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Comments on Resource Portfolio Assumptions

Additional submitted attachment is included below.

California Energy Commission
Docket Unit, MS-4
Docket No. 21-SIT-01
715 P Street
Sacramento, California 95814
VIA E-COMMENTING

July 7, 2023

RE: Comments on Joint Agency Staff Workshop on Resource Portfolio Assumptions for the Next CAISO 20-Year Transmission Outlook (Docket No. 21-SIT-01)

To the California Energy Commission,

The Center for Biological Diversity, 350 Bay Area, The Climate Center, and Sierra Club California provide the following comments on the California Energy Commission (CEC), California Public Utilities Commission (CPUC) and the California Independent System Operator (CAISO) proposed portfolio assumptions for use by CAISO in the next 20-Year Transmission Outlook.

Particularly in light of the ever-increasing urgency of the climate emergency, with last week becoming the hottest days on earth ever recorded,[1] we urge the CEC, CPUC and CAISO to adopt a more aggressive schedule for gas plant retirement, in line with the state's climate goals and legislative mandates, including SB 350, AB 197 and SB 887. Retirement of gas plants in disadvantaged communities (DACs) presents an opportunity to target deployment of distributed energy resources (DERs), including community solar plus storage and microgrids, that would provide community and environmental benefits that the bulk energy system cannot provide. In this regard, the proposed portfolio assumptions fail to coordinate with CEC and CPUC proceedings that have explicitly anticipated a high-DER future and committed to explore ways to maximize DER benefits.

[1] Leo Sands, *This July 4 was hot. Earth's hottest day on record, in fact*, Washington Post, July 5, 2023.

As detailed below, it is critical for the CEC, CPUC and CAISO to recognize that decarbonization and environmental and energy justice are inextricably linked, must be addressed together and given equal weight. Otherwise, focusing more narrowly on decarbonization—and treating justice as secondary—will likely lead to solutions that tolerate and even justify inequitable distribution of benefits and burdens and local externalities in pursuit of system-level objectives for decarbonization, affordability and balancing area reliability. We raise this concern at the outset because the proposed portfolio assumptions over-emphasize buildout of bulk system assets, and largely ignore the potential benefits of DERs, which are uniquely capable of providing local benefits, mitigating past and ongoing harms to frontline communities, and enabling all customers and communities to participate fully in the clean energy transition. We must recognize that historical tolerance of local externalities and "sacrifice zones" in pursuit of macro objectives have contributed to today's climate and ecosystem crises and inequities, and that solutions that continue such practices by ignoring local benefits and burdens cannot address the climate emergency at the level of root causes. This perspective is the background for the comments and recommendations that follow.

The over-reliance on the bulk system is further complicated by the accompanying proposals for measures to address the climate emergency that, to the contrary, will not serve that goal, but will instead simply harm DACs and other environmental justice communities. These proposals include carbon capture and sequestration (CCS) and hydrogen combustion that will simply serve to jeopardize meeting our climate and equity goals. The agencies must modify their overall approach to meet State commitments, including in the CEC's 2022 Integrated Energy Policy Report (IEPR) Update, and maximize benefits and reduce disproportionate harms in environmental justice communities.

I. The CEC, CPUC and CAISO Should Accelerate and Prioritize Gas Plant Retirements in DACs.

The 2021 Joint Agency Report included two additional scenarios: a No Combustion Scenario, retiring all combustion resources by 2045, and an Accelerated Timeline Scenario, meeting SB 100 by 2030, 2035 and 2040. The CEC, CPUC and CAISO should build off of these scenarios to develop a faster timeline to retire gas plants, pursuant to state law. State law also requires prioritization of retirements of gas plants in DACs.

SB 887 requires the CEC and CPUC in collaboration with CAISO to "[p]rovid[e] resource projections that . . . substantially reduce, no later than 2035, the need to rely on [gas plants] in local capacity areas."

