

2016 CREPC/SPSC/WIRAB Study Requests to WECC/TEPPC

January 29, 2016

10-Year Study Requests

High DG Integration Case. This study request builds upon and seeks to complete the (incomplete) lessons of the 2024 PC19 High DG Case modeled in 2015. It also tests mitigation measures as requested but not actually studied for that prior case. Distributed generation (DG) is defined to be 10 MW or less in capacity and connected to the distribution system behind or in front of the meter. For this study the DG in question is photovoltaic (PV) generation. The elements of this study request are as follows.

- a. This study case would model a significantly higher (than Common Case) level of distributed PV penetration across the interconnection reflecting continued technology advances that lower the cost of solar PV resources. This likely will strongly impact CA, but may also significantly impact some other states. The study would examine:
 - i. impact on west-wide energy dispatch, fuel use and CO₂ emissions;
 - ii. modeled over-supply or curtailment (dump energy) problems including what generation and locations are involved,
 - iii. the impact on transmission flows and congestion, including if/how changes in interregional transfers are being utilized (or are constrained) in integrating the increased DG , and
 - iv. if overloading and congestion on local/lower voltage transmission is being modeled as a major driver of curtailment (dump energy), what specific circumstances are involved in this, and does deeper inspection find this to be a realistic outcome?
- b. Additionally, if substantial curtailment/dump energy problems result, the study would test and compare two contrasting kinds of storage additions in terms of their operational effectiveness in mitigating this problem: (i) distributed storage, and (ii) bulk pumped storage, at one or two appropriate locations..
- c. This study may produce important, credible stress (snapshot) conditions that could now or in the future be evaluated via reliability/powerflow studies. However, such studies are not requested at this time.
- d. Lastly but importantly, there should be evaluation of what lessons this DG-focused case provides regarding if and how TEPPC production simulation studies can be run or refined to produce useful and realistic insights into issues associated with high penetration of

distributed solar generation (and possibly other distributed technologies) on the western grid.

This High DG study request in 2016 replaces the SPSC/WIRAB's High DG study request submitted in 2015.

Coal Retirements Reliability Case. This study request builds upon the lessons of the 2024 PC20/21 Low Carbon/Coal Retirement Case modeled in 2015. Last year, 2024 PC20/21 targeted a level of coal retirements and low-emission replacement energy to reduce CO2 emissions 34% in 2024, consistent with a trajectory of attaining an 80% reduction by the year 2050 relative to 2005 levels. This emissions reduction trajectory is higher than the goals set by the Clean Power Plan. The 2015 Coal Retirements Case did not hit the emission reduction target and did not analyze the reliability issues associated with retiring 55% the 2024 coal fleet. The purpose of this new 2016 Coal Retirement Case request is to: (i) improve the specification of retirements and replacement energy needed to reach the emissions reduction target for 2026; (ii) consider the resource adequacy and reliability implications of shifting the generation mix from coal-fired generation to renewable energy; and (iii) examine the potential for and reliability of repurposing existing transmission lines from retired coal plants for new renewable energy development.

- a. Specify a combination of coal plant retirements and replacement low-emission energy to reduce CO2 emissions in 2026 consistent with the long range trajectory of attaining an 80% reduction by the year 2050 relative to 2005 levels. To the extent feasible, locate new renewable energy generation near retired coal plants and repurpose its transmission lines to deliver renewable energy to loads. Model this Coal Retirements Case with the production cost model to analyze the impact on west-wide energy dispatch, the potential congestion on existing lines, and identify areas for potential new lines.
- b. Examine the potential reliability impacts of substantially greater coal plant retirements in this case through the round trip process. Perform power flow model analysis that evaluates steady state and dynamic conditions during periods when the system may be most vulnerable as identified from the production cost modeling results.
- c. If there are reliability problems with the 2026 Coal Retirements Case, analyze specific mitigation measures that could be taken to resolve the reliability problems such as replacing retired generators with synchronous condensers, specifying renewable generators with frequency response controls, and adding storage.

This 2016 Coal Retirements study request replaces the SPSC/WIRAB's Coal Retirements study request submitted in 2015

High RPS Case. This request examines the implications that: (i) existing state RPS policies increase over the next 10 years across the Western Interconnection; and (ii) California seeks to fulfill part of its new 50% RPS target by 2030 with out-of-state renewables. This request assumes modest and plausible increases in RPS as follows:

State	Current RPS Rate for 2026	Study Case RPS Rate for 2026
Arizona	15%	25%
California	40% in 2024; 45% in 2027	45%
Colorado	30%	40%
Idaho	N.A.	
Montana	15%	25%
Nevada	25%	35%
New Mexico	20%	30%
Oregon	25%	35%
Utah	20%	30%
Washington	15%	25%
Wyoming	N.A.	

The purpose of this Higher RPS case is to build upon the work and lessons of the recently completed Flexibility Assessment project (WECC-WIEB-E3-NREL, 2015) and the Low Carbon Grid Study (CEERT, 2015). In particular, this case would seek to better understand and explore: (i) increased level of renewable generation and potential changing flows of power across the interconnection; (ii) assess the deliverability of energy on the expected 2026 grid and identify potential areas for grid expansion; and (iii) potential operational challenges of periodic over-supply and curtailment issues for this level of RPS policies;

- a. Model the higher RPS rates and corresponding renewable generation across the interconnection. Include in the resource mix a regional diversified portfolio designed to contribute to the California RPS target. Evaluate the impacts on the Common Case transmission system.
- b. Identify and implement steps to address issues that arise from transmission congestion and over-supply issues. Depending on the problems identified, specify mitigation measures that could include the following: (i) more geographic distribution of renewable generators; (ii) storage, (iii) BA cooperation that effectively lowers hurdle rates; and (iv) new transmission.

This High RPS study request in 2016 replaces the SPSC/WIRAB’s High Renewables Mitigation and Flexibility study request submitted in 2015.

20-Year Study Request

Low Carbon Future Options – This 20-year request seeks to explore potential pathways to a lower carbon energy future and link to the 10-year Coal Retirements Case. To date, TEPPC has not produced a coordinated 10-year case with a corresponding 20-year case. We believe there is value in linking these two cases in a manner to complement our understanding how the power sector may change in response to the policy goal of reducing CO₂ emissions.

In 2013, TEPPC modeled the SPSC 20-year Low Carbon study using a multi-sector economy Low Carbon Tool developed by Energy and Environmental Economics (E3). Time constraints limited modeling to one scenario with a single set of policy tools to reach the GHG reductions. In another project, E3 expanded its work through the United Nations' Deep Decarbonization Pathways Project (DDPP). E3's role involved developing its Pathway model to identify trajectories toward achieving long-term, economy-wide GHG emission reduction goals. In November, 2014, E3 released a report with findings on four 2050 GHG reduction scenarios for the United States.¹

In 2014, SPSC contracted with E3 and selected one of the Pathway GHG reduction scenarios to model for a TEPPC 20-year study request. E3 converted the relevant assumptions from the Pathways project for use in WECC's Long Term Planning Tool. This new 2016 study request asks TEPPC to model this 20-year request to attain a carbon reduction target for 2036 that is consistent with the trajectory of a 80% reduction by 2050 relative to 2005.

This 2016 20-year Low Carbon study request replaces the SPSC/WIRAB's 20-year Low Carbon study request submitted in 2015.

¹ https://ethree.com/publications/index_US2050.php