BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE

STATE OF CALIFORNIA

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Order Instituting Rulemaking to Continue Oversight of Electric Integrated Resource Planning and Procurement Processes.	**Rulemaking 25-06-019** **(Filed June 26, 2025)**

CALIFORNIA RESOURCES CORPORATION COMMENTS ON ADMINISTRATIVE LAW JUDGE'S RULING SEEKING COMMENTS ON BUSBAR MAPPING OF ELECTRICITY RESOURCE PORTFOLIOS FOR 2026-2027 TRANSMISSION PLANNING PROCESS

Chris Gould
Jonathan Dethloff
California Resources Corporation / Carbon TerraVault
1 World Trade Center, Suite 1500
Long Beach, CA 90831
(888) 848-4754
Chris.Gould@crc.com
Jonathan.Dethloff@crc.com

Nora Sheriff
Buchalter, A Professional Corporation
425 Market Street, 29th Floor
San Francisco, CA 94105-2491
415.227.3551 office
415.227.0770 fax
nsheriff@buchalter.com

Counsel for California Resources Corporation

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California Resources Corporation (CRC)[1] submits these comments to the November 3, 2025 *Administrative Law Judge's Ruling Seeking Comments on Busbar Mapping of Electricity Resource Portfolios for 2026-2027 Transmission Planning Process* (Nov 3 Ruling) and the November 12, 2025 *Integrated Resource Planning (IRP) Webinar on the Proposed 2026-27 Transmission Planning Process Portfolios and Preliminary Busbar Mapping Results* (Nov 12 Webinar).

I. INTRODUCTION AND SUMMARY

CRC supports the California Public Utilities Commission's (CPUC) efforts on busbar mapping of resource portfolios to inform the Transmission Planning Process (TPP). Mapping resource portfolios identifies needed transmission and infrastructure investments to support electricity sector GHG reduction targets, while ensuring reliability in the face of unprecedented load growth. Mapping resource portfolios can also provide feedback on the portfolios

[1] CRC, through its Carbon Terravault line of business (CTV), is leading the development of Carbon Capture and Sequestration (CCS) in California. CTV is developing a CCS project at CRC's Elk Hills power plant in Kern County, where captured CO2 will be stored in a co-located, depleted oil and gas storage reservoir.

themselves by identifying the costs and timing of needed transmission and infrastructure upgrades, and thereby optimizing the affordability and timelines of the portfolios.

As explained in the Nov 12 Webinar, busbar mapping starts with the CPUC-generated IRP portfolios, which are then assessed based on transmission, interconnection viability, land-use, environmental, and commercial interest criteria to identify optimal geographic locations and substations for new resources.[2] This round of busbar mapping is utilizing the 2026-2027 TPP Proposed Base Case (see Figure 1 below).

Figure 1: 2026-2027 TPP Proposed Base Case[3]

Resource Type (cumulative GW)	2026	2028	2031	2036	2041	2045
Natural Gas	-	-	-	-	-	-
Geothermal	0.1	0.3	1.2	3.4	3.4	3.4
Geothermal (Enhanced)	-	-	-	1.7	1.7	1.7
Biomass	-	-	-	-	-	-
In-State Wind	0.3	0.8	2.0	2.6	4.8	7.7
Out-of-State Wind	1.4	2.9	5.5	7.0	17.0	19.0
Offshore Wind	-	-	-	2.9	4.5	4.5
Solar	4.0	15.0	35.9	47.5	53.7	68.5
Li-ion Battery (4-hr)	3.9	6.7	6.8	6.8	6.8	6.8
Li-ion Battery (8-hr)	0.2	1.0	10.0	13.2	13.2	18.6
Location Constrained Storage (12-hr)	-	-	1.6	5.4	5.4	5.4
Generic Long Duration Storage (12-hr)	-	-	-	-	-	-
Generic Long Duration Storage (24-hr)	-	-	-	0.5	0.5	0.5
Generic Long Duration Storage (100-hr)	-	-	-	-	-	-
Shed DR	-	-	-	-	-	-
Gas Capacity Not Retained	(1.3)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)

