

Smart Grid Stimulus*

Utilities hurry up and wait to apply for grant money.

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The American Recovery and Restructuring Act (ARRA, or the Recovery Act), signed into law in February, provides \$4.5 billion in stimulus funding for programs aimed at “electricity delivery and energy reliability activities to modernize the electric grid.” This funding commitment, and swirl of industry and lawmaker activities since, has helped lift the smart-grid agenda out of the shadows of utility engineering departments and into the public’s broader view. A testament to this is found in CNN’s reporting on March 21, 2009 about the concern over smart-grid cybersecurity.¹ The smart-grid concept has caught on as an issue of national importance.

Many utilities are scrambling to define how their smart-grid projects might qualify for smart-grid demonstration or matching grant funding. The Department of Energy (DOE) published guidance in mid-April for prospective grantees, but a great deal of uncertainty remains about how to develop a meaningful funding opportunity, how to decipher the pros and cons of submitting an application early, and how to reconcile utility smart-grid funding plans with existing utility initiatives. There also is tremendous pressure within DOE to identify funding allocations and priorities, get the grant-making guidance published, start the review of applications, and make awards.

Regardless of the uncertainty, time may be of the essence for utilities intent on capitalizing on funding opportunities; utilities will need to

advance a clear proposition and business case for how they will use federal funds and why these uses comport with the dual imperatives of the legislation to advance the interests of improving the electricity delivery system while stimulating economic activity. How will the smart-grid business case be uniquely shaped by these imperatives and what’s at risk in acting hastily?

Haste and misguidance could change outcomes and directions for the smart grid community and supporting industries.

The rush of activities has many potential downsides. Some expect DOE to face hundreds if not thousands of potential grant applications from a wide range of energy market participants (e.g., technology companies, utilities, research entities, among others). A practical challenge thus emerges about how to weed through this deluge of funding requests and order and prioritize the opportunities. DOE will be under pressure to be responsive in the interests of getting funding out the door regardless of the quality and nature of the funding requests. Equally challenging is that utilities are rushing now to get grant applications developed in the absence of clear guidance, and what gets submitted may deviate substantially from DOE’s priorities when finalized.

This two-sided problem—a lack of information for those developing grant applications and the pressure DOE is under to make awards quickly—might lead to unintended consequences. Certain companies, technologies

¹ “Smart Grid may be vulnerable to Hackers,” Mererve, Jane, CNN, Mar. 21, 2009.
<http://www.cnn.com/2009/TECH/03/20/smartgrid.vulnerability/index.html>.

and research and demonstration agendas may reap substantial rewards over others, and what is funded may have little to do with creating employment and stimulating the economy, which is one of the primary purposes of the Recovery Act; the funding also might do little to advance the development of the smart grid generally. Haste and misguidance could change outcomes and directions for the smart-grid community and supporting industries.

To understand this conundrum, it's useful to review the regulatory background—what the Recovery Act requires and what guidance it provides, the role of DOE's initial, but withdrawn, guidance for funding, the role of the National Institute of Standards and Technology (NIST) around standards, guidance from FERC, the potential impact of new federal smart-grid legislation, and the role of separate state efforts.

EVOLVING GUIDANCE

The Recovery Act provides minimal guidance on how the money should be spent. Very broad areas are listed (e.g., demand response, energy storage, security, reliability, supply disruptions) as are the general uses (e.g., equipment, development, demonstration, deployment).

The Office of Electricity Delivery and Energy Reliability (OEDER) within the DOE will oversee much of the grant making. \$100 million will go to worker training, \$80 million for studying future demand transmission requirements and \$10 million for the NIST to establish a framework on smart-grid interoperability. The use of the balance of the funds isn't prescribed as to amounts, but gives latitude under some circumstances for the Secretary of Energy to use funds for transmission improvements and the hiring of staff. Funding earmarked for EISA Section

1306—the matching grant investment program—will represent at most a 50-percent cost share with the grantee. Of significance is that the \$4.5 billion of smart-grid funding is only 10 percent of the total Recovery Act funds for which DOE finds itself responsible. (Congress provided another \$27 billion to DOE as part of general appropriations for 2009). Given that the goal is to commit all Recovery Act funds within 18 months, DOE has a lot to accomplish in a short period of time.

