United States Association for Energy Economics

USAEE

Dialogue

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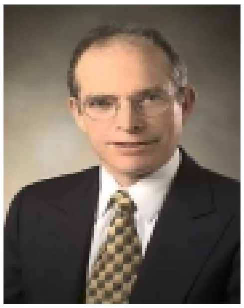
PRESIDENT'S MESSAGE



I just returned from Aberdeen and an excellent IAEE/BIEE conference on "Innovation and Maturity in Energy Markets." The breadth of participants and attendees was amazing. And while the conference sessions were engaging, the side conversations were even more so.

Many of the global participants plan to join us on October 6-8, for our North American Conference in Vancouver, Canada — "Energy Markets in Turmoil: Making Sense of It All". Mark Jaccard and his program team have done a super job. The program has been finalized, and conference registrations are already coming in. Please see further conference information in this issue of *Dialogue*.

There is a strong interest not only for the next IAEE Conference in Prague, Czech Republic (June 5-7, 2003) but also for our next North American Conference in Mexico City (October 19-21, 2003), co-sponsored with the Asociación Mexicana para la Economia Energetica.

Despite excellent Internet communications, there is no substitute for face-to-face discussion and debate, as we work to better understand energy and environmental markets and policy frameworks from our own national, professional and personal perspectives. There is no shortage of critical issues, most of which are relevant across the globe.

Energy security has taken on new dimensions. The complexities of electricity restructuring have become more evident. Climate change and other environmental issues continue to grow in importance. Concerns about growing dependency on natural gas to produce electricity and on potentially unstable oil supplies continue. Questions remain about the role of renewable energy and nuclear energy in meeting future electricity demand, particularly given concerns about fossil fuel carbon emissions. Securing adequate long-term investment in energy and infrastructure with volatile commodity markets is challenging, as is meeting national needs for both equity and economic efficiency. We've only scratched the surface on understanding the role of technology in economic and energy markets. And how OPEC members will respond over the next several years in the face of growing Russian and other non-OPEC oil exports and potentially weak oil demand growth remains problematic.

In the U.S., Congress has approved President Bush's selection of Yucca Mountain, Nevada, as the nation's first geologic repository for high-level nuclear waste, collecting the spent fuel from the nuclear reactor sites in 31 states where it is currently produced and stored. Congress also will be creating a new Cabinet level Department of Homeland Security that will affect how U.S. critical infrastructure, including energy and water infrastructure, is protected and secured.

In May 2001, President Bush issued the National Energy Policy Report of his interagency Energy Policy Development Group. That report, which sought to integrate US energy, environmental and economic policies contained over 100 energy policy goals and recommendations. While many of these have been implemented, many still require legislation. Both the House and Senate have now passed their respective energy policy bills and over the next several months, Conference Committee members will be trying to hammer out a compromise.

The USAEE has established a dialogue forum on our web site to facilitate such energy policy discussion and debate among our members. Thanks to Shirley Neff and Dave Williams, that site has posted the National Energy Policy Report, both the House and Senate bills, and a side-by-side comparison of those bills. I would invite you all to sign on (just click "forum" on our website – www.usaee.org) both to access these items and to participate in the dialogue and debate. You can post your own issues as well.

Have a wonderful summer. Enjoy your vacation and time with family and friends. I know I will.

Hope to see you in Vancouver in October!

Arnie Baker

Editor's Corner

This issue of *Dialogue* brings you two excellent papers by Vito Stagliano of Calpine Corporation and Gürcan Gülen and Michelle Foss of The Institute for Energy, Law & Enterprise at the University of Houston.

Mr. Stagliano's article, "Moving Power," documents the evolution of law, regulations, and organizations to deal with the transmission of electric power. It is clear that, although we've made headway in resolving the issues, this is still a "work in progress."

The paper by Dr. Gürcan Gülen and Dr. Michelle Foss addresses real-time pricing in power markets. They examine many of the price structures that have been created and experiments that have been conducted. The appetite of the market for real-time pricing is uncertain at best.

Please send new articles (or suggestions for articles) and notices for publication in *Dialogue*. Include news of chapter events and appropriate press releases. Items can be sent via e-mail (proberts@reliant.com or proberts@

(continued on page 2)

Editor's Corner *(continued from page 1)*

alumni.rice.edu), by Fax (713-207-0705), or by regular mail (15709 Singapore Lane, Jersey Village TX 77040-3035). If you have questions, comments, or suggestions, I can be reached by phone at 713-207-5059.

Paul Roberts

USAEE Student Scholarship Fund:A Call for Support

Started in 1997 at the San Francisco North American Conference, the USAEE is proud to continue its student scholarship fund. Funds are used to cover the cost of registration fees for students attending the annual conference of the USAEE/IAEE. Students must submit a written application and letter from their student advisor requesting that funds be granted. At the Houston Conference, thirteen students qualified to have their conference registration fees waived in an effort to share our conference experience, the field of energy economics and networking opportunities with other students. Further, inviting student participation at our conferences is one of the best mechanisms for recruiting new members to the USAEE.

The student scholarship fund has been generously provided by the support of the following organizations/individuals:

Conoco, Inc.	Joe Dukert	Hirokatsu Sugiyama
Michael Lynch	Andre Plourde	Exxon Mobil Corporation

Recognizing the need for interested and qualified graduates, many funding organizations view the program as supporting education as well as recruitment. The USAEE has started its campaign for scholarship funds for the 2002 North American meeting in Vancouver, British Columbia, Canada, October 6-9. Contributions have ranged from $50 to $2500. If you would like to receive information on how your or your company can become a supporter of this program, please contact Dave Williams, USAEE Executive Director at (p) 216-464-2785, (f) 216-464-2768, or usaee@usaee.org

Dialogue Disclaimer

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A Note from the Vancouver Program Chair

The program of the Vancouver conference is now set and people are getting excited with the quality and range of topics and speakers. Keynote speakers include the British Columbia Minister of Energy and Mines and the heads of major energy corporations in Western Canada. These highly respected individuals will address recent regional and continent-wide trends in electricity reform, natural gas development, offshore petroleum, alternative energy, and mergers and acquisitions.

The plenary sessions will cover topical issues with wide-ranging interests, including:

- Continental energy prospects,
- Energy security,
- Lessons from California's electricity experience,
- Offshore petroleum,
- Canada-U.S. natural gas trade,
- Sustainability of fossil fuels, and
- Innovations in energy regulation.

Judging from the overwhelming number of submissions to concurrent sessions, interest in the conference is very high. Even with 24 concurrent sessions, and the acceptance of alternate speakers for each of these, many proposed papers had to be turned away.

Topics of the concurrent sessions cover the whole range of issues covered by energy economics today. Don't miss this pivotal conference that can help you to make sense of energy markets in turmoil.

Mark Jaccard

*** USAEE WEBSITE UPDATED ***

If you have not been to usaee.org lately you are in for a surprise. Our new site has been rebuilt from the ground up, including a streamlined design, cleaner navigation and an easier search for information. We encourage you to visit usaee.org when looking for association happenings, news, conference and chapter information.

Some of the information you will find on our site includes:

√ Online Energy Discussion Forum
√ Overview/Objections of USAEE
√ Council and Chapter Presidents Listing & Contacts
√ Chapter News and Conference Information
√ Full Issues of USAEE's Dialogue
√ USAEE North American Conference Information
√ Links to IAEE's Energy Web Links and Member Database
√ USAEE/IAEE Membership Database

We're sure you will find our new site full of up-to-date information. Please feel free to drop USAEE Headquarters an email at usaee@usaee.org if you have any suggestions on how we can improve and expand our website.

!!! MARK YOUR CALENDARS — PLAN TO ATTEND !!!

Energy Markets in Turmoil: Making Sense Of It All

22nd USAEE/IAEE Annual North American Conference – October 6-8, 2002
Vancouver, British Columbia, Canada – Sheraton Wall Centre Hotel

We are pleased to announce the 22nd Annual North American Conference of the USAEE/IAEE, ***Energy Markets in Turmoil: Making Sense Of It All***, scheduled for October 6-8, 2002, in Vancouver, British Columbia at the Sheraton Wall Centre Hotel.