Figure 1 shows 1.7 GW of natural gas capacity not retained and 0 GW of new natural gas capacity by 2045. However, the TPP Proposed Base Case and busbar mapping do not take into account the potential for natural gas power generation with carbon capture and storage (NGCCS). NGCCS results in clean, firm power that can reliably and affordably support California's clean energy goals, particularly in response to recent federal policy changes and additional

[2] A. 25-09-019, *IRP Proposed 26-27 CAISO TPP Portfolios and Initial Busbar Mapping Results Webinar* (Nov. 12 Webinar), Nov. 12, 2025 at 58-60.
[3] *Id.* at 35.

resource needs driven by data center load growth. Utilizing the existing natural gas generation fleet, through retrofits with CCS technologies, reduces the complexity involved in identifying a feasible busbar for other resources. Moreover, there is substantial commercial interest in NGCCS, as seen in supportive comments on the CPUC's Reliable and Clean Power Procurement Program proposal,[4] as well as the recent announcement of an NGCCS commercial agreement between Google and Broadwing Energy.[5]

NGCCS therefore has the potential to significantly impact the proposed 26-27 TPP Base Case, increasing the amount of gas capacity retained and new gas capacity, while reducing reliance on other clean, non-firm resources. NGCSS would reduce the demand for costly transmission upgrades needed to bring new resources online, while also impacting transmission and substation capacity. NGCCS would impact the modeling of gas capacity not retained, as the

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[4] *See, e.g.*, R. 20-05-003, *Middle River Power LLC Opening Comments RCPPP Staff Proposal* at 17-18 (Middle River Power "strongly supports the California Resources Corporation's proposal to allow gas-fired resources with carbon capture and storage ("CCS") to qualify to supply zero-emission credits ("ZECs") under the RCPPP."); R. 20-05-003, *Opening Comments of Shell Energy North America (US), L.P. on the RCPPP Staff Proposal* at 16 (Shell supports "a broad and technologically-neutral approach to zero carbon resource eligibility, including considering resources such as carbon capture and sequestration and the potential use of generation paired with carbon credits."); R. 20-05-003, *Opening Comments of Pacific Gas and Electric Company on the Administrative Law Judge's (ALJ) Ruling Seeking Comments on RCPPP Staff Proposal* (PG&E RCPPP Opening Comments) at 36-38; R. 20-05-003, *Southern California Edison Company's Comments on Ruling Seeking Comments on RCPPP Staff Proposal* (SCE RCPPP Opening Comments) at 58; R. 20-05-003, *San Diego Gas & Electric Company on ALJ's Ruling Seeking Comments on RCPPP Staff Proposal* (SDG&E RCPPP Opening Comments) at 53; R. 20-05-003, *Southern California Gas Company's Opening Comments on ALJ Ruling Seeking Comments on the Electric RCPPP Staff Proposal* at 10; R. 20-05-003, *Comments of the Public Advocates Office on ALJ's Ruling Seeking Comments on RCPPP Staff Proposal* at 45; R. 20-05-003, *Comments of Independent Energy Producers Association on ALJ's Ruling on Seeking Comments on RCPPP Staff Proposal* at 3-4; R. 20-05-003, *Comments of Calpine Corporation on ALJ's Ruling Seeking Comments on RCPPP Staff Proposal* at 10-15; R. 20-05-003, *Comments of Bloom Energy Corporation on the RCPPP Staff Proposal* at 2; R. 20-05-003, *Comments of the California Hydrogen Business Council on the Staff Proposal: RCPPPs* at 3; R. 20-05-003, *Comments of Engie North America on the Staff Proposal: RCPPP* at 5; *Comments of the Green Power Institute in Response to the ALJ's Ruling Seeking Comments on the RCPPP Staff Proposal* at 36-37.

