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Additional submitted attachment is included below.

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September 24, 2019

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I. INTRODUCTION

The California Hydrogen Business Council (CHBC)[1] welcomes this opportunity to share comments on the IEPR Joint Agency Workshop on Energy Efficiency and Building Decarbonization that took place on August 27, 2019. We urge the joint agencies to support a technology-neutral approach to decarbonizing California's buildings, rather than narrow the strategy to electrification-only of all end uses for all buildings, as it is essential in this rapidly evolving landscape to not exclude opportunities for solutions that can potentially play important roles to quickly and effectively meet the state's climate and clean energy targets. We strongly support the goals and recommendations set forth in the staff report on the draft 2019 California Building Efficiency Action Plan, with two notable exceptions under Goal 3 – "Reducing Greenhouse Gas Emissions from Buildings," identified below.

[1] The CHBC is comprised of over 100 companies and agencies involved in the business of hydrogen. Our mission is to advance the commercialization of hydrogen in the energy sector, including transportation, goods movement, and stationary power systems to reduce emissions and dependence on oil. The views expressed in these comments are those of the CHBC, and do not necessarily reflect the views of all of the individual CHBC member companies. Members of the CHBC include Air Liquide Advanced Technologies U.S. LLC.; Alameda-Contra Costa Transit District (AC Transit); American Honda Motor Company; Anaerobe Systems; Arriba Energy; Ballard Power Systems, Inc.; Bay Area Air Quality Management District (BAAQMD); Beijing SinoHytec; Black & Veatch; BMW of North America LLC; Center for Transportation and the Environment (CTE); Charm Industrial; Chiyoda Corporation; Clean Energy Enterprises; Community Environmental Services; CP Industries; DasH2energy; Dominion Energy; Eco Energy International, LLC; EcoNavitas; ElDorado National – California; Energy Independence Now (EIN); EPC - Engineering, Procurement & Construction; Ergostech Renewal Energy Solution; EWII Fuel Cells LLC; FIBA Technologies, Inc.; First Element Fuel Inc; General Engineering & Research; General Motors, Infrastructure Planning; Geoffrey Budd G&SB Consulting Ltd; Giner ELX; Gladstein, Neandross & Associates; Greenlight Innovation; GTA; H2B2 USA; H2Safe, LLC; Hexagon Lincoln; Hitachi Zosen Inova ETOGAS GmbH; HODPros; Hydrogenics; Hydrogenious Technologies; Hydrogen Law; HyET - Hydrogen Efficiency Technologies; HyperSolar, Inc.; Hyundai Motor Company; IGX Group Inc; ITM Power Inc; Ivys Inc.; Iwatani Corporation of America; Johnson Matthey Fuel Cells; KORE Infrastructure, LLC; Kraft Powercon; Life Cycle Associates; Longitude 122 West, Inc.; Loop Energy; Magnum Energy; Manticore Advocacy LLC; Millennium Reign Energy; Mitsubishi Hitachi Power Systems Americas; Motive Energy Telecommunications; Natural Gas Fueling Solutions (NGFS); Natural Hydrogen Energy Ltd.; Nel Hydrogen (US); Neo-H2; Neuman & Esser USA, Inc; New Flyer of America Inc; Next Hydrogen; Nikola Motor Company; Noyes Law Corporation; Nuvera Fuel Cells; Pacific Gas and Electric Company - PG&E; Pacific Northwest National Laboratory (PNNL); PDC Machines; Planet Hydrogen Inc; Plug Power; Politecnico di Torino; Port of Long Beach; Powertech Labs, Inc.; Primidea Building Solutions; RealEnergy, LLC; RG Associates; Rio Hondo College; Rix Industries; Sacramento Municipal Utility District (SMUD); SAFCell Inc; Sheldon Research and Consulting; South Coast Air Quality Management District; Southern California Gas Company; Strategic Analysis Inc; Sumitomo Corporation of Americas; Sumitomo Electric; Sunline Transit Agency; T2M Global; Tatsuno North America Inc.; Terrella Energy Systems Ltd; The Leighty Foundation; TLM Petro Labor Force; Toyota Motor Sales; Trillium - A Love's Company; University of California, Irvine; US Hybrid; Valley Pacific Petroleum Services Inc; Vaughan Pratt [Individual]; Verde LLC; Vinjamuri Innovations LLC; Winkelmann Flowform Technology; WireTough Cylinders, LLC; Worthington Industries; YanliDesign; Zero Carbon Energy Solutions.

