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California Grid Planning Computing Center

Additional submitted attachment is included below.

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The Energy Commission is currently soliciting ideas and stakeholder input for the 2018 – 2020 EPIC Triennial Investment Plan. For those that would like to submit an idea for consideration in the 2018-2020 EPIC Triennial Plan, we ask that you complete the form below. Submittals are due by **5:00 p.m. on February 10, 2017.**

Part 1. Initiative Description and Purpose:

1. Please provide a brief description of the proposed initiative:

The goal of this initiative is to stand-up a multi-institutional computing center for electric grid planning to address the increasingly complex regulatory, technological, and hazard environment facing the utilities, CPUC, CAISO, third parties, and other state stakeholders. The center would serve two roles: (1) provide computing system resources (high performance computing systems, storage, data and model archives, grid planning software, user support, pre- and post-processing tools, etc.) for advanced analysis and planning studies performed by grid stakeholders; (2) perform R&D to address gaps in planning tools. This center would represent a coalition of computing centers and expertise within the state, collaborations with grid planning software vendors, national labs, and academia, and include technical expertise in computational, computer and data science, grid planning, and power engineering.

This concepts embodied in this proposal are also included in the 2016 DOE Grid

2. What technical and/or market barriers would the proposed initiative help overcome? For scientific analysis and tools, what knowledge gaps would the proposed initiative help fill?

The need for this center is driven by the importance of computing and planning tools for supporting a wide range of important investment and engineering decisions made across the grid community. Urgency for this project driven by regulatory and technological changes that have exceeded the planning capabilities deployed today. To provide some specificity to this argument, the following examples are provided: (1) DRP Working Group has highlight that the computational capabilities for calculating hosting capacity are limited by access to sufficient computing resources and performance limitations in existing planning software; (2) Under the IRP, stakeholders are concerned that calculations requiring the optimization of assets are expected to exceed the capacity of current tools and computing resources; (3) Simulations to evaluate grid resilience to cyber-physical and natural hazards will require significant computing resources and new tools that are not available today.

Part 2. Benefits and Impacts

3. If this initiative is successful, either fully or partially, what would be the expected impact? Who are the primary users and/or beneficiaries?

Previous studies have shown that high performance computing and computational science could increase the planning capabilities by factors of over 1000 compared with approaches using desktops and small computer servers. As such, this center would enable the stakeholders to perform considerably more complex and accurate planning analyses that would not be achievable with today's resources. The benefit would be enhancing the state's planning capabilities that would reduced cost, provide greater reliability and resilience, and lower risk. The primary users of this center would the utilities, CPUC, CAISO, CEC, and relevant third parties.

4. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed initiative:

Metrics for the computing center would include estimates of the improvement of grid planning analyses compared with those used previous studies, number of scenarios performed, complexity of scenarios analyzed, and a qualitative assessment on improvement of analysis. For metrics for the tools research and development, these could include time-to-solution improvements for important calculations, qualitative assessment of new capabilities, development of new modeling capabilities, and transition of algorithms and methods into commercial codes.

5. Please provide a list of peer-reviewed references that support the responses for questions 3 and 4. Proposed initiatives that include peer-reviewed references will be given stronger consideration.

T. Edmunds, A. Lamont, V. Bulaevskaya, C. Meyers, J. Mirocha, A. Schmidt, M. Simpson, S. Smith, P. Sotorrio, P. Top, Y. Yiming, "The Value of Energy Storage and Demand Response for Rewable Integration in California," CEC-500-2017-014, Feb 2017.

B.M. Kelley, P. Top, S.G. Smith, C.S. Woodward, L. Min, "A Federated Simulation Toolkit for Electric Power Grid and Communcations Network Co-Simulation," Modeling and Simulation of Cyber-Physical Energy Systems (MSCPES), 2015 Workshop on, pp. 106, 13-13 April 2015.

6. (For technologies only) What competitive advantages does the proposed technology solution have over current benchmark technologies? If the technology is beyond the prototype stage, what strategies do you suggest to bring to scale?

N/A

Part 3. Connection to Energy Commission's EPIC Framework

Energy Commission staff have developed a draft strategic framework to guide the CEC's planning and implementation of EPIC across triennial investment cycles. One of the objectives of the draft strategic framework is to communicate a consistent set of priorities for organizing current and future EPIC investments.

7. Please indicate which of the following strategic framework themes you feel the proposed initiative best fits within:
    - Advance Technology Solutions for Deep Energy Savings in Building and Facilities
    - Accelerate Widespread Customer Adoption of Distributed Energy Resources
    - Increase System Flexibility from Low-Carbon Resources
    - Increase the Cost-Competiveness of Renewable Generation
    - Create a Statewide Ecosystem for Incubating New Energy Innovations
    - Maximize Synergies in the Water-Energy-Food Nexus
    - Develop Tools and Analysis to Inform Energy Policy and Planning Decisions
    - Catalyze Clean Energy Investments in California's Underrepresented and Disadvantaged Communities

Other (Please Specify Below)

If Other, Please Specify

This program concept fits several strategic framework themes:
+ Develop Tools and Analysis to Inform Energy Policy and Planning Decisions
+ Accelerate Widespread Customer Adoption of Distributed Energy Resources