the electricity while utilities continue to provide transmission or distribution services. Meanwhile states are moving away from regulations that set rates for electricity and toward oversight of an increasingly deregulated industry in which process are determined by competitive markets.

The Infrastructure Imperative of Transmission

Competition in the power generation sector is making the industry more efficient and has lowered prices at the wholesale and retail level. But the transmission sector is still not competitive. It enables

multiple generators in different regions to use the transmission grid to compete with each other to serve customers. Yet, the transmission grid cannot facilitate competition unless it can expand and modernize to accommodate new technologies.

According to a GF Energy report, “the nation’s 158,000-mile electricity transmission system has not kept pace with either the growth of the power market or the digitization of society. Annual investments in transmission have been declining by almost \$120 million a year for the past 25 years, even as grid congestion caused by consumer demand and increased trade has intensified.”² The transmission grid is characterized by 1950s technology trying to meet rigorous performance standards of the 21st century. Inefficiencies in the system and resulting outages can have devastating economic effects: industrial and digital economy firms are collectively losing \$45.7 billion a year from equipment damage, lost

Successful Restructuring Models

Efforts in the Mid-Atlantic region and Texas hold promise as successful restructuring examples that transitioned from electric monopoly to market model.

In the Mid-Atlantic: Electric utility restructuring efforts in the Mid-Atlantic¹ region saved all classes of consumers more than \$3 billion in 2002 with projected future savings of \$28.5 billion. Households in New Jersey, for example, are saving on average \$222 year with lifetime savings projected to be \$1,512 per household. In addition to lower cost, the Mid-Atlantic (PJM) region has improved reliability of power through its auction system. For more information on the study produced by CAEM on the PJM restructuring model, go to www.caem.org/website/pages/PJM.htm.

In Texas: A 1999 Texas law required utilities to “unbundle,” or separate, their electric generation and transmission operations as part of preparations for a deregulated retail electric market. The restructuring of the \$20-billion electricity industry has enabled both individuals and corporations in most cities in Texas to choose their power supplier. According to CAEM, Texas “represents a large coherent retail market that benefits from coordinated retail and wholesale electric regulation by the Public Utility Commission of Texas.” For more information, go to www.caem.org/website/pdf/retailing.pdf.

Restructuring will eventually give consumers more to choose from than just price and reliability. Innovative technologies may bring consumers the ability to determine the appropriate mix of lighting at various times of the day, optimize appliance use, or calculate the benefit of closing curtains when outdoor temperatures fall.

¹ Delaware, District of Columbia, Maryland, New Jersey, and Pennsylvania in 2002

² GF Energy, *Managing Transmission Grid Investment in a Competitive World*, February 2003.



Speed to market is critical for project developers of new technologies to upgrade the transmission system.

productivity, and idle labor, according to the Consortium for Electric Infrastructure to Support a Digital Society (CEIDS).³

It may take at least a decade to correct existing problems and rebuild the system to optimize existing assets. New technologies are needed that reduce congestion and optimize flow, while transmission owners need new operational tools. In addition, new transmission facilities will be needed.

New Transmission Technologies

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Two new technologies entering the market include HVDC Converter Substations that can use underground cables (which avoid overhead line right-of-ways and

reduce the emission of electromagnetic fields while being overall more environmentally sensitive). Merchant HVDC Converter Substations are currently proposed in the northeast states by Conjunction LLC, Atlantic Energy Partners, GenPower, TransEnergie and Hydro One to transmit power from Canada (where excess hydro power is being produced) to the

northern United States. Now under construction at Northeast Utilities is a STATCOM, a Flexible AC Transmission System (FACTS) that enables an increase of power flow in a transmission system by 10 to 20 percent by propping up the voltage and stabilizing the network under full load conditions. In the UK, FACTS technology was used to support the transfer of power generated in the north to demand centers in the south without having to build new transmission lines, which would have been costly and taken 10 to 15 years. The installation of the relocatable FACTS device can be done in 12 to 18 months.

About the Panelists

Roger Gale, Partner of GF Energy, has been involved in electric utilities and energy companies since the late 1970s. He was CEO of PHB Hagler Bailly and headed PA Consulting's global energy practice before starting GF Energy in 2001. Gale has held senior positions with the U.S. Department of Energy, Federal Energy Regulatory Commission, and the U.S. Environmental Protection Agency and covered energy issues in Japan for a number of publications. He currently serves on the board of directors of Constellation Energy Group and of the United States Energy Association.

Ken Malloy, CEO of Center for the Advancement of Energy Markets, is internationally recognized as a bold visionary on the energy industry's transition from monopoly to competitive markets. He has made over 600 presentations in the last two decades to every sector of the energy industry and been featured on major media networks and in leading newspapers and magazines. Formerly with PHB Hagler Bailly's Corporate Strategy and Market Analysis Group, Malloy was the U.S. Department of Energy's lead official on policies relating to competition, regulatory reform, and industry restructuring from 1987 to 1996. He has held positions in the areas of natural gas, electricity and oil policy.

Anthony Pasquarella, well-known globally as a leading corporate strategist, is Vice President of ALSTOM T&D, Inc. and serves as Managing Director of ALSTOM's Transmission Projects Business for North America. Prior to his tenure at ALSTOM, Pasquarella was Country Manager for the Ukrainian electric utility investments of The FondElec Group, President & CEO of Selectrica, President of ABB T&D Enterprises, and Vice President and General Manager of ABB High Voltage Systems.

³ CEIDS, *The Cost of Power Disturbances to Industrial and Digital Economy Companies*, July 2001.

The RED Index

In order to move forward with alternative approaches for deregulation, it is necessary to determine the elements of success that can be replicated by other jurisdictions. The Retail Energy Deregulation (RED) Index issued by CAEM measures the progress states are making toward electric restructuring and will assist legislators, commissioners, companies, and analysts in understanding pace, quality and direction of change in policies effecting the transition. A score of 0 represents the monopoly model and a score of 100 represents complete and effective implementation of the competitive model.

Table 1

The Retail Energy Deregulation (RED) Index

Jurisdiction	RED Index Score 2003	RED Index World Rank 2003
England (UK)	88	1
New Zealand	75	2
Texas	69	3
Pennsylvania	67	4
Maine	64	5
Alberta (Canada)	61	6
New York	60	7
District of Columbia	54	8
Michigan	52	9
Maryland	52	9
Victoria (Australia)	50	11
New Jersey	50	11

About the IRG Discussion Forum

The IRG Discussion Forum, a monthly event hosted by Henri-Claude Bailly (chairman of IRG's Board of Advisors), addresses issues affecting international development. Each session is informal, with guest speakers and attendees participating in a personal capacity. For comments, questions, or information on the Discussion Forum, contact discussionforum@irgltd.com or call IRG at 202-289-0100.

2004 Schedule

February 19 Water and Security
 March 18 Cultural Preservation Fund
 April 15 Middle East Oil
 May 20 Rule of Law
 June 17 Knowledge Management

FORUM FEEDBACK

- Using the criteria set forth in the RED Index, countries outside of the U.S. that serve as good examples of restructuring efforts include New Zealand, Australia, and United Kingdom. Argentina is an interesting case: it transitioned very quickly from a monopoly to a competitive model in the natural gas sector as a result of strong central control.
- In order for a competitive electricity market to work successfully, government needs to enforce reliability standards. For example, in Argentina the government can levy a penalty against a company that fails to meet reliability standards. In the U.S. customers have no recourse for compensation if power fails.
- Federal Energy Regulatory Commission has interest in benchmarking at the regulatory level, but measurable data needs to be acquired first.

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