



221 Main Street #448
Los Altos, California 94022
+1 650.641.1371

Research Triangle
Stratford Hall
1009 Slater Road, Suite 300
Durham, North Carolina 27703

www.gridiantcorp.com

Via Email: docket@energy.ca.gov
California Energy Commission
Dockets Office, MS-4
Re: Docket No. 12-EPIC-01
1516 Ninth Street
Sacramento, CA 95814-5512



GRIDiant Stakeholder Comments: *First Triennial Investment Plan for Funds Administered by the California Energy Commission for the Electric Program Investment Charge (EPIC) Program*

[GRIDiant attended the Sacramento EPIC Workshop for this Docket matter on August 2, 2012 and offered oral comments and notes on a comment card at a breakout session. These written comments expand on the points then offered.]

Recommendation: GRIDiant recommends that the CEC, the California IOUs, and the CPUC make use of new distribution grid modeling, simulation, analytical, and display/visualization methods and tools, and new data streams from Smart Grid AMI, SCADA, GIS, and other sources to populate the models, in framing and carrying out EPIC R&D projects addressing critical issues now confronting California.

Some of these tools, including GRIDiant's GRIDfast software platform, were tested and proven up in part with the support of the CEC PIER program, using Public Goods Charge funds,¹ and now are available to extend research benefiting California ratepayers and utilities.

¹ CEC 500-2005-096, "Optimal Portfolio Methodology for Assessing Distributed Energy Resources Benefits for the Energynet™", New Power Technologies, Prime Contractor; and CEC-500-2010-021, "Verification of EnergyNet® Methodology", New Power Technologies, Prime Contractor. These projects developed a groundbreaking grid modeling and simulation methodology and demonstrated Advanced Grid Management (AGM) software tools (among them GRIDiant's software now branded "GRIDfast") that have the promise of dramatically benefiting California and national grid managers, public and investor-owned utilities, and ratepayers in all customer classes, by allowing improved electric Transmission and Distribution power grid reliability, efficiency, and capital asset planning and management, resulting in multiple cost economies.

We include a partial list of suggested R&D topic areas that might be addressed with “What if...?” inquiries posed to sophisticated models/simulators for California’s grids.

Discussion

Background. GRIDiant Corporation offers a commercial software platform comprised of multiple applications (tools) for advanced grid analytics and management. The GRIDiant software core engine (“GRIDfast”, formerly branded “AEMPFAS”) and functionality were tested and verified in part in CEC PIER-sponsored projects supported by the PGC, between 2002 and 2010.

The EPIC Program represents an opportunity now to put to work for a next-generation of R&D purposes key Distribution grid modeling, simulation, and advanced optimization and analytics tools that were proven up in the earlier PGC-supported projects.

GRIDiant does not expect to be a prime applicant for EPIC R&D project funding. The purpose of these comments is to call to the attention of the CEC and the California IOUs the existence and availability of new software tools such as GRIDiant’s that others could use in conceptualizing and carrying out R&D on a range of topics of pressing importance to efficiency and reliability of California’s 21st Century electric power grid.

New Class of Modeling/Simulation/Analytics Tools for Use in R&D. GRIDfast software is of a new class of power grid modeling, simulation, optimization, advanced analytics, and display/visualization software tools. These tools now will allow utility industry, grid management, and regulatory engineers to leverage the investments California utilities and ratepayers are making today in deployment of advanced Smart Grid hardware. They can put to work new data streams from smart meters (AMI advanced metering devices), SCADA hardware (advanced grid monitoring equipment), GIS systems, installed EMS/OMS/MDMS systems and other utility sources in ways that will benefit California grid managers, public and investor-owned utilities, and California ratepayers in all customer classes.

Grid models today are increasingly accurate and detailed. They can represent a single integrated model connecting transmission (including the WECC) and distribution systems, as in the New Power Technologies/GRIDiant projects for CEC PIER. They can be fully nonlinear, without resort to linearization and simplification. They can include 3-phase balanced, 3-phase unbalanced, and split-phase (2-phase) unbalanced (e.g. distribution secondary 2-phase circuits) components in multiple different combinations. They include data describing the location and attributes of all physical grid assets (lines, capacitors, transformers, switches, voltage regulators, generators, inverters, storage devices, etc.). They can model inverter-based single

and three phase generation plus synchronous and induction generators. They increasingly allow for rapid network data updating. Analytical engines now are available that can run the models on high-end PC notebooks in very short (both planning and operations) run-times for a variety of analytic outputs. Simulators now can visualize and display in a variety of formats the modeled network and the post-analytic results of “What if...?” queries.