[5] Google, *Our First Carbon Capture and Storage Project*, Oct. 2025 (available at: https://blog.google/outreach-initiatives/sustainability/first-carbon-capture-storage-project/).

emission reductions from NGCCS and commercial interest in NGCCS resources impacts the criteria by which natural gas resources are prioritized. By leveraging California's large existing natural gas power fleet and abundant carbon storage capacity, NGCCS can be quickly scaled to affordably support grid GHG reductions and reliability in the face of growing electricity demand. Therefore, NGCCS should be factored into the TPP Proposed Base Case and busbar mapping.

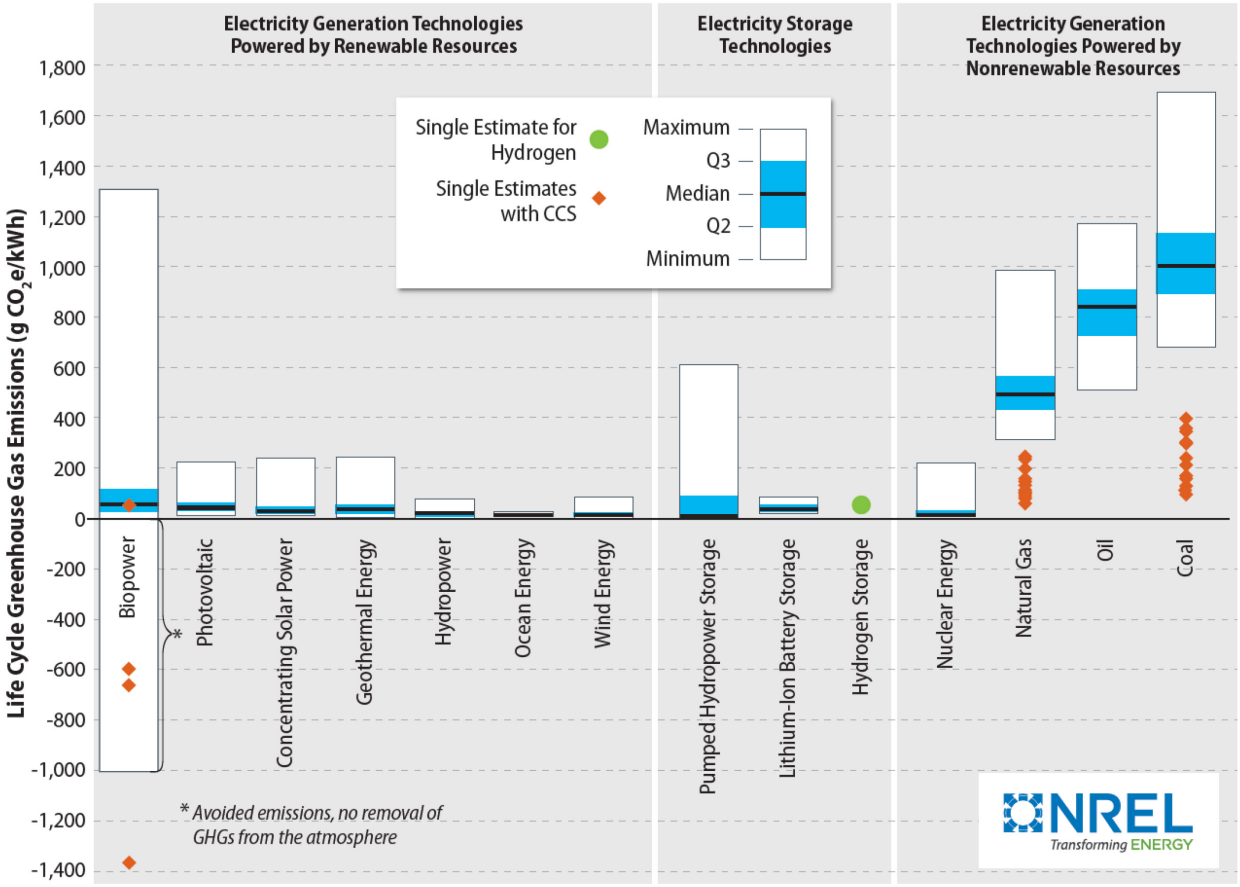
II. NGCCS IS CLEAN, RELIABLE, AND AFFORDABLE

A. NGCCS is Clean

No source of power generation is GHG emissions free when evaluated on a lifecycle basis.[6] NGCSS has lifecycle GHG emissions comparable to wind and solar, especially when these intermittent renewables are paired with energy storage (see Figure 2 below).[7] Furthermore, use of NGCCS at existing power generation sites avoids or minimizes the GHG and other environmental impacts associated with constructing new transmission for new power renewable power sources, given that retrofitted NGCCS power plants are already interconnected to the grid. Therefore, NGCCS should be viewed as a clean power source along with renewables.

[6] National Renewable Energy Laboratory (NREL), *Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update*, NREL/FS-6A50-80580, Sep. 2021 (available at: Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update).
[7] *Id*. at 2.

Figure 2: Life Cycle of GHG Emission Estimates for Selected Electricity and Generation and Storage Technologies, and Some Technologies Integrated with CCS[8]



Concerning local air pollution, CCS is expected to reduce criteria pollutant emissions, such as nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter (PM). Recent studies have shown that implementation of carbon capture, and requisite flue gas pre-treatment, can reduce criteria pollutant emissions by 75-99+%, resulting in material health benefits for residents of the surrounding region (see Table 1 below). Therefore, the potential for NGCCS should be factored into busbar mapping Criteria 5 when assessing natural gas retirements or the potential for new natural gas resources.[9]