Please mark your calendar for this crucial conference. Some of the key selected themes and sessions for the conference are listed below. The plenary sessions will be interspersed with 24 concurrent sessions designed to focus attention on major sub-themes. Ample time has been reserved for more in-depth discussion of the papers and their implications> Plenary Sessions include:

Energy Security in the 21st Century
Session Chair: Robert Ebel

- Geopolitical Risks
- Growing Asian Import Dependence
- Reliable Suppliers – Russia, Central Asia, the Caspian

Continental Energy Markets Prospects
Session Chair: Leonard Coburn, U.S. Department of Energy

- Enhanced Regional Integration
- Common Energy Picture
- Harmonization on Standards

California Fallout: What Useful Lessons Can Be Learned?
Session Chair: Perry Sioshansi, Henwood Energy Services, Inc.

- What Went Wrong?
- Resolving the Situation
- Lessons for Other Jurisdictions

Offshore Petroleum Industry: Reflections on Moving Forward
Session Chair: Merete Heggelund, Norsk Hydro

- Economics of Offshore Projects
- Local Procurement for a Global Industry
- Environmental Issues

Canada – U.S. Natural Gas Trade Prospects
Session Chair: Campbell Watkins

- Resource Prospects
- Market Considerations
- Transmission Expansion

Fossil Fuels and Sustainability: Like Oil and Water?
Session Chair: Mark Jaccard, Simon Fraser University

- Decarbonating Fossil Fuels
- Sequestering Carbon
- Technology Synergies

Energy Regulation Trends and Prospects in North America
Session Chair: Michelle Foss, University of Houston

- What Kind of Markets are Being Built?
- How is Success Measured? By Price?
- How Much Restructuring is Needed for Electricity?

Vancouver, British Columbia is a wonderful and scenic/tourist place to meet. Single nights at the Sheraton Wall Centre Hotel are $224.00 Cdn. (less than $150.00 U.S. dollars – a phenomenal rate) per night. Contact the Sheraton Wall Centre Hotel at 604-893-7120, to make your reservations). Conference registration fees are $500.00 for USAEE/IAEE members and $600.00 for non-members. Your registration fee includes two lunches, a dinner, three receptions and numerous coffee breaks, all designed to increase your opportunity for networking. Special airfares have been arranged through Air Canada. Please contact Air Canada by calling 800-361-7585 (or 514-393-9494) and reference our group #CV625181. These prices make it affordable for you to attend a conference that will keep you abreast of the issues that are now being addressed on the energy frontier.

There are many ways you and your organization may become involved with this important conference. You may wish to attend for your own professional benefit, your company may wish to become a sponsor or exhibitor at the meeting whereby it would receive broad recognition or you may wish to submit a paper to be considered as a presenter at the meeting. For further information on these opportunities, please fill out the form below and return to USAEE/IAEE Headquarters.

Energy Markets in Turmoil: Making Sense Of It All

22nd Annual North American Conference of the USAEE/IAEE

Please send me further information on the subject checked below regarding the October 6-8, 2002 USAEE/IAEE Conference.

____ Submission of Abstracts to Present a Paper(s) _____ Registration Information _____ Sponsorship Information _____ Exhibit Information

NAME: ______________________________

TITLE: ______________________________

COMPANY: ______________________________

ADDRESS: ______________________________

CITY,STATE,ZIP: ______________________________

COUNTRY: ______________________ Phone/Fax: ______________________

USAEE/IAEE Conference Headquarters
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Real Time Pricing in Electricity Markets

By Gürcan Gülen & Michelle Michot Foss

Introduction

One of the primary reasons for the crisis in California was the gap between wholesale prices and retail prices that were capped. The inability to pass the increases in wholesale prices to end-users not only led to PG&E's bankruptcy but also prevented consumers from responding to price signals by lowering their consumption and pushed the system to its limits. Without demand-side response, electricity markets cannot be expected to function efficiently and market manipulation could become easier as the demand peaks and supplies tighten, which then jeopardizes the reliability of the system. Regulators seem to concur. In 1998, after the Midwest price spikes, FERC identified the lack of adjustment on the part of retail customers to prices as a contributing factor. In 2000, FERC issued its order accepting the market revisions in New England, and again acknowledged that "the lack of price-responsive demand is a major impediment to the competitive electricity markets."[1]

Braithwait & Faruqui (2001) carried out a simulation analysis of California data to show that, under a medium demand-response scenario, a mere 2.5 percent decrease in load during peak times could have lowered prices by about 24 percent. In addition, this reduction in load could help avoid most (if not all) of blackouts and brownouts.[2] The latter observation shows how important it is for consumers to receive the correct price signals from the perspective of system reliability. In 2000, the NERC acknowledged this point when it noted that to "…improve the reliability of electric supply, some or all electric customers will have to be exposed to market prices."[3] Clearly, for system reliability, a reduction in demand is an almost perfect substitute to building new generation and/or transmission capacity.

Bushnell and Mansur (2001) have shown that the average electricity consumption in San Diego decreased by roughly 6 percent in August 2000 (and similarly in September) and that the most of the reduction (9 percent) occurred between 4-7 pm (peak hours). Authors suggest that because of the uncertainty about the duration and the credibility of the rate increase, these results should be viewed as a lower bound on the demand reductions that could be achieved through pricing incentives. But, after the California State Legislature passed an amendment to refund the difference and re-establish a retail price cap in September 2000, demand rebounded in San Diego. Interestingly, these results were achieved without dynamic pricing approaches. Instead, customers waited weeks to see the impact of higher prices on their bills.

Could bigger savings be achieved by consumers if dynamic pricing approaches such as real time pricing (RTP) or time-of-use (TOU) pricing were being implemented? Could these methods help avoid brownouts and/or blackouts? Hirst (2002) shows that dynamic hourly pricing would have saved California consumers about $2.5 billion in 2000, or 12 percent of the state's power bill. A McKinsey & Co. study (2001) calculates that dynamic pricing could save the nation $10 to $15 billion per year. According to Colledge, et al. (2002), experiments with dynamic pricing in Texas led to a shift or curtailment of almost a third of demand from peak to off-peak periods.

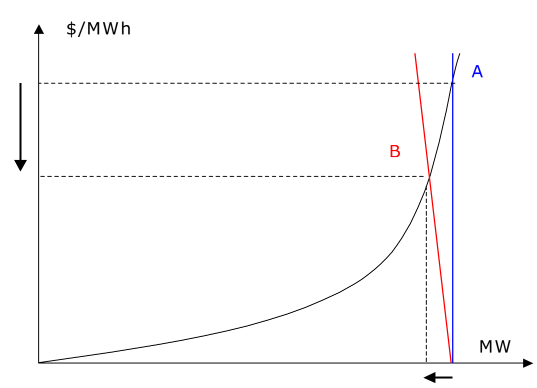
California already has real time meters for about 8,000 MW of load (rendered useless during the crisis due to the rate freeze) and is installing more. (The proposal before Summer 2001 was to get all customers above 200 kW demand on RTP at an estimated cost of $30 million.) Enel, in Italy, is setting up 27 million residential customers with advanced meters and associated communications devices. In addition to these somewhat government-mandated programs, there are also private sector efforts in the U.S. Puget Sound, Georgia Power, Florida Power & Light are among the leaders in experimenting with these programs.

Despite the economic justification, however, competitive suppliers in restructured markets (and even regulated utilities) are reluctant to move forward with dynamic pricing. Costs seem to be prohibitive, especially for smaller customers (although the threshold for small is dynamic as market conditions and technology change). In addition, there are concerns about customers' interest in these programs (and in switching suppliers in general). Finally, the past experience with these pricing schemes, especially under the DSM programs, is not encouraging even for larger commercial and industrial customers. An example from the recently opened Texas retail markets provides support for these concerns.

