Focus: More About New Administration's Natural Gas and Electric Policies

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Obama's Smart Grid Legislation

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The Obama administration has vowed to double the nation's capacity to generate alternative energy and to begin building a new electricity grid with more than 3,000 miles of transmission lines "to convey this new energy from coast to coast." If this is done, we will make gains on climate change.

However, the monopolies with their combustion business want to control and limit what the Smart Grid does to them. A great deal of savvy must be applied by the administration to ensure that the new Smart Grid will actually reduce grid load at substations, not result in a few scattered solar panels and press releases. The age of triviality and tokenism with its boutique solar photovoltaic and demand-response pilot projects must be replaced with a new market structure in which government creates a policy framework for competitive bidding in order to structure deals adequately that achieve rate stability and energy security. This is especially urgent in this constrained debt environment.

ENORMOUS INVESTMENT TO BE HANDLED WITH CARE

Democrats in the U.S. House of Representatives have revealed their plan to revive the U.S. economy using $550 billion in new spending and $275 billion in tax cuts. In its current

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form, the plan includes substantial tech spending, including $32 billion to transform the nation's energy system, "allowing for a smarter and better grid and focusing investment in renewable technology," allowing $11 billion for Smart Grid, $8 billion for green power generation and transmission, and $6.9 billion for public-sector energy efficiency.

As even the president himself would agree, his Smart Grid and Green Power package is "just a beginning" of what will have to be done to take a meaningful dent out of U.S. power and transportation fuel emissions. Representative David Obey (D-WI), head of the House Appropriations Committee, seems to recognize it as a stopgap measure despite its apparent magnanimity: he said that it is "the largest effort by any legislative body on the planet to try to take government action to prevent economic catastrophe," yet "even that may not be enough."

Consider what it means for the Smart Grid industry players having received significant investment before the Wall Street collapse began. Companies like Comverge and Optimal Technologies, and their competitors, are poised to build a major new infrastructure, but will depend on government to create real competitive opportunities outside the utilities.[1] Federal policymakers should prepare for a political world in which monopoly utilities strong-arm their contractors in return for gaining or forfeiting future contracts. In order to create the kind of competition needed in a monopoly-oriented industry, Obama's programs will engage with issues such as utilities seeking to block city governments from building federally financed renewable energy systems. Smart Grid must contend with sophisticated and financially massive, aggressive corporations with a record of political hubris and few signs of change in business culture.

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The Smart Grid market will jump to $70 billion by 2013 according to *Energy Insights'* Rick Nicholson, the additional money coming from the U.S. economic stimulus package, and will require industry to address workforce availability problems, manufacturing capacity, and project complexity itself. Nicholson predicts that the first choice for utilities will be energy efficiency and demand response, including "smart metering, home area networks, in-home displays, smart thermostats, and consumer web portals." [2]

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The Electric Power Research Institute (EPRI) says that a smarter grid may cause utility revenues to fall by 10 percent. Hedge fund investor Nick Gogerty warns[3] that the very efficiencies made possible by Smart Grid technologies (that is, if they are well designed) will cause customers to buy less electricity—and that could reduce utility revenues by as much as 10 percent going forward. He even thinks that demand-response providers such as EnerNOC "could see their market shrink dramatically." Proponents of decoupling, where utilities are rewarded for efficiency, attempt to overcome procurement incentives for utility shareholders but neglect to address overall system and debt service revenue requirements that are the bread and butter of the utility business.

STATES CHIME IN

Some in the government are eager to spend money for the sake of spending money on a good cause. Wyoming Governor Dave Freudenthal said that he is concerned that the credit crunch could discourage developers from moving aggressively to build new transmission lines. Much as in California after the blackouts, Democrats and Republicans alike called for building lots of new gas-fired power plants to avert a "shortage" that anyone with a brain knew to have been a dissimulation. Thus, now there is a push for federal financing of new transmission lines.

He proposed that the government use stimulus funds to leverage private funds by providing low-interest loans to infrastructure developers, or by giving them tax-exempt bonding authority. As it is, private investors are "sitting on the sidelines," he said. The push for new capital investment could permanently move the nation into another commitment to the Dumb Grid and block, for the third time, introduction of innovative technology.