Although the projected retirement of 15,000MW of gas capacity by 2045 is a good start, it still falls short of the mandate under SB 887. 15,000MW represents only approximately half of the gas plant retirements required for analysis.[2] Limiting the gas capacity retirement in the assumptions in this way would in turn skew CAISO's Transmission Outlook analysis of the

[2] *See e.g.* Union of Concerned Scientists, Turning Down the Gas in California (August 2018), available at https://www.ucsusa.org/sites/default/files/attach/2018/07/Turning-Down-Natural-Gas-California-fact-sheet.pdf ("There are nearly 200 utility-scale natural gas–fired power plants in California; together, they provide approximately 39 gigawatts of generation capacity to the grid (S&P Global 2018).")

emissions reductions that can be made, and to the detriment of environmental justice communities. Pursuant to SB 887, the CEC, CPUC and CAISO must correct this deficiency and plan accordingly for a "substantial reduction." At the very least, the CEC, CPUC and CAISO should assume that the *majority* of gas resources should be retired by 2035.

SB 350 further requires load serving entities to "[m]inimize localized air pollutants and other greenhouse gas emissions, with early priority on disadvantaged communities."[3] AB 197, the companion bill to SB 350, further requires the State, to "prioritize direct emission reductions" to "protect the state's most impacted and disadvantaged communities."[4] The localized air pollution from gas plants in DACs is well documented. The CEC, CPUC and CAISO should therefore assume "early priority" for gas plant retirements in DACs with poor air quality, rather than prioritizing retirements by age of facility. As detailed in the 2022 IEPR Update:

> While the state is transitioning to a clean energy future, many Californians are still burdened by the polluting energy system of the past and present and lack equitable access to clean, affordable, and reliable energy. As Lori Pesante with the Dolores Huerta Foundation emphasized at the July 20, 2022, IEPR workshop, we have been historically extractive in nature, extractive from our people, from our land, and from our resources.[5]

Publicly available tools can assist in this endeavor.[6]

Moreover, an accelerated retirement schedule for gas plants is also feasible. SB 887 also requires the consideration of alternatives to transmission capacity upgrades to meet electricity demand following retirement of gas plants. As discussed below, DERs provide significant environmental and community benefits and have not been fully considered by the CPUC, CEC or CAISO in even the No Combustion and Accelerated Timeline scenarios.

II. The Portfolio Assumptions Should be Revised to Maximize the Benefits of DERs to the Energy System and to Environmental Justice Communities.

The 2022 IEPR Update details the CEC's commitment to Distributional Equity, in particular to "create opportunities for people and communities to participate in the energy system supply/value chain, operations, service, and ownership" at the same time, "minimiz[ing] potential harm."[7] The Update further lists considerations to embed equity into investments, including "support energy democracy through community-scale distributed energy resources," and providing direct community-driven benefits to Tribes and Justice communities, in particular

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[3] Cal. Pub. Util. Code § 454.52(a)(1)(H).

[4] Cal. Health and Safety Code § 38562.5.

[5] 2022 IEPR Update at 15.

[6] *See e.g.* PSE Healthy Energy, California Power Map, *available at* https://www.psehealthyenergy.org/california-power-map/; California Public Safety Power Shutoff Interactive Map, *available at* https://www.psehealthyenergy.org/our-work/interactive-tools/california-public-safety-power-shutoff-interactive-map/

[7] 2022 IEPR Update at A-3.

resilience benefits.[8] This reflects the CEC's recognition that DERs provide greater economic, environmental and public health benefits especially to environmental justice communities, when compared to the status quo energy system's over-reliance on the bulk system.

DERs when optimized can be *an environmentally and socio-economically superior alternative* to over-reliance on buildout and operation of large-scale generation and transmission projects. The portfolio assumptions should be revised to maximize these benefits.

Maximizing non-wires alternatives can meet our climate goals faster, and provide tangible environmental and economic benefits to environmental justice communities, while at the same time avoiding adverse impacts on our public lands.[9]

In line with the IEPR Update recommendations, DERs support local economic development,[10] and bring other non-energy benefits, including enhanced resilience benefits.[11] And by incentivizing investment in DERs, we can potentially avoid billions of dollars in transmission investments. The CPUC has identified transmission building costs as the number one cause of escalating rates in California to date.[12] Transmission lines are also closely tied to the wildfires costing ratepayers additional billions of dollars in mitigation, what the CPUC has identified as the number two cause of escalating rates.[13]

Non-wires DER solutions can avoid many of these costs. For instance, in 2018, CAISO recommended the cancellation of 18 transmission projects and revisions of 21 other projects in the PG&E area and two in the San Diego Gas & Electric area, avoiding an estimated $2.6 billion in future costs. These savings were mainly due to displaced need for bulk electricity generation on account of DERs: energy efficiency programs and increasing levels of residential, rooftop solar generation.[14] Given the significant barrier that rising electricity rates pose to statewide decarbonization targets, especially in low-income communities, it is prudent for the CPUC, CEC

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8 2022 IEPR Update at A-13.

