SMART GRID STIMULUS

Can It Jolt The Economy & Our Electricity Future?

Cascadia Capital, LLC & Global Smart Energy

Introduction by
Jesse Berst & Michael Butler

The Top 10 "Smartest" States In 2009

*By **Jesse Berst, President, Global Smart Energy***

With over $4 billion in Washington DC's stimulus money now available for smart grid improvements and innovations, the burden now falls on the states to use these funds effectively and efficiently. The goal, as Smart Grid News' Stimulus Scorecard (http://www.smartgridnews.com/artman/publish/commentary/SGN_Stimulus_Scorecard-536.html) makes clear, is to help consumers, utilities, the nation and the planet win.

Given that the world is moving to an Electricity Economy, modernizing the grid is one of the smartest things any state can do to ensure it will remain globally competitive. But which states have made the most progress? And which are now in the best position to deploy recently released stimulus dollars productively?

I asked a cross section of the brightest smart grid experts around the country for the 10 "smartest" states in America. To my surprise, there was a strong consensus about who's leading the charge toward a modernized electricity system. So, without further hesitation, here's the top 10 smart grid states, as measured by their progress in policy, planning and implementation:

Tier 1

California—The Golden State is at the top of everyone's list. On the policy side, regulators are out in front, pushing new smart grid practices. For their part, the state's three big utilities—SCE, SDGE and PG&E—have each developed best practice studies and frameworks that can help the rest of the country grasp the benefits of smart grid improvements. The three utilities are also rolling out smart meters to all of their customers. And, in terms of stimulus readiness, the state's governor, Arnold Schwarzenegger, has vowed to get more stimulus money than any other state in the nation (http://www.smartgridnews.com/artman/publish/news/Stimulus_News_Roundup-543.html)

Texas—The Lone Star State is just behind California as the current smart grid leader. From a policy perspective, however, Texas is not quite as proactive as California. But three of its utilities—CenterPoint Energy, Oncor and Austin Energy—are as progressive as any in the country, and they are well underway with smart meter rollouts. The next breakthrough here will be integrating a host of digital tools for the smart grid.

Tier 2

Florida—The Sunshine State has established a strong build out for the smart grid—especially in the area of load control and communications infrastructure. A major utility, FP&L, has many substantive programs and is planning a number of new rollouts that will advance smart grid efforts.

Illinois—The Prairie State has been cited for its collaborative approach to the smart grid. This involves and engages communities up and down and all across the state. Tight community linkage is crucial for optimal smart grid success.

Pennsylvania—The Keystone State is the nation's leader when it comes to smart meter installation; a 2008 report from FERC indicates that advanced metering penetration has reached nearly 25 percent in Pennsylvania.

West Virginia—The Mountain State is about to unveil a fully integrated statewide smart grid plan. Experts are impressed by this comprehensive approach at such an early stage.

Ohio—The Buckeye State has a group of enlightened policy makers who have stressed smart grid education.

Tier 3

New Jersey—The Garden State's guiding light on the smart grid, Commissioner Fred Butler, is a progressive pragmatist who also serves as the Chairman of the national association for regulators, where he is spearheading studies on standards and best practices for the smart grid.

Connecticut—The Constitution State is considered a smart grid policy and build out leader; a supporter of Energy Improvement Districts, Connecticut has begun to increase use of distributed generation and demand response programs.

Colorado—The Centennial State has lots going for it in the smart grid world. First, Xcel's 100,000-person smart grid city; second, the National Renewable Energy Laboratory in Boulder; and lastly, Governor Bill Ritter, who is a big believer in Colorado's new energy economy.

States To Watch

Michigan—DTE Energy is a forward-thinking utility that will enhance smart grid upgrades.

New York—Utilities in the state have done innovative research on the smart grid and how it would fare in dense urban areas.

Hawaii—The Department of Energy has selected Hawaii as a smart grid test case because of fossil-fuel dependence.

These informal smart grid rankings are a snapshot in time. Our electricity system is about to undergo major changes, thanks—in part—to federal stimulus funding.

In such a dynamic environment, it's unclear who will be the smart grid leaders and followers in 2010. It's also hard to say which states will be able to stay ahead in all three major smart grid categories—policy-making, planning and implementation.