GRIDiant’s software supports detailed modeling, simulation, and visualization/display of Distribution grids and integrated T&D grid models, with node-level analysis, optimization, and ranking of grid assets, loads, and resources relative to grid conditions, constraints, and grid performance objectives. The software platform has diverse potential applications planning for DER integration (including feeder- and substation-specific and system-wide renewable generation), market and tariff/pricing design, and potential real-time Distribution grid operations applications. Other companies also have offerings in this class of software tools.

GRIDfast applications have been used to identify no-new-wires optimized grid-side efficiencies (minimization of active and reactive power losses) and system Volt/VAR improvement; optimized design and dispatch of Demand Response, Renewables Integration, distributed storage and EV recharge infrastructure; and several-fold improvement in the cost-effectiveness of other Smart Grid programs such as AMI deployment and traditional utility capital asset improvement programs.

R&D Topics for Modeling/Simulation and Advanced GRID Analytics. Topics now before California’s electric power community that could be the subject of R&D projects using grid modeling, simulation, and advanced analytics -- build the model/simulator and use it -- include, among many possible others, the following:

- RPS and California Solar Initiative, Rule 21, AB 2514, and other California loading order-related issues
 - R&D on how the overall T&D grid and regional portions of the grid, actually function under wind and solar penetrations required for meeting 33% RPS goals.
 - R&D analysis of scheduling, storage, and grid support solutions required to enable such penetrations while maintaining reliability characterized by specific prescribed reliability performance criteria.
 - R&D on interconnection analysis methodologies for renewables and storage interconnection studies
 - R&D Analysis of how a particular part of a distribution grid – individual feeders and collections of feeders -- actually functions with higher

- penetrations of solar PV? What supports or mitigations are required in order to address what grid reliability concerns, at what costs?
- R&D analysis of a variety of scenarios related to California Rule 21
 - R&D on solar site optimization and prioritization based on location and project characteristics; FIT-related analyses
 - Other Energy Efficiency, DR, DER, renewables integration, and EV infrastructure planning and development issues
 - R&D on utility grid-side efficiencies (P and Q loss reduction, Volt/VAR optimization): methods, potential gross savings, measurement, potential valuation, and incentives to IOUs and POUs for utility grid-side efficiencies.
 - R&D on higher valuation and priority dispatch of some DR than other DR -- i.e., DR that because of its location in the grid also offers voltage support value in addition to load relief value.
 - R&D on optimal planning for increased EV penetration in distribution grids. What supports or mitigations are required in order to address what grid reliability concerns, at what costs? Development and testing of charging schedules.
 - R&D on possible pricing methodologies and market structures for DER, based at least in part on grid operational value.
 - Summer-Fall 2012-2013 Peak Load Planning in SDG&E/SCE service areas
 - R&D on identification of optimized strategies for meeting peak load requirements in absence of certain base load generation
 - R&D on optimized, ranked, targeted DR, DG, and precision load shedding under various load, generation, and interconnection scenarios.
 - AMI and Other CapEx ROI analyses:
 - R&D on Identification and quantification of CapEx and O&M \$\$ savings to utilities and ratepayers identifiable
 - AB 32 and Cap & Trade Re Utility Generation

- R&D on methodologies for measurement and valuation of carbon-avoidance through improved efficiencies in grid operations resulting in reduced fossil generation
- R&D on consequences to grid reliability of carbon-based dispatch of fossil generation
- IOU Smart Grid planning & development: R.08-12-009
 - R&D on near-term and future utility applications of grid modeling, simulation, and analytics for both grid planning and real-time, grid operations (decision-support and distribution system automation)

Thank you for considering these comments and for the opportunity to submit them.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Richard Hammond", is written over a horizontal line.

Richard Hammond, SVP
GRIDiant Corporation