There's a raft of unresolved questions about how this funding will, or should, be used. The Recovery Act required the Secretary of Energy to issue guidance within 30 days of the Recovery's Act's passage in the form of a notice of intent (NOI) to issue a funding opportunity announcement (FOA) for the regional demonstration projects, and 60 days for the investment grant program. DOE released the NOI and a draft FOA on April 16. The NOI provided instructions about eligibility criteria for projects and grantees, and the draft FOA outlined the department's plans for a formal solicitation for proposals.

At this writing, DOE was assimilating comments it received during the April NOI's 20-day public comment period. However, even though the NOI and FOA aren't yet finalized, prospective grantees already have begun the process of fine tuning grant applications, in anticipation of a final FOA scheduled for release in mid-June. Whether the NOI and FOA resolve funding priorities is another question.

Within OEDER there are many different program areas, including those held under the research and development branch. Smart-grid monies likely will be sought after, and allocated, across all the program area sponsors ranging from energy-system security, energy storage, cyber security, superconductivity,



integration of renewables, transmission and smart metering and distribution automation systems. The \$4.5 billion in total funding, less-specified commitments (e.g., training, etc.) may

FUNDING CRITERIA

In addition to establishing broad program allocations, DOE also must establish funding criteria. DOE gave some indication of this when

Table 1. Tracking Stimulus Grants

| Background Area | Description | Source |
|---|---|---|
| DoE Weekly Activities | The federal government has established a web site for tracking Recovery Act developments. Weekly reports by each federal Department are provided. | http://www.recovery.gov/?q=content/agency-weekly-reports |
| NIST Study Effort | The NIST conducted a “foundational session” explaining its work effort in November 2008. NIST must build on this work and gain FERC approval. | http://www.nist.gov/smartgrid/NIST_GI08_Foundation%20Session%20Slides_final.pdf |
| DoE’s Research & Development Branch | DoE’s R&D organization will most likely see funds allocated across program areas. This site provides background on the four major R&D areas with the Office of Electricity. | http://www.oe.energy.gov/our_organisation/rnd.htm |
| NARUC/FERC Collaborative funding criteria | Criteria established as a consensus among 19 states and FERC for guiding DoE Smart Grid grant making | http://www.ferc.gov/industries/electric/industry-act/smart-grid/FERC-NARUC-collaborative.pdf |

devolve quickly into \$200 million to \$400 million specific program allocations. If it does, that portion of funding slated for AMI-centric uses also could be small and this may be controversial given the visibility of smart meters within the smart-grid discussion. Given, however, that the Secretary of Energy has yet to complete many senior appointments within the department, it’s questionable whether Secretary Chu will issue definitive and conclusive guidance about program priorities (both funding levels and emphasis) so early in the process.

As utilities struggle to understand the priorities for funding, the federal legislative landscape is already shifting.

it released the NOI, stating the program would provide 50-percent matching grants ranging in size from \$500,000 to \$20 million for smart-grid technology deployments, and grants between \$100,000 and \$5 million for deployment of grid-monitoring devices (e.g., phasor measurement units). Also, the draft FOA proposes to allocate \$615 million for demonstration projects involving smart-grid, utility-scale energy storage and grid-monitoring technologies.² The NOI emphasizes regional, large-scale best practices, and cooperation and collaboration among utilities and integrated teams across the spectrum of stakeholders (e.g., utility, vendor, government, financial, etc.). DOE is also placing a strong emphasis on program metrics and cost-benefit

² “Vice President Biden Outlines Funding for Smart Grid Initiatives,” DOE press release, April 16, 2009; and Notice of Intent to Issue and Funding Opportunity Announcement No.: DE-FOA-0000036.

Funding Uses and Criteria

The range of uses of “smart grid” funding as called out for in EISA 2007 (Section 1306(d))

- Demand-responsive equipment
- Enhance security and reliability of the energy infrastructure
- Energy storage research, development, demonstration and deployment
- Facilitate recovery from disruptions to the energy supply
- For implementation of programs authorized under title XIII of the *Energy Independence and Security Act of 2007*;
Section 1304: Smart Grid Technology Research, Development and Demonstration;
Power Grid Digital Information Technology;
Smart Grid Regional Demonstration Initiative;
Section 1305: Interoperability framework;
Section 1306: Federal Matching Fund for Smart Grid Investment Costs; and
Uses focused on Smart Grid Functions.