That said, there are already many lessons to learn right now—in how to plan, how to set policy, and even how to pursue stimulus dollars -- from regulators and utilities in states like California, Texas, Florida, Pennsylvania, West Virginia, Illinois, Ohio, New Jersey, Connecticut and Colorado. These lessons will be invaluable if we are to keep pace with China, Europe and the Middle East, all of which are aggressively upgrading their electricity grids.

So, as we close the first quarter of a very eventful 2009, these are the country's "smartest" states.

Jesse Berst is head of GlobalSmartEnergy (GSE), an internationally recognized consulting firm, and author of the forthcoming book, "Electronomics—Creating Wealth and Prosperity from the Transition to the Electricity Economy."

A Smart Step Toward Economic Recovery

*By **Michael Butler, Chairman & CEO, Cascadia Capital, LLC***

When it comes to the economic possibilities and financial upside of the smart grid, I take comfort in several key data points, because they help us better understand this very complicated infrastructure endeavor.

The first number that encourages me is $4.5 billion, the amount that President Obama's stimulus bill allocates for the modernization and digitalization of the nation's electricity system.

One of the key reasons for the government's support, of course, is the smart grid's job creation impact and potential.

A recent study from IBM indicates that this infrastructure transformation could generate nearly 500,000 jobs with a $10 billion investment. I believe that's a conservative number, because smart grid upgrades will launch new companies and new industries for at least a generation, providing the beleaguered economy with both a kick-start and an ongoing super Keynesian jolt. Think about the Internet Revolution on steroids, and that's what the smart grid represents.

Providing Work for Legions of People and Companies

One measure of the smart grid opportunity can be seen in this simple statistical set: there are 142 million electricity meters in the United States, but only 5 percent of them are smart. Converting each of these meters is very much akin to retrofitting all the old buildings across the nation—it will provide work for legions of people and companies, and deliver economic stimulus, for years to come.

But smart grid infrastructure improvements will result in much more than a new generation of smart meters, and that's the first reason I believe this technology transition will help the economy find its way back to prosperity. If we upgrade properly, the smarter grid will enable hybrid cars as well as solar and wind power to flourish on a broad and truly meaningful scale.

The second reason I think smart grid improvements will bolster the economy as a whole has to do with the fact that tens of thousands of applications and services—many we haven't even thought of—will follow in the wake of the first injection of electricity infrastructure stimulus. Once again, a good analog here is the Internet; a decade ago, for example, we had no idea how many Web-based tools would ultimately be developed for online commerce. And no idea what companies would develop. At the beginning of the Internet Revolution, there was no Google. Or Amazon. Or Facebook.

Silicon Valley Makes the Move

Silicon Valley knew then, and knows now. And that's why traditional high-tech players like Google, Microsoft, Cisco and IBM are currently charging into the smart grid marketplace along with stalwarts such as General Electric. This kind of corporate interest and momentum tells me that smart grid investments from the private sector will be broad and deep, and this can't help but boost the sagging economy.

The Energy Department is still trying to determine how the smart grid stimulus funding will be doled out. Most analysts believe the money will be funneled to electric utili-

ties rather than technology developers, so Silicon Valley players are moving quickly to secure long-term partnerships with power distributors. IBM is already providing smart meter technology to CenterPoint Energy, a Houston-based utility that is planning to deploy 2.4 million meters using IBM software over the next five years.

Setting Utilities Free

This brings me to the fourth reason I see the smart grid as an economic driver. After years of pretty backward and balkanized regulatory thinking, this infrastructure effort will finally help utilities become part of the solution rather than part of the problem. How? With new rules that will reward efficient and forward-thinking power distributors for selling less energy rather than more, and with new deregulation that will foster competition and allow the best-run utilities to diversify and enter new energy-related markets.

The fifth reason why smart grid enhancements will enrich our economic prospects centers around consumers, who will play a significant role in this process when demand response technologies are deployed. These cutting-edge digital solutions will help end users customize and conserve their energy consumption to free up cash for other spending.

Public-Private Partnerships

My recent meetings in Washington DC several weeks ago convinced me that the smart grid can have a powerful economic impact from coast to coast because of the tight alignment and authentic partnership between the public and private sectors. This is reason six. When you hear the commitment and see the consensus emanating from lawmakers, regulators, executives and entrepreneurs, you know that something big is going to happen in this area. The same kind of vast public-private alliance helped spawn NASA and the expansion of the aerospace industry in the 1960's.