9 *See e.g.* Center for Biological Diversity, *Rooftop Solar Justice* (March 2023), *available at* https://www.biologicaldiversity.org/programs/energy-justice/pdfs/Rooftop-Solar-Justice-Report-March-2023.pdf.

10 Vibrant Clean Energy, *Why Local Solar For All Costs Less: A New Roadmap for the Lowest Cost Grid* (December 2020), *available at* https://vibrantcleanenergy.com/wp-content/uploads/2020/12/WhyDERs_TR_Final.pdf.

11 Gridlab, *The Role of Distributed Energy Resources in Today's Grid Transition* (August 2018), *available at* http://gridlab.org/wp-content/uploads/2019/04/GridLab_RoleOfDER_online-1.pdf.

12 CPUC, *Utility Costs and Affordability of the Grid of the Future* (May 2021), *available at* https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/office-of-governmental-affairs-division/reports/2021/senate-bill-695-report-2021-and-en-banc-whitepaper_final_04302021.pdf.

13 *Id.*

14 *See e.g.* CAISO News Release, *Plan calls for canceling, modifying projects to avoid $2.6 billion in costs* (March 23, 2018), *available at* https://www.caiso.com/Documents/BoardApproves2017-18TransmissionPlan_CRRRuleChanges.pdf; *see also* R.14-08-013, Reply Comments of the California Independent System Operator Corporation (Aug. 23, 2019) at 4-5.

and CAISO to assume a high DER future, as the CPUC and CEC already assume in their respective DER focused proceedings.

III. The CPUC, CEC, and CAISO Should Adhere to the Memorandum of Understanding and Commitments Made in Related Proceedings, and Coordinate Efforts to Maximize the Benefits of DERs.

The CPUC, CEC and CAISO have entered into a Memorandum of Understanding regarding Transmission and Resource Planning and Implementation, "[a]ffirming the commitment to tighten linkages between planning, procurement direction, and the ISO interconnection process - and local planning - to the greatest extent possible."[15] The simple fact that DERs reduce the need for new or expansions of existing electrical transmission facilities reinforces the understanding between the agencies to coordinate efforts on DERs. Yet, as clarified at the Workshop, the portfolio assumptions erroneously focus only on the bulk system.

Meanwhile the growth of DERs was identified as an emerging theme in the 2022 IEPR Update.[16] The CPUC is also advancing DERs through Rulemaking 22-11-013, which assumes an energy system future with a high penetration of DERs. Similarly, the CEC also has a current open proceeding to maximize DERs, and "explore[s] issues related to the operation and performance of a *mature high*-DER electricity system in California," as well as near-term obstacles to that energy future.[17] Importantly, both CPUC and CEC proceedings seek a better understanding of the local benefits and avoided environmental harms from more widespread DERs statewide deployment.

The proposed portfolio assumptions fail to align with the direction of these other inter-agency efforts. Not only do the proposed portfolio assumptions focus only on the bulk system, but they also fail to include the full suite and potential of DERs the CPUC and CEC have previously recognized, thus excluding significant community and environmental benefits from consideration. While we applaud the CEC's goal of 7GW of load shifting by 2030, the proposed assumptions neither incorporate them, nor maximize opportunities for energy efficiency, demand response or flexibility, behind or in front of the meter generation, grid benefits of medium and heavy duty EVs, and other DERs.

The proposed assumptions also omit the current performance and future potential of virtual power plants. DERs reach their true potential when aggregated together to create capacity resources at the multi-MW scale, even if individual constituent resources are small, kW-scale assets. An LADWP study found that active management of DERs could avoid 600 MW of

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15 *See* CAISO, Memorandum of Understanding with CPUC and CEC Posted (January 2023), *available at* http://www.caiso.com/Documents/memorandum-of-understanding-with-cpuc-and-cec-posted.html

16 2022 IEPR Update at 11.