Economics of Demand Response

Per their nature, all energy commodity prices are volatile, but the analysis of the historical data shows that they revert to the mean (although the mean may change in the medium to longer term because of fundamental changes in demand, supply or both). Mean reversion is important because it implies that extremely high or extremely low prices are short-term abnormalities that will be eliminated when demand and/or supply respond to these price signals. This is the case for even the price of crude oil, which is influenced by OPEC, as well as for the natural gas price in the U.S. One would expect the same distributional characteristics to manifest themselves for other commoditized energy market including the one for electricity. One of the necessary conditions, however, is to allow the fluctuations in the wholesale market to be passed on to the retail market to ensure demand response.

Chart 1
Electricity Supply and Demand



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[1] See Endnotes at end of text.

Chart 1 compares the situation where this link is not established and hence the demand is not responsive to price (vertical demand curve) to the case where this link is established (at least partially) and the demand has an elasticity that is greater than zero. Hirst (2001) uses a similar chart to represent generator offers to the CalPX in June 2000. Point A represents what happened in California without demand response and yielded a price of $550/MWh for roughly 29 GWs of demand. However, using an elasticity of 0.1 (still very inelastic demand), point B could be reached where the price is $250/MWh for roughly 27.5 GWs of demand. This elasticity was analogous to the PJM's study of its market conditions on June 7, 1999. The ISO calculated that a 4 percent drop in demand could have lowered the price by almost 50 percent on that day. Similarly, based on data from the US and the UK, Braithwait & Faruqui (2001) calculated load-weighted elasticities ranging from 0.07 to 0.135. Note that these elasticity estimates are based on data from markets where only some of the larger customers are able to respond to market-based prices. It is possible to have more elastic aggregate demand if more users (possibly from all market segments) are enabled to respond to real-time prices.

Dynamic Pricing Methods

Real Time Pricing (RTP)

As demand fluctuates during the day, different type of power plants with different cost structures are brought on and off line as needed. This leads to fluctuations in the marginal cost of generation. Real time rates vary in higher frequency (15-minute to an hour) in order to reflect these fluctuations more accurately and hence to increase the economic efficiency by providing customers better price signals.

As one approach, the actual billing history of customers is used to create a baseline usage – amount paid on non-RTP rates for that historical usage. If demand in any period is higher than the baseline, the customer pays the RTP price. If demand is lower than the baseline, the customer receives a credit for load reduction at the RTP price.[4] As a result, in period t, the customer is charged according to the following formula:

$$P_{MC}(t)*[D_{ACT}(t) - D_{BL}(t)] \qquad (1)$$

where: $P_{MC}(t)$ is the marginal price; $D_{ACT}(t)$ is the actual electricity demand and $D_{BL}(t)$ is the baseline usage in period t.

The total bill (monthly, weekly, etc.) is calculated as the sum of all period charges within the bill period. Clearly, customers who can lower their consumption during peak hours below their baseline will benefit greatly from this arrangement. Customers can achieve large potential savings if they are able to switch and/or curtail load during emergencies. If, for any reasons, a customer is not able to deviate much from his/her baseline, there will be no significant (if any) difference in his/her bill.

RTP can also be used together with interruptible loads. Utilities have been offering interruptible contracts for a while now to mostly large users, who benefited from the lower rates. The risk of interruption by the utility has usually been very low. Combined with RTP, a customer accepts an interruptible load schedule instead of his/her baseline for certain periods and benefits when it reduces its load below the interruptible level. If the customer fails to reduce its load, it pays the marginal price times the difference between the actual and the interruptible level in addition to possible penalties. Then, formula (1) becomes:

$$P_{MC}(t_I)*[D_{ACT}(t_I) - D_I(t_I)] \qquad (2)$$

where: $D_I(t_I)$ is the subscribed interruptible level in period t_I.

Time of Use (TOU) Pricing

Although TOU rates are not set for as high frequency as RTP rates, they are also designed to reflect the fluctuations in marginal cost of generation during the day as the system load changes and different plants operate at different times. But, the TOU approach usually divides the day into several time blocks (usually two to five) and predetermines the rates for each block. As such, these rates cannot be as accurate as RTP rates in reflecting the marginal cost of generation. Nevertheless, they have some flexibility in distinguishing among different customer types. While residential and small commercial users may prefer a simpler rate structure, large commercial and industrial customers often prefer a more complex tariff structure, especially if they can see the savings.

TOU rates have to be provided for at least two time blocks to emphasize the difference between on-peak and off-peak hours. Further divisions as mentioned before are possible. In addition, the on-peak and off-peak rates may vary across days and/or across seasons. Rates are set ahead of time for a certain period (usually several months), which allows customers to get ready for switching and/or curtailing their load from on-peak to off-peak periods.[5] But, in order to design TOU rates, utilities and competitive suppliers have to determine their costs and convert their costing periods into rating periods. These two need not overlap, because on-peak periods, which are expensive for the users, may be too long to allow them the opportunity to switch/curtail load and/or there may be too many costing periods for the user to remember.

Experiments

Puget Sound Energy, Bellevue, Washington[6]

Puget Sound Energy (PSE) is the first electric utility to invest in real-time meters for all customer classes and the first electric distribution utility in the nation to provide TOU price and comparative TOU consumption information to all classes of customers. PSE subsidiary ConneXt developed the software that automates the meter reading process, which allows the company to match hour-by-hour energy usage with real-time energy-market pricing. Customers can plan and check their energy usage on PSE's web site, using the Personal Energy Management™ system. A pricing trial of this system was expected to continue through May 2002.

Since May 2001, about 300,000 PSE customers have been paying variable TOU rates for electricity. The customers pay about 30 percent less during off-peak hours than at high-demand times of day. Power-usage data from June and July indicate that TOU rates are promoting a strong conservation ethic among PSE customers. Customers paying these rates shifted about 5 percent of their load, on average, from the morning and early evening hours when public demand for power - and wholesale power prices - are highest. That 5 percent shift is in comparison to the peak-period power use of PSE customers who already are receiving detailed personal reports on the timing of their electricity consumption, but not TOU rates. In addition, customers paying TOU rates reduced their overall electricity usage in June 2001 by more than 6 percent compared to their June 2000 usage. In a July 2001 survey of 821 PSE customers paying TOU rates, 89 percent said the program has spurred them to shift some load to off-peak hours. 49 percent said they have cut their overall consumption. Nine in 10 said they would recommend the TOU program to a friend.

Georgia Power, Atlanta, Georgia[7]

Georgia Power has different TOU options. One option (TOU-4) for large users (>1,000 kW) has a monthly base rate of $475 and different rates between noon and 8 pm during weekdays for different loads. The prices also differ between June-September and October-May periods. The company also has TOU options for smaller commercial and industrial users as well as residential users. Residential model (TOU-REO-1) has a $10 monthly charge. Between June and September, on-peak kWh costs $0.1749 and off-peak kWh costs $0.05403. Between October and May, first 650 kWh is priced at $0.05403 and everything above is priced at $0.0302 per kWh.

Georgia Power also has RTP options that are based on the baseline usage methodology described above. One option (RTP-DA-1R) is available to all customers who are able to benefit from hourly price signals and can demonstrate and maintain a peak 30-minute demand no less than 250 kW. Hourly prices are determined each day based on projections of hourly running cost of incremental generation, transmission and outage costs, etc. An administrative charge of $155 or $250 for customers with loads larger than 1,000 kW and $175 and $270 for smaller customers will be applied. Those who pay the larger sum receive a computer, a printer and a modem. Those who pay the lower sum must provide this equipment in compliance with the company's specifications. There are also other RTP and TOU options.

Georgia Power lets large energy consumers track prices and cut use based on price. With the use of the Internet to inform 1,650 of its biggest business customers of price fluctuations, Georgia Power can save as much as 800 megawatts at a time (enough to power almost 225,000 homes). On certain days, customers reduce load by 30 percent during periods of $300/MWh power and by 60 percent during periods of $1,000/MWh power. There are some lessons learned from the Georgia Power experiment:

- Some businesses respond more than others: e.g., mining and chemical companies versus marble companies and colleges.
- Roughly 50 percent of the load responds.
- In general, customers with onsite generation are more likely to respond.
- Elasticities ranging from 0.03 for commercial customers to 0.3 for hour-ahead customers.