The economy is floundering right now, and there's very little cause for optimism anywhere. With that in mind, it's fairly dangerous to pin our hopes for recovery on any one sector. But I believe that smart grid infrastructure upgrades, along with green building, represent the future of the post-petroleum era. It will be interesting to watch how both new markets make their way in the coming decades.

Michael Butler is Chairman and CEO of Seattle-based Cascadia Capital, LLC, a national investment banking firm that is financing the future for a wide range of companies in sustainable industries

Thought Leaders

Peter Fox-Penner & Ahmad Faruqui

Principal and Chairman Emeritus & Principal, The Battle Group

What is the most important next step in the development of the smart grid?

"The most important first step is a comprehensive assessment of the benefits and costs of various elements of the smart grid, including elements involving all stages of the industry, from generation to the end user. The assessment should identify the net benefits, associated uncertainties, key drivers and unresolved policy issues. This assessment should also incorporate information from many projects, pilots and studies that are ongoing.

Those features that have high net benefits and low uncertainty should proceed toward full-scale implementation, beginning possibly with large-scale demonstrations. Those features that have high net benefits and high uncertainty should be tested through pilot programs and further research.

It is likely that several regulatory barriers will be identified during the assessment. It will be important to understand the barriers and create a 'collaborative' process for addressing them. Foremost on the list will be the disincentive utilities have for implementing programs that encourage consumers to use less energy, lower energy costs and improve the environment while at the same lowering utility earnings. There are several ways of addressing these barriers and they need to be revisited. Another barrier that is likely to surface is the restrictions placed by regulations on the role utilities can play beyond the meter. There are several ways of addressing these barriers and they, too, need to be assessed."

What kind of "shovel-ready" jobs can the smart grid produce?

"There are many programs on the customer side of the meter that are ready for immediate deployment. These include the deployment of smart meters. Of the 142 million meters, only 5 percent are smart. Smart meters can make customers aware of the cost of power and, if people are enabled with smart meters and in-home displays, they can help reduce peak demands and energy consumption. We have estimated that this benefit would be worth $80 billion in reduced power costs over the next four decades."

What role should the federal government play in this transformation? What role should the states play?

"The federal government can provide leadership by funding national and regional assessments of net-benefits, funding large-scale demonstrations and conducting well-designed experiments with new rate designs and new technologies. The federal government must also play a key role in providing credible, balanced educational materials and programs on smart grid technology, especially to state regulators and other stakeholders involved in state-level deployment and funding decisions.

As the nation's central energy R&D agency, the Department of Energy should lead and coordinate federal, state and international public and private R&D into new smart grid technologies, making sure that the role of public R&D is appropriate. Finally, the federal government should determine the appropriate type and level of activities that will foster technical standards to facilitate smart grid expansion; then it should work to facilitate such standards.

"As the nation's central energy R&D agency, the Department of Energy should lead and coordinate federal, state and international public and private R&D into new smart grid technologies, making sure that the role of public R&D is appropriate."

States need to be closely involved in this process as well. They regulate the retail sale of electricity and have an important influence on smart rate design and revenue decoupling mechanisms. They also establish the boundary conditions on what utilities are allowed to do on the customer-side of the meter. It may make sense to hold workshops to identify the various players in the smart grid space and to seek to identify the roles each can play in that space. Without such a reconsideration of roles, the players may engage in sub-optimal strategies."

Frederick Butler

President, NARUC

What is the most important next step in the development of the smart grid?

"The most important next step is to be deliberate and focus on the back-end of the transmission system. This will help utilities and vendors prove that the smart-grid technology works before we start delivering smart meters to consumers, along with the associated higher costs to pay for them.

Moving deliberately will also give regulators a chance to implement new rate models and policy incentives that will spur the innovations and necessary consumer behaviors.

I want to be clear on the important role regulators play in all this. We are required by law to ensure that any new energy programs result in just, reasonable and affordable rates. We all recognize the potential of the smart grid, but this isn't something that can be done overnight. If we start rolling out this new technology along with higher rates to pay for it, we better be sure this stuff works. That's our message.

" Well, ideally under a 'smart grid' we won't need as many 'shovel-ready' projects, as part of the reason for modernizing the grid is to put less steel in the ground."