Funding Criteria and Emphases

- Ready to implement; provides meaningful near term investment and employment
- Regional (e.g., EISA Section 1304)
- Unique, innovative, but ready to be commercialized
- Sufficient scale
- Broad group of stakeholders (utilities, vendors, government, RTO/ISO, financial community, customers)
- Encourages the expansion of smart grid
- Willingness (requirement) to share information and performance data
- Ability to further develop smart grid metrics

analysis, transparency, cyber security, and interoperability standards development, all items stressed by Patricia Hoffman, DOE's acting secretary of OEEDR at a March 3 hearing before the U.S. Senate's Energy and Natural Resources Committee. Hoffman also emphasized that one of her office's highest funding priorities is to implement the Recovery Plan generally, implying the importance of getting the money working within the economy as a whole.

Others also are offering opinions on the question of funding criteria. The NARUC/FERC Smart Grid Collaborative has offered its own

extensive outline of funding criteria for both the regional demonstration and the matching grant programs. It breaks its criteria down into pre-conditions for grants (e.g., compliance with FERC reliability standards, participation in information clearinghouse, designing for upgradeability, etc.), overarching criteria (e.g., distribution of funding, project scale, geographic diversity, etc.), conditions for technologies, rate-design considerations, regulatory issues, information requirements, customer privacy and program monitoring. The NARUC/FERC collaborative's proposed criteria are detailed—there are over 50—and they



provide early useful guidance to prospective grantees working on applications development.³ FERC's Commissioner Suedeen Kelly characterizes the criteria as a consensus among 19 states and FERC offered in the interest of ensuring stimulus money is put to best use.

FERC AND NIST GUIDANCE

Further complicating the funding picture is the important work that NIST must accomplish in the establishment of an interoperability framework for smart grid. FERC put pressure on the NIST by issuing on March 19, 2009 a proposed policy and action plan on proposed interoperability standards and inviting public comment. FERC's focus is in part trying to force prioritization of the NIST efforts, ensuring that cybersecurity concerns are tackled. The NIST work and FERC's strong policy plan may influence the nature, type and speed of DOE funding deliberations, especially as cyber security concerns grow. In April and May, DOE convened meetings among industry stakeholders and policy makers to advance the standards-setting process.

The NIST (part of the U.S. Department of Commerce) effort on standards and protocols is authorized by the EISA 2007 (Section 1305) with the Recovery Act further funding these activities. NIST aims to establish a framework of concepts, principles, processes and models that will help promote the interests of smart-grid interoperability across the entire spectrum of smart-grid devices and uses. Once NIST completes its work, then FERC (primarily due to its bulk-power reliability jurisdiction) will "institute a rulemaking proceeding to adopt such standards and protocols as may be necessary to insure smart-grid functionality

and interoperability in interstate transmission of electric power, and regional and wholesale electricity markets."⁴

A key part of NIST's study effort is to evaluate business requirements and use cases and from these, decompose what devices are interacting with each other and what standards and protocols and policies pertain to these interactions. From that analysis, NIST can start putting together an understanding of the gaps and overlaps in standards and protocols. Criteria for standards and protocols include how they support such requirements as: system upgradeability, scalability, extensibility (e.g., adding new features and devices), security, time sequencing, information logging, automatic detection and configuration, and asset identification. Part of what NIST also wants to accomplish is the development of a process that will help resolve interoperability problems as they emerge, a process predicated on deep technical expertise among working group members and a rigorously managed "interoperability knowledge base."

In addition to its policy guidance around standards, FERC also issued guidance on March 19, 2009 about smart-grid project rate recovery. FERC's interim guidance—until standards are established by FERC through the NIST process or otherwise—is to provide recovery for those projects that demonstrate compliance with established FERC reliability criteria and that demonstrate an ability to upgrade the system subject to recovery so as to avoid the risk of stranded assets. FERC also wants to ensure that recovery obligates the jurisdictional utility to share information about projects, especially demonstration projects that advance the interoperability challenges, with

³ <http://www.ferc.gov/industries/electric/industry-act/smart-grid/FERC-NARUC-collaborative.pdf>.

⁴ EISA 2007, Section 1305(d).

the information clearinghouse established as part of the Recovery Act.

As utilities struggle to understand the priorities and emphasis for potential funding opportunities, the federal legislative landscape already is shifting. Congress is working on new energy legislation that includes smart-grid provisions related to hybrid electric vehicles, smart appliances, and demand reduction goals. If passed, this legislation or a variant will promote new federal priorities for smart grid advancement.