17 CEC DER OIIP at 4, *available at* https://www.energy.ca.gov/filebrowser/download/4010 (emphasis added).

peak load.[18] The CPUC, CEC and CAISO should include the full range of possible DERs and DER aggregations in portfolio assumptions, rather than unnecessarily limiting this potential and foreclosing environmental and community benefits.

In particular, the CPUC's techno-economic screen excludes substantial areas suitable for rooftop solar and other DERs, including urbanized industrial areas. Already developed and industrialized areas present significant rooftop potential for solar generation that local jurisdictions have already identified, yet the CPUC, CEC and CAISO omit.[19] Moreover, omitting this potential also ignores significant opportunities for community solar plus storage projects that provide significant benefits to environmental justice communities.

Regarding customer sited solar generation, it is unclear why the CPUC, CEC and CAISO backtrack from the SB 100 Core Scenario's projection of 28.2 GW of projected distributed solar by 2045,[20] to the substantially smaller proposed addition of 125 MW.[21] While the portfolio assumption of 30GW of BTM PV by 2040—as a demand-side input—may account for this discrepancy, that projection is still inadequate. Restricting DERs to function *only* as load modifiers, and not suppliers of renewable energy, does not reflect the true potential of DERs, subsequently skewing resource portfolios in either RESOLVE or SERVM.

In addition, the CPUC, CEC and CAISO should acknowledge the federal prioritization and funding for DERs. For instance, the Inflation Reduction Act includes incentives for DERs, reflecting the nation's commitment to DERs as part of a climate solution. Furthermore, the federal Environmental Protection Agency (EPA) has recently clarified "three priority project categories that are particularly impactful to achieving the [federal Greenhouse Gas Reduction Fund] program objectives and the near-term climate goals of the United States."[22] The first priority project area EPA lists is "Distributed Power Generation and Storage."[23] This include "[p]rojects, technologies, or activities that generate and/or store zero-emissions power near to the point of use, instead of in centralized plants. Examples include distributed solar, distributed wind, geothermal, stand-alone energy storage, and community-wide microgrids."[24] EPA is also developing a program—Solar for All—that seeks to concentrate distributed solar and storage in low income and disadvantaged communities. The CPUC, CEC and CAISO must incorporate these priorities and funding into portfolio assumptions.

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[18] James Barner & Jason Rondou, Distributed Energy Res. Plan. & Programs Presentation, LADWP (June 29, 2017), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=219953&DocumentContentId=30212.

[19] *See e.g.* Draft Los Angeles County Climate Action Plan *available at* https://planning.lacounty.gov/long-range-planning/climate-action-plan/documents/.

[20] *See* 21-SIT-01 Workshop Slide 7.

[21] *See* 21-SIT-01 Workshop Slide 33.

[22] EPA's Implementation Framework for the Greenhouse Gas Reduction Fund, *available at* https://www.epa.gov/system/files/documents/2023-04/GGRF%20Implementation%20Framework_730am.pdf

[23] *Id.* at 16.

[24] *Id.*

In line with the established Loading Order, instead of focusing only on the bulk system, the CPUC, CEC and CAISO should: first, seek to maximize energy-efficiency and energy conservation; second, maximize DERs like rooftop and community solar, storage, and microgrids that maximize health and environmental benefits, decrease gas generation in local capacity areas, and minimize large-scale transmission harms; and third, fulfill remaining energy demand with responsibly-sited large-scale renewable energy, storage, and transmission that has gone through robust environmental review and early community engagement.[25]

IV. Gas Plant Retirement Presents an Opportunity to Maximize and Target DERs to DACs.

Gas plants are disproportionately located in DACs. Furthermore, "historically disadvantaged communities often have more inefficient buildings and less access to clean energy technologies. This means that the higher energy load from buildings in disinvested neighborhoods can stress the local grid more than other areas, likely leading to a higher instance of grid constraints in underserved communities."[26] "Grid limits exacerbate existing inequities: households in increasingly Black-identifying and disadvantaged census block groups have disproportionately less access to new solar photovoltaic capacity based on circuit hosting capacity."[27]

DERs deployed as non-wire alternatives can lower the need for transmission and distribution investment costs.[28] It makes sense, therefore, to target DERs to DACs, specifically areas where the CPUC, CEC and CAISO assume gas plant retirements.

