TELLUS INSTITUTE | BOSTON | MARCH 1, 2007

A Failed Experiment

Why electricity deregulation did not work and could not work

The massive national experiment in electricity deregulation — launched by over a dozen states more than a decade ago, in the wake of the Reagan revolution — has failed on multiple counts. Intended to reduce electricity rates, deregulation instead increased rates. For the 10 months through October 2006, average rates in deregulated states were 55 percent higher than in regulated states. Volatility has also increased, and reliability has decreased. This report explains why deregulation failed.

Richard Rosen, Ph.D.
Marjorie Kelly
John Stutz, Ph.D.

TELLUS INSTITUTE
for a Great Transition

A poster child for the nation's failed experiment in electricity deregulation is Montana, where the tale began with a slap-dash decision. At the end of the 1997 legislative session — after most deadlines had passed — Republican majorities in the House and Senate suspended rules to allow the late introduction of a deregulation bill. Despite its 100-page length, it was rammed through with almost zero debate. The disastrous consequences have been unfolding ever since.

Montana Power Co. — which had provided the bulk of the state's power for nearly a century and had lobbied heavily for the bill — immediately began selling off the utility assets Montanans had paid for over generations. In a deal engineered by Goldman Sachs, the profitable utility once worth $2.7 billion was transformed into a telecommunications company that would soon go bankrupt. The 2003 *60 Minutes* program on the fiasco was titled, "Who Killed Montana Power?"

The aim of the whole project, ostensibly, was lower consumer prices. Instead, the spot market for electricity hit astronomical highs in 2001. Today, Montanans pay the highest electricity prices in the region. The legislature in January 2007 was sorting through some 100 utility and energy bills vying to be introduced in the 2007 session. Among them: an attempted re-regulation of Montana's utility sector.

Welcome to the world of electricity deregulation. In this ill-fated national experiment, launched in the market euphoria of the Reagan revolution, more than a dozen states deregulated in the late 1980s and early 1990s. This massive experiment, now more than a decade old, has been a failure. Via the supposed magic of competition, deregulation was expected to deliver lower rates. Instead, a Tellus Institute study shows that regulated states have remained relatively protected, while deregulated states have faced substantially higher prices. For the ten months through October 2006 — the latest data available from the Department of Energy — average rates in deregulated states were 55 percent higher than in regulated states.

And the gap is widening. Deregulated states are getting more and more expensive with each passing year. The Tellus study shows that between 2005 and 2006, average rates in regulated states rose 7.6 percent, while in deregulated states they rose a substantially higher 12.3 percent.

With deregulation, the pursuit of profit replaced concern for the public interest. Before deregulation, utilities had an obligation to provide electricity reliably, and regulators saw that this responsibility was met. After deregulation, power companies in California, for example, failed to build plants to keep up with rising demand. They strategically waited and used market power to boost prices and withhold power. What went wrong is the topic of this report. It looks at why deregulation did not work and in fact could never have worked.

Understanding what's wrong with the deregulation of electric generation is vital, because electric power is central to modern society. Global power demand may double in the coming two or three decades if greenhouse gas constraints are not established, and modern economies are becoming more deeply dependent on electricity, vulnerable to disruptions and constraints. At the same time, the electric power sector generates 40 percent of all carbon dioxide emissions.

The issue is politically critical today, as many states wrestle with the ruinous aftereffects of the failed experiment. California suspended retail competition in 2001. Montana acted in 2003 to delay deregulation. Many states put price caps in place to delay the worst effects, including Illinois, Ohio, Pennsylvania, and Virginia. For many states, the issue remains contentious and unresolved.

At the federal level, the nation will soon face a political turning point as a new chairman of the Federal Energy Regulatory Commission (FERC) will be appointed when Joseph Kelliher's term expires in June 2007. And in the courts, a landmark ruling is expected — possibly as early as this spring — in a federal appeals court case challenging deregulation as an illegal breach of FERC's mandate to regulate prices in the public interest.

In the broader social and ecological picture, energy is emerging as a defining issue of the new century. Energy is a master resource on which all of society depends, yet we can no longer depend on stable supply and unfettered use. Society faces three converging energy crises, all of which will affect electricity. These crises are potently interconnected, magnifying the risks.