Duke Power[8]

Duke Power implemented a similar program starting with 12 customers in 1994. Currently, there are about 110 customers with 1,000 MW of load. With maximum daily price at $300-350/MWh, hour-ahead customers reduce load by 29 percent, day-ahead customers reduce load by 8 percent. With $1,500-2,000/MWh, 60 percent and 20 percent reductions for hour-ahead and day-ahead customers, respectively, are observed. This experiment also yields similar observations:

- Only some customers respond significantly to price changes: low price elasticity of 0.04.
- Customers with on-site generation respond significantly when the price is high enough to render self-generation economical.
- Customers with switching ability respond more (e.g., paper mills).

Florida Power and Light[9]

Florida Power and Light proposes a particular RTP metering system that can benefit small companies whose current TOU rate is too restrictive or who own energy management systems. Businesses who qualify for their proposed system have to be currently in rate classes GSLD-2, GSLDT-2, GSLD-3 and GSLDT-3 or GSLD-1, GSLDT-1 with demands greater than 1,000 kilowatts. The benefits to RTP are lower average pricing, no demand charges for incremental usage and hourly price variations. (See endnote 4)

Metering Use in the UK[10]

The electricity market uses 30 minute intervals to log consumption in order to build up a profile of electricity use over 24-hour periods, and until recently, customers wishing to take advantage of the competitive market were obliged to have a special meter installed which recorded the consumption every 30 minutes.

A trading system, which opens up the market to all customers including the residential sector has been geographically phased in since September 1998. Because half hourly metering may be too expensive for the majority of customers in this market opening, an alternative has been introduced which requires no change to the existing meter or the frequency of meter reading, but is based on assigning a 24 hour profile to the customer. The eight profiles assigned (two for residential and six for commercial & industrial users) are based on historic records from sample surveys conducted over many years, and are expressed as a series of 48 regression coefficients, and accounts for factors such as temperature, lighting up time and the type of day (e.g. Sunday, Bank Holiday, etc.). As we will see, ERCOT in Texas followed a similar approach to develop three profiles for small commercial users (<1 MW) but not for residential users.

These profiles were found inadequate to represent the variety among the customers, but there are strict requirements for the introduction of new profiles:

- The profiles can be allocated easily and unambiguously to each metering system in an auditable way;
- Profiles should be derived from and maintained through load research;
- Each profile is statistically different from any others that are in use;
- Each profile should be designed to reproduce average half hourly demand as accurately as practical within the class it represents;
- If a large number of customers move to the new profile, then remaining profiles are still coherent and robust;

As a result of these requirements, many considered dynamic pricing alternatives. Half hourly metering is considered an accurate but expensive solution, whereas profiling is low cost but potentially inaccurate, especially for residential users. In particular, the profiles make it difficult for an electricity supplier to calculate the profitability of all but the simplest tariff. One of the compromise solutions, *Reduced Data Profile Representation*, can be applied to reduce data volumes for each customer through regression modeling in the meter and occasional transmission of the reduced data set to the settlement agency, resulting in lower collecting and processing costs than half hourly metering and more accuracy than straight profiles.

An alternative is *Virtual Metering*, which models the consumption of the customer either within IT systems operated by the electricity supplier or within the Settlement system. The control algorithm would be simulated; identical or near identical parameters would be input along with any available total consumption data and associated profiles. This will result in a stream of half hourly data, which accurately reflects the consumption that can be input into the Settlement system with more confidence than straight profiles.

As can be seen, after more than ten years of a competitive electricity market with the highest rate of switching among residential customers, there are concerns about this segment of the market even in the UK.

Challenges

Costs Associated with Advanced Metering

Clearly, the utilities as well as competitive suppliers that are willing to provide these services will also have to upgrade their own information systems to manage the significantly increased data flow from their customers. Colledge, et al. (2002) estimate the cost of replacing or upgrading these systems in the range of $50 to $100 million for a midsize or large utility. While the regulated utilities may be concerned about regulatory approval of costs, competitive suppliers are more concerned about being able to recover these upfront costs.

Customers, on the other hand, will be expected to cover the costs of the installation and O&M costs associated with the advanced meters (interval data recorders – IDRs). One-time costs (meter + installation) associated with an IDR meter can range from $450 to $1,500 (the low end is based on IDR meters that can be acquired for about $200 per equipment in large quantities). Monthly fees for small users (<1 MW) range from $10 to $300.[11] Even relatively cheaper TOU meters ($80-$200 with similar monthly fees) can be too costly for small users. A third and more recent alternative is to use the power lines to transport consumer data. Although this is a fairly untested technology especially in terms of data-carrying capacity of these wires, Colledge, et al. (2002) estimate an investment of $160-170 per household with similar monthly fees.

Lack of Customer Interest

Except for the UK and, perhaps to a certain extent, PJM markets, smaller customers have not been switching their electricity suppliers. And, even in these markets, switching rates are ranging from only 20 percent to 40 percent depending on the customer type and there are doubts about the future health of switching.[12] California experiment with retail switching was declared a failure early on with Enron abandoning the market after losing upwards of $30 million in marketing. The program is officially suspended after the crisis in California. In Texas as well, residential and most small commercial customers are not signing up with new suppliers although it is still early in the Texas' experiment with competitive electricity markets and people may be more cautious after the California and Enron debacles.

As dynamic pricing and associated metering and energy services could be important for retail providers to compete, the reluctance to switch is concerning. Goett, et al. (2000) report the results of a retail choice experiment. One of the factors they used to measure the customer interest was the dynamic pricing alternatives. The results are not encouraging: the small/ medium commercial and industrial customers had an overall negative reaction to market-based rate structures. Hourly rates were considered worse than TOU rates, which were considered worse than seasonal rates. Overall, customers seemed to prefer fixed rates. Note that they focused on commercial and industrial users; it is highly likely that they would get similar negative reaction from residential users as well.

Some of these pricing methods were implemented under the DSM programs. In particular, there have been many studies that concluded there was little response from the businesses to TOU rates.[13] More than 50 percent of 123 IOUs surveyed by EPRI in 1985 offered TOU tariffs to residential customers, but less than 1 percent of the customers subscribed. Note, however, that most studies are from the 1980s and hence do not reflect the competitive market conditions and the price volatility that comes with restructuring nor the advances in metering and computer technologies.

At the same time, Tishler (1998) shows the potential value of even simple (two-period) TOU pricing by allowing for labor separability (i.e., the ability to switch labor and hence some production from on-peak to off-peak hours) based on an experiment in Israel. Unlike the previous studies, this assumption yielded a higher price elasticity and hence a greater response to TOU pricing. Nevertheless, the majority of evidence (statistical and/or anectodal) does not give confidence for the future success of dynamic pricing approaches, especially for smaller users.

Regulatory Uncertainty[14]

For dynamic pricing to be successful, rules and regulations concerning wholesale energy markets, transmission congestion, ancillary services and market power mitigation should be clearly set, remain stable and be consistent. For example, most states imposed rate discounts and/or freezes and established load profiles for at least some group of customers. Both approaches are inconsistent with dynamic pricing. Another consideration is the cost recovery for advanced metering infrastructure: Who will own it? Who will pay for it? What happens when customers switch? In addressing these and similar issues, consistency is also needed in determining the role of ISOs (or RTOs) in demand response as well as the role of state agencies versus the role of federal regulation.

The Texas Case: Ercot Profiles vs. Dynamic Pricing

In Texas' restructured electricity market, users with peak demand larger than 1 MW are required to have IDR meters and settle based on the reading of these meters. On the other hand, small commercial customers (<1 MW), which consume 75 percent of total commercial sector electricity use, are assigned one of the three load profiles: low load factor (LLF), medium load factor (MLF) and high load factor (HLF), depending on the customer's historical usage.[15]

Adding the residential customers to the mix, a significant portion of the load in Texas will remain non-responsive to real-time fluctuations in the electricity price. For the next few years, Texas is expected to have a comfortable reserve margin and with larger users already settling based on IDR reads, price volatility may not be a serious problem. Although prices are said to reach regularly the $1,000 cap in the balancing market since the market opened on January 1, 2002, many attribute these spikes to the adjustment period to the new market rules that market players are going through. In fact, there are recent reports that the balancing market is becoming more stable, partially thanks to the monitoring efforts of ERCOT and the PUC.

