Competitive Electricity Markets and Innovative Technologies: Hourly Pricing Can Pave the Way for the Introduction of Technology and Innovation

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For most electricity consumers, the transition to a "competitive market" has been unremarkable—if noticed at all—because the transition has come almost entirely at the wholesale level, where few consumers are involved. Not much (and, from my perspective, not enough) has changed in the retail market for electricity or in the consumer's understanding of electricity services to make for effective competition. As an early proponent of a competitive retail electricity market, Sempra Energy is urging the adoption of at least one step we believe will enhance competition significantly: the imposition of hourly retail electricity prices. This is an essential step to create competition in the retail end of the electricity market and, ultimately, more effective competition throughout the electricity sector. This market reform will have the added benefits of speeding the development and introduction of new technologies that can transform the electricity industry and spurring innovative new products and services.

The Department of Energy should keep in mind the compelling link between public policy and new technology. Retail competition in the domestic electricity industry will have the long-term effects of reducing prices, increasing the range of products and services available to consumers, and improving the overall delivery system. But those benefits cannot be achieved without the addition of an essential element of a competitive market: presenting accurate price signals through the use of hourly prices reflecting wholesale price fluctuations in the broader regional commodity markets for electricity. The hourly pricing of electricity at the retail level should induce many customers to reduce on-peak consumption, bringing pressure on suppliers to drop prices. Furthermore, exposing peak prices to customer choice can also spur the development and

[1]Note that the contents present the views of their authors, not necessarily those of the Department of Energy, RAND, or any other organization with which the authors may be affiliated.

introduction of smart services and alternative products. If consumers respond to high peak prices by reducing peak-period consumption or by trying new products and services, reliability will improve as electric transmission and distribution system operating margins are increased. If demand reductions and/or price reductions are sustained, environmental benefits can be captured as inefficient and dirty generating plants are forced into retirement. And, where automated meter-reading systems are deployed to facilitate hourly pricing, local distribution companies will improve their outage management capabilities as these systems also deliver high-resolution, real-time system information to operators. Sempra Energy encourages the Department to endorse policies incorporating the accurate portrayal of electricity prices to consumers and lay the foundation for and support the development of emerging energy technologies that take advantage of market conditions fostered by those policies.

Wholesale Market Volatility

As industry insiders and analysts know, the value of electricity is highly volatile. Prices in wholesale electricity markets vary hour-to-hour across each and every day, influenced by system loads, costs of production, the availability of transmission capacity, operating conditions on the local distribution system, and other market conditions As electricity demand reaches its daily peak, these factors combine to increase wholesale prices until demand abates, usually in the early evening, and prices fall back. During extreme peaks, prices can race skyward, particularly when some unique but not necessarily unpredictable influence, e.g., a plant outage, transmission constraint or extreme weather condition, enters the picture. Normal daily wholesale-price fluctuations may range from lows of under twenty dollars per megawatt-hour to fifty dollars at peak. But summer peak prices ten to twenty times “normal” are becoming common, with occasional nightmarish prices of over $5000 per megawatt-hour having been reported in several regional markets in recent years. A recent study by the Electric Power Research Institute indicates that electricity represents the most volatile commodity being traded today, with price risks several orders of magnitudes greater than for foodstuffs, equity and debt instruments, or any other energy commodity.

Retail Electricity Prices: Hiding the Story

At the retail end of the market, consumers, including those customers who currently procure their own electricity supplies, are insulated from and largely oblivious to the nature of the wholesale market and its daily perturbations. In the

first place, no regulatory jurisdiction has required hourly electricity pricing at the retail level. The thought of having every consumer, especially residential customers, receiving multipage bills detailing their usage across the twenty-four hours for each day of the billing cycle conjures up daunting public-relations issues. Thus, retail electricity customers continue to see monthly weighted-average supply prices in their bills. Price-averaging, a holdover from pre-competitive, regulated days when electricity was fully bundled, smoothes out and masks daily price fluctuations, including extreme prices. This situation breeds the problems evidenced in California this past summer. Where peak-period wholesale prices remain high across several days or weeks, consumers, completely unaware that their consumption contributes to the amplitude of both overall system demand and wholesale prices, receive monthly billings well above their expectations. Even worse, they receive the bad news too long after the fact, without any recourse or opportunity to adjust their usage levels. The absence of meaningful demand-side responses to prices constitutes a major impediment to achieving optimal competitive market conditions. And, as discussed in greater detail below, average pricing, with its lack of detail, stunts the competitiveness of exciting new technologies with the potential to transform energy markets.