Consumers' bills are going up right now without this, and they will only go higher as the country tackles climate change, expanded transmission and other energy priorities. We just have to remember that while all this technology sounds great, someone, at the end of the day, has to pay for it. So let's make sure it works on the back-end of the transmission system, have the utilities pay for it, and if we see the efficiencies we anticipate, let's move to the next level.

Additionally, we need new rate structures so we don't have a smart grid with dumb rates. Smart meters will do nothing but sit on the walls if we don't give consumers the power and incentive to change their energy consumption.

We've got a lot of groundwork to do, but we are doing it."

What kind of "shovel-ready" jobs can the smart grid produce?

"Well, ideally under a 'smart grid' we won't need as many 'shovel-ready' projects, as part of the reason for modernizing the grid is to put less steel in the ground.

But that said, as you may infer from my earlier response, there are plenty of jobs we can create, and work we can do, on the back-end of the transmission and distribution system. We can install phasor measurement and backscatter sensors on the transmission grid, along with video sagometers and wireless mesh sensors, and we can use radio-frequency identification (RFID) technology to give utilities real-time information on the status of specific lines. These sensors can detect problems on the grid as they develop, and the problems can be relayed back to the utility for resolution before they escalate into a massive blackout. Instead of relying on costly and time-consuming manual visits from work crews, utilities will have up-to-date information on their system and can act accordingly.

These jobs can be done right now. We don't need to go into consumers' homes yet; let's prove this stuff can work, and then we can roll it out on a more commercial scale.

As a commissioner, my consumers are not beating down my door and asking for their smart meters. In fact, in the states that have moved aggressively with smart-grid pilots,

most consumer groups actually opposed these projects. They don't see the need or value in it yet. We haven't convinced the public that this is worth the investment, and that burden falls on all of us.

This is why, as I've said above and elsewhere, if the utilities and vendors can prove how effective these technologies are on the back-end of their systems, if they can show the savings and efficiencies, then we can move to the next level. And remember, these back-end updates are all a part of the smart grid anyway, and we can't get the omni-directional communications until this work is complete. So it just makes more sense to start here first."

What role should the federal government play in this transformation? What role should the states play?

"The federal government should continue its partnership with state regulators so we can learn how best to implement pilot and demonstration projects. We've got a very strong working relationship with the Federal Energy Regulatory Commission, and through the FERC-NARUC Smart Grid Collaborative, we are exploring this very issue.

Modernizing the grid and empowering consumers cuts along state and federal jurisdictions. Instead of working at cross purposes, the FERC-NARUC Collaborative, which I co-chair with FERC Commissioner Suedeen Kelly, lets us find a common group and develop a true partnership.

Our collaborative consists of about 20 state regulators, along with Commissioner Kelly and myself, and we meet about three times a year. We hear from commissioners, vendors, utilities, consumers and other stakeholders on the best ways of implementing and developing smart-grid programs.

We clearly need this collaboration to continue. In the best interest of our country and consumers, states and our federal colleagues must work together to make the smart grid a reality.

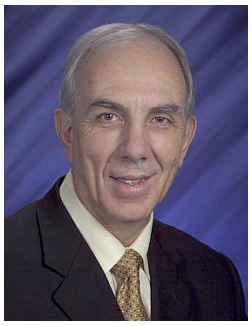
In terms of specifics, states should look into the existing pilot and demonstration projects and determine what works best. Personally, I think any program needs a grassroots element that spreads a 'buzz' about the smart grid, not a ratepayer revolt. As I stated above, many consumers remain unconvinced about the smart grid's potential, so outreach and education is key.

The federal government can use its bully pulpit and espouse the virtues of the smart grid, and the states can go in and design their own programs to ensure that consumers are on board. At the end of the day, we are all here to serve ratepayers, so let's keep that in mind."

NARUC is an association representing the state public service commissioners who regulate essential utility services, such as electricity, gas, telecommunications, water, and transportation throughout the country.

Mike Davis

Associate Laboratory Director, Energy and Environment Directorate
Pacific Northwest National Laboratory (PNNL)



What is the most important next step in the development of the smart grid?

"The nation needs an 'air traffic control system' for the grid. First we need to deploy the necessary sensors and communications to gather the data. Then we need to construct a computation and visualization platform. This platform will provide real-time grid performance information across a wide geographic area and put us on the path to a grid as seamless and cohesive as the Internet.