State mandates to implement AMI may blunt DOE support for deployments.

Many states have created mandates to reduce peak loads through demand-response programs, and many utilities within these states actively are evaluating and deploying smart meter and grid technologies. California, Delaware, Maryland, Illinois, Massachusetts, Pennsylvania and Texas are some of the states leading the way. Similarly, many utilities outside of these states are pursuing pilots and large deployments even in absence of formal state mandates to do so, and in most instances securing recovery allowances for the investment. Due to Recovery Act requirements that there cannot be duplicative funding sources, state mandates to implement AMI—and to provide recovery of these investments—may blunt serious consideration by DOE to help support AMI deployments.

THE ROLE OF AMI

Many utilities have yet to develop a coherent smart-grid strategy but many recognize the central role that AMI plays at some point in their smart-grid implementation. For both state commissions and regulated utilities, AMI is

clearly a central smart-grid application—enabling customer choice with advanced rates design predicated on hourly or sub-hourly data, in-home gateway choices and options through the home area network communication protocols and capabilities, net and bidirectional read capabilities to support distributed generation and advanced hybrid electric vehicles, end-of-line voltage and power-quality measures to enable distribution engineering applications, and disconnects to help manage and curtail loads. While there is a tendency to organize the smart-grid strategy around the role of the smart meter, it is also clear that the Recovery Act grant monies extend far wider than AMI-centric uses and applications.

One challenge utilities will have is how to organize their smart-grid plans around the needs for ubiquitous meter change outs while positioning for Recovery Act grant dollars aimed at extended uses and demonstrations of smart-grid capabilities that go far beyond the typical scope of AMI business-case evaluations. Moreover, given the precedent of numerous state mandates to deploy smart-metering systems, and many investor-owned utilities pursuing AMI systems and gaining regulatory recovery for these investments (with attendant regulatory findings around reasonableness, prudence and the meeting of the public's interest) it is not clear that DOE would look favorably upon grant monies being used to fund AMI deployments.

More promising will be proposals that extend and enhance the scope of proposed or actual AMI deployments and offer transparency about the extent of costs and benefits associated with pursuing these extended and enhanced uses. Good examples are using the meter-enabled end-of-circuit voltage measurement to better manage transformer loads and sizing and better balance voltage levels on distribution

circuits. A proposal to aggressively and rigorously study such efforts and make results available to the smart-grid community (a grantee's obligation as part of receiving funding) may receive more attention as a worthy funding priority within DOE.

SMART GRID MEETS RECOVERY ACT

The additional challenge in prioritizing smart-grid research, development and commercialization grants is to reconcile how these grants meet Recovery Act requirements around creating employment, stimulating economic activity otherwise, getting money spent quickly, buying American products, and ensuring that the grant dollars are non-duplicative. Many smart-grid deployment-oriented initiatives, for example, will take a long time to plan and implement; a typical AMI network can be deployed for several million dollars (not considering meters and IT systems), but only a handful of technicians are needed to mount a few hundred collectors and repeaters. Unless the utility already has selected an AMI vendor partner, the process of reviewing, selecting and negotiating with the AMI vendor partner will take at least twelve months and another six months of planning will follow before field work could be conducted. Assuming DOE takes six months to make awards, this implies a timetable of nearly two years before grant monies start circulating due to support of an AMI project. As a utility evaluates proposals it will wrestle with how to show convincingly how grants today can get money circulating quickly. R&D programs and investments hold more promise in this regard than AMI-centric deployment activities.

As utilities grapple with developing a grant application and having this ready to submit to DOE in June, many key developments will be pending. DOE may not have established

important priorities for funding. It may not have the benefit of a full cadre of political leadership in senior posts. Consensus may be lacking with key stakeholders like OMB, FERC and NARUC about funding and R&D priorities. NIST's important work on reviewing standards and protocols for interoperability will be in progress, new federal smart-grid legislation may be pending, and states will continue in their efforts to evaluate and implement separate smart metering, demand response and smart-grid initiatives and programs.

Against this backdrop, it is likely that DOE will entertain thousands of grant applications for a huge range of potential funding awards, and DOE will be pressured to make awards quickly in the face of a deteriorating economy and the politics of the larger stimulus bill.



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