It is a case of build it and they will come. "As soon as you get the power lines built, they'll

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put in the [wind] turbines, because the current production tax credit for wind energy makes the production of wind energy a very attractive proposition," he said. "But there's not a similar incentive for building the power lines."

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Colorado Governor Bill Ritter urged Obama to launch a major energy infrastructure project. He suggested the government could offer price guarantees for renewable energy distributed through the new lines if the developer got the power to the line.[4] Ritter also said the government could help to build regional power lines to reach areas where wind, solar, and other renewable projects could be built.

In Montana, where wind and coal also are major commodities, Governor Brian Schweitzer said that he supports partnerships between the government and private industry to build a new "smart" energy grid, one that saves energy using updated digital technologies. But he said it should be done separately from the stimulus package, which aims to spend money quickly on "shovel-ready" projects.

Schweitzer said that the Smart Grid, which could cost as much as $100 billion, would require extensive permitting and manufacturing, and would not be done quickly enough for the stimulus package. "It's going to take a fair amount of gearing up," he said.

At the federal level, Representative Henry Waxman (D-CA), chairman of the House Energy and Commerce Committee, proposed recently that along with Obama's plans for new transmission lines, the stimulus package include temporary loan guarantees for transmission projects, including upgrades, that begin construction by October 2011.

MAKING A MORE-EFFICIENT DELIVERY SYSTEM

Smart metering will be dumb and dumber if federal policymakers simply give the money to the nation's grid owners and monopolists.

Look to California. For years, at least one major utility prevented consumers from controlling public goods charge funds that state law requires to support energy efficiency measures. But spending money on measures is not a problem for utilities: only if they actually reduce power consumption is there an interruption of utilities' "revenue requirements." The last U.S. monopoly is standing in the way of any profound redefinition of retail electricity markets, and is banking on controlling the impacts of federal Smart Grid and renewable energy funds to benefit its annual growth and share price. Power companies that are also gas and coal companies must not be depended on to implement the Smart Grid, or it may go the way of the electric car.

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U.S. utilities are the last industrial sector to receive intelligence. While even small dairies depend on Web-based process control and monitoring systems, the utilities do not know there is a power failure unless they get telephone calls from two separate customers. They are flying blind.

Waste is built into the system because that system is such a large concentration of capital that it is overused as collateral for new borrowing by its owners. The overburden and leveraging of capital can easily overstrain even large commercial enterprises and cause them to fall into bankruptcy or even completely implode.

Underlying the waste of capital is the waste of energy and resources that supports the utility monopoly system. According to Lawrence Livermore Labs, only 30 percent of the energy in the fuel that powers U.S. electric generators reaches your electric plug. The rest is "lost" in inefficient electric generation, transmission, and distribution systems.

Once the electric power gets to your home or business, another poorly designed infrastructure wastes most of the rest. Even in the case of a relatively efficient compact fluorescent bulb, 100 pounds of coal produces only about 8 pounds of coal worth of useful energy in the form of light for the consumer. The vast waste built into the business model creates the illusion of looming shortage, and the need for more and more extraction of fuel, construction of power plants, and the building of ever more and longer wires.

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The growth curve that built the twentieth century is no longer feasible from a carbon perspective. Reconfiguration and relocalization of power systems are key to delivering carbon reductions that must now come.

The biggest failure of the "natural" utility monopoly is climate change. Utilities need annual growth or their stock is bad. That means growing consumption of power. The utilities have built-in conflicts of interest that no amount of intelligence can repair. What this means is that a utility- driven Smart Grid is an oxymoron. Smartness consists not of upgrading but reducing dependency on the grid and increasing reliance on local and distributed networks.

Skype is the best model: networks are smart—and efficient—to the extent that a maximum number of users can use the same wire; thus, each user's net consumption footprint on the wire is physically, financially reduced.

From a demand-side perspective, such as is proposed by Local Power, the Smart Grid means making the Big Grid a backup system. The current industry model creates an inherently inefficient and unstable structure, where local generation is used only for backup power supply in power outages. A truly Smart Grid would not build lots of new wires and vulnerable infrastructure, but would reduce dependency on building more expensive wires.

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DUMB GRID TECHNOLOGIES

A recent MIT Technology Report focused on wind farms and new power transmission systems as important Smart Grid technology.[5] Yet transmission systems that increase centralization of the grid and delocalization of power will only reduce integration flexibility between different intermittent resources.

