

DOCKETED	
Docket Number:	25-EPIC-01
Project Title:	Electric Program Investment Charge 2026–2030 Investment Plan (EPIC 5)
TN #:	265418
Document Title:	Arne Jacobson Comments - Assessing Transmission Alternatives to Support Renewable Energy Development on CA's Central Coast
Description:	N/A
Filer:	System
Organization:	Arne Jacobson
Submitter Role:	Public
Submission Date:	8/8/2025 10:28:18 AM
Docketed Date:	8/8/2025

Comment Received From: Arne Jacobson
Submitted On: 8/8/2025
Docket Number: 25-EPIC-01

Assessing Transmission Alternatives to Support Renewable Energy Development on CA's Central Coast

Additional submitted attachment is included below.



Electric Program Investment Charge 2026–2030 (EPIC 5) Research Concept Proposal Form

The California Energy Commission (CEC) is currently soliciting research concept ideas and other input for the Electric Program Investment Charge 2026–2030 (EPIC 5) Investment Plan. For those who would like to submit an idea for consideration, please complete this form and submit it to the CEC by **August 8, 2025**. More information about EPIC 5 is available below.

To submit the form, please visit the e-commenting link:
<https://efiling.energy.ca.gov/EComment/ECommentSelectProceeding.aspx> and select the Docket **25-EPIC-01**. Enter your contact information and then use the “choose file” button at the bottom of the page to upload and submit the completed form. Thank you in advance for your input.

1. Please provide the name, email, and phone number of the best person to contact should the CEC have additional questions regarding the research concept:

Arne Jacobson, Ph.D.

Email: arne.jacobson@humboldt.edu

Phone: 707-826-4302

2. Please provide the name of the contact person’s organization or affiliation:

Director, Schatz Energy Research Center, Cal Poly Humboldt

3. Please provide a brief description of the proposed concept that you would like the CEC to consider as part of the EPIC 5 Investment Plan. What is the purpose of the concept, and what would it seek to do? Why are EPIC funds needed to support the concept?

Senate Bill 100 (de Leon, 2018) requires California to procure 100% zero carbon and renewable energy resource by 2045. To support this goal, transmission build out will be critical. Transmission costs are projected to rise by \$45 billion to \$60 billion.

It is the official policy of the state that Diablo Canyon does not continue operating past 2030, and the California Public Utilities Commission is prohibited

from considering the “energy, capacity, or any attribute from the Diablo Canyon Unit 1 or Unit 2 after August 26, 2025” as part of its planning processes to achieve the goals in SB 100. Therefore, as far as the California Independent System Operator’s Transmission Planning Process is concerned, the transmission lines Diablo Canyon is currently using will be available for other uses after 2030.

However, PG&E has applied to the Nuclear Regulatory Commission to extend operation of Diablo Canyon for another 20 years. While these processes have not yet been completed, there is a strong possibility that PG&E will secure the necessary approvals to extend Diablo Canyon.

This research concept proposes to assess Central Coast transmission needs that consider multiple planning scenarios- such as whether Diablo Canyon goes offline by 2030, is extended for only a few years beyond 2030, or is extended by 20 years. Each scenario has different implications for transmission needs. Further, as California deploys additional renewables resources that will have need for transmission, such as the offshore wind leases on the Central Coast and other potential sources of clean energy generation in the region (e.g. utility-scale solar PV), this analysis will assess how that will further implicate transmission needs, such as whether they can use the lines Diablo Canyon is using, whether more transmission is needed regardless of the status of Diablo Canyon, and how to cost-effectively and efficiently build out network upgrades, including substations, to support interconnection of these projects to the grid.

4. In accordance with Senate Bill 96ⁱ, please describe how the proposed concept will “lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory energy goals.” For example, what technical and/or market barriers or customer pain points would the proposed concept address that would lead to increased adoption of clean energy technology or innovation? Where possible, please provide specific cost and performance targets that need to be met for increased industry and consumer acceptance. For scientific analysis and tools, provide more information on what data and information gaps the proposed concept would help fill, and which specific parties or end users would benefit from the results, and for what purpose(s)?