Three converging energy crises:

- **Global warming,** which will require society to adopt carbon constraints and thus limits on the use of fossil-fuel power.
- **Peak oil production,** which will lead fossil-fuel prices to soar, not only for petroleum but for natural gas and coal. In a deregulated environment based on marginal

pricing — which much of the nation has now in electricity — scarcities will allow producers of these other fuel sources to command higher prices.

- **Electricity deregulation,** which means many states no longer can regulate prices and plan effectively. States deregulated not only in the wrong way, but at the wrong time.

There may still be hope for a positive outcome, because solving our energy crises could yield unexpected benefits. Since energy is a central resource, transforming our approach to it opens the possibility of reorienting society more toward sustainability.

PART I: THE HISTORY AND PROCESS OF DEREGULATION

For more than a century, electric utilities in the U.S. were vertically integrated monopoly providers. To prevent investor-owned utilities from using monopoly power to charge unfair prices, utilities were regulated by state public service commissions (PUCs) on a cost-of-service basis. There was central management of the four steps of providing electricity: generation, transmission, distribution, and retail sales.

In the late 1980s and 1990s — as Reagan-era enthusiasm for markets heated up, and companies like Enron lobbied successfully — the notion caught on that electric utilities should be deregulated and face competition, much as airlines, railroads, and trucking did in the 1980s. The idea was to treat electricity not as a public good but as a commodity provided by competitive businesses.

> FERC endorsed a pernicious form of market mechanism, known as marginal pricing, which drives rates for all forms of power up when natural gas prices soar, as they have in recent years.

Many states made no change, retaining the vertically integrated, cost-of-service model. But in California, New York, New England, Michigan, Texas, and other states, a complex process of restructuring began. Vertically integrated utilities were broken up. Transmission and distribution remained on a cost-of-service basis, which used to represent about 40 percent of electric bills. But at the wholesale level — where generation is sold to distributors — prices were set by markets. Many states also, in theory, deregulated at the retail level, allowing consumers to buy power from anyone willing to serve them. In practice, retail competitors rarely stepped in, and most did so only to serve large, industrial customers.

One result was that, with factories in Detroit able to buy power from Texas, power was moved around the country far more than before — creating unnecessary demands on transmission infrastructure.

Another result was that much regulatory oversight shifted to Washington. FERC now had oversight of transmission, where prices continued to be set on a cost-of-service basis. More importantly, it also regulated generation, which is where market prices came into play.

The questionable policy of marginal pricing

FERC endorsed a particularly pernicious form of market mechanism, known as "marginal pricing," which tended to drive rates up. Problems with this are discussed in greater detail below, but in brief, marginal pricing means the price of all power generation is pegged to the most expensive form of power: those plants "at the margin" that are turned on last. Generally this means natural gas-powered plants. Marginal pricing can become disastrous when natural gas prices soar, as they did in recent years. One study in Virginia found, for example, that natural gas represented only 6 percent of total generation in one district. Yet when it spiked, it set the price for coal and nuclear power as well, which represented 94 percent of generation and had substantially lower production costs. Marginal pricing is not the only problem with deregulation, but it is a key reason electric power costs are higher in deregulated states.[1]

Consumer advocates say that in decid-

WEIGHTED AVERAGE RETAIL PRICE OF ELECTRICITY IN RATE-REGULATED STATES AND DEREGULATED STATES WITHOUT RATE CAPS IN 2006 (CENTS/KWH)

All Customers	2002	2003	2004	2005	2006 Jan-Oct.	Average Annual Growth 2002-06	Annual Growth 2005-06
Rate-Regulated States	6.37	6.53	6.70	7.07	7.60	4.5%	7.6%
Deregulated States Without Rate Caps in 2006	9.01	9.39	9.61	10.50	11.79	7.0%	12.3%
Difference between rate-regulated and deregulated states	41%	44%	43%	48%	55%		

Note: Deregulated IL, OH, PA, and VA are included with regulated states due to existing price caps. CA is included with regulated states, though it suspended retail competition in 2001. MT, which acted to delay regulation in 2003, is included in regulated states. Deregulated states used in calculations here are CA, CT, DC, DE, MA, MD, ME, MI, NH, NJ, NY, RI, and TX.
Average retail price is weighted by electricity sales.
Source: Monthly Retail Sales, Revenues, and Average Retail Price as reported to Department Of Energy. (Form EIA-826) http://www.eia.doe.gov/cneaf/electricity/page/sales_revenue.xls
Data analysis by Freyr Sverrisson.

