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Additional submitted attachment is included below.

CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov

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:

Open source modeling and optimization tools for planning
The existing tools and software used for planning and analysis in California are either expensive, difficult to use, or not generally accessible to a large number of participants. These limitations restrict the availability of participants for larger scale energy and grid studies in the state. The proposed initiative would build upon federal and state investments in open source software, and create and improve open source tools for use in the state planning and analysis activities.
Computational analysis and simulation frameworks in development at national labs and universities can be brought forward to complement existing tools. An open source platform would provide a path for novel techniques and strategies to be brought into the larger community and reviewed by a broad set of stakeholders.

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 primary barrier to participation in design and planning is the availability and flexibility of the software used in the studies. Many of the tools are either expensive or difficult to use or both. If even a small portion of the tools could be available in open source this would have a positive impact in the number of available participants and the pace of innovation possible when the tools can be experimented on, and tested and reviewed by others.
At present, mainstream tools do not provide the computational capability that has been delivered by National Labs, such as sensitivity analysis capability, critical for stability studies, and optimization capability needed for optimal control design. It is difficult (and in some cases impossible) to add new computational methods to mainstream-tools. The proposed framework will be designed in a modular fashion allowing for straightforward customization and capability extensions.

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?

The expected impact is a significant cost savings in tools, and an increase in flexibility and adaptability of the tools, as well as an increase in the diversity of available participants. The primary users are the researchers and engineers conducting planning and design studies, and the ultimate beneficiary are the California energy customers benefiting from a more open and flexible design system that can quickly adapt to changing requirements and unique situations, and incorporation of novel research into the design process.

Our vision is to build upon open standards for modeling, simulation and analysis of power systems that can be tested and evaluated for future adoption in commercial products. This will create more opportunities and competition in the market of custom solutions for grids. The delivered software will be licensed under business-friendly open source license that allows incorporating them in to commercial tools.

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

The initial metric for success would be an ability to replicate previous studies using purely open source tools in part or in whole. The second metric is the number of collaborators and users of the software. A third and longer-term metric is the adoption of proven techniques and methods by commercial vendors to provide longer-term support.

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.

Kelley, B. M., Top, P., Smith, S. G., Woodward, C. S., & Min, L. (2015, April). A federated simulation toolkit for electric power grid and communication network co-simulation. In Modeling and Simulation of Cyber-Physical Energy Systems (MSCPES), 2015 Workshop on (pp. 1-6). IEEE.

Lecouvez, M., Falgout, R. D., Woodward, C. S., & Top, P. (2016, July). A parallel multigrid reduction in time method for power systems. In Power and Energy Society General Meeting (PESGM), 2016 (pp. 1-5). IEEE.

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?

Open source tools for grid planning would bring following benefits:
- Significantly reduced total cost of ownership
- Increased flexibility in usage and deployment
- More opportunities for innovation (tools development model allows for virtually unlimited experimentation and improvements)
- Open review of models and computations that engages broader power systems community and leads to better overall predictive capability

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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

If Other, Please Specify

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