Nevertheless, it is very likely that profiles assigned by ERCOT to small commercial users will differ from their actual usage patterns as they would be determined based on IDRs. In particular, some would face lower costs under an IDR-based system than the profile-based settlement; and others would face lower costs based on the ERCOT profile. Clearly, the former group would be interested in IDR services if they were aware of this difference and if it were high enough to cover the costs.

Retail Electricity Providers (REPs) would also be interested in this group because their actual usage will mostly be cheaper to serve with less need for spot transactions (for energy and/or ancillary services) during peak times. The benefits from serving this group of customers can be further enhanced if they also have some curtailment and/or switching ability. This ability could lower spot costs (if any). So, the difference between the profile and the IDR costs can be split between the customer and the REP. *But, the decision depends on the condition that this difference is large enough to compensate for costs associated with installation and servicing of IDR meters*.

In Chart 2, we compare two different customers (both with <1 MW peak demand) in an average July day in Texas. Customer 1 is assigned an HLF profile and Customer 2 is assigned an MLF profile by ERCOT based on their historical usage and according to the formula provided in endnote 13.

Clearly, Customer 1 would prefer to settle under the profile rather than the IDR reads as the former implies a usage below the latter during the system peak hours (roughly between 13:00-20:00). Customer 2, on the other hand, would rather settle based on the IDR reads as these imply a significantly lower consumption than the profile during the system peak hours. Then, the question is whether Customer 2 would save enough to justify the costs associated with IDR metering.

We carried out a simple exercise to compare the costs of serving these two customers from the ERCOT system under the profile and the IDR. We used the following estimates of the ERCOT system marginal cost ($/MWh).

Natural Gas Price
($/MMBtu)

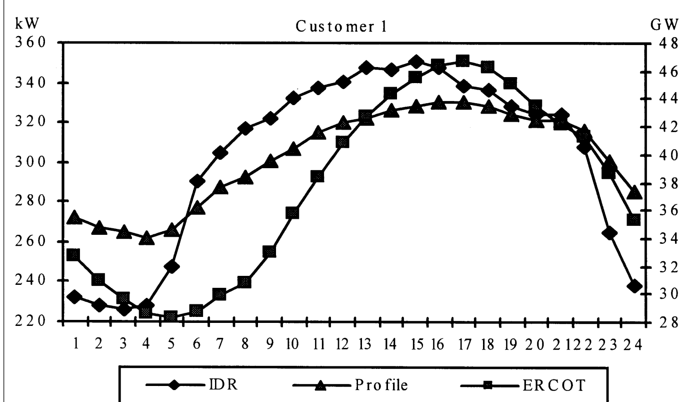
Load (GW)		1.50	3.50
	<22	10.00	10.00
	22-36	10.50	24.50
	36-52	16.50	38.50

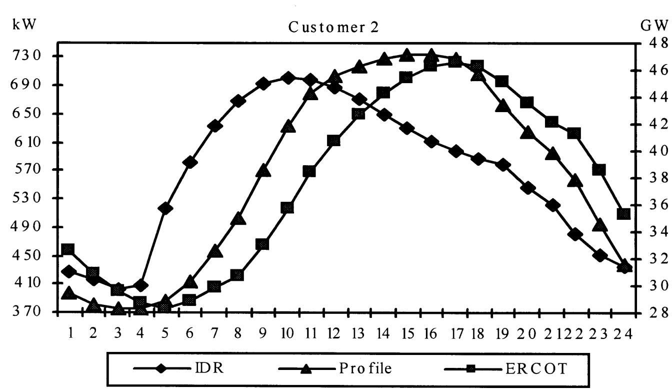
These values are based on the following observations about the ERCOT system: When the load is less than 22 GW (only during shoulder months during 1-5 am), nuclear, coal and lignite plants meet most of the requirements. Between 22 and 36 GW, most efficient gas-fired combined cycle and cogeneration facilities are called upon (average heat rate of 7,000). After 36 GW (May through September, most of the day), less efficient gas-fired steam and simple cycle plants are needed with heat rates increasing from 9,000 to 11,000 and upwards; for simplicity we picked an average heat rate of 11,000. In 1999, the actual ERCOT system load peak in August stayed below 52 GW, which we have taken as the end of our range.

Then, we calculated a typical day for each month where each hour's consumption was calculated as the average across the whole month for both the profile and the IDR. Then, we calculated the cost difference between the two across 24 hours of the typical day based on the actual ERCOT system load (1999) for each hour and the corresponding system marginal cost from the table above. Monthly averages were then aggregated by multiplying this daily value with the number of days in each month. Finally, the total annual cost difference was calculated as the simple sum of monthly values.

Based on these calculations, Customer 2 could save roughly between $575 ($1.50/MMBtu gas) and $1,100 ($3.50/MMBtu gas) in a year if it were settled based on the IDR reads instead of the ERCOT profile. Customer 1, on the other hand, could save between $124 and $376 under the ERCOT profile. These numbers confirm the expectations based on the visual observation of Chart 2.

Chart 2
Comparison of ERCOT Profile and IDR-implied Actual Use





Given that one-time costs for IDR meters range from $450 to $1,500 and that monthly fees range from $10 to $300, the decision is not straightforward. Although, annual savings of $575-1,100 are probably large enough to cover monthly fees, depending on the number and type of meters needed to provide dynamic pricing, upfront costs can deter investment both on the part of Customer 2 and on the part of the REP. There is always the possibility that these savings will not be considered by Customer 2 significant enough to even bother with inquiring about IDRs and RTP services, or that the REP may consider to serve this customer too costly. Also, note that Customer 2 is a fairly large user within the less-than-1MW category, with its July average peak near 750 kW and its overall peak actually near 1 MW (not shown in chart). If such large users are not likely to gain from these services, smaller users will probably be less interested.

Conclusions

Despite the economic justification of dynamic pricing approaches such as RTP and/or TOU, there does not seem to be sufficient market incentives for smaller customers and retail service providers to implement them. Although the threshold for defining the "small" customers is dynamic as market conditions and technology change, upfront costs seem to be prohibitive for residential and most commercial customers. The Texas case study indicates that customers with <1 MW peak demand (greater loads are required to have IDRs for settlement purposes) are not very likely to be interested in dynamic pricing. In addition, the smaller customers' interest in these programs and in switching suppliers in general has been fairly low where the market was open. Finally, the past experience with these pricing schemes, especially under the DSM programs, is not encouraging even for larger commercial and industrial customers.

Nevertheless, if the electricity markets continue to open up for competition, prices will become more volatile and customers may change their minds about these services in order to hedge their price risk. Improvements in metering technology would also encourage both customers and service providers to pursue RTP and/or TOU as costs will likely fall. Finally, concerns about system reliability may cause regulators and/or system operators to promote, if not require, these services to be offered by the service providers. But, even then, the threshold for what market segment (based on peak demand) should be required to have these services needs to be decided. As some of the studies sited indicate, all customers do not need to settle based on RTP in order to ensure system reliability. Developments in California, Texas, Italy and elsewhere indicate that this track will probably be seriously pursued.

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Endnotes

[1] For detailed discussion of these issues and references, see Hirst (2001).

[2] Also see Faruqui, et al. (2001).

[3] See Hirst (2001).

[4] See FP&L example at http://www.fpl.com/savings/efficiency/contents/real-time_pricing_program_rtp.shtml#P24_325.

[5] Borenstein (2001) points out, however, that the infrequency of adjusting TOU rates creates an environment where wholesalers may exercise market power.

[6] For details, visit http://www.pse.com.

[7] For details, visit http://www.southerncompany.com/gapower and see Hirst and Kirby (2001).

[8] For details, see Hirst and Kirby (2001).

[9] For details, visit http://www.fpl.com.

[10] For details, visit http://www.eatl.co.uk/products_services/

en_trading/future.htm.

[11] Colledge, et al. (2002) estimate monthly fees at around $3-4 for residential users. Our research of the experiments around the country, however, indicates a lower bound of $10 for monthly fees.

[12] See discussion of the UK profiles above.