ing that higher market-set prices were acceptable, FERC violated the Federal Power Act of 1935, which requires the commission to maintain "just and reasonable" prices. In December 2006, a federal appeals court ruled that FERC had indeed abdicated its responsibilities, saying the agency had imbued its concept of markets with more legitimacy than was warranted. What the ruling meant is that even market prices must be in a "zone of reasonableness" related to the cost of producing electricity, said Marilyn Showalter, president of the Public Power Council and former Washington State utility regulator. The decision allows Western states like California to continue pursuing their claims that they were overcharged billions of dollars in the regional energy crisis of 2000 and 2001.

A more fundamental challenge to FERC is pending now in the U.S. Court of Appeals for the D.C. Circuit, in a far-reaching case arguing that the commission's basic approach to deregulation circumvents the unambiguous terms of the Federal Power Act. Other than "the market," FERC has no standard for determining if rates are just and reasonable, the petitioners argue. The case is being brought by Public Citizen, the Public Utility Law Project of N.Y., and other consumer advocates. A decision is expected in spring 2007 at the earliest.

PART II: THE FAILURE OF DEREGULATION

The entire process of deregulation was said to be designed to deliver lower prices. And prices did drop for a time, due to regulated rate caps. But eventually, prices began climbing as fuel costs increased. And tellingly, prices moved significantly higher in deregulated states.

The failure of deregulation could have been predicted. Indeed, it was predicted by several Tellus Institute papers, including a 2000 report entitled, "Can Electric Utility Restructuring Meet the Challenges It Has Created?" That report analyzed why deregulation was likely to lead to rising rates, increased volatility, and price discrimination — all of which have since come to pass.

Rising rates: As shown in the accompanying chart on page 3, average annual rates in deregulated states for 2006 (for the ten months through October) were 55 percent higher than in regulated states. This is based on the weighted average retail price of electricity, per kilowatt hour (kWh), for all classes of users from household to industry, based on actual sales, as reported to the Department of Energy.

In Illinois, some households opened electric bills in January to find prices double the month before. Some must choose between keeping warm or buying medicine or food.

Further increases hit in January 2007, as rate caps expired in a number of states. In Marion, Ill., for example, residents opened electric bills in January to find prices double the month before. As Mayor Robert Butler told the *New York Times,* some residents are "choosing between keeping warm or buying medicine and food."[2]

Additional increases have yet to show up in other states, because of political intervention. Maryland electric rates were set to rise 72 percent, until the legislature decided to phase increases in over several years. Rates in Connecticut went up 27 percent in 2006 and would have risen another 50 percent in January 2007, but the utility commission phased in increases through July 1. Similarly in Delaware, rate increases of 59 percent were to begin in May 2006, until the legislature created a phase-in plan through January 2008.

Increased volatility: The most dramatic example of volatility was the California power crisis of 2000-01, when the cost of power in the state quadrupled from $7 billion to $28 billion in one year. This led to rolling blackouts, utility bankruptcy, and institutional chaos that is still being sorted out. As one analyst wrote in the *Electricity Journal,* the proximate causes were a "runaway wholesale spot market," and restructuring rules that left customers unduly exposed to those markets.[3]

In another study, researchers at the University of California Energy Institute analyzed why California wholesale prices quadrupled from 1999 to 2000. They found only 21 percent of the increase was due to higher production costs, while 20 percent was due to increased competitive rents, and fully 59 percent was attributable to market manipulation.[4]

Decreased reliability: Here one can point to the widespread August 2003 blackout that left 50 million people from the Midwest to the East Coast in the dark, costing an estimated $5 billion in losses, according to three former utility executives who formed Power Engineers Speaking the Truth.

These multiple problems with deregulation — decreased reliability, increased volatility, and rising rates — can be traced to the political decisions that drove the process. Deregulation was undertaken with virtually no analysis, even though tens of billions of dollars were at stake. It was undertaken not because new data appeared or some economic breakthrough made it seem logical. It arose out of a near-religious belief in the power of markets. At FERC, there developed a belief — which persists to this day — that electricity would benefit from being moved from a regulatory to a market domain.