This is important because neither PG&E nor SCE were able to fulfill local area needs in the last procurement cycle.[29] As a start to cure this defect of the energy system, portfolio assumptions should prioritize local procurement to transition to cleaner resources. Furthermore, given the significant time required to review, approve and deploy transmission projects, there is a risk of stranded assets, should transmission projects not be completed on time. Adequate

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[25] *See* Policy Brief: Pursuing a Just and Renewable Energy System, A Positive & Progressive Permitting Vision to Unlock Resilient Renewable Energy and Empower Impacted Communities (May 2023) *available at* https://www.biologicaldiversity.org/programs/energy-justice/pdfs/Policy-Brief-for-Positive-Vision.pdf. The CPUC, CEC and CAISO should also prioritize additional transmission needs for existing resources that are transmission limited, such as the Helms pump storage, before considering any new transmission for newly developed large-scale resources.

[26] Institute for Market Transformation, Redistributing Power to Communities in Oregon (April 18, 2023) *available at* https://www.imt.org/news/redistributing-power-to-communities-in-oregon/

[27] *Id.*; *see also* Brockway, Anna M; Conde, Jennifer; Callaway, Duncan, Inequitable access to distributed energy resources due to grid infrastructure limits in California (2021), *available at* https://escholarship.org/uc/item/6pc2k2tv.

[28] Hayden Reeve, Pac. Nw. Nat. Lab'y, The Distrib. Sys. Operator with Transactive (DSO+T) Study: Executive Summary (Jan. 2022), *available at* https://www.pnnl.gov/sites/default/files/media/file/EED_1574_BROCH_DSOT-ExecSumm_v11.pdf.

[29] *See* CPUC Decision 22-03-034.

deployment of DERs can hedge against this risk. To put it simply, DERs enable deployment of power supply as close as possible to where it is consumed, and these clean renewable technologies offer energy services that can reduce the need for costly distribution and transmission system investments, while also providing environmental benefits to communities, including cleaner air.

Targeted deployment of DERs to gas plant retirement areas in DACs will allow for the prioritization of local needs, and, will decrease the need for grid upgrades to the benefit of all ratepayers and the environment. Publicly available tools exist to assist in this endeavor.[30] The CPUC, CEC and CAISO should revise the portfolio assumptions to accelerate gas retirements, prioritize those retirements in DACs, and then target replacement of the gas plant local capacity needs with the grid and socio-economic benefits of DERs.

V. The Portfolio Assumptions Should Include Resiliency.

Maximizing DERs will also assist the State in solving its electricity reliability challenges. The Demand-Side Grid Support (DSGS) Program has the potential to target DERs to remove our reliance on dirty fossil fuel backup generation, including diesel back-up generators. Similarly, the Distributed Electricity Backup Assets (DEBA) Program provides local clean opportunities to specifically address reliability.

In addition to reliability, the CPUC, CEC and CAISO must also consider resiliency when determining portfolio assumptions. Resiliency, from the customer perspective, requires continuity of electric service during system outages, at least for essential services that can be a matter of life or death for vulnerable people and communities. SB 350 requires load serving entities to "[s]trengthen the diversity, sustainability, *and resilience* of the bulk transmission and distribution systems, and local communities."[31] The portfolio assumptions must therefore incorporate resiliency, either in line with reliability or as a constraint in RESOLVE, just as how the model meets GHG and RPS requirements.

VI. Additional Land Use Screens Provide Important Safeguards to Promote Responsible Siting.

The assumptions' focus on the bulk system risks significant impacts to the environment both by undervaluing DER's benefits and by preferentially weighting development of large-scale renewable energy projects and additional transmission that impact increasingly rare intact habitat in the State. Poorly sited large-scale renewables development and transmission can cause many unnecessary harms, including to communities and habitats, through fragmentation, loss of

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30 *See e.g.* PSE Healthy Energy, Exploring Potential Resilience Hubs, *available at* https://www.psehealthyenergy.org/our-work/interactive-tools/exploring-potential-resilience-hubs-in-california/.