[8] *Ibid.*

[9] Nov 12 Webinar at 58-60 [Criteria 5 on Community and Environmental (societal) Impacts provides that "[m]apped resources should seek to bolster and benefit pollution-burdened and disadvantaged

Table 1. Summary of Emissions Reductions at Martinez and Beaumont FCC Units[10]

Reduction in Emissions of Various Pollutants from CCS Addition at Studied Refinery FCC Units*					
	CO_2 Reduction	Criteria Air Pollutants Reduction			
Refinery	CO_2	NO_X**	SO_2	Filterable PM	Condensable PM
Martinez	87% 1,250,000 TPY	73% 351 TPY	99+% 673 TPY	97.5% 61 TPY	96% 296 TPY
Beaumont	87% 1,344,000 TPY	33% 55 TPY	99+% 160 TPY	95% 151 TPY	95% 59 TPY

** TPY=tons per year. Calculation of % Reduction is (Original Emissions less Emissions w/ Pre-Treatment and CO2 capture, including New Auxiliary Boiler)/(Original Emissions).*

*** NO_x reduction for Martinez is greater than for Beaumont because Beaumont has an existing SCR that achieves high efficiency NO_x control. This study included an upgrade of Martinez's SNCR to an SCR, resulting in higher NO_x removal efficiency.*

A concrete example of how NGCCS could alter busbar mapping is La Paloma Generating Station (La Paloma), which has been identified as a leading candidate for gas capacity not retained.[11] La Paloma is located within 10 miles of Carbon TerraVault I, California's first permitted Class VI CO2 storage site, and is also close to other potential Class VI storage sites in the region. Given the proximity to CO2 storage and growing commercial interest in NGCCS, CRC and Capital Power (the owner of La Paloma) recently signed a Memorandum of Understanding (MOU) to jointly evaluate and develop CCS on La Paloma.[12] Therefore, there is strong potential for La Paloma to reduce GHG and criteria pollutant emissions, and engage in clean power

communities where feasible, particularly with the goal of reducing reliance on fossil-fuel generators." This objective should be updated to recognize that NGCSS has the ability to reduce emissions and air pollutants in disadvantaged communities.].