FERC made rules that forced people to engage in market transactions. In a few short years, many states moved from vertical integration to deregulation, with

no precedent to guide them. It was like throwing people into the deep end of the pool to see if they would swim. The results were some well-publicized drownings.

California is a case in point. It was the largest electricity market that deregulated, and it did so in a particularly aggressive way. There were no long-term contracts, so all electricity was purchased on the spot market, with prices varying from hour to hour. For several years, this worked well and prices were stable. But when California ran into shortages, there was no longer a mutual-aid arrangement where surpluses were sold at cost. Instead there were aggressive traders — as at Enron — who took advantage of opportunities to increase profits.

Markets behaved as we expect markets to behave. When supply became tight, electricity went to prices never before seen in history. Enron was discovered to be manipulating prices. Consumer pocketbooks took a tremendous hit, with Californians paying billions of dollars more for electricity during 2000-01 than they should have. Lawsuits followed. And the nightmare is still unfolding. There are problems with throwing people into the deep end of the pool, particularly if it is filled with sharks.

On the Eastern seaboard, a new set of problems arose several years later. In many states — like Delaware and New Jersey — price increases were delayed by caps put in place by legislators. Then Hurricane Katrina tore through natural gas and oil fields, and prices began spiking as rate caps were expiring. In Boston, for example, prices had been stable at 10 or 12 cents kWh for many years. But in recent months prices hit an astronomical 20 cents kWh, which no one ever believed possible.

The political fallout is still landing. In one dramatic gesture, the Maryland legislature fired the entire state Public Service Commission, which immediately went to court on appeal. In a number of states, legislators ran against deregulation in recent campaigns. In Connecticut, the attorney general called the so-called competitive electricity market a complete failure and waste of time and money.

Still, denial remains pervasive. In late December 2006, when the manufacturers' association ELCON said they might be willing to go back to cost-of-service regulation, the chairman of FERC shot back that deregulation was working fine.

PART III: WHY DEREGULATION DID NOT AND COULD NOT HAVE WORKED

If the political decision-making behind deregulation was flawed, the technical process itself was more so. There are a number of reasons that deregulation was doomed to fail.

1. Market-pricing structures established for wholesale generation were flawed.
Under deregulation, wholesale generation prices were set by marginal pricing, which means — as mentioned earlier — that the price of all power generation was based on prices bid for power from those plants turned on last in each hour, within each small section of the transmission grid. Now, assume we're looking only at the cost of energy, not the cost of distribution or retail sales. Let's say, for example, that power from old, highly depreciated coal plants might cost 2 cents per kWh, but power from new natural gas plants costs 6 cents per kWh (with 3 of those cents being just the cost of operating the plant). Under marginal pricing, the market-determined price for power generation from natural gas plants would set the price for power from coal plants as well. The price of all power would thus rise to more than 6 cents per kWh. Consumers would lose out. And the generating companies that own the old plants would profit, capturing rents to which they should not be entitled. This implies that single-price auctions are economically inefficient.

FERC established regional transmission organizations that set up complex, single-price auction hourly markets for energy, which proved easy to game. At times of scarcity, generators were virtually guaranteed artificially high prices. If all generation in a city is owned by one company, for example, at times of peak demand that company has tremendous power to raise prices, due to transmission constraints on competitors trying to bring power into that city.

Beginning in the mid-1990s, any form of marginal pricing for power was unlikely to lead to declining prices in electricity, at least not for very long. This contrasts with other industries, where new technology can decrease prices over the long term, as with computers. Say, for example, that Dell has a stockpile of $1,000 computers, but new computers coming on the market cost $500. Now Dell must sell its $1,000 computers for the marginal cost, which is $500. In a declining-cost industry like that, marginal pricing will drive prices down permanently. But in energy markets — with issues like Hurricane Katrina, peak oil and gas production, and carbon constraints — marginal prices were only likely to go up in the long term.

In electricity auctions, price manipulation is easy to master. A Cornell study showed that participants learned within a few rounds of bidding how to drive up prices 20 or 30 percent.