It's important to note that this system would not interfere in any way with regulatory structures, operational control or market pricing, just as the air traffic control system doesn't interfere with airline fares. In fact, it will provide clarity for all participants—including grid operators, utilities, regulators and ultimately customers as well. That clarity simply doesn't exist today and it is essential to the rapid and effective transformation of our electric infrastructure."

"The nation needs an 'air traffic control system' for the grid."

What kind of "shovel-ready" jobs can the smart grid produce?

"A model for this platform already exists and is functioning at PNNL. A full-scale, nationwide version can be realized in 2-3 years by accelerating the build out of the North American Phasor Network—by adding communication and computational capabilities to manage the collection, production, and dissemination of this vital information about where, when and how power is flowing. It can be achieved with U.S. supplied components with an investment of $150-$200 million. Ongoing operational investment would be around $10-20 million per year."

What role should the federal government play in this transformation? What role should the states play?

"We should pay for this investment via the stimulus package. We can fund ongoing operation based on the value this information will have to market participants. This capability and knowledge creation will do more in a shorter period of time to realize the grid we want for the 21st century than any other single activity."

Based in Richland, Washington, Pacific Northwest National Laboratory is one of the U.S. Department of Energy's 10 national laboratories. Its Energy and Environment Directorate consists of nearly 1,000 scientists and staffers whose missions are to increase US energy capacity; to reduce US dependence on imported oil; and to reduce the environmental consequences of human activities. Its Electric Infrastructure Operations Center is one of the world's leading facilities for research into next generation grid technologies.

Rick Luebbe

CEO, EnerG2

What is the most important next step in the development of the smart grid?

"The first step is acknowledging that today's grid is not suitable for our evolving requirements; we have to admit we have a problem. Then, we have to identify and better characterize the various challenges and build discrete solutions for each one of them.

For example, today's grid has inefficiency designed into it. The 'step down' from regional utility scale infrastructure to neighborhood scale introduces enormous waste, unnecessary cost and degrades reliability. Massive investment was required to construct a large scale and highly centralized transmission and distribution infrastructure. But, as demand changes and as new sources of supply (i.e., renewables) come online, that centralized infrastructure will be stretched beyond its limit. For example, what will happen when plug-in hybrids take off and everyone comes home at night and plugs in their car—right before they turn on all their lights and start the oven?

Similarly, the variability of renewable supplies means that traditional methods of dealing with power quality become obsolete. Traditionally, frequency is adjusted to compensate for constant mismatch in supply and demand. The additional unpredictability of wind and solar energy will exacerbate this challenge. Quality and reliability will start to degrade.

Technologies exist for each of these problems—in some cases, the same technologies can solve multiple problems. Distributed generation has been looked at quite a bit, for example—what about pairing that with distributed storage?

Peak demands can be addressed more easily with small, easy-to-scale sources of stored supply. Those same localized storage supplies can be used to mitigate grid-level variations in utility supply caused by increased renewable use; the neighborhood can effectively be insulated from grid-level problems. These are smaller scale solutions that can be relatively quickly rolled out—they do not need massive grid-level overhauls.

So the immediate need is to identify the problem and begin building solutions that (1) are not merely tweaks to the existing grid and (2) combine technologies at a small local level to solve multiple problems.

Those working on energy storage solutions are looking at technologies that span the spectrum of scale—it's not just about batteries! Experts in energy storage can be a significant part of the solution."

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What kind of "shovel-ready" jobs can the smart grid produce?

"The small-scale projects I mentioned above are shovel-ready. Storage is an essential part of the solution, and requires significant investment and labor resources to manufacture and deploy it. The materials that will go into these storage devices need not be imported (like Lithium is). We can make the manufacturing of storage materials for grid-modernization a key part of the growth that will reinvigorate the economy."

What role should the federal government play in this transformation? What role should the states play?

"Distributed generation and distributed storage are just that: distributed! The states have to work with their utilities to pull it off; and the federal government should direct the funds to the states to begin to roll out these projects. We cannot have a centralized entity pushing a decentralized strategy. The states—and even the municipalities—know far better how to make this happen. The federal policy should be to fund a variety of implementations in a variety of locations and effectively enable the winners to naturally emerge."

Seattle-based EnerG2 is currently focused on engineering advanced nano-structured materials for energy storage breakthroughs

Joe Manchin III

Governor, State of West Virginia

What is the most important next step in the development of the smart grid?