This research concept proposes to assess different Central Coast transmission planning scenarios, including substation build out, dependent on the status of Diablo Canyon and the need of additional renewable resources to use that transmission as part of achieving the goals of SB 100.

Some examples of data gaps this proposal could fill in include: the amount and location of additional transmission needed, if any; how to build out this transmission in the most cost-effective way; and where and how to build out an additional substation to support interconnection of additional renewable resources.

These are critical barriers to understanding how to effectively understand the transmission cost and planning impacts of Diablo Canyon remaining operational past 2030 or if it goes offline.

5. Please describe the anticipated outcomes if this research concept is successful, either fully or partially. For example, to what extent would the research reduce technology or ratepayer costs and/or increase performance to improve the overall value proposition of the technology? What is the potential of the innovation at scale? How will the innovation lead to ratepayer benefits in alignment with EPIC's guiding principles to improve safety,ⁱⁱ reliability,ⁱⁱⁱ affordability,^{iv} environmental sustainability,^v and equity?^{vi}

This proposal can:

- 1) Reduce ratepayer costs by assessing where and how to cost-effectively configure transmission infrastructure, including possible buildout of new infrastructure, if Diablo Canyon remains operational past 2030.
 - 2) Reduce ratepayer costs by assessing where and how to cost-effectively build out an additional substation to connect renewable resources to the grid on the Central Coast.
 - 3) Increase the value proposition of new renewable resources, like offshore wind or utility-scale solar, by helping plan for the interconnection of these projects on the Central Coast depending on the status of Diablo Canyon past 2030.
6. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed research concept.
 - Quantitative data indicating the transmission capacity needed
 - Quantitative data indicating the size of substation needed
 - Geographical and locational data for transmission and substation build out
 - Quantitative data showing the estimated costs associated with possible transmission and substation investments.

7. Please provide references to any information provided in the form that supports the research concept's merits. This can include references to cost targets, technical potential, market barriers, equity benefits, etc.

Prior studies of transmission infrastructure needs to support renewable energy development have helped inform state policy decisions with respect to transmission planning. For example, studies carried out by the Schatz Energy Research Center at Cal Poly Humboldt and partners to assess alternatives for transmission infrastructure developing on California's North Coast helped inform subsequent analysis by the California ISO in the context of the 2023/24 Transmission Planning Process and served as inputs for the state's AB 525 strategic plan for offshore wind. The Schatz Center-led study identified promising transmission alternatives that were aligned with state policy interests while also delivering benefits to host communities in a cost-effective manner. Identification of alternatives that provide regional benefits through a connection between the new transmission infrastructure and the local electrical system helps address equity issues, by ensuring that host communities that experience many of the negative impacts of transmission development also receive energy system benefits such as improved service reliability and increased capacity to support economic development. Transmission alternatives that include regional benefits may facilitate permitting and reduce local opposition, thereby making it more likely that the transmission infrastructure development effort is successfully completed on time and within budget.

Examples of prior studies are included below. The first study listed (published in 2024) was funded by the California Energy Commission, while the second study listed (published in 2022) was funded by the federal Bureau of Ocean Energy Management (BOEM).

- Zoellick, J., G. Adams, A. Mustafa, A. Cooperman, R. Anilkumar, P. Duffy, A. Sparks, S. Kramer, S. Trush, S. Bernstein, C. Butler, A. Porter, A. Herath, M. Cesario, E. Wallach, C. Ingvoldsen, D. Wakeman, C. Chamberlin, and A. Jacobson. (2024). *Northern California and Southern Oregon Offshore Wind Transmission Study, Volume 1* (Revised). Cal Poly Humboldt, Arcata, CA: Schatz Energy Research Center. <http://schatzcenter.org/pubs/2023-OSW-R2.pdf>
- Jacobson, A., J. Zoellick, R. Anilkumar, Z. Alva, C. Chamberlin, A. Cooperman, G. Chapman, A. Daneshpooy, P. Duffy, W. Musial, A. Mustafa, A. Younes. (2022). *Transmission Alternatives for California North Coast Offshore Wind, Volume 1: Executive Summary*. Cal Poly Humboldt, Arcata, CA: Schatz Energy Research Center. <http://schatzcenter.org/pubs/2022-OSW-R1.pdf>