[13] See Aigner and Hirschberg (1985), Aigner, Newman and Tishler (1994), Park and Acton (1984), Schwarz (1984) and Woo (1985).

[14] See Hirst (June 2002) for details.

[15] See discussion of the UK profiles above. ERCOT uses the following formula to calculate load factors:

$$AvgLF = \frac{\sum_{m=1}^{12} AHUse_m}{\sum_{m=1}^{12} MaxKW_m}$$

where $AHUse_m$ is the average hourly use and $MaxKW_m$ is the peak hourly demand for month m.

[16] Note that this exercise considers what it would cost to serve the customers' loads from the generation perspective and hence does not necessarily correspond to prices that could be charged to these customers under the Profile or IDR by the REPs. Naturally, the REPs' costs and profit margins should be incorporated into actual end-user prices. This may imply larger savings for the customers, depending on how much the REPs are able to save in their wholesale and spot purchases after IDR-based services start and how much they are willing to share with the customers.

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Moving Power

*By Vito Stagliano**

Precis

A decade ago, the U.S. Congress set out to break the monopoly that for the previous fifty years had produced and delivered electric energy to most Americans. The Energy Policy Act (EPAct) of 1992 created the independent power generation industry and shifted the burden, as well as the financial risk of new plant construction from ratepayers to shareholders. EPAct also authorized the Federal Energy Regulatory Commission (FERC) to order incumbent utilities to interconnect independent generators to the transmission grid and to provide transport service. In 1996, the FERC issued order 888 to ensure open access to the grid, and followed it in 1999 with Order 2000, which directs transmission owners – mainly vertically integrated utilities – to relinquish control over the grid's operation to an independent agent.

With independent producers currently accounting for near 20% of national generation capacity, the Congressional intent of a vibrantly competitive power sector has been largely achieved. The regulatory intent of open access to transmission, so that ***all*** power can reach markets at reasonable cost, remains problematic. The interstate transmission system is the new regulatory battleground for the jurisdictional divide that has always separated State and Federal authority over the national electric system. FERC's transmission policy - and the States' response – will determine if and how the markets for power will be organized and managed by Regional Transmission Organizations (RTOs). It will also determine whether the power sector's restructuring process will be brought to a successful conclusion.

Context of Transmission Decisions & Response

In Order 888, the FERC sought to impose upon transmission owners the requirement that they provide transmission service to others of the same quality that they provided to themselves. In the East, the order led to the further evolution of long-existing, tight pool organizations into Independent System Operators (ISOs). The first ISO was the PJM Interconnection, which also designed the first real time market for energy in the United States. California moved next to create the statist CaISO as part of a legislated restructuring process that was to prove disastrous. The Electric Reliability Council of Texas (ERCOT), which is, uniquely in the U.S., almost entirely under the jurisdiction of the State Public Utility Commission, transformed itself from a regional reliability council into an independent system operator in late 1996. New York and the six New England states followed suit, albeit with a more problematic history of market design.

No other ISOs beyond the original four (plus ERCOT) were conceived or proposed to the FERC in the latter 1990s, although transmission owners in the Midwest entered into what proved to be a slow-moving process to organize the Midwest ISO (MISO). Given its limited authority to wrest control of transmission assets through divestiture, or to force ISO creation by other means, the FERC eventually sought to jawbone compliance to its vision of open and non-discriminatory access to the national transmission system by means of Order 2000. The Order, which was issued in December 1999, directed FERC-jurisdictional utilities to voluntarily participate in a Regional Transmission Organization (RTO) of their choice, or justify to the FERC why they should not. Order 2000 spurred a flurry of fresh negotiations, but no deterministic filings, to form the Alliance RTO (RTO) in the Midwest, Grid Florida, Grid South, Desert Star (later West Connect), SE-Trans and RTO-West.

Under new leadership, frustrated by the slow pace of negotiations for RTO formation and by the scope and configuration of the resulting organizations, the FERC in 2001 took the unusual step of ordering two settlement conferences, under the leadership of senior Administrative Law Judges (ALJs). The ALJ for the Northeast conference sought to orchestrate a merger of ISO-NE, NY-ISO and PJM-Interconnection, to thereby create a unified RTO covering a substantial U.S. and Canadian market geography. New England transmission owners complicated the already complex proceedings by tabling a proposal to create a for-profit independent transmission company that would operate under RTO oversight. In the Southeast, the ALJ intended to bring together RTO proposals that were still nascent, and seek a unified organization for Grid-Florida, Grid-South and SE-Trans.

The settlement proceedings proved a failure, and served in the end to galvanize State opposition to what was interpreted as FERC over-reach in regard to the type of RTO that the States should have to support. An unexpected result of the conferences, however, was the decision of PJM-Interconnection to study its trading patterns and reach conclusions substantially at odds with the FERC's settlement conference objectives. PJM-Interconnection determined, in fact, that the more economically efficient "merger" prospect lay to the West rather than to the North. It consequently entered into an agreement with the MISO to form a common market – eventually the largest in the world – while retaining separate operational and corporate structures. Later, the NY-ISO and the ISO-NE also undertook a union, having discovered by cost benefit analysis that their merger could produce economic benefits in excess of a quarter million dollars per year. [1]

In 2002, further turmoil erupted when the FERC determined that the ARTO proposal, which from the beginning had been in competition with the MISO, did not meet Order 2000 criteria for scope, size and configuration. The FERC ordered the ARTO members, many[2] of whom had earlier withdrawn from the non-profit MISO to join the for-profit ARTO, to negotiate entry either into MISO or into PJM-Interconnection. The FERC also rejected the RTO application of the members of the Southwest Power Pool (SPP) and ordered its largest participant, Entergy, to either join the MISO or the SE-Trans. In the wake of these orders, SPP joined MISO, Entergy joined Southern in SE-Trans,

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[1] See endnotes at end of text.

and American Electric Power (AEP), the driving force of ARTO, looks ready to join PJM-Interconnection. In the Midwest, an unusual union of Xcel[3], Alliant, MidAmerican, Omaha Public Power, Nebraska Public Power, and Lincoln Electric Cooperative joined to form TRANSLink, an independent, for-profit transmission company that will operate under the oversight of the MISO. Also operating under the MISO umbrella are the American Transmission Company of Wisconsin and the International Transmission Company of Michigan.

In sum, after a decade of effort, the three Northeast ISOs are fully operational, with associated markets that work reasonably well. A fourth, MISO, is functional if not fully operational, albeit without an organized real time market. The fifth, CaISO[4], functions without FERC approval, under the direct jurisdiction of the State of California, and without a real time market. In all other areas of the nation, RTOs remain works in progress.

Policy Theory & Practice

A simple majority of three Commissioners is all that is required to set policy for the $250 billion electric power industry. It is notable that no Commissioner in living memory has brought to the five-member FERC direct experience in the generation, transmission, distribution or marketing of electric energy. The FERC's sweeping statutory authority, granted by the Federal Power Act of 1935, extended by the National Energy Act of 1979, broadened by EPAct in 1992, is nearly Olympian. FERC decisions are of course reviewed by the Courts, which have historically affirmed the Commission's decisions. FERC's major policy initiatives have been remarkably few in its 67-year history[5], all the more surprising its activism of the last decade, both in regard to the electricity sector and the natural gas industry.

It is notable that the FERC successfully restructured the natural gas interstate pipelines in the mid-1990s with Order 636. The positive experience of Order 636 may have given the Commission a false sense of confidence in regard to what it could accomplish with the power sector, and on what model. Two critical differences in the respective legislative mandates for natural gas and electricity reform illuminate the ease of restructuring the former and the difficulty of restructuring the latter. First, Congress deregulated natural gas wellhead prices in 1989, leaving no role for FERC to determine, as it must for electricity, what is a just and reasonable price for gas at wholesale. Second, the FERC has unequivocal power of eminent domain in regard to gas pipelines, which it lacks for interstate transmission lines.