"There is not one important step, but a few steps that we should take at the same time. This is critical since there is not one definition for smart grid or one smart grid solution that everyone can agree upon. Coordination among and between different power generation, transmission and distribution issues, especially beyond any narrow definition of smart grid, such as one that limits the discussion to smart metering issues, is important. Smart grid, as a public policy concern, does not exist in a vacuum. So, we must, collectively, move toward those goals that can create the greatest benefit for the greatest number.

In West Virginia, we are moving forward simultaneously on a few issues. For example, we are introducing alternative and renewable portfolio standards legislation this legislative session to require 25 percent of the electricity sold to retail customers to be generated from alternative and renewable energy sources by 2025. These sources would include advanced coal technologies, wind, solar, and other nontraditional sources of energy, along with provisions for smart grid technology deployments.

"From an employment perspective, these projects create opportunities for utility engineers and consultants, equipment manufacturers, vendors and installers."

Beyond the portfolio standards, the bill requires the West Virginia Public Service Commission to set net metering and interconnection requirements. It creates a credit trading system for the implementation of demand-side projects and greenhouse gas emission reduction or offset projects. The bill establishes the Alternative and Renewable Energy Resources Research Fund to provide matching grants to state universities for research on alternative and renewable energy projects. The bill also provides incentives to locate new alternative energy facilities in West Virginia. Addressing the energy, environmental and economic issues in an integrated fashion, like this, is crucial to a better, more modern generation, transmission and delivery system."

What kind of "shovel-ready" jobs can the smart grid produce?

"Right now, West Virginia is home to a few, innovative technology projects. In the northern part of the state, Allegheny Power has been working with a West Virginia technology company, Augusta Systems, on a number of smart grid projects that involve the use of a fully integrated, intelligent communications and control network, featuring smart meters, line and substation monitors, automation equipment, distributed resources, customer appliances and more. In the southern part of the state, Appalachian Power has been exploring the use of advanced storage devices as part of a smart grid solution. The company has deployed a NaS battery storage system to assist during peak demand periods.

From an employment perspective, these projects create opportunities for utility engineers and consultants, equipment manufacturers, vendors and installers. As these are demonstration projects, the employment numbers are limited currently, but as more projects move forward, opportunities for businesses and our workforce increase."

What role should the federal government play in this transformation? What role should the states play?

"We have seen from the energy policy act of 2007 and from the recent stimulus bill that the federal government can assist in setting the tone and providing important funding

for smart grid efforts. It can also play an important role in encouraging the setting of standards for smart grid technologies, which is underway. So too, can the states make an impact through legislation and regulatory action, such as through the proposed portfolio standards bill in West Virginia.

From a big picture perspective, progress must occur on multiple fronts, in a coordinated manner. A smarter grid will require the continued development of next-generation technologies by researchers and manufacturers, but also the deployment of current technologies by utilities. It will require those utilities to work with public service commissions on effective implementation of projects and technologies. It will require policy makers to ensure that federal and state governments promote smart grid deployment. It will take all of us to work with and educate our constituents and customers on the needs and challenges involved.

For example, we are putting together a smart grid implementation plan in West Virginia. My energy office is working with the state public service commission and the major utilities in the state on this effort, which is partially funded by the state and the U.S. Department of Energy. This is a prime example of the type of cooperation and coordination, which is so necessary for grid modernization. Not one of those entities can do anything on their own about this important issue. Utilities cannot make their electricity grids smarter overnight. Regulators and policy makers cannot will a smart grid into existence. We are all in it together."

Patrick Mazza

Research Director, Climate Solutions

What is the most important next step in the development of the smart grid?
"With significant funding for smart grid deployment coming through the stimulus package, $4.5 billion in matching funds at a 50 percent cost share, the most important consideration is to make sure the money is spent in the most catalytic way possible. That means more than smart meter projects—it means deployment of full systems that prove the range of smart grid capacities. It is not good enough to say the grid is being made ready for mass-scale demand response or distributed generation interconnection. Projects must actually create a pathway to implement these pieces, as well as plug-in vehicle integration, to show why it is worthwhile to move to smart grid.

Large-scale smart grid demonstrations should be coordinated with mass-deep energy efficiency retrofits that include installation of building intelligence and on-site renewables, construction of new zero-energy buildings that trade energy with the grid and plug-in vehicle network deployments with smart charging. This translates into a high level of coordination between utilities, state regulatory and energy agencies, local governments and the building and vehicle sectors. Local-state public-private partnerships should look to build deployment projects that combine smart grid funds with expenditures and tax incentives provided in the stimulus for energy efficiency, renewables and plug-ins."