1. **We are concerned with the implication in Recommendation "f," which calls for California to *"(d)evelop building codes that require the installation of cost-effective, demand flexible, electric-ready infrastructure in preparation for all-electric buildings,"* without support for other strategies to decarbonize buildings as well. A one-size fits all approach will not be best in every circumstance, leaves the state's building decarbonization strategy vulnerable to seen (e.g, a less reliable grid facing public safety power shutoffs) or unforeseen (e.g. natural disaster) circumstances, and ignores additional opportunities to decarbonize buildings that may become favorable. In the comments below, the CHBC describes why it is not technically possible at this time to predict that all-electric will be the optimal pathway for all buildings to decarbonize, and that this direction creates risks for negative reliability, public health, safety, and potentially negative cost impacts. While you consider electrification as one path forward, we encourage you to also enable the decarbonized gas market - including renewable and zero carbon hydrogen[2] – so that the state may boost energy system reliability and allow multiple strategies to compete to find optimal, low cost solutions providing maximum emissions reductions.**

2. **We propose a refinement to Recommendation "i," which calls for the state to *"(c)o-fund electrification in buildings with flexible assets in order to optimize integration with DERs, DR, and load shifting capabilities."* For reasons explained below, we urge building decarbonization funding programs to include fuel cells that supply electricity fueled by decarbonized gas, such as renewable or zero carbon hydrogen, to be eligible for such programs, along with electrolyzers that are used onsite or in campus or community microgrids.**

[2] We are defining renewable hydrogen for the purposes of these comments as hydrogen produced through electrolysis using renewable electricity or reformation of methane derived from renewable feedstocks such as organic material. We are defining zero carbon hydrogen as hydrogen having an Energy Economy Ratio Adjusted Carbon Intensity value of zero.

The CHBC strongly believes that California should prioritize the development and use of hydrogen produced from increasingly renewable and zero-carbon feedstocks, which can play a significant role in facilitating building decarbonizing across multiple end uses in our state. Multiple cross-sectoral pathways, innovative technologies, and process innovations, which are discussed below and implemented elsewhere globally, can be adopted to help achieve California's carbon neutrality goals.

II. COMMENTS

A. We applaud and agree with agency leaders at the workshop that fuel switching from fossil fuels ought to be a fundamental principle of building decarbonization strategies over the long term. We encourage a technology neutral approach to achieve this transition, rather than an all-electric one.

Several stakeholders at workshops and in written comment to date have called for a diversified approach to building decarbonization, including EDF, RNG Coalition, Biogas Association of California, and labor representatives, among others.[3] We agree with this strategy and believe it should extend to California's approach to achieving a technologically, economically, and socially successful transition from fossil fuel dependence. To this end, we urge the state to continue to support a broad suite of solutions to fuel switch in the building sector, which include energy efficiency technologies, renewable electricity generation and storage technologies, solar and geothermal technologies, renewable and zero carbon gas technologies, and cross sectoral technologies like fuel cells that use decarbonized gas to store and generate building energy, as well as electrolyzers that use decarbonized electricity to produce hydrogen gas for building related uses.

B. No legislation calls for all-electric buildings as the sole pathway to building decarbonization.

Although there is a push from California agencies for all-electric buildings, there is no legislative language requiring that that this is the only or best strategy to decarbonize buildings. As further explained below, we believe that while electrified end uses make sense for some cases, the

conclusion that all-electric is optimal for all buildings is rushed and runs serious risks that merit deeper consideration.

C. Some building types in California, including commercial and industrial building inventories, can be particularly hard to decarbonize with "full electrification" due to its energy intensive attributes and exponential costs to upgrade electric transmission and distribution infrastructure.

Electrification of buildings (residential, commercial, industrial and agricultural) increases the load on electricity delivery infrastructure. According to the Lawrence Berkley National Lab (LBNL,2018)[4], *"while incremental changes in specific buildings are unlikely to have impacts, extensive changes in large industrial facilities, or an accretion of smaller changes in the same area, could require distribution system upgrades*" leading to higher cost of electricity services.

D. Fuel cells and electrolyzers that are used onsite or in campus or community microgrids ought to be eligible for consideration as flexible building assets in funding programs that seek to optimize integration with DERs, DR, and load shifting capabilities.

As NFCRC points out in their comments: "*Fuel cells for power and heat generation are unique, non-combustion solutions that reduce greenhouse gas emissions ("GHG") in commercial, industrial, multi-unit residential buildings and other facilities*."[5] They go on to explain, "*Stand-alone fuel cell systems as distributed energy resources (DER) can also create resiliency outside of a microgrid and provide continuous clean power in addition to islanding connection to critical loads onsite. A fuel cell system can smoothly transition from grid-connected operation to fully power loads during a grid outage, without interruption to the end user."*[6]

[4] http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf

[5] See p. 2, NFCRC comments Joint Agency Workshop on April 8, 2018 on this docket.

