Generating Realistic Information for the Development of Distribution and Transmission Algorithms (GRID DATA)

The Generating Realistic Information for the Development of Distribution and Transmission Algorithms (GRID DATA) program will fund the development of realistic, open-access power system models. These models will have the detail required to allow the successful development and testing of transformational power system optimization and control algorithms, including new Optimal Power Flow (OPF) algorithms. Project teams will take one of two tracks to develop models. Some projects will partner with a utility to collect and anonymize real data as the basis for a publically available model. Others will construct purely synthetic power system models. The program will also fund the creation of an open-access, interactive repository to store these power system models, as well as other models developed by the engineering community.

PROJECT DESCRIPTIONS

GridBright, Inc. – Alamo, CA
A Standards-Based Intelligent Repository for Collaborative Grid Model Management - $1,697,292
GridBright, Inc. and Utility Integration Solutions, LLC. (UISOL, a GE Company) will develop a power systems model repository based on state-of-the-art open source software. The models in this repository will be used to facilitate testing and adoption of new grid optimization and control algorithms.. the repository will use field-proven open source software and will be made publicly available in the first year of the project. Key features of the repository include a semantic model based search capability to support the research community, faster model upload and download times, and the ability to support thousands of users. The team will establish a long term strategy for managing the repository in order to achieve self-funding of the repository after the initial ARPA-E investment.

National Renewable Energy Laboratory – Golden, CO
SMARtDaTa: Standardized Multi-Scale Models of Anonymized Realistic Distribution and Transmission Data- $2,300,000
The National Renewable Energy Laboratory, with partners MIT-Comillas-IIT and Alstom Grid, will develop combined distribution-transmission power grid models. Distribution models will be created using a version of Comillas' Reference Network Model (RNM), adapted to U.S. utilities, and based on real data from a broad range of utility partners. The models will be complemented by the development of customizable scenarios that can be used for accurate algorithm comparisons. These scenarios will take into account unknown factors that affect the grid like future power generation technologies, including distributed energy resources, such as residential solar and home energy storage, varying electrical load, disruptions due to weather events, solar and wind data, and repeatable contingency sequences.

Pacific Northwest National Laboratory – Richland, WA
Sustainable Data Evolution Technology for Power Grid Optimization - $1,484,922
The Pacific Northwest National Laboratory (PNNL), along with the National Rural Electric Cooperative Association, Alstom Grid, PJM, Avista, and CAISO, will develop a sustainable data evolution technology (SDET) to create open-access power grid datasets that the grid community can continually update. The SDET approach will derive features and metrics from many private datasets provided by PNNL's industry partners. Based on these features and metrics, the team will develop data creation tools to generate large-scale, realistic datasets and validate them using industry tools provided by Alstom Grid. The data creation tools and datasets

can be integrated into the GRID DATA program repository so they can evolve based on user requirements and power grid advancements.

Pacific Northwest National Laboratory – Richland, WA
Data Repository for Power System Open Models with Evolving Resources (DR POWER) - $1,500,108

The Pacific Northwest National Laboratory (PNNL) has partnered with the National Rural Electric Cooperative Association (NRECA) to build a power system model repository, DR POWER, to maintain and develop open-access power grid models and data sets. The DR POWER approach will review, annotate, and verify submitted datasets while establishing a repository and a web portal to distribute open-access models and scenarios. Key features include the ability to collaboratively build, refine, and review a range of large-scale realistic power system models. For researchers, this represents a significant improvement over current small-scale, static models that do not properly represent the challenging environments encountered by present and future power grids. The repository and the web portal will be hosted and sustained in PNNL's Electricity Infrastructure Operations Center.

The University of Illinois at Urbana-Champaign – Champaign, IL
Synthetic Data for Power Grid R&D- $1,028,325

The University of Illinois at Urbana-Champaign, with partners from Cornell University, Virginia Commonwealth University, and Arizona State University will develop 10 open-source and synthetic transmission system models and associated scenarios that match the complexity of power grids. By utilizing statistics derived from real data, the team's models will have coordinates based on North American geography with network structure, characteristics, and consumer demand that mimics real grid profiles. Much of the developed software will be open source and available on the MATPOWER software suite as well as the GRID DATA repository.

The University of Michigan – Ann Arbor, MI
High Fidelity, Year Long Power Network Data Sets for Replicable Power System Research - $1,418,845

The University of Michigan, with partners from Los Alamos National Laboratory, the California Institute of Technology, and Columbia University, will develop a transmission system data set with greater reliability, size, and scope compared to current models. The project will use real power systems' data provided by Réseau de Transport d'Électrique (RTE) France and advanced techniques to anonymize data and create realistic models. In addition, the project delivers year-long test cases that capture grid network behavior, enabling the analysis of optimization algorithms over different time scales. These realistic datasets will be used to develop synthetic test cases to examine the scalability and robustness of optimization algorithms. The team is also developing a new format for capturing power system model data using JavaScript Object Notation and will provide open source tools for data quality control and validation, format translation, synthetic test case generation and obfuscation.

University of Wisconsin-Madison – Madison, WI
EPIGRIDS: Electric Power Infrastructure & Grid Representations in Interoperable Data Sets - $1,866,788

The University of Wisconsin-Madison, with team members from Argonne National Laboratory, Alstom Grid, GAMS Development Corporation, and coordinating with Commonwealth Edison, will develop transmission system models and scenarios that will serve as test cases for the development and adoption of new grid optimization and control technologies. The team aims to create a system that will construct realistic grid models by using software to emulate the transmission and generation decision processes used by utility operators. This synthetic model will utilize Geographic Information Systems (GIS) data on population density, industrial and commercial energy consumption patterns, and land use, over geographic footprints ranging from city to continental scale. The system will allow for tailoring specific data sets and scenarios to address particular challenges of developing optimization and control algorithms and will create models with challenging scenarios to test the robustness of grid solutions.

These projects have been selected for negotiation of awards; final award amounts may vary. Last updated: 1/15/2016