8. The EPIC 5 Investment Plan must support at least one of five Strategic Goals:^{vii}

- a. Transportation Electrification
- b. Distributed Energy Resource Integration
- c. Building Decarbonization
- d. Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas
- e. Climate Adaptation

Please describe in as much detail as possible how your proposed concept would support these goals.

This concept proposal supports “Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas”.

The state’s SB 100 report noted that to meet state clean energy and climate goals while eliminating or dramatically reducing the use of fossil fuels such as natural gas, California will need to roughly triple its current electricity generation capacity. Specifically, the report projects that the state will need to add approximately 6 gigawatts (GW) of new renewable capacity annually, nearly double the historical average. A study conducted by the Clean Air Task Force and the Environmental Defense Fund concluded that, at a minimum, transmission capacity must double by 2045 to accommodate new renewables and ensure grid reliability. The associated costs with this anticipated massive build out are immense. Currently, CAISO projects transmission costs to rise by \$45 to \$60 billion.

The future of Diablo Canyon, whether it remains online past 2030 or it goes offline, will have significant cost implications for the Central Coast’s transmission. The state needs to understand the amount and cost of transmission needed, where, and by when, to support development of additional renewable resources. The same is true for substation build out. Such a study can inform where to build new renewable resources, or better support the interconnection of renewable projects already being planned for, such as the offshore wind leases or potential utility-scale solar projects on the Central Coast.

About EPIC

The CEC is one of four EPIC administrators, funding research, development, and demonstrations of clean energy technologies and approaches that will benefit electricity ratepayers of California’s three largest investor-owned electric utilities.

EPIC is funded by California utility customers under the auspices of the California Public Utilities Commission.

To learn more about EPIC, visit: <https://www.energy.ca.gov/programs-and-topics/programs/electric-program-investment-charge-epic-program>

EPIC 5 documents and event notices will be posted to:
<https://www.energy.ca.gov/proceeding/electric-program-investment-charge-2026-2030-investment-plan-epic-5>

Subscribe to the EPIC mailing list to stay informed about future opportunities to inform the development of EPIC 5:
<https://public.govdelivery.com/accounts/CNRA/signup/31897>

i See section (a) (1) of Public Resources Code 25711.5 at:

https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC§ionNum=25711.5.

ii EPIC innovations should improve the safety of operation of California's electric system in the face of climate change, wildfire, and emerging challenges.

iii EPIC innovations should increase the reliability of California's electric system while continuing to decarbonize California's electric power supply.

iv EPIC innovations should fund electric sector technologies and approaches that lower California electric rates and ratepayer costs and help enable the equitable adoption of clean energy technologies.

v EPIC innovations should continue to reduce greenhouse house gas emissions, criteria pollutant emissions, and the overall environmental impacts of California's electric system, including land and water use.

vi EPIC innovations should increasingly support, benefit, and engage disadvantaged vulnerable California communities (DVC). (D.20-08-046, Ordering Paragraph 1.) DVCs consist of communities in the 25 percent highest scoring census tracts according to the most recent version of the California Communities Environmental Health Screening Tool (CalEnviroScreen), as well as all California tribal lands, census tracts with median household incomes less than 60 percent of state median income, and census tracts that score in the highest 5 percent of Pollution Burden within CalEnviroScreen, but do not receive an overall CalEnviroScreen score due to unreliable public health and socioeconomic data.

vii In 2024 the CPUC adopted five Strategic Goals to guide development of the EPIC 5 Investment Plan. A description of the goals can be seen in Appendix A of CPUC Decision 24-03-007 available at:

<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M527/K228/527228647.PDF>