[6] See pp. 5-6, NFCRC Comments to April 8, 2019 Joint Agency Building Decarbonization Workshop

Likewise, electrolyzers are controllable loads that can enable flexibility in the electric grids to assist in addressing DER-related challenges. UC Irvine's research has shown that deploying electrolyzer technology as part of its campus microgrid could optimize solar generation, increasing by ten-fold the amount of solar energy used.[7]

We urge the state to include fuel cell and electrolyzer technology in programs that seek to maximize opportunities for demand flexibility. This would also be aligned with research being done at the federal level.[8]

E. While the staff report on the draft California Building Efficiency Action Plan concludes there is "*a growing consensus that building electrification is the most viable and least-cost path to zero-emission buildings*,"[9] we strongly believe such conclusions are premature, as well as challenged by a growing group of experts who are championing hydrogen as an important solution.

E3's study on *Residential Building Decarbonization in California* suggests that close to half new single-family homes and a third of multi-family homes would potentially have increased energy bills of $100 or more a year, if they are built all electric.[10] This suggests that what may be most efficient or economic for some homes may be uneconomical for others, and that a more diverse set of options to decarbonize, beyond all electrification, would be more appropriate.

The report specifically recommends that California ought to presently pursue developing both electrification *and* renewable gas pathways in the near-term because of the fact that both depend on nascent technology markets.[11] The report also suggests that in the long-term, the cost-effectiveness of this approach depends on progress being made on commercialization of

[7] https://www.energymanagertoday.com/uc-irvine-power-gas-storage-performs-lithium-ion-batteries-0168751/

[8] See, e.g. NREL research on *Dynamic Modeling and Validation of Electrolyzers in Real Time Grid Simulation* https://www.hydrogen.energy.gov/pdfs/review18/tv031_hovsapian_2018_o.pdf

[9] See draft Action Plan, pp. 17 and 130

[10] p. 69, *Residential Building Decarbonization in California*, E3; April 2019

[11] p. 2, *Building Electrification in California*, E3; April 2019 https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf

electrolytic hydrogen technology" [12] Numerous experts are optimistic about this prospect, given dropping renewable generation costs that are driving down the cost of renewable hydrogen production. There is a growing call to support hydrogen development to enable it to achieve its potential as an economical, critical, cross-sectoral decarbonized energy solution for, among other applications, building energy, in addition to electrification. For example:

- A recent ICF study (2019)[13] to evaluate the role of gas utilities in a decarbonized world evaluated that the high cost of building electrification would likely "crowd out" other cost-effective alternatives to help reduce building related emission. The analysis further points out that the annual cost per household under technology neutral decarbonization is cheaper than full residential electrification (the annual estimated cost per house hold increased by $1,420 per customer under residential electrification versus $1,200 per customer under technology neutral decarbonization scenario).[14]

- RMI recently wrote that hydrogen can be used for a number of applications, including electricity and heat, and despite the fact that "*misconceptions about hydrogen abound*," and "*haters are expressing doubt over the development of hydrogen resources, fearing that it competes with electrification and battery technology*," when in fact, "*this concern doesn't reflect reality… With its zero-carbon potential and the role it can play in increasing demand for renewable energy, hydrogen has an important role in our energy transition and is a key complement to electrification."*

- The International Energy Agency stated in a recent report that "*With declining costs for solar PV and wind generation, building electrolysers at locations with excellent renewable resource conditions could become a low-cost supply option for hydrogen, even after taking into account the transmission and distribution costs of transporting hydrogen from (often remote) renewables locations to the end-users"*[15]They go on to declare that "*now is the time*

[12] Ibid.

[13] ICF webinar on the analysis is available at: https://www.icf.com/resources/webinars/2019/gas-utilities-in-a-decarbonizing-world

[14] Slide 17 of the ICF webinar available at: https://www.icf.com/resources/webinars/2019/gas-utilities-in-a-decarbonizing-world

[15] https://www.iea.org/hydrogen2019/

to scale up technologies and bring down costs to allow hydrogen to become widely used…But for hydrogen to make a significant contribution to clean energy transitions, it needs to be adopted in sectors where it is almost completely absent, such as transport, buildings and power generation."[16]

- Bloomberg New Energy Finance echoed the favorable outlook for hydrogen, reporting, *"The cost of producing hydrogen gas with renewables is likely to plummet in the coming decades, making one of the most radical technologies for reducing greenhouse gases economical."*

- Both former Secretaries of Energy under President Obama are optimistic about the prospects of hydrogen, with a research team led by Secretary Ernst Moniz calling it one of eleven breakthrough technologies needed to succeed in deeply decarbonizing California and is among the clean fuels needed to "*ensure that all sectors can operate at the scale, timing, frequency, and levels of reliability that are required to meet social, economic, and stakeholder needs*,"[17] and also cautioning that the "*work must pick up the pace today and be sustained to support … development."*[18]

California has just begun to provide policy support for renewable hydrogen,[19] which if sustained, would favorably impact costs in the state.