An old adage states that to make policy is divine, to implement it human. The well intentioned, if timid Order 888 is a case in point. The FERC's clear intent to eliminate discriminatory access to transmission access had to be carried out by the very investor-owned utilities (IOUs) that were the target of the Order. Needless to say, the IOUs moved with something less than alacrity to change their traditional practices and allow open access to their portion of their grid. They were aided and abetted in their selective application of Order 888 by the implied (and overt) protection afforded by their States' regulators. State's protection of discriminatory behavior by native utilities can only be explained by jurisdictional jealousy, since it cannot be explained be justified on economic grounds, given the direct connection between open access and price competition.

Tensions between State and Federal regulation has seldom been as pronounced as it is with regard to the creation of RTOs. A majority of States have viewed RTOs as infringements on their jurisdictional powers, and have remained furthermore unconvinced that RTO-administered markets can result in prices equivalent to just and reasonable rates. States have not, however, been any more successful than has the FERC in organizing ISOs or markets within their state boundaries, nor in establishing viable retail markets for power, and not incidentally, also for natural gas. Indeed, the most economically catastrophic ISO experience of the last decade took place in California. There, the State, by a combination of legislation and regulation, created in 1996 an ISO and Power Exchange that proved so flawed[6], in concept as well as execution, as to drive one of the nation's largest utilities into bankruptcy, and expose the State to over $20 billion in remedial liability.

However, RTO policy remains problematic also because the structural model is antithecal to sound business practice. First, transmission owners, who are overwhelmingly vertically integrated utilities, have little incentive to divest their assets and organize them, as was done with natural gas interstate pipelines, into independent, diversified enterprises capable of earning a competitive return on equity. The FERC has been more miserly with equity returns on transmission - typically less than 10% - than it was when the gas pipelines were restructured.[7] Second, in the absence of divestiture, the RTO model requires transmission owners to relinquish control over their assets, even as they retain ownership. This model, which has no equal in any other industry, establishes a disincentive for new investment on the part of both the owner and the operator because neither can claim unencumbered ownership rights. Third, the ISOs/RTOs thus far established are non-profit organizations that cannot be held to any meaningful legal accountability because they own no assets and are not liable for bad performance. The consequence of these economically questionable and regulatorily uncertain conditions is that investment in transmission has fallen dangerously behind investment in new generation, and is now barely $2.0 billion per year[8], mostly financed by independent generators for purposes of interconnection. Investment in maintenance may have fallen even more dramatically, as evidenced by the incidence of transmission loading relief.

RTOs are required by FERC to create and operate real time markets for energy. The designers of RTOs, and of concomitant market structures, are historically regulated utilities and their present day regulators, whose experience with open and competitive markets is limited at best, or entirely inexistent. It is not therefore self-evident why these organizations, whose entire formative history was in the world of cost based rates, should be now charged with the task of creating America's competitive markets for power. Interestingly, those who are relegated to the periphery of RTO design are the independent generators and energy marketers, in other words those who have assumed the financial risk that was once carried entirely by ratepayers, and who presumably know something about competition, risk and reward. It may therefore be less than coincidental that, after a decade of effort, most of the nation's 158,000[9] miles of high voltage wires remain more or less firmly under the control of the incumbent utilities, and that only three provincial markets of relatively modest size are functioning effectively.

What Matters

Markets have not historically been designed by government agencies. Rather, they have evolved from a common – private - interest in trade. Governments in due course have intervened to regulate the behavior of market participants, in order to secure the public interest that is expected to result from competition. It is therefore far from clear that the FERC will succeed in its effort to see that proper markets are created for the power sector, and that these function competitively. What is clear is that if the market structures are in any way flawed, then the remaining functions of the RTO matter little, if at all. This is because the complexity in transmission policy is not in the operation of the grid, for which expertise is available, tested, broad, and deep. Indeed, it is a credit to the skill of the hundreds of engineers who staff the nation's 140 control/dispatch centers that the transmission system has continued to function effectively, even as it has accommodated a virtual explosion of new transactions.

The policy complexity is almost entirely in the constitution of the markets. In restructuring parlance, glib mention is often made about the inevitable commoditization of electricity. The reality is that electrons do not behave like carbons or metals or pork bellies. There are laws of physics at play in the movement of electric energy over long and short distances, and there is the fact that electricity cannot be economically stored for later use. Furthermore, in no other market structure is there a requirement to balance supply and demand instantaneously, every instant.

Markets do not behave like engineered systems. Markets are messy, unpredictable, volatile, and sometimes irrational. However, as Churchill said of democracy, markets are superior to all other alternatives. Simply, no better means has been found to determine the economic value of things. Still, regulators accustomed to stable rates that can be fixed in time and space are unnerved by the behavior of markets. They wonder how markets can possibly deliver the equivalent of those just and reasonable rates that are their frame of reference. They are right to wonder. Markets can only deliver…prices.

The scope, size and configuration of power markets are the critical factors in the formation of RTOs. The FERC, which had been focused almost entirely on the system operation part of the RTO equation until recently, finally has recognized the need to provide guidance as to what constitutes an acceptable market structure. The Commission will soon issue a notice of proposed rule on a standard market design (SMD), which will presumably incorporate the best elements of the nation's cumulative experience. Some analysts fear that the experience reflected in the proposed rule is limited, and perhaps overly reliant on the PJM model. It should therefore not come as a surprise that the RTOs, especially those without tight pool experience, will take the SMD as more guidance than blueprint. States are already claiming the right to local exceptions and are warning, in some cases, that the FERC may not impose a market structure of any kind unless it first demonstrates that its benefits will outweigh the costs.

What has been learned so far about market structure and governance is probably sufficient to at least theoretically avoid a repetition of the markets that have failed. In sum:

- Multiple trading elements are necessary to constitute a competitive power market:
  1. A real time physical market for energy, administered by the RTO,
  2. Management of congestion by market means: locational pricing, financial transmission rights (FTRs) that are auctioned massively and frequently, and a secondary market for FTRs,
  3. A competitive market for ancillary services,
  4. Day ahead and forward markets for energy, preferably larger than any single RTO's geography, and administered by independent market operators,
  5. Futures/forwards (financial derivatives) markets to manage price risk.
- Markets confined to a single State are likely to be less competitive than those that encompass broader regions. Liquidity is the key to competitive prices, and this requires a significant number of market participants engaged in statistically significant number of transactions.
- Markets for power should be greater than the mere aggregation of pre-existing franchises, otherwise the dominant franchisee – typically the incumbent utility – will merely transform itself from monopolist to monopsonyst.
- Markets should provide reliable price signals for new investment to ***solve*** constraints and congestion, and not merely to reflect their cost in the cost of doing business.
- Markets should have clear and enforceable rules.

Policy Priorities

The first rule of policy is to above all do no harm. Much harm has been done in the last decade of trial and error in the quest for the power sector's competitive end state. The next steps in the restructuring process should be deliberately, carefully taken, with a view to limiting further institutional experimentation, among other reasons because public institutions are expensive to establish and difficult to reform once bureaucratized. The FERC should therefore be commended for having thus far settled the mantle of legitimacy on only one RTO, the MISO. On the other hand, the fact that PJM, NY and NE ISOs have not been granted RTO status, though they have accumulated greater operational experience than has MISO, is not easily explained. It is worth emphasizing, in support of FERC caution, that those who file to create RTOs are the incumbent transmission-owning utilities. These are not disinterested parties, their motives understandably to protect the interests of their shareholders.

The self-interest of the native utilities must be weighed against the public interest, however, if the FERC is to achieve the policy goals that have eluded the nation for a decade. To that end, an RTO's filing utilities should be made to relinquish decision-making over the RTO-to-be as soon as the initial proposal is accepted by the FERC. Second, for economic efficiency, transitions from company rates to RTO rates should take no more than five years to accomplish. Third, to ensure system reliability and operational efficiency, RTOs should be required to achieve full functionality within one year of approval by the FERC. Fourth, markets should become operational concurrently with RTOs, and this can be accomplished most efficiently by widespread use of already developed and tested software. Finally, jurisdictional utilities that fail to comply with RTO adherence and market organization policy should forfeit their right to market based wholesale rates.