[10] Clean Air Task Force, *Air Pollutant Reductions From Carbon Capture*, Nov. 2023 at 8 (available at: https://www.catf.us/resource/air-pollutant-reductions-carbon-capture/).

[11] Nov 12 Webinar at 76.

[12] California Resources Corporation, *California Resources Corporation and Capital Power to Explore Decarbonized Power Solutions in California*, Nov. 2025 (available at: https://www.crc.com/news-releases/news-release-details/california-resources-corporation-and-capital-power-explore).

offtake agreements via NGCCS, both of which should impact its ranking and modeling under the busbar mapping process.

B. NGCCS Is Reliable

Natural gas currently forms the backbone of California's electricity grid, given its reliability and dispatchability, allowing it to meet demand regardless of the weather or time of day/year. The 26-27 TPP Proposed Base Case models natural gas's large reliability contribution.[13] This reliability has become ever more important with the increasing penetration of intermittent renewables, and is why most modeling, including the 2026-2027 TPP Proposed Base Case,[14] calls for retaining natural gas power generation for decades to come.

Adding carbon capture and sequestration to natural gas power generation does *not* impact natural gas's ability to reliably meet grid demand and provide grid stability. Thus, NGCCS can play a critical role in ensuring a reliable and clean California grid in 2045 and beyond. This potential to provide clean, reliable power through retrofitting existing natural gas power generation with CCS should be reflected in busbar mapping, including the mapping criteria.

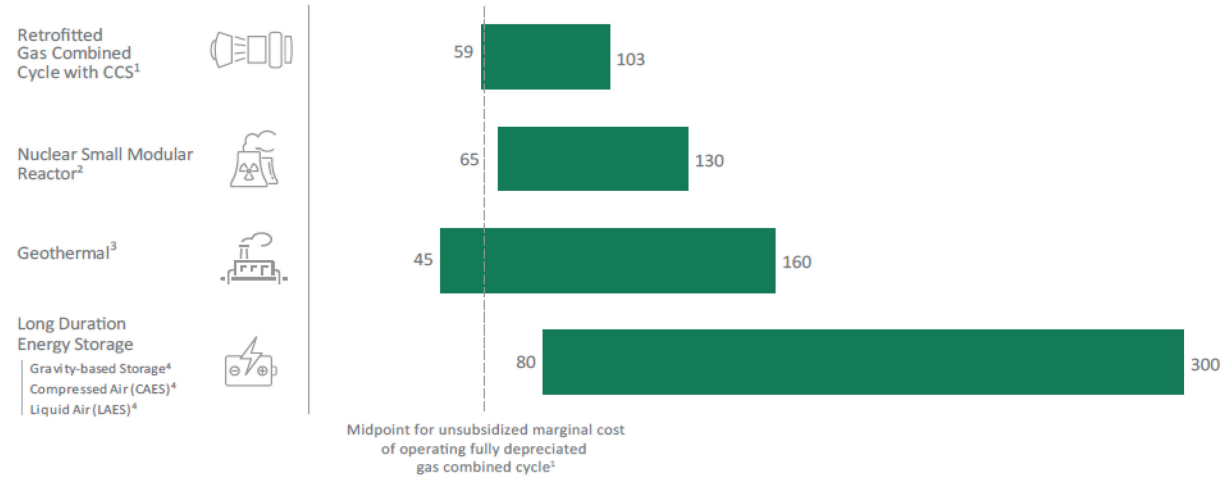
C. NGCCS Is Affordable

Natural gas is already one of the cheapest sources of power generation, which, along with its dispatchability, is why it sets California power prices for much of the year. While adding CCS may increase the price of natural gas power, the increase can be partially offset by incentives (e.g. 45Q tax credit, avoidance of Cap & Invest fees). Even with the addition of CCS, NGCCS is one of the cheapest sources for clean, firm power generation (see Figure 14, below).