The intermittency of renewables makes them naturally local in deployment. Centralization of green power resources is thus intrinsically bad policy. No amount of central grid retroplanning around intermittency will deliver carbon reductions. The lion's share of the brains of the Smart Grid will have to be on the customer side of the meter.

Putting that kind of power in customers' hands can mean losses for the nation's gas and electric monopolies, unless the industry finds some new way to make customers pay to cover their losses. The courts may anticipate energy companies claiming a taking of private property without compensation when ratepayers install new systems that make the customer disappear on the utility meter. Climate change is a zero-sum game, and the Department of Energy will have to get tough on the industry the way the state and federal government got tough on Big Tobacco.

EFFICIENCY AND VIRTUAL CAPACITY: THE ROLE OF GOVERNMENT, THE MARKET, AND UTILITIES

Discussions of the economic megawatt-hour potential of virtual capacity from demand-response and other demand-side technologies is limited by regulatory models that are often politically predefined. However, many cost centers contribute to high premium margins for these technologies.

The EPRI recently studied the range of savings attainable through utility programs that encourage adoption of energy-efficient technologies, taking into consideration technical, economic, and market constraints.[6] While the Energy Information Administration (EIA) projects that electricity consumption will grow at an annual rate of 1.07 percent, the EPRI said energy-efficiency programs have potential to reduce this growth rate to 0.83 percent per year. Under an ideal set of conditions conducive to energy-efficiency programs, this growth rate can be reduced to as low as 0.68 percent per year. This represents a total reduction of 5 percent to 8 percent in electricity consumption by 2030.

The EIA projected that peak demand in the United States will grow at an annual rate of 1.5 percent from 2008 through 2030, and the EPRI said the combination of energy-efficiency and demand-response programs has the potential to realistically reduce this growth rate to 0.83 percent per year and that under ideal conditions, this growth rate can be reduced to as low as 0.53 percent per year.

The EPRI said, "These estimated levels of electricity savings and peak demand reduction are achievable through voluntary customer participation in energy efficiency and demand response programs implemented by utilities or state agencies." The impact of carbon costs or

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a slowdown in economic growth, which could alter consumer behavior and reduce projected load growth, was not included in this analysis.

The EPRI's model estimates the cost of implementing programs to achieve realistic potential savings will range from $1 to $2 billion in 2010, growing to $19 to $47 billion by 2030. Achieving the maximum potential would cost more: from $3 to $7 billion in 2010, rising to between $25 and $63 billion in 2030.

While policymakers are looking to energy efficiency to help meet the challenges of maintaining reliable and affordable electric service, wisely managing energy resources, and reducing carbon emissions, utilities view efficiency as a revenue loser. The more consumption a utility reduces, the less revenues it enjoys from procurement (which some state incentives try to address). This also applies to overall system revenues, which are gradually being unbundled into a supraregional surcharge environment with location pricing.

In contrast, policymakers have no such conflict of interest. Fundamental to such policies are fact-based estimates of the achievable potential for energy efficiency. Most national studies of energy-efficiency potential employ macro "top-down" approaches. While other studies comingle effects of existing and anticipated codes and standards with programmatic effects, this study isolates the impact of programs. As such, any new codes, standards, regulatory policies, or other externalities could contribute to greater levels of overall efficiency.

The degree to which nonutility factors are critical to energy efficiency is highlighted by the EIA report that provided the framework for the EPRI's analysis. The EIA showed that the combined effects of existing federal, state, and local efficiency codes and standards, as well as natural market forces, would reduce growth in electricity consumption from 2.5 percent per year to 1.2 percent. This reduces the projected demand for 2030 from approximately 6,400 to 4,858 billion kilowatt-hours, a savings of about 1,500 billion kilowatt-hours. By comparison, the EPRI's projections for utility program savings ranged from 398 to 544 billion kilowatt-hours. Both of these figures were considerably more optimistic than the EIA's own projection of utility savings of only 162 billion kilowatt-hours.

This should highlight how utility program savings embody a relatively small portion of actual achievable energy efficiency. The key to achieving the larger potential is to recognize the critical role of each social sector. In order of potential, government has by far the greatest potential, followed by the market. The least potential is in the regulated utilities, which would appear to confirm our hypothesis of the conflict between utilities and efficiency. Looked at through the prism of utility programs, only 10 to 26 percent of the real total efficiency potential appears to be economical.