"Large-scale smart grid demonstrations should be coordinated with mass-deep energy efficiency retrofits that include installation of building intelligence and on-site renewables, construction of new zero-energy buildings that trade energy with the grid and plug-in vehicle network deployments with smart charging."

What kind of "shovel-ready" jobs can the smart grid produce?
"Installation of smart grid systems at the distribution level is 'shovel-ready.' Some transmission projects have been teed up, but for the most part the game is distribution."

What role should the federal government play in this transformation? What role should the states play?
"The federal government should provide funding and tax incentives, as it has done through the stimulus. Anticipating a second stimulus, a larger funding pool should be set aside. Federal agencies also have a critical role to play in creating interoperability standards through the GridWise Architecture Council. Continuing research and development should be funded in areas such as managing renewables' variability though demand response. State commissions should make sure regulatory frameworks are opening ways to prove smart grid benefits through regulatory pilots, and they need to provide performance incentives that encourage using the smart grid to promote efficiency and renewables. State energy agencies should spur and participate in large-scale smart grid demonstrations."

Seattle-based Climate Solutions is a research and advocacy group focused on accelerating global warming solutions

Terry Mohn

Technology Strategist, Sempra Energy utilities

What is the most important next step in the development of the smart grid?
"No one 'first step' will achieve all our industry has in mind since there are so many stakeholders with varying interests in the smart grid. First of all, utilities need to make investments in new technologies, i.e. those identified in the modern grid initiative. The investments are risky in that many unknowns exist because we don't have examples to draw from. We can minimize technology obsolescence risk through: cost sharing, standards adoption, reference designs and successful pilots. Second, we need to incorporate the consumer into the decision process. One way is to provide them access to energy costs in real time. Another is to offer higher efficiency on their purchased products, perhaps products that understand the cost of energy when it is used. Third, energy storage and distributed generation needs to be better explained and supported by all stakeholders."

What kind of "shovel-ready" jobs can the smart grid produce?
"Any new long-term project taken on for smart grid creates jobs. Examples include: installing new information technology systems, deployment of AMI, training solar panel installers, training AMI meter installers, installing demand response systems (i.e. PCT's), deployment of distribution automation control and actuator systems, and so on."

What role should the federal government play in this transformation? What role should the states play?
"The federal government should continue to support standards development and co-funding for first-of-a-kind projects. Much federally funded research should be made available in demonstrations rather than simple research. It should also coordinate other agency work (i.e DOD's cyber security and distributed generation) as appropriate for the energy sector.

The states should simplify the site issues for transmission and distributed generation. They should also adhere to federal designs around smart grid rather than defining it separately for themselves. Overall, both the federal and state groups need to coordinate activities as quickly as possible while the environment and job creation are top of mind."

"The states should simplify the site issues for transmission and distributed generation. They should also adhere to federal designs around smart grid rather than defining it separately for themselves."

The Sempra Energy utilities—San Diego Gas & Electric Co. and Southern California Gas Co.—serve more than 20 million consumers

Sunil Cherian

President, Spirae

What is the most important next step in the development of the smart grid?

"The next phase of smart grid development needs scalable and adaptable demonstrations designed to address concerns about system reliability and cost/benefit uncertainty. These projects should be designed to demonstrate how the smart grid offers a rich platform for enabling new business transactions between energy producers, consumers and service providers while maintaining grid reliability through automatic network and power management. Smart grid platforms should be naturally scalable so that innovative solutions, value propositions, regulatory changes and policy incentives can be tested and refined, proven in operations and continually scaled for broader adoption."

What kind of "shovel-ready" jobs can the smart grid produce?

"Smart grid deployments need a variety of solutions such as: smart consumer appliances and energy management systems; metering, protection and switching equipment; renewable energy systems, distributed generation, and storage; advanced modeling, simulation, and training software; and grid operations and enterprise information systems. Smart grid projects will create or retain jobs in all these areas, led by smart grid analysis (business, technical, regulatory), design, development, integration and operations jobs. With appropriate incentives, distributed resources such as flexible demand, roof-top PV, grid-friendly energy management systems and selective grid upgrades can be immediately deployed to support smart grid objectives that create job opportunities."