Rather than jump to conclusions prematurely, California instead ought to take a technology neutral approach and encourage testing and development of a wide range of technologies capable of decarbonizing buildings, including efficiency, electrification – with a broad enough definition

[16] See *Future of Hydrogen* Summary, IEA, https://www.iea.org/hydrogen2019/

[17] p. xii, *Optionality, Flexibility & Innovation, Pathways for Deep Decarbonization in California, Summary for Policy Makers*, Energy Futures Initiative; April 2019 https://energyfuturesinitiative.org/efi-reports

[18] p. xi, ibid.

[19] The CEC is funding the state's first two renewable hydrogen demonstration projects for transportation fueling; https://ww2.energy.ca.gov/contracts/GFO-17-602_NOPA_revised.pdf; the legislature passed SB 1369 in 2018 to advance green electrolytic hydrogen; and the CPUC has expressed interest in establishing hydrogen pipeline blending protocols to support renewable hydrogen development (see R.1302008 Scoping Memo and Ruling), is considering hydrogen scenarios in the IRP process (see R1602007) and has recently hired staff to help oversee renewable gas related issues.

to include fuel cells – as well as solar thermal, *and* decarbonized gas like renewable or zero carbon hydrogen used to fuel switch from fossil fuels. Technology criteria should prioritize:

1. Capacity to decarbonize building energy
2. Flexibility to allow deployment of technologies in various combinations, based on needs and priorities identified for the sites at which projects are being developed.

F. A technology neutral approach is also prudent, given the virtually impossible task of currently calculating a realistic future cost comparison between all-electric homes and those that rely on renewable gas for some uses because of the uncertainty of wildfire impacts on future electricity rates.

Utility rate increase requests are already reaching nearly 22% over the next few years to help pay for the costs of wildfire liability and prevention.[20] Fundamentally, however, current uncertainty around wildfires, utility liability, and associated cost to ratepayers make it difficult, if not impossible to compare future gas and electricity rates, and alternate building decarbonization pathways dependent on them, in any reliable way. The E3 study states explicitly that it does not attempt to "*forecast how the cost of wildfires may affect future electricity rates*."[21] The draft *California Efficiency Action Plan* touches upon wildfires and resiliency as a context for building decarbonization, but meaningful discussion is lacking. Without further information and evidence-based analysis in this area, any attempt at estimating costs of all-electrification in the building sector are highly speculative. In fact, the only thing certain about electricity rates right now is that they will remain highly uncertain until the legislature acts to address wildfire liability, and perhaps even beyond that, if inverse condemnation[22] is not addressed, which threatens "customers' access to affordable energy and clean water."[23] This lack of certainty regarding future electricity rates reinforces the importance of diversifying approaches to building

[20] https://calmatters.org/economy/2019/08/pges-rate-increases-what-you-need-to-know/

[21] p. 37, *Residential Building Decarbonization in California*, E3; April 2019

[22] Inverse condemnation is a legal concept used in California that allows the public to seek being awarded for damages caused by entities providing a public benefit (such as utilities do for providing electricity) regardless of whether that entity behave negligently. There is discussion underway in California about changing this doctrine in the wake of recent wildfires.

[23] Wildfire Commission (2019) Draft Executive Summary, June. http://opr.ca.gov/meetings/wildfire-commission/2019-06-07/docs/20190607-Item_7_Wildfire_Commission_Executive_Summary_Discussion_Draft.pdf

decarbonization beyond those that depend entirely on the electricity system.

G. It is also critical for policymakers to consider the reliability, safety, and public health concerns related to increased reliance on the electricity grid, given its vulnerability with respect to disasters like wildfires and earthquakes, as well as the need for solutions that can supply clean energy 24/7 under all circumstances.

With all-electric buildings comes increased dependence on the electric grid for all building end uses. While this may well carry benefits for some buildings, it also carries significant risks, including to reliable energy service and resilience in the face of wildfire and other disaster prevention and management.

Underground gas lines, which may carry increasing amounts of hydrogen, are comparatively less vulnerable with respect to fire than overhead power grids. In addition to being less prone to sparks during dry wind events, they are also less likely to cause fires after earthquakes, which risk being especially life threatening in California. According to a study prepared for the US Geological Survey and the California Geological Survey, the cause of about half of fires after earthquakes are electrical related, compared to about a quarter that are gas-related.[24]

To manage the risks of the power grids related to wildfire, electric utilities are planning to de-energize for hours or days at a time during high wind periods in large and potentially expanding regions of California considered at high risk of wildfires. This stands to impact more than a quarter of the state's population, who currently reside in wildfire prone regions.[25]

Longer term power shutdowns of weeks or longer occur in such regions, along with the rest of the state in the event of major earthquakes, when disasters strike. Some homes impacted by the Woolsey fire still do not have access to grid electricity, due to the long timetable for restoring

[24] pp. 4