[13] Nov 12 Webinar at 37.
[14] *Id*. at 35.

This does not account for the fact that CCS on natural gas power plants would utilize existing interconnections and transmission, improving its cost advantage over new build clean, firm resources.

Figure 14. Estimated Levelized Cost of Energy (LCOE)/Storage (LCOS) ($/MWh)[15]



Sources: 1. Lazard 2. PNNL 3. BCG analysis 4. US DoE

Equally important, adding clean, firm power such as NGCCS to the resource mix will significantly lower the cost of achieving SB 1020 and SB 100 goals by reducing the needed overbuild of renewables. NGCCS also takes advantage of existing transmission and interconnections, reducing the significant investments required to upgrade grid infrastructure. Stanford, Princeton, and Energy & Environmental Economics (E3) modeling all show that NGCCS could reduce projected California transmission and distribution costs in 2045 by 33% (see Figure 15, below). Utilizing existing transmission has the added benefit of lowering wildfire risk and costs by avoiding additional transmission buildout.

[15] Boston Consulting Group, *Unlocking California's Climate Ambition*, Jul. 2024 at 14 (available at: https://web-assets.bcg.com/37/f5/7685135144d38912ab9623dfaf6e/ca-decarbonization-report-2024-07-12.pdf).

Figure 15. Wholesale Generation and Transmission Costs for 100% Carbon-Free Electricity for the Year 2045[16]