The following table shows the extent to which consumers can be caught unawares as to whether electricity markets were in frenzy or calm. The inaccuracy of retail prices does not foretell the problem that may be lurking in the current month's wholesale market. Electricity has always represented a fundamentally volatile market and the absence of real-time and hourly prices can make for unpleasant surprises under the market structures that are evolving in today's wholesale markets. That this volatility is unappreciated by consumers constitutes a fundamental flaw in the retail electricity market, a flaw that will prevent the development of a robust competitive electricity market.

City	Period	Peak Wholesale Price (per mwh)	Retail Energy Price (per kwh)	Implicit Discount
Boston	April 2000	$6000.00	$0.0369	99.4%
Los Angeles	August 2000	$350.00	$0.0536	84.7%
New York	August 2000	$1671.08	$0.0857	94.9%
Philadelphia	June 2000	$906.84	$0.0500	94.5%
San Francisco	May 2000	$350.00	$0.0544	85.6%
Washington, D.C.	June 2000	$297.78	$0.0499	83.2%

As indicated by the table, consumers paying energy rates of under four cents per kilowatt hour would no doubt be greatly surprised that included in that rate were hours in which the price reached six ***dollars***. As the Department pursues end-use efficiency and seeds other new energy-related technologies, it should keep in mind that, under current billing protocols reflecting average monthly prices, individual consumers in the marketplace will necessarily compare the efficacy of adopting new practices and technologies against the retail price and not the peak price of electricity. If the only available retail price is the monthly average, the value those new practices or technologies could provide to both the consumer and society at-large will be hidden, and will be lost.

The Problem with Price Averaging

The virtue of price-averaging, namely its simplicity, is also its greatest fault: it is *too* simple. The weighted-average pricing convention prevents the retail consumer from appreciating the product value of electricity, which is not as constant as the convention makes it appear. Price-averaging trains the retail consumer to believe, contrary to everything known about electricity markets, that the choice of flipping a light switch or turning on an air-conditioner at mid-afternoon during the hottest day of summer is identical to that same choice later in the evening. It is not.

The fundamental problem in the retail electricity market is that price-averaging masks the true costs of consumption, thereby precluding any meaningful demand response to rising prices. What is missing from the retail electricity market is a pricing discipline that describes electricity products, e.g., peak power versus choosing to shift demand to lower-cost periods versus a more efficient appliance, to the consumer accurately and precisely. Recently, the New York Independent System Operator adopted a price cap of $1300.00 per megawatt-hour as a proxy for demand responsiveness, specifically justifying its action on the grounds that the absence of a market response to high prices on the consumer side constitutes a serious market flaw.

Consumers need to understand that the value of electricity is not constant, but varies with system demand. Under the current market structure, the product value of electricity is set in the wholesale market by generators and marketers, who price based on their perceptions of shortage and scarcity in both the generation picture and delivery system. If, however, consumers were provided a variety of prices reflecting the differing product values of electricity under various shortage and scarcity conditions, consumers could participate in setting

prices by affecting the supply-demand equilibrium from the consumption end of the equation.

I am convinced that consumers would reject high-priced electricity if they could, and buy low-cost electricity in its place wherever possible. As an example, two percent of California's summer-peak electricity demand is caused by residential clothes drying. Another three percent is caused by residential cooking.[2] If residential consumers knew that electricity consumed at 2:00 PM would cost ten times as much as electricity consumed four hours later, barring unusual circumstances and emergencies most customers would seek to limit their 2:00 PM purchases. Most would prefer to reject the high-priced peak electricity product, shift their usage to a lower-priced period, and pocket the savings. But weighted-average pricing gives them the wrong message.

