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Sandia National Labs Response to Modeling Tools RFC

Please see attached.

Additional submitted attachment is included below.

Request for Comments: Sandia Feedback

Draft Solicitation on Modeling Tools to Evaluate Distributed Energy Resources (DERs) and Microgrids located behind the meter on California's Modern Distribution Systems

Group 1: Validated and Transparent Microgrid Valuation and Optimization Tool

1. *Are the proposed funding amounts identified in this Request for Comments (RFC) appropriate for the work requested? Please explain the rationale behind the recommendations, and if applicable, what the appropriate level of funding should be to develop the products identified in this draft solicitation?*

There is no detail given about what is meant by "Validated". This ask could easily consume a large part of a budget depending on what is expected. Does validation mean proven useful for prediction/forecasting? What are the criteria to justify a claim of validation? What tests will be applied in order to make a claim of validation?

Will this be a 3-year effort? Will the $2M proposed budget be divided over the years or is this $2M per year?

Will you consider proposals that make modifications to existing capabilities or do you require that a new capability be developed? This could greatly impact the cost. Similarly, though you give an example of a web deployed storage tool (StorageVet), you do not explicitly state whether the new software will have to be web deployed or not. Only that it be "publically available" and "similar" to StorageVet.

Does "publically available" preclude a price for usage? Must it be freely available to the public?

How will data be managed and communicated. What data sources will be available to support design, assessment of resources, loads, etc.?

Clarity on each of these issues would be required in order to do an assessment of the proposed funding level.

2. *What are specific recommendations you can provide to improve the group descriptions of the solicitation outlined in this RFC that would result in a better evaluation of the impacts of high concentrations of DER? Please explain the rationale behind the recommendations.*

Asks for project to *"Develop, test, and validate a publicly available modeling tool to determine the most optimal size, and the combination of the most optimal DERs for a microgrid for a given location."* but then goes on to talk about assessing value by geographic location and benefit to disadvantaged communities. Unclear. Do we need metrics that favor disadvantaged communities and are we talking about a tool that will both choose site and design for a microgrid or are we designing a microgrid at a given location as indicated? If not choosing sites/locations, then what is value of accounting metrics having to do with community affluence/constrained areas of the grid?

3. *Are there existing efforts that complement the groups identified in this RFC? Are there specific changes to this proposed solicitation that you would suggest to better leverage these existing efforts? Please explain the rationale behind the recommendations and the expected value of your recommendations.*

The Department of Energy Office of Electricity has funded and is currently funding several microgrid design and optimization efforts including projects leveraging the Distributed Energy Resources Customer Adoption Model (DER-CAM) from Lawrence Berkeley Labs and The Microgrid Design Toolkit (MDT) from Sandia Labs. Several lessons-learned about developing such software can be extracted from these efforts. Recommend indicating that the new tool will leverage lessons learned from these efforts as was recommended for the StorageVet software.

4. *N/A*

5. *Are there suggestions to better complement the needs associated with CPUC proceedings related to Modeling, distributed renewable generation, electric vehicles, the use of Smart Grid Technologies and Distribution Resource Planning? Please provide specific recommendations and rationale.*

Miscellaneous Feedback:

- It is not clear what is meant by "behind the meter". Are we talking about assets on individual residences, is an entire distribution system considered "behind the meter", community scale microgrids, …?
- Not clear what microgrid "advantages" are of key concern… ability to support larger grid and generate value for community, ability to withstand extreme events? What is meant by "benefits to constrained areas of the grid". What is a "constrained area"?
- Not clear the fidelity of modeling that is being requested. Since proposal is concerned with "high penetrations of DERs" (presumably renewables unless in Hawaii or remote villages, etc.), are you asking for dynamics?
- Storage is a key consideration when designing a microgrid. Proposal is asking for optimal sizing of DER amongst other things. As is known, to optimally size storage for use with intermittent renewables, higher fidelity data is needed than is generally available. Insulation data is typically in time series with 1 hour intervals. To assess storage ability to support intermittency, order of a few seconds data intervals is needed.

Group 2: Open Source Modeling Framework and Translation tool.

No response

Group 3: Enabling High Performance Computing in Open-Source Grid Modeling

Suggested improvements:

Focus on speeding up Open-Source Grid Modeling but do not limit it to HPC. There are many technologies and tools being developed at Sandia National Labs and NREL under DOE EERE funding that address the speed concerns without resorting to expensive and centralized HPC solutions. The vast majority of grid modeling done by utilities is almost always done on desktop machines especially for the distribution system.

This research has maintained excellent accuracy in distribution grid simulations while significantly reducing model run times. Methods used include: 1) Circuit reduction can reduce the complexity of power systems models by 90% or more resulting in 90% less computation time. 2) Using parallel processing on desktop multicore machines can cut processing times dramatically using both temporal and spatial parallelization. 3) Time series approximation methods can speed up dynamic time series analysis powerflow analysis by at least 2 orders of magnitude. The combination of these 3 examples demonstrates that analysis that could take up to 120 hours can be accomplished in 5 minutes or less on desktop machines once these tools and methods are implemented in open source and commercial software packages. The 3rd phase of this project on the implementation part of this project will begin in December of 2017.

Group 4: Open-Source Desktop Environment/User Interface for Gridlab-D

Suggested improvements:

Include OpenDSS in addition to Gridlab-D. OpenDSS, like Gridlab-D, is an open-source distribution modeling tool in wide use at Sandia National Labs, NREL, EPRI, universities, and more. Utility feeder models are often converted into openDSS to allow for detailed modeling and analysis of future scenarios such as hosting capacity analysis. Similar to Gridlab-D, OpenDSS natively uses a command line interface that is difficult to learn and inhibits its use.

To overcome some of the obstacles of working with OpenDSS, Sandia and Georgia Tech have created the GridPV toolbox, which allows for control of OpenDSS from the data analysis program MATLAB. While the GridPV toolbox includes some graphical user interfaces (GUIs) and detailed instructions, it requires a familiarity with MATLAB. Additional work to further simplify the user interaction in running OpenDSS would make it easier to get started with OpenDSS and make running OpenDSS more user-friendly for developer, researcher, and public agency use.

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