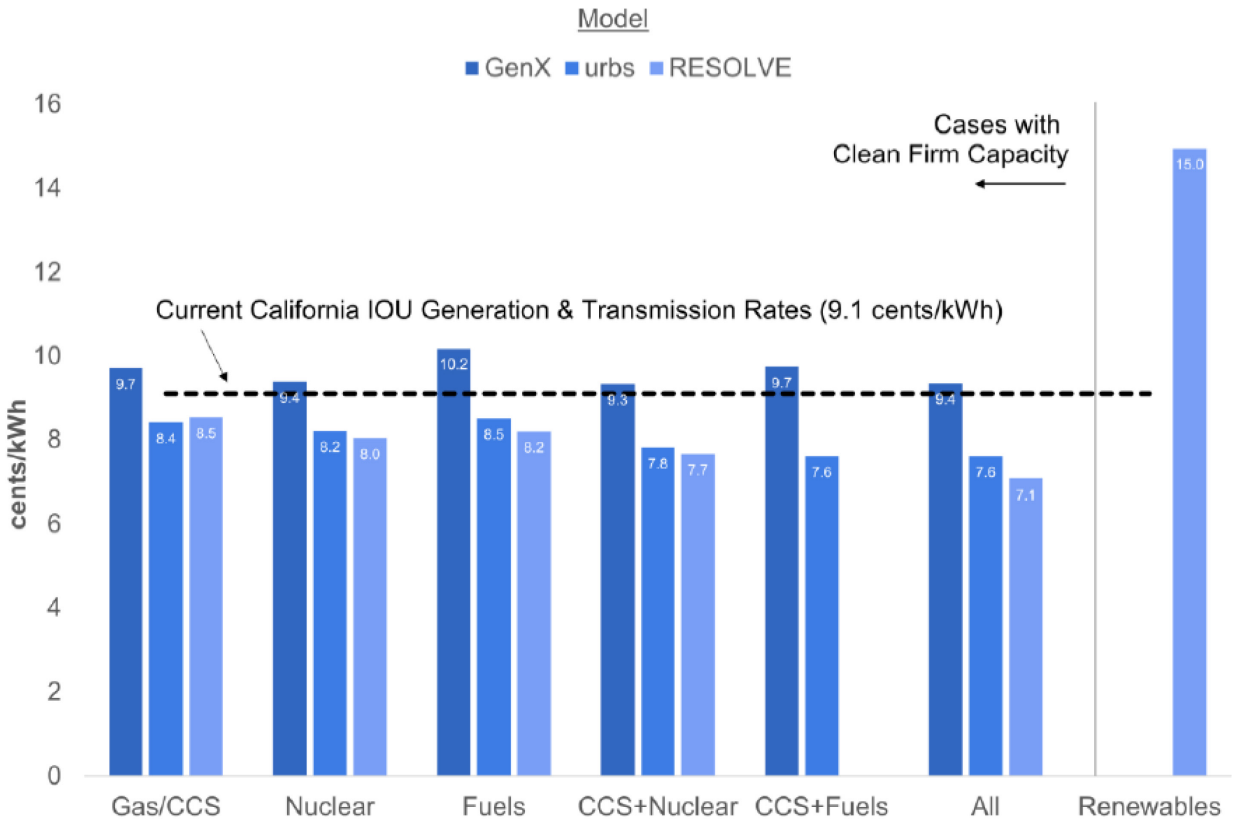


Figure 2. The wholesale generation and transmission costs for 100% carbon-free electricity for the year 2045. All cases shown include variable renewable energy and batteries. The case in red labeled "Renewables" did not allow any clean firm power to be built. Other cases allow both renewable energy, batteries and the labeled form of clean firm power. Results shown for mid-range capital cost cases and $33/MMBtu generic zero-carbon fuel. The renewable and batteries-only case was only solved by E3's RESOLVE and RECAP models to ensure reliability of this portfolio through all weather-years.

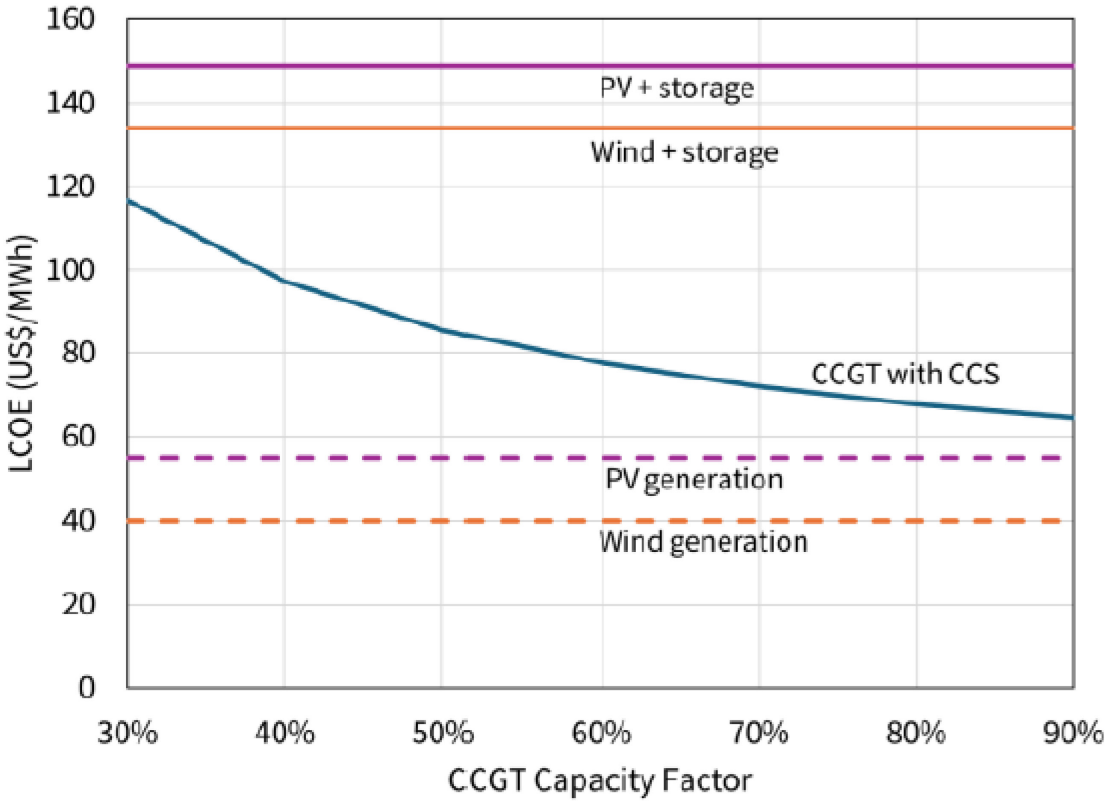
These findings from multiple studies are further reinforced by a recent Oxford study that shows that NGCCS is more affordable than PV + Storage and Wind + Storage at all NGCC capacity factors above 30% (see Figure 16, below).[17] This conclusion is conservative, given that