Energy efficiency is a key component of a full-portfolio approach to reducing carbon emissions, as documented in the EPRI's prism analysis. Energy efficiency represents the greatest near-term potential for carbon reduction, bridging the time for less carbon-intensive generation options to come online. The importance of energy efficiency in this regard underscores the need for a comprehensive, fact-based assessment of its achievable potential. Not only does the importance highlight why we need to go beyond the regulated utility business model, but the importance also shows that the opposite extreme of a "market-only" approach also falls short. A real solution to energy efficiency will need the combined best efforts of government, the market, and the regulated utilities.

DEMAND RESPONSE

Demand response is a $20-billion-a-year industry; thus, this package is small, but it is perhaps the most promising sector in energy technology. Installing basic parallel processing into local community microgrids will open markets for solar photovoltaics and electric vehicles, improving the economic efficiency of renewable distributed generation through integrated applications of local renewable generation, load automation, and battery storage in new electric vehicles and charging infrastructure.

"Most of the technology sits on a shelf today," said Kurt Yeager, former president of the EPRI, a year ago when Wall Street at last opened its coffers to companies such as Comverge or GridSense. He now serves as executive director of the Galvin Electricity Initiative. "It's just a matter of incentivizing the system to change," Yeager said.[7] Acorn Energy CEO John Moore commented on an article I coauthored last year in this periodical[8] about the fact that load automation technologies are beyond the technical and

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cost-effective threshold. He said, "The real issue is will someone step in to deliver blocks of customers to our virtual capacity technologies?"[9]

PRECEDENT IN EUROPE

With its deregulated energy markets, Europe's attempt to grope with the revenue losses implied by Smart Grid has created allies and opponents of disruptive technologies in the energy retail market. In Britain, the Conservative Party has recently called for a Smart Grid that includes electricity and gas customers. Metering.com says the plan also includes "a system of feed-in tariffs for home renewable generation," incentives for improvements in home energy efficiency, and a series of recharging stations for electric and hybrid vehicles.

Because distribution of electricity and gas is controlled by a single company in the United Kingdom (the National Grid), implementation is likely to happen far faster than in the United States. On the other hand, the National Grid's implementation of sales-reduction assets also may signal industry control of what needs to be a customer- (not supplier-) owned resource.

SILICON VALLEY BOOM?

Daryl Hatano, vice president of public policy at the Semiconductor Industry Association (SIA), says the ubiquity of semiconductors in many of the technologies Obama is promoting as part of his energy policy spells opportunity for SIA members. He said, "We think that semiconductors can revolutionize the generation, distribution, and consumption of energy, and can transform the economy in the energy area the same way we transformed the economy through the Internet."[10]

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Tech firms are ramping up for the deluge. Smart meters have "a long value chain, and Obama's proposed $32 billion investment into a smarter grid would have a ripple effect throughout the tech world, reaching everyone from large smart meter makers and start-ups alike, as well as semiconductor manufacturers and data-management software companies."

Many, like *Electronics Business,* presume a "superhighway" metaphor of the smart grid, or a water "pipeline" that needs lots of data, and most of that data is going to be collected in remote locations—say, wind farms and water reservoirs in Kansas—or from many distributed users. Instead of looking to dense urban environments, they imagine the grid as a larger, more centralized transmission grid—not a distribution-level grid bypass system.

Large networks of sensors, most of which will be based on some form of low-power wireless technology, will be produced by companies such as Broadcom (BRCM) and Atheros (ATHR), but start-ups like G2 Microsystems, Gainspan, and ZeroG Wireless could be big winners in the remote sensor market, according to *Electronics Business.* For, companies that provide the software, servers, and data centers that host and store that information, "digital infrastructure is going to play a much more profound role in the Obama plan."[11]

This all implies an introduction of many new businesses into the retail electricity business. Companies such as IBM have been quick to spot many of these opportunities, launching its Smarter Planet campaign to "bring" information technology innovations to the energy, transportation, water, and retail sectors of the economy. IBM Venture Capital Group has been cultivating relationships with strategic start-ups. In the current economic climate, strategic relationships between big-tech and clean-tech start-ups may become more common.

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