"The next phase of smart grid development needs scalable and adaptable demonstrations designed to address concerns about system reliability and cost/benefit uncertainty."

What role should the federal government play in this transformation? What role should the states play?

"The federal government can accelerate the adoption of smart grids by facilitating a common set of standards in areas such as generation interconnection, data exchange, service delivery, reliability and security. This will enable vendors and solutions providers to confidently develop products and services for smart grids. Financial incentives for deploying scalable and adaptable smart grid implementations will enable utilities and other stakeholders to share the uncertainties and risks of smart grid development and adoption. At the state level, regulatory changes and policy incentives can play a significant role in enabling individual projects, regional collaborations and multi-utility smart grid initiatives. Ultimately, federal and state policy and regulatory certainty is essential for attracting the long-term investments required for smart grids."

Based in Fort Collins, Colorado, Spirae is focused on developing solutions for large-scale integration of renewables, DG and demand response into a seamless system that works for system operators, utilities and end users

Conclusion by
Eric Dresselhuys

Why We Must Seize the Moment Now

*By **Eric Dresselhuys, Vice President, Silver Spring Networks***

A handful of factors are driving the need for smart grid policy today: climate change, job creation, infrastructure reliability and safety and customer empowerment.

Given the urgency of these policy issues, we do not have the luxury of choosing between "depth" (foundational deployments) and "breadth" (multi-application demonstrations). We need both, and the good news is that the technology and commercial viability of smart grid solutions is already available today.

Investment That Matters

To reap the immediate benefits of foundational technologies, we must start investing immediately in a real-time operating system for our power grid. Deployment of the networking platform at the heart of this system requires long-term planning and reorganization of utility IT infrastructure, implementations that can take three years or more. To delay building the core platform of the smart grid means we will delay achieving the aforementioned policy objectives and the innovation that such foundational technologies enable.

Demonstration projects are also important, and can be run in parallel to investment in foundational technologies. We need a better understanding of the full benefits of "what's next," including self-healing grids, massive distributed generation, smart buildings and micro-grid applications. What we don't need is yet another pilot project to see if demand response works—we know it does. Once the foundational deployments are in place, the benefits of applications demonstrations will become achievable.

Creating the Business Model

We need to leverage the Economic Recovery Act to accelerate the deployment of open, ubiquitous, secure platforms that will enable an evolutionary business model for the smart grid—one that allows utilities to: empower their customers, enable ecosystems of vendors and partners to flourish, and improve operations by deploying any of the devices and applications needed, when they are needed.

Many jobs will be created as a result of this movement to smart grid. Most obviously, deployment of the core smart grid platform and advanced metering will create tens of thousands of technical, manufacturing and installation jobs almost immediately. These are overwhelmingly U.S.-based jobs that can be staffed with retrained workers displaced by the macro-economic downturn. The Gridwise Alliance has estimated that more than 280,000 jobs could be created by the smart grid alone.

Over time, the smart grid will create any number of appealing, high-paying jobs—including field-network technicians, network operators, electrical engineering and IT staffing positions, all of which pay more than any non-technical jobs they may be replacing.

Getting Government Involved

Both federal and state agencies have important roles to play in facilitating the smart grid.

The federal government has used tax and spending policy to facilitate state implemen-

tation of smart grids on the distribution grid and should continue to work cooperatively with the states to implement effective transmission expansion to ensure that our growing renewable portfolio can be accessed by our major population centers. Building on the recent stimulus package, we'd expect to see major federal action in 2009 on both climate and energy policy—including carbon monetization—which will further highlight the benefits of a smarter grid.

State regulators have a more immediate and direct role to play. State Commissions must be decisive in creating a clear regulatory and rate process for near-term implementation of the smart grid throughout the United States. Legacy cost-recovery models based on narrowly defined 'least cost' models are only effective in addressing narrowly defined problems. When applied to the smart grid, "least cost" likely results in "lowest long-term value" or "soon to be fork-lifted out."

An Economic No-Brainer

For less than a few dollars per customer per month, we can build the critical infrastructure needed to create a 21st century electric grid. If it's not worth that, why are we all talking about it?

Eric Dresselhuys is Vice President at Silicon Valley-based Silver Spring Networks. Silver Spring builds networks that enable a utility to make the business changes necessary today to improve efficiency, reliability, and customer service while reducing costs.

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