31 Cal. Pub. Util. Code § 454.52(a)(1)(F) (emphasis added).

connectivity for terrestrial wildlife, destruction of carbon sequestration of soils, and introduction of predators and invasive weed species on intact habitat.[32]

Because most of California is a noted "biodiversity hotspot" on the planet, it is imperative to carefully conserve and protect the ecological functioning of key areas. We are pleased to see the evolution of the land use screens but continue to be concerned about the over-reliance on modeling and older data sets. At most, these land use screens can provide a rough approximation of the ecological values of various areas of the state but, as has been emphasized before, they cannot be relied on for actual siting decisions which require site specific surveys and on-the-ground investigations.

The inclusion of additional land use screens, including ACE Biodiversity (Rank 5), ACE Connectivity (Ranks 4 and 5), ACE Irreplaceability (Ranks 4 and 5), USFWS Critical Habitats, Wetlands and Terrestrial Landscape Intactness is a good start to improve the planning for future renewable energy projects and transmission, and we support a requirement for their inclusion into all planning processes. The incorporation of additional screens would provide further safeguards for important landscapes, and reduce the conflicts (including permitting time and costs) for implementation of renewable energy while staunching the ongoing global extinction crisis, based on the unique flora and fauna that call California home.

Therefore we suggest additional screens be added to the siting evaluation process, including:

(i) Add the ACE Climate Resilience to the land use screens.

ACE Climate Resilience identifies areas that will remain relatively buffered from the effects of climate change as it progresses; where conditions will likely remain suitable for the existing plants and wildlife that reside; and where ecological functions are more likely to remain intact.

(ii) While the ACE connectivity screens (Rank 4 and 5) are essential, Rank 3 connectivity also needs to be incorporated into the land screens.

Plant and animal connectivity is a quickly advancing area of science, with modeling being the preferred method of assessing large landscape connections. However, data is currently very limited on the actual use of the predicted modeled connectivity corridor(s) for the targeted species. For animals, resource selection models (the typical types of models used to identify key landscape connectivity) were not robust and did not include the animal's behavioral state (e.g. foraging, dispersing, etc.) which is an important determinant of resource selection patterns and

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[32] U.S. Department of Energy, *Solar Impacts on Wildlife and Ecosystems* (2021), *available at* https://tinyurl.com/mwwfu3rc; Rebekah Hernandez, *et al., Environmental Impacts of Utility-Scale Solar Energy, Renewable and Sustainable Energy Reviews* (2014), *available at* https://escholarship.org/content/qt62w112cg/qt62w112cg.pdf; *see also Nevada Views, No free lunch on green energy* (June 2021) *available at* https://www.reviewjournal.com/opinion/nevada-views-no-free-lunch-on-green-energy-2382525/.

would provide a more accurate outcome from the model.[33] We could find no literature that evaluated the effectiveness of modeled connectivity for plants (seed, pollen, propagule movement).

In addition, California's biota are also trying to adapt to the on-going effects of climate change and as it progresses, robust connectivity will aid in that adaptation. At minimum, the inclusion of Rank 3 connectivity will provide a more robust land screen to minimize conflicts between energy needs and extinction prevention.

California Department of Fish and Wildlife define ACE Rank 3 as:

> Connections with implementation flexibility. These are other areas that have been identified as having connectivity importance, but have not been identified as channelized areas, species corridors, or habitat linkages at this time. This may change with future changes in surrounding land use or regional specific information. Hexagons included in this category include areas mapped as "intensified" in the TNC Omniscape study, core habitat areas, and hexagons on the periphery of mapped habitat linkages when not included in the categories above" (Rank 4 and 5).[34]

Due to the future advances in modeling, effects of climate change, and inclusion of plant connectivity, including ACE Rank 3 in the screens will provide additional flexibility needed to preserve California's status as a global biodiversity hotspot.

VII. Portfolio Assumptions Should Not Include CCS or Hydrogen Combustion, But Must Include Non-Energy Benefits.

We strongly object to including CCS technologies and hydrogen combustion in the portfolio assumptions. Climate benefits from CCS are illusory, including significant operating costs that perpetuate disproportionate local impacts, and increase the risks of hazards in DACs. Similarly, combustion of hydrogen for electricity production also increases disproportionate air and water quality impacts in DACs and risks achievement of our climate goals.