Price-averaging has the disastrous effect of stalling competition and precluding the best benefits of adopting competitive market structures. Competition is stalled and innovation thwarted because, in the retail electricity market, every competitor and each new product or service must compete against the entire monthly wholesale market. That is, competitors essentially compete against every kilowatt of installed capacity that may be brought to market and every kilowatt-hour that may be consumed since the retail price bundles them all together and presents them at a single price to the consumer. That's a tough business proposition and the ultimate barrier to entry.

Price-averaging effectively sets the demand elasticity of alternatives and choices too low. The best retail competition would occur at the highest priced increments of the market, but the retail price of those increments are represented to consumers at levels substantially below cost. Under today's pricing regime, the consumer comparing the cost of alternative products and services, weighing whether to shift demand to lower cost periods or foregoing consumption altogether, would compare the below-cost price for peak power against the price of alternatives. In many cases, the societally economic choice is uneconomic to the consumer because of the subsidies peak power receives in the retail marketplace. This results in fewer alternatives being selected than should be the case. Demand-side services and appliance efficiency suffer the most from these distortions.

New entrants in the retail end of the electricity business are forced to resort to offering their own weighted-average bundles in order to compete with price-

[2]Keese, William, Chairman, California Energy Commission, "Electricity Supply and Adequacy in the West," Address to the National Conference of State Legislatures Energy Project, July 18, 2000.

averaged power available from the default service provider, usually the incumbent utility, only to receive lukewarm response from consumers who would rather not be bothered with choices offering them savings expressed in pennies per month.

Weighted-average pricing presents electricity as an undifferentiated product. Energy service providers are essentially forced into a competition with a "generic" product, generally being provided by a century-old incumbent with a strong local brand identity. Even worse, customers who stand to benefit most from innovative products and services, that is, those with high-cost load profiles, receive the greatest subsidy under flat-rate pricing and competitors who might serve them are shut out of the market. There may well be a market suited to a flat-rate, "anytime" electricity product, but it does not span the entire spectrum of customers. Hourly pricing can reveal the customers that can be served under a flat price and, more importantly, those who should not be.

Under regulated conditions, consumers were protected from shortage and scarcity pricing by implicit price caps set by regulators. Prices were cost-based and capped at levels meeting local definitions of "prudence." But such regulatory protections are limited in the wholesale markets and consumers, whether they know it or not, are paying prices ranging from under two cents to over five dollars per kilowatt-hour. Exposing the prices at the high end of the spectrum would only serve to reduce them. Few customers would pay the five-dollar prices a kilowatt-hour can draw under extreme market conditions. But price-averaging encourages them to do so. Even worse, those customers who do not purchase peak power, rejecting its high prices, unknowingly subsidize those who do the opposite. And because they are not the customers who participate in competitive electricity procurement or are sought by marketers, the smallest customers tend to be the ones who pay the greatest subsidies.

An important aspect of competitive markets is the range of choices and voluntary decisions the consumer has the ability to select and make. In today's retail electricity markets, consumers have few choices, most of them only marginally distinguishable from one another. Even the largest industrial consumers receive product offerings mimicking generally available wholesale market products. What consumers need, and do not by and large perceive they have, is the ability to refuse to buy and take a pass, the ultimate element of what I would describe as true choice. Since weighted-average pricing obliterates (or at least obscures) the benefits of rejecting certain electricity products, e.g., the peak-period kilowatt-hour with shelf prices of one to five dollars each, consumers don't deny themselves of an otherwise objectionable electricity purchase when they should. For competitive retail markets to emerge, this must change.

From the Sempra perspective, retail electricity markets are in a state of incomplete competition. We see fewer and fewer competitors serving local distribution customers. A recent study indicated that only ten percent of the energy service providers entering the newly opened California market of 1997 remained in business in 1999.[3] Disturbingly, the "default supply service" provided by Sempra, a plain-vanilla service, has become the service of mass choice. This is not what was envisioned when retail competition was adopted. Further structural changes in the retail marketplace will get us closer to the benefits of competition. We believe the next key step in market evolution is the implementation of hourly pricing in the retail sector. This provides for higher-resolution differentiation in electricity products (and, yes, electricity at 3:00 p.m. on a peak summer day is a different product from everything else) and enables competitors to pick and choose which electricity products and services they will either offer or compete against. That these alternative products and services would come available transfers the power of choice from wholesale market participants to the retail consumer, completing the competitive evolution of the electricity market. At this stage, the benefits promised from competition would finally be delivered.