[16] Long et al., *California needs clean firm power, and so does the rest of the world; Three detailed models of the future of California's power system all show that California needs carbon-free electricity sources that don't depend on the weather,* Sep. 7, 2021 at 6 (available at: SB100 California Clean Firm Power Report).

[17] Oxford Institute for Energy Studies, *Unlocking gas-to-power with life cycle greenhouse gas emissions as low as renewables*, May 2025 at 9 (available at: Insight-168-Lifecycle-emissions-of-gas-with-CCS.pdf.

the renewable build out would require full dispatch and hourly matched supply from clean NGCCS resources to provide firming capacity and stratify demand growth.

Figure 16. LCOE for CCFT with CCS as a Function of Capacity Factor Compared to Renewable Energy With and Without Battery Storage[18]



Given the potential for NGCCS to support affordable decarbonization of California's electricity sector, there has been considerable recent commercial interest in NGCCS. This is demonstrated by California load serving entities' support for NGCCS to be included in clean energy policy,[19] California power plant operators exploring CCS retrofits on their existing

[18] *Id.* at 9.

[19] *See, e.g.*, PG&E RCPPP Opening Comments at 36-38; SCE RCPPP Opening Comments at 58; SDG&E RCPPP Opening Comments at 53.

plants,[20] and the recent signing of a NGCCS commercial agreement by Google. [21] All of this demonstrates commercial and development interest retrofitting existing natural gas power generation with CCS, which should be reflected in busbar mapping, specifically Criteria 6.[22]

III. CONCLUSION

CRC appreciates the opportunity to provide these comments on the Initial Busbar Mapping Results and urges the Commission to include NGCCS in portfolio modeling and busbar mapping criteria.

Respectfully submitted,

Buchalter, A Professional Corporation

By:

Nora Sheriff
Counsel for California Resources Corporation

November 21, 2025

[20] *See, e.g.*, Calpine, Sutter Carbon Capture (available at https://www.calpine.com/carbon-capture-and-sequestration-ccs/sutter-carbon-capture/); California Resources Corporation, CalCapture (available at: https://www.crc.com/carbon-terravault/projects/calcapture); California Resources Corporation, *California Resources Corporation and Capital Power to Explore Decarbonized Power Solutions in California*, Nov. 2025 (available at: California Resources Corporation and Capital Power to Explore Decarbonized Power Solutions in California - Tue, 11/04/2025 - 16:30); California Resources Corporation, *California Resources Reports Third Quarter 2024 Financial and Operating Results*, Nov. 2024 [CRC "Received California's first conditional use permits for Carbon TerraVault I CCS project in Kern County and signed a memorandum of understanding4 (MOU) to develop carbon capture and storage (CCS) solutions with Hull Street Energy LLC, a leading California power partner"].

[21] Google, *Our First Carbon Capture and Storage Project*, Oct 2025 (available at: https://blog.google/outreach-initiatives/sustainability/first-carbon-capture-storage-project/).

[22] Nov 12 Webinar at 60.