

Electric Distribution R&D Peer Review 2006 Project Summary – Modern Grid Initiative

YOUR ORGANIZATION:	National Energy Technology Laboratory (NETL)
PROJECT TITLE:	Modern Grid Initiative (MGI)
PRESENTERS:	Steve Pullins, RDS/SAIC
FY 2005 FUNDING:	~\$400K
FY 2006 FUNDING:	\$4,100K
START/COMPLETION DATES:	April 2005 – October 2006

Overall Project Purpose and Objectives: This program, which has been termed the DOE Modern Grid Initiative, is designed to advance a national effort -a partnership among key stakeholders including utilities (both public and private), manufacturers, academia, the National Labs, regulators, State and Federal Government - to improve the national grid. Potential areas of improvement include, but are not limited to capacity, reliability, security and power quality. Activities in support of this program will include stakeholder outreach, analysis, and technology advancement with respect to electric grid transformation activities. This program shall to the greatest extent possible and practical work in cooperation and coordination with OE's existing programs such as Transmission Reliability, Electricity Distribution, GridWise, and GridWorks. It shall also attempt to foster constructive and beneficial relationships /partnerships with other industry efforts related to electric grid modernization or improvement.

Task 1: System Development – Concept Creation

Under this task the following work shall be performed:

- Gathering various team and stakeholder input to be applied to updating the “Modern Grid v1.0” document and further update the document as determined necessary during the course of the project
- Develop “white papers” on the electrical grid’s principal characteristics and key technology areas
- Develop “white papers on various topics/areas such as: national policy needs, state regulation needs, utility industry needs, technology deployment needs, metric/performance measurement needs, developmental field test, regional demonstration program needs, educational / knowledge worker needs and others.
- Develop briefing and technical communications packages from a systems viewpoint
- Develop an economic modeling document to provide a potential benefits case
- Develop an adoption strategy including a functional specification for standards bodies

Task 2: System Development – Developmental Field Tests

Under this task the following work shall be performed:

- Use the system concept developed in Task 1 to develop a advanced technology integration plan
- Develop a comprehensive conceptual design of integrated developmental field tests
- Develop field test agreements with one or more “host” organizations with system base-lining performed
- Develop necessary test planning that addresses an “overall” view for regional advanced technology integration projects and specific developmental field tests
- Provide modeling and simulation products to support the test program
- Develop a standard package for developmental field tests

Task 3: Stakeholder Development

Under this task the following work shall be performed:

- Develop a “Modern Grid” website
- Plan and implement “Regional Summits” (4 anticipated)
- Plan and Implement a “National Summit”
- Develop a working group / stakeholder feedback website
- Develop a link to the SmartGrid newsletter
- Work on implementing academic development grants
- Work on visualization of the Modern Grid
- Provide a long term stakeholder development plan and management

Achieving DOE OE R&D Program Goals

The Modern Grid Initiative will support the stated goals of DOE’s R&D programs to lead a national effort to modernize the grid through several key activities that:

- Identify key regulatory barriers and drive required changes with solid analysis.

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- Catalyze consensus-based, open-protocol architectures and standards for communication.
- Develop pre-competitive technology in strategic areas where commercial interest is insufficient or unfocused.
- Conduct demonstration projects to promote early commercial development and reduce perceptions of risk.
- Support the basic science needed to analyze and advance the transformation.

Expected Benefits

- Effective coordination of broad technology developments
- Wide-spread communication of definitive results
- Objective quantification of benefits
- Most efficient and cost-effective approach; enhanced likelihood of deployment of the RIGHT technology suite
- Enhanced DOE leverage of non-DOE technology through collaboration
- Stimulation of new technology and process developments and deployments
- Credible basis for policies, standards, and incentives needed for modernizing the grid
- National program that includes clear regional benefits among multiple regions

Addressing the Barriers

“The fear of the unknown is worse than the horror of the present.” – former utility manager, heard May06

- Projects designed to directly address deployment barriers for host utilities, consumers, and regulators
- Clearly shows physical, economic, technical, and commercial viability (reduces uncertainty, increases predictability)
- Provides data, information, and analysis to influence policies (federal and state standards, economic incentive basis, and regulator support)

FY 2005 and FY 2006 Results and Accomplishments:

FY05:

- Completed the systems analysis of the grid and the required future state of the grid to support a 21st century economy.
- Completed initial industry vetting of the results (Initial Regional Summit hosted by GridWise Alliance and PJM, Sep05, 25 attendees)

FY06 (to date – funding in place Mar06):