Separating CO2 from air requires a substantial amount of energy that the portfolio assumptions fail to account for. When attached to a power plant, operating today's CCS technologies can require up to 40% of the power generated by the power plant.[35] In fact, one CCS project in McFarland, CA will need its own dedicated 23MW gas-fired power plant to

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[33] Abrahms, B., S.C. Sawyer, N.R. Jordan, J. W. McNutt, A.M. Wilson, J.S. Brashares *Does wildlife resource selection accurately inform corridor conservation?* Journal of Applied Ecology 54 (2): 412-422. https://doi.org/10.1111/1365-2664.12714

[34] ACE Dataset Fact Sheet Terrestrial Connectivity (August 21, 2019) at 5, *available at* https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150835&inline

[35] Leon Clarke et al., *2022: Energy Systems. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, International Panel on Climate Change (November 27, 2021), p. 6-38.

operate.[36] The storage and transportation associated with CCS also present significant impacts not adequately considered in the portfolio assumptions.[37] It is troubling that Staff comments at the Workshop include CCS as either a clean firm attribute or a long duration storage option, yet claim that the technology involved is "less important" for the analysis. That is simply incorrect. The failure to account for CCS's energy-related impacts alone could derail our progress to meeting SB 100 because of the energy required to operate CCS.

Similarly, hydrogen combustion also presents significant local impacts, in particular in DACs. Hydrogen combustion produces nitrogen oxide (NOx) emissions. NOx is a health-damaging air pollutant that contributes to respiratory health impacts, and can also react in the atmosphere to form ozone and particulate matter, which contribute to respiratory and cardiovascular health impacts. The storage and transportation of hydrogen feedstock and related products also implicates additional industrial infrastructure, adding safety risks and air pollutant emissions to existing industrial pollution burdens in areas with significant existing cumulative socioeconomic and environmental health burdens.

Moreover, the effectiveness of both CCS and hydrogen combustion as climate solutions is further undermined by their inherent risks of lifecycle leaks. For instance, the potential for hydrogen to leak throughout production, processing, transmission, and end-use presents significant climate impacts that the portfolio assumptions do not consider. Relatedly, both CCS and hydrogen combustion subject society to unacceptable public health and environmental hazards. CCS can increase toxic wastewater discharge, and underground storage of CO2 can contaminate aquifers.[38] Spills or other disasters involving CO2 would also cause major environmental harm and incur major costs from chemical solvents used in the CCS process.[39] Hydrogen combustion also risks catastrophic infrastructure failure, whether near pipelines or gas plants, threatening public safety and our GHG targets. The costs to mitigate liability from environmental disaster should serve as a basis to reject both CCS and hydrogen combustion as candidate resources, or, at a bare minimum, be included in the portfolio assumptions.

Finally, we emphasize the need to incorporate an adequate consideration of non-energy benefits into all cost-effectiveness determinations throughout the SB 100 process, including to inform the portfolio assumptions. As noted in the 2022 IEPR Update:

> Incorporating nonenergy benefits may produce greater benefits to all Californians by increasing the societal benefits produced by public funds. Incorporating and

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[36] *See* McFarland Planning Commission Staff Report (January 2022), *available at* https://www.mcfarlandcity.org/AgendaCenter/ViewFile/Agenda/_02152022-314

[37] *See e.g.* Eldardiry et al., Carbon capture and sequestration in power generation: review of impacts and opportunities for water sustainability, (2018) *available at* https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-018-0146-3.

[38] *Id.*

[39] Michael Salt and Christina Ng, CCS for power yet to stack up against alternatives, Institute for Energy Economics and Financial Analysis (March 2023) at 7, *available at* https://ieefa.org/resources/ccs-power-yet-stack-against-alternatives.

> tracking these benefits supports investments essential to California's transition to a clean energy economy.[40]

We will comment further on this overdue requirement to consider non-energy benefits in the future, but for now, we emphasize that adequate consideration of non-energy benefits would show the enormous harmful environmental and local impacts, especially in DACs, of including CCS and hydrogen combustion in the portfolio assumptions. The CPUC, CEC, and CAISO should remove CCS and hydrogen combustion as candidate resources and from the portfolio assumptions.

Respectfully submitted,

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[40] 2022 IEPR Update at A-9.