Competitive Benefits

Among the most important benefits of hourly pricing would be a more precise understanding of the price elasticity of electricity demand. As consumers reject power at some prices and consume more at other price levels, we would get a better understanding of optimal energy-system design and resource planning. This is not only important for traditional grid-based electricity products, but it is essential to developing product substitutions and alternative products and services.

Demand Response

There are a number of benefits that would evolve from empowering consumers with true choice. As discussed previously, I believe consumers would reject high-priced electricity in most cases in favor of either foregone consumption or demand shifting. This would reduce peak demand and prices, ease system

[3]Byrne, Warren W., "Green Power in California: First Year Review from a Business Perspective," Foresight Energy, p.14. Of the 250 energy service providers registered to do business in California in 1997, only twenty-seven remained registered in 1999. Only ten were cited as "actively marketing." These companies spent over $250 million to recruit but 200,000 customers out of an eligible meter population of 25,000,000.

constraints, improve operating margins and system reliability, and perhaps reduce the operation of (or even result in the closure of) environmentally or economically high-cost plants that only run at peak.

A demand response to wholesale-market prices would reduce retail prices immediately. Clipping peak demand, even a little bit, would have favorably disproportional impacts on wholesale electricity prices, since most regional markets operate under one-price-clears-all regimes. Eliminating the last increment of demand will ratchet incremental price-setting bids downward, reducing the clearing price paid to the entire supply pool. This can only intensify the competition at the clearing-price end of the wholesale market, potentially eliminating the sometimes out-of-control leapfrogging of daisy-chained contracts that occurs in today's marketplace. Other consumers would search for alternative products and substitutes rather than accept peak-price volatility, creating a demand for innovative products and services, particularly those based on innovations that would avoid consumption of on-peak power.

As part of its recent study on the potential impacts of competition, the Department of Energy compared the possible impact time-of-use pricing could have on retail electricity prices.[4] The study forecasted the impacts of demand elasticity across 108 product segments (six seasons, three types of day, three periods per day, two parts per period) on retail prices using three consumer scenarios. The three scenarios tested flat-rate pricing, time-of-use pricing under moderate demand elasticity, and time-of-use pricing under high demand elasticity. Both scenarios using time-of-use pricing resulted in lower nationwide electricity prices.[5] Under the moderate demand elasticity case, a 1.5 percent change in demand for every ten percent increase in price was forecasted to result in overall retail price reductions of three percent nationwide, with savings at least twice as great occurring in Texas, California-Nevada, New York and the Mid-America Interconnected Network states.[6] These price benefits will be foregone without time-of-use pricing and metering.

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[4]"Electricity Prices in a Competitive Environment," Energy Information Administration, U.S. Department of Energy, Office of Integrated Analysis and Forecasting, DOE/EIA-0614, Washington, D.C., August 1997 (updated September 1999). The study did not segment consumers into different groups and it was acknowledged that different consumers would bear different demand elasticities.

[5]*Id*., at 30. The study broke the country into thirteen regions, generally using the North American Electric Reliability Council regional designations, with some of the regions subdivided for greater study resolution. The study indicated that two of the thirteen regions would suffer higher prices under competitive conditions generally, due to their current resource mix. Low-cost coal generation in the Mid-Continent Area Power Pool and low-cost hydroelectricity in the Pacific Northwest Region of the Western System Coordinating Council starts these regions with embedded costs below marginal generating costs. *Id*., at pp. 51-52, 57-58.

[6]This is a net price savings taking into account two countervailing effects that would raise prices: general national load growth patterns; and, the increasing cost of mid-peak and off-peak electricity due to increased consumption during these periods caused by load shifting.