- Released the Modern Grid v1.0 summary document (Nov05), Modern Grid Initiative v1.0 (Mar06), and Modern Grid Description v1.0 (Apr06)
- Held Modern Grid Regional Summits in the Southwest (Phoenix, Nov05, 60 attendees) and Northwest (Portland, Apr06, 80 attendees)
- Launched The Modern Grid website (www.themoderngrid.org) (Apr06)
- Agreement in principal with AEP for a developmental field test (DFT) of an integrated suite of advanced grid technologies in West Virginia delivering some of the principal characteristics of the Modern Grid (Apr06)
- Agreement in principal with Allegheny Power for a DFT of an integrated suite of advanced grid technologies in West Virginia delivering some of the principal characteristics of the Modern Grid (May06)
- Alignment plan for other modern grid-related earmark projects (May06)

FY 2007 Plans and Expectations:

In anticipation of a continuing Congressional-earmark project of \$5M for FY07, the team plans to:

- Refine the Modern Grid v2.0 in preparation for functional specifications, the regional technology integration projects, and national adoption strategy (\$200K)
- On-going stakeholder development and support through TheModernGrid.org, the Characteristics and Key Technologies Working Groups, and stakeholder summits (\$300K)
- Completion of at least two public-private DFT's (\$4,400K)
- Construct the Regional Advanced Technology Integration Project Program (\$200K)
- Alignment of several earmark R&D projects with the Modern Grid Initiative (\$200K)

FY 2008 – 2012

- Bid, selection, and deployment of five Regional Advanced Technology Integration Projects (\$30M-\$50M each)
- Refinement of the Modern Grid strategies through lessons from the integration projects

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FY 2008 – 2013

- Adoption of the Modern Grid strategies by appropriate national and state organizations

Public/Private Partnerships: Identify cooperative efforts and technology transfer/outreach activities related to this and related projects. When answering, consider work with private industry, state and local government, federal government, national laboratories, academia, and trade associations. List the major partners, including subcontractors, with whom you are participating in this project, and the role they play in its completion.

The value to the country is not realized in technology demonstration projects alone. The benefit comes from deploying integrated technologies and processes that prove to modernize the grid. Government and industry must partner to create regulations, incentives, and processes that encourages investment in integrated grid infrastructure and advancements.

The Systems View of the Government Role:

- Recognize and champion societal benefits of modern grid
 - *“As a neutral third party, government is uniquely positioned to convene the nation’s top talent – in academia, industry, and national laboratories – to collaborate on defining a shared vision, developing innovative solutions, and speeding the adoption of new technologies.” Powering Our 21st-Century Economy,“ GridWise Alliance, March 2005*
- Accelerate advancement of modern grid through:
 - Long-term RD&D
 - Policy and regulation (e.g. performance standards)
 - Facilitation of commercial deployments (e.g. through investment incentives)
 - Facilitation of demonstration and commercial readiness of needed technologies
 - Elimination of long-held barriers to necessary infrastructure development (e.g. supporting transmission line siting approval within 1 year)
- Facilitate stakeholder involvement on a national and regional level

Current MGI Team cooperative efforts – aggressive public / private partnering!

Concept Development

- TVA, BPA, ConEd, PJM, SDG&E, SCE, AEP, APS
- RDS/SAIC, Enernex, Renz Consulting, JAM Enterprises, Advanced Control Systems, Infotility, Center for Smart Energy, Battelle PNL, ICF Consulting, CTC
- EPRI Intelligrid, GridWise Alliance, GridWise Architecture Council, CEC, PSERC, Galvin Initiative
- Virginia Tech, University of Wisconsin, Arizona State Univ.

Developmental Field Tests

- AEP, Allegheny
- WVU APERC, CMU
- RDS/SAIC, Augusta Systems, S&C Electric, Amperion, NGK, ACS, Weller & Associates

Stakeholder Development

- BPA, TVA, APS, SDG&E, PJM, SCE, PGE, PSE, ConEd
- GridWise Alliance, GridWise Architecture Council, GridApps, CEC, DRAM, Northeast Midwest Institute, PSERC, CERTS, NEETRAC, WA PUD Association, NCSL, Northwest Energy Coalition, Northwest Power and Conservation Council, Climate Solutions, WA CTED, Galvin Initiative
- RDS/SAIC, Center for Smart Energy, Augusta Systems, PGNC Power, VRB Power Systems, SEL, Celerity, AREVA, ETAP, Capgemini, Intel
- WVU, Washington State Univ, Virginia Tech, University of Wisconsin, Arizona State Univ., Portland State University, University of Texas