2. Price manipulation — the exercise of market power — was far too easy.
Generation markets are unlikely ever to be competitive. In the case of electricity markets, having even three or four generation owners in a small market is not a competi-

tive structure, and small regions will generally not have more than this. Price manipulation through market power is thus predictable and expected. Also, large generation owners began to create regional oligopolies in generation ownership.

Market power can be exercised in two main ways. The first is through strategic bidding — bidding the price above a competitive level — which it is in the interests of all generation owners to do, whether large or small. The second is capacity withholding. A generator might take a plant offline, ostensibly for maintenance. Or it can, as Enron traders did, overload capacity to create fake transmission constraints. Traders might sell power out of state then appear to bring it back in, simply to appear to overload lines and create the impression of capacity constraints.

These forms of manipulation are relatively easy to master. In a 1997 paper published in the *Energy Journal,* mathematician Alex Rudkevich and others at the Tellus Institute showed theoretically how participants in a bidding exercise could exercise market power to drive prices up. In subsequent lab experiments at Cornell University, it was shown that participants could indeed learn, within a few rounds of bidding, how to drive prices up 20 to 30 percent. In essence, deregulation allowed the system to be run not by engineers but by speculators.

3. Dismembering vertically integrated utilities was inefficient.

Vertically integrated utilities — with generation, transmission, distribution, and retail sales all centrally managed — are simply more efficient than an unbundled array of organizations handling the same activities. Under the old approach, all functions were operated by one set of utility managers. Through power pools, utilities were able to share costs.

By contrast, a dismembered system made direct costs rise. It's more expensive to plan for four separate activities, so when added together it's mathematically inevitable that the sum costs of operating the four will be greater than in an integrated system. Coordinated planning also became more difficult, and environmental costs were harder to take into account. Energy conservation programs were undermined, which further added to consumer costs.

Through least-cost planning under the supervision of state public utility commissions, a better mix of generating units was likely to be built, compared to the outcome of a disjointed market of unrelated organizations. Also deregulated firms can face a higher cost of capital than regulated firms, because uncertainty and higher risk can lead capital markets to demand higher returns.

Vertically integrated utilities — with generation, transmission, distribution, and retail sales all centrally managed — are more efficient than a variety of organizations handling the same activities.

4. The transmission system was used in ways for which it was not designed.

Electricity used to be consumed primarily locally, with power purchased close to where it was generated. The system was built to connect neighbor to neighbor, not to move large blocks of power from one region of the country to another. But with deregulation, power was being sent farther across the country — if, for example, a low-cost seller found a big industrial buyer far away. This increased transmission costs. And it overloaded the transmission system, which was not designed to be used in this way.

In order to maximize their profits, generators wanted to sell to as wide an area as possible. Under deregulation, this meant they pressed to build more transmission lines. That led to a tendency to overbuild or over-congest transmission lines, neither of which is socially beneficial. Under least-cost planning, a certain level of transmission is optimal, and building beyond that only increases costs. Society ideally should live with cost-effective transmission constraints.

Some of what is being touted today as declining transmission infrastructure may in fact be the inappropriate use of existing infrastructure. Sending power from Texas to Detroit simply makes no sense. Building new lines to do so makes even less sense.

5. Retail competition did not make economic sense.

Although technically permitted by deregulation, retail competition never in practice caught on in most states — except in the case of some large customers. Deregulation had its real impact at the level of generation, not at the level of retail sales. One reason is the price caps many states put in place to delay price increases. Another reason is that many states allowed consumers to opt for standard offer service, which could be likened to staying with Ma Bell when the phone monopoly was broken up.

Ultimately, the problem was that it's simply cheaper for one centralized service to buy electricity in bulk to distribute to everyone. Having multiple retail sellers means there is an additional layer of costs added on, to cover marketing costs and profits. Expecting this form of unbundling to deliver lower costs was irrational.

6. Reliability was neglected.

Under regulation, companies were willing to make necessary investments in infrastructure, confident regulators would allow them to recover costs. Today, many states have no authority to order investments or compensate companies who make them.

The result is a neglected infrastructure, contributing to potential blackouts and other service problems.