Demand responsiveness can be enhanced greatly through the addition of market protocols enabled by hourly metering and real-time pricing. Among the most prominent of these is the emerging market for load-reduction bidding. In simple terms, under certain market conditions customers "sell" load reductions, effected through self-curtailment or the use of proprietary generation, into the system and are paid to reduce consumption during peak periods. A number of these types of programs are sprouting up around the country, emplaced by both utilities and energy service providers who see the flexibility of certain customers to curtail as a valuable asset worth capturing and monetizing.[7] Hourly meters can improve the precision of measuring and compensating the benefits of customer curtailments.

This development fits the long-standing forecasts of a number of energy-industry analysts who have touted the benefits of an electricity market in which "negawatts," i.e., load reductions or demand management practiced on the consumer-side of the meter, would be bought and sold. Implementing hourly pricing structures would pave the way for the further development of load-reduction technologies, trading systems and the appliance improvements that would permit the smallest of customers to participate in negawatt markets.

New Products and Services: Traditional Genus

Unbundling the electricity product into its various hourly components would have the salutary effect of allowing consumer decisions, whether manifested in rejecting power at high

prices or buying alternative products and services, to govern the evolution of the electricity marketplace and the pace of technology, product and service innovation. The current state of competitive electricity markets and unitary pricing conventions will never achieve this result. Rather than have consumers make the key decisions about the products and services they want, legislative intervention and regulatory proceeding after regulatory proceeding defines the nature of competition. Consumers in large part sit on the sidelines, wondering what all the fuss is about. There is a lot of room for new products and services to restructure the electricity market, particularly in peak periods, and we should set

[7]The New York Power Authority has engaged over sixteen megawatts of load reductions in its programs. "NYPA Program Eases Strain on City Electricity Supply," *EnergyCentral*, August 3, 2000. Several vendors of the supporting software systems required, such as Apogee of Atlanta, Georgia, and Silicon Energy of Alameda, California, have signed up utilities as clients. The California Public Utilities Commission has authorized the use of demandside bidding for Pacific Gas & Electric and Southern California Edison. See CPUC Resolutions E-3619 (July 1999), E-3624 (August 1999) and E-3650 (April 2000).

the stage for innovators rather than regulatory economists and lawyers to make the market.

If and when this happens, there are a number of new products and services that would become more competitive if retail prices more accurately reflected the cost of electricity. For example, gas-fired air conditioning, thermal energy storage and distributed generation are in most cases (and even then only at best) marginally competitive under weighted-average electricity pricing. But the competitiveness of these products increases dramatically as grid-delivered electricity is broken into several time-differentiated products using hourly prices to reflect the variable cost of wholesale electricity. The concept of using distributed resources to supplement the delivery capabilities of regional electricity grids has been discussed for many years. Under competitive market conditions, technologies for determining the range of optimal conditions under which distributed resources should be dispatched and for facilitating the automated dispatch of distributed resources when those conditions are met are essential.

The notion that energy service providers could, if given the proper market conditions, create a distinctive product identity for different kinds of electricity is demonstrated by the success of "green power." In most states where customers can select their supplier, competitors offering power generated using renewable fuels and otherwise bearing environmental benefits have created distinctive brands and marketing strategies. Green power has found its market despite the fact that it generally commands a premium price as compared to more "generic" electricity. The American Power Exchange reports green-power premiums in the Midwest markets at between $0.50 to $8.75 per megawatt-hour for the current year, with volumes reaching over 200,000 megawatt-hours in June 2000. California market premiums reached an extraordinary $29.95 per megawatt-hour in November 1999, with monthly averages ranging between two and five dollars.[8]

Even more remarkable is that the market for green power is not limited to fringe environmentalist consumers. Mainstream commercial and industrial customers whose corporate identities include commitments to environmental responsibility and sustainable development are also willing to pay above-market prices for green power. The California operations of Toyota Motors USA are powered exclusively by green power. This represents over 40 million kilowatt-hours

[8]APX Midwest and California Market Exchange Data, www.apx.com/markets; August 2000. Over ninety percent of the 200,000 California electricity consumers that have switched service providers since the opening of retail competition have elected green power. Moore, Michal, Commissioner, California Energy Commission, "Green Power Wins Big in California," *Electricity Daily*.

annually, five percent of this coming from wind generation. Over 1000 facilities of the United States Postal Service have committed to using green power under a three-year agreement with GoGreen.com; the contract covers more than 30 million kilowatt-hours per year. It is not hard to imagine that the green power market could be extended if, rather than paying a premium for renewable resources, consumers were offered *lower bills for shifting their consumption to off-peak hours when fossil plants were not operating*. If green power is a legitimate market niche, other classes of electricity products can surely also exist. In the event hourly pricing is implemented, I would expect to see new product identities to be developed by energy service providers, say an "off-peak" product and perhaps even free nights and weekends where tied to ancillary services.

New Products and Services: Multiplexing the Infrastructure

Among the most exciting opportunities for new products and services in the electricity industry is the potential for achieving the technological convergence between the electricity and telecommunications industries. Powerline-carrier technology has been available commercially for several years but emerging software and hardware solutions indicate the vast potential for unlocking the latent broadband network capabilities of the national electricity grid. In the past, the high-frequency harmonic noise in and the generally uncontrolled and chaotic topology of the power system and local cabling presented daunting obstacles and challenges to using power lines and electrical wiring as a communications medium. But several techniques, including popular spread-spectrum protocols used in consumer electronics bus automation systems for controlling appliances in so-called "smart houses," are coming available that could transform power lines and interior cabling into a new communications architecture. Imagine the extent to which Internet connectivity would be improved if every room of every standing structure carried information in addition to electricity! Such a communications system would present the opportunity to embed termination and translation electronics into every end-use appliance, automating the purchase of electricity at the outlet. This would require upgrades to the metering technology currently in place, turning the meter into a communications relay and information gateway. Smart houses, after all, would not work with dumb meters.

There is also the near-term potential for using powerline-carrier technologies as the fundamental telemetry conveying consumption and pricing data to and from the meter. It is hardly farfetched that new metering technologies could be coupled with Internet-based appliance-control systems to allow retail consumers to accept or reject electricity prices in real-time. Several consortia of preeminent information-technology providers, including Sun Microsystems / Netscape,

Oracle and Excite@Home, are developing technologies that would turn every flat appliance surface into an Internet-connected user interface. Including electricity-consumption controls and displays within that user interface hardly would be a trick and taking advantage of ubiquitous interior, local and regional electricity wiring would speed the adoption of these interfaces as well as enhance their compelling functionality. When these technologies come to market, a consumer could well see the real-time price of electricity on the door of a microwave oven or clothes dryer, and elect then and there whether to flip the switch or wait fifteen minutes for a better electricity price. What an electricity market that would be!

Incentives for Investment in Infrastructure

In addition to the changes that may occur in the dynamic equilibration of supply, demand and market prices, increasing competitive pressure in the electricity industry would spur investment in critical infrastructure. Other deregulated industries experienced dramatic increases in investment as their markets grew more competitive and attention focused on service quality and availability.

In the domestic telecommunications industry, immediately following their divestiture from AT&T, the regional operating companies tripled their fiber-optic cable during 1985 to 1987, a trend followed by other competitors. This decreased the regional companies' cost-per-meter of line to under twelve cents by 1995, well under the 1980 figure of $2.50 per meter. Similarly, investments in digital switching were accelerated as a result of competition, once again resulting in lower costs to consumers and enhanced service capability.

Passenger air service saw a similar pattern of investment. Nationwide airport expansions and upgrades were triggered by the growing number of carriers and flights. The national air-traffic control system has seen over $3.8 billion of investment to accommodate the needs of today's market.

Comparable investment in the electricity industry could be made in the transmission grid, either to improve local reliability or enhance capacity. At present, investment in transmission upgrades and expansion projects has fallen sharply in the last few years as uncertainty in the market clouds both responsibility and returns.[9] In addition to bulk upgrades, NERC has been citing

[9]The North American Electric Reliability Council forecasts that only 6,978 miles of new transmission lines will be built during the next ten years, representing a little more than a three-percent enhancement to current facilities, well behind the pace of demand growth and transactional requirements. See "Reliability Assessment: 1999-2000, The Reliability of Bulk Electric Systems in North America," May 2000, at p. 7.

with increased frequency the need to bolster local voltage support on transmission and distribution systems.[10] A number of emerging technologies for improving transmission-system operations and reliability are coming into the market. Flexible AC transmission system technologies offer the potential for highly precise control and measurement of power flows. Corona cameras that reveal transmission-line electromagnetic-field phenomena facilitate the detection of faulty lines and substation components. Video sag meters are replacing theory-based algorithms for determining line ratings and limits. Increasing the level of competition in the industry and clarifying competitors' roles, rights and rewards could only help to reverse current investment trends, speeding the addition of new capacity and installation of these exciting new technologies.

Implementing Hourly Pricing for Retail Electricity

Pricing electricity and billing retail consumers on an hourly basis would require more frequent meter reading than is presently the case. Fortunately, a number of technologies exist to facilitate hourly meter reading. Radio-based polling systems can read meters and record consumption levels at two-minute intervals, far more precision than is necessary for the purposes of implementing hourly retail pricing. Interconnection with existing telecommunications systems offers another medium for transmitting meter data. Both usage and billing data can be combined into real-time and high-resolution views accessible by customers via the Internet.

A price-based billing convention with a few understandable tiers would also simplify the type of commodity-price-reporting local newspapers, web sites and other information providers might offer to retail consumers. In a small box placed next to the weather, newspapers could report the hours of the day falling into the typical billing tiers (two to three cents, three to four cents, etc.). Consumers could adjust their electricity consumption accordingly. To reflect extreme prices or prices otherwise above the last numerically represented cents-per-kilowatt-hour tier, information sources and the monthly billings could use the notational convention my favorite restaurant uses for its (typically expensive) catch-of-the-day specials, a simple *A.C.* This notation could become a well-understood signal that electricity prices are volatile and could be extreme. My expectation is that *Ante Cibrum* (i.e., before eating) warnings and pricing would be much more effective at curbing electricity demand on extreme-peak days than

[10] Ibid, at p. 34.

broadcasting last-minute pleas to consumers to conserve energy voluntarily as is done today.

Sooner is Better than Later

The incomplete competition found in today's retail-electricity market is undermining the long-term prospects for a robust and dynamic marketplace. Energy service providers in jurisdiction after jurisdiction are exiting the market or limping through quarter after quarter of high customer-acquisition costs and thin or nonexistent margins. If they exit, they will leave a trail of customers who will be reluctant to switch again. This adds to the message being played in the current market that the best choice is to stand pat. Allowing this situation to continue will increase the barriers to entry for future competitors and ensure the failure of worthy energy service providers and their innovative products and services.

Hourly pricing in the retail electricity market is at its heart the essential information consumers need to exercise choice and make real decisions about their energy habits and consumption. Weighted-average pricing hasn't taught consumers much about electricity products and choices and, if anything, it has taught them some woeful fictions. With pricing information reflecting the highly variable product value of electricity, consumers would be positioned to demand more benefits, products and services from their service providers and thus armed to participate in the shaping of the electricity market and the competitive landscape.

In a retail market offering unbundled hourly prices, consumers would have true choice. They could reject high-priced electricity in favor of lower prices or reduce their consumption altogether. They would be empowered to make real decisions and exert a huge influence on the prices paid in upstream wholesale markets, giving them some measure of bargaining power with wholesale producers and marketers. Any stubbornness on the part of the wholesale market to meet consumer demands would provide incentives for new entrants with alternative products and services to enter the game. Those alternatives have the potential to provide ancillary but directly related results such as improved system reliability and power quality, environmental benefits or energy efficiency, creating the wholistic market for energy products that regulators have attempted to forge for decades.

Markets work. But the incomplete competition of today's retail electricity is missing key elements that might otherwise encourage consumer participation, true choice and market evolution. Hourly pricing of electricity would be a huge

first step to achieving a real market. Sempra firmly believes that this next step should be adopted sooner rather than later so as to speed the proliferation of competitive benefits to the consumer.