In the end, the actual number of RTOs that will assume control of the national grid is less important than the size and liquidity of the markets that evolve around each of them. Indeed, the more competitive the market, the greater the number of RTOs, or independent transmission companies, that can be accommodated within it. The goal should be the achievement of the largest, most competitive regional market, not necessarily the largest RTO. In cases where the size and scope of the RTO is likely to produce a sub-optimal market, the FERC should impose common markets upon multiple RTOs.

Conclusion

The power sector touches every life in the nation. Indeed, life would be unimaginable without reliable and economic electric power. It is merely by an accident of history that the power to make policy for the economically critical electricity industry has been vested in a five-member regulatory agency. The burden of history is upon the FERC, which has indeed been transformed in the last decade by its role as an agent of change. The FERC has also been scarred by the unintended consequences of some of the decisions it has issued in the last three years, and by its inability to police the markets under its jurisdiction. The FERC is blamed, by and large unfairly, for California's electricity debacle, but with reason for having failed to correct California's market flaws. It is blamed, with greater justification, for the slow and unsteady pace of its deliberations on RTOs, and for its unwillingness to impose sanctions for non compliance with its stated policy of non discriminatory open access to the grid. In any case, what seems essential now, in order to successfully conclude the next phase of the restructuring process, is, in the words of T.S. Eliot, "a hand expert with sail and oar."

Endnotes

[1] NYISO-ISO-NE "RTO Costs and Benefits Analysis," released 15 May 2002

[2] The MISO members who withdrew from MISO in 2001 were: Commonwealth Edison, Illinois Power, and Ameren.

[3] Xcel is a multi state holding company whose transmission assets straddle the Eastern and Western Interconnections. The proposed TRANSLink could therefore hold the key to transfer of power between the two Interconnections.

[4] In May 2002, CaISO filed at the FERC a proposal for a new market structure that, if approved, would allow it to come into compliance with FERC Order 2000.

[5] The Federal Energy Regulatory Commission was known as the three-member Federal Power Commission until reorganized during the Administration of Jimmy Carter and brought under the general jurisdiction of the Department of Energy in 1979.

[6] California law required all power generators to bid into the Cal-PX run real time spot market. Utilities were prohibited from forward purchases to mitigate the high volatility of the spot market. The CAISO operated a flow model that prevented accounting for congestion in the day ahead schedules. Load serving entities were required to buy supply in the Cal-PX at market prices but charge their retail customers rates frozen by the PUC. The California market model provided no direct link between supply and demand functions, and made no provision for growth in demand to be met by investment in new generation or transmission, or both.

[7] In the early period of Order 666 implementation, the FERC granted to pipelines returns on equity as high as 15% in order to encourage vertical dis-aggregation and divestiture. The strategy was successful because the majority of pipelines are today profitable, diversified enterprises.

[8] EIA data

[9] EIA data for transmission above 230kV, both AC and DC.

USAEE 2002 – 2006 Strategic Plan – Overview

Throughout 2001, USAEE members of the Strategic Planning Group met and discussed with the USAEE Council a long range Strategic Plan for the association. At the January 2002 USAEE Council meeting, Council voted unanimously to accept the plan. Below please find the mission statement for the association as well as a brief overview of the tasks under development as well as their goals within the Strategic Planning Group.

MISSION STATEMENT

The United States Association for Energy Economics is a nationwide non-profit organization of business, government, academic and other professionals that advances the understanding and application of economics across all facets of energy development and use, including theory, business, public policy and environmental considerations.

To this end, the United States Association for Energy Economics:

- *Provides a forum for the exchange of ideas, advancements and professional experiences.*
- *Promotes the development and education of energy professionals.*
- *Fosters an improved understanding of energy economics and energy related issues by all interested parties.*

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- Increase and broaden our regular and sustaining membership base through improved member products and services and marketing outreach to other professional organizations concerned with energy.
- Support energy policy community dialogue by:
  - Hosting one or more daylong energy policy seminars each year on front-burner topics
  - Conducting regular member energy policy surveys and disseminating the results
- Stimulate North American Conference attendance and Sponsorships through improved programs and conference services, broader marketing, improved media coverage, increased student participation and expanding benefits of sponsoring organizations.
- Provide increased support to current Chapters and Chapter start-ups as needed.

If you are interested in becoming involved in one of the strategies listed above, please contact Dave Williams at USAEE Headquarters, email: usaee@usaee.org

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9-11 August 2002, Southwest Renewable Energy Fair at Flagstaff, Arizona. Contact: Amy LeGere, Event Manager, Greater Flagstaff Economic Council, 1300 S Milton Road, Suite 125, Flagstaff, AZ, 86001, USA. Phone: 928.779.7658 Email: swref@gfec.org URL: www.gfec.org/swref

19-23 August 2002, Cogeneration Technology at Madison, WI. Contact: Conference Coordinator, College of Engineering University of Wisconsin-Madison, The Pyle Center, 702 Langdon Street, Madison, Wisconsin, 53706, USA. Phone: 800-462-0876. Fax: 800-442-4214 URL: http://epdweb.engr.wisc.edu/brochures/A953.html

17-18 September 2002, Asia Regional Farmout & Exploration Promotion Forum 2002 at Sheraton Suites, near the Galleria, Houston, USA. Contact: Babette van Gessel, Group Managing Director, Global Pacific & Partners, 2nd Floor, Regent Place, Cradock Avenue, Rosebank, Johannesburg, 2196, South Africa. Phone: 27 11 778 4360. Fax: 27 11 880 3391 Email: info@glopac.com URL: www.petro21.com

19-20 September 2002, 7th Annual Deepwater Technologies and Developments at Renaissance Houston, Houston, TX, USA. Contact: Julie Bach, Marketing Manager, Strategic Research Institute, USA. Phone: 1-646-336-7030. Fax: 1-212-967-7973 Email: jbach@srinstitute.com URL: www.srinstitute.com/cr229

23-24 September 2002, Platts PJM Regional Conference at Hyatt Regency on the Inner Harbor - Baltimore, MD. Contact: Platts Global Conferences, Platts, 3333 Walnut Street, Boulder, CO, 80301, USA Email: plconf@platts.com URL: www.conferences.platts.com

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25-26 September 2002, Mexican Investment Opportunities: Oil, Gas & Energy 2002 at Sheraton Suites Houston, near the Galleria, Houston, USA. Contact: Babette van Gessel, Group Managing Director, Global Pacific & Partners, Private Bag X61, Saxonwold, Gauteng, 2132, South Africa. Phone: 27 11 7784360. Fax: 27 11 8803391 Email: info@glopac.com URL: www.petro21.com

25-27 September 2002, Herold Pacesetters Conference at Hyatt Regency in Old Greenwich, CT. Contact: Bianca Smothers, Conference Director, John S. Herold Inc., 14 Westport Ave., Norwalk, CT, 06851, USA. Phone: 203-847-3344. Fax: 203-847-5566 Email: bsmothers@herold.com URL: www.herold.com/confmenu.htm

25-27 September 2002, Petrolac 2002 - Energy Ministers Meeting at Houston, TX. Contact: Information, Petrolac, USA Email: contact@petrolac.com URL: www.petrolac.com

26-27 September 2002, Oil & Gas: Restructuring Business Strategies Through Technology Management at Houston, TX. Contact: Strategic Research Institute, USA. Phone: 1-888-666-8514 Email: sri@dmgltd.org URL: www.srinstitute.com/CR232

27-29 September 2002, New Directions in the International Conference on Earth Sciences and the Humanities: Experiments in Interdisciplinarity at Colorado School of Mines, Golden, Colorado USA. Contact: Robert Frodeman, Professor, Colorado School of Mines, Liberal Arts & International Studies, Stratton Hall 301, Golden, Colorado, 80401, USA. Phone: (303) 273-3585. Fax: (303) 273-3751 Email: rfrodema@mines.edu URL: www.mines.edu/newdirections

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9-11 October 2002, 25th World Energy Engineering Congress at Georgia World Congress Center, Atlanta GA. Contact: Ted Kurklis, Exhibit Manager, Association of Energy Engineers, POB 1026, Lilburn, GA, 30048, USA. Phone: 770-449-1595. Fax: 770-448-1575 Email: ted@aeecenter.org URL: http://www.aeecenter.org/weec

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