PART IV: THE POLITICAL AND ECONOMIC SIGNIFICANCE OF DEREGULATION'S FAILURE

Broadly understood, electricity deregulation can be viewed as part of a larger stealth attack on the New Deal, of which the Federal Power Act of 1935 was a part. Deregulation was part of a wide-reaching effort to shift control of public services from public to private hands. This has been described as an ongoing process of commodification, where public goods — electricity, education, sanitation, water — are converted into commodities, managed not by governments but by markets.[5] The advocates of deregulation constantly stated the mantra that electricity was just another commodity like wheat or oil.

Yet it is not possible to have a competitive market in electricity. There are insurmountable problems intrinsic to the technology involved. Electricity is unique. It cannot be stored in significant amounts, so there must be instantaneous matching of demand and production, which is different from other commodities. There are major constraints everywhere in the transmission system. The generation and transmission system is a complex and delicate machine, with most of its functions highly interactive. In addition, consumers have no ability to decline to purchase when prices are too high.

Electricity is not a commodity. It is a public good, a necessity of life. As something that is essential to the well-being of all, electricity is appropriately subject to public oversight. It requires government regulation. The failure of electricity deregulation is thus an object lesson in over-reliance on markets to handle all economic issues.

Electric power providers should be accountable to consumers through democratic governance. State utility commissions — with commissioners directly elected, or appointed by governors — can provide that accountability. Although little appreciated, utility commissions have a track record of effectiveness, as shown by their success at keeping electric rates substantially lower in regulated states. These public bodies at their best can be a form of government that is local, transparent, and accountable. In addition to keeping rate increases in line, they can ensure reliable service and be public tools for resource planning, constraining greenhouse gases, and supporting the shift to alternative fuels.

At one time, for example, two dozen or so states used integrated resource planning (IRP). Hearings allowed stakeholder groups to participate in a meaningful way. There was also consideration of energy conservation investments, so the least-cost mix of options could be pursued. And the process provided an analytical framework to take into account the environmental impact of electricity generation in planning. But IRP hearings began to die out. Once deregulation laws were passed, IRP was formally ended in many states.

In correcting the errors of electricity deregulation, one step is to revive processes like IRP. At the federal level, FERC must see that wholesale prices charged are reasonable, based on costs, which is the aim of the pending federal appeals court case. The federal government should not intrude on traditional state and local regulatory areas. Where possible, states that have deregulated should return oversight for new investments to state utility commissions. At the same time, the transmission grid should be returned to its original intent, enabling bulk power transfers between utilities in emergency, not moving power long distance. Some states may also wish to expand publicly owned power, and there are a number of drives to do so underway. There are those who will say we cannot go back to the best of the old system, but we can. It may take time. But we can once again bring appropriate oversight and rational planning to our national electricity system.

Electricity is not a commodity. It is a public good, a necessity of life. As something that is essential to the well-being of all, electricity is appropriately subject to public oversight.

Richard Rosen (RRosen@Tellus.org) and John Stutz (JStutz@Tellus.org) are Senior Fellows at Tellus Institute in Boston. Marjorie Kelly (MKelly@Tellus.org) is Senior Associate at Tellus.

(Endnotes)

1. Kenneth Rose and Karl Meeusen, "2006 Performance Review of Electric Power Markets: Review Conducted for the Virginia State Corporation Commission," Aug. 27, 2006.
2. Alexei Barrionuevo, "Generating Anger," *New York Times,* Feb. 17, 2007, p. B1.
3. John Jurewitz, "California's Electricity Debacle: A Guided Tour," *Electricity Journal,* May 2002, Vol. 15, No. 4, p. 11.
4. Severin Borenstein, James Bushnell, and Frank Wolak, "Measuring Market Inefficiencies in California's Restructured Wholesale Electricity Market," Center for the Study of Energy Markets Working Paper, University of California Energy Institute, June 2002, www.ucei.org.
5. Daniel Chavez, *Beyond the Market: The Future of Public Services,* Public Services Yearbook 2005/06, Amsterdam, The Netherlands: The Transnational Institute, 2006, p. 2.

The Tellus Institute is a 30-year-old nonprofit research and consulting organization, with areas of focus that include energy, water, corporate transformation, sustainable communities, and human well-being. The aim of the Institute is to help society navigate a Great Transition toward ways of producing, consuming, and living that balance the rights of people today with those of future generations and the wider community of life.

Tellus Institute
11 Arlington Street
Boston, MA 02116
Tel: 617.266.5400
Fax: 617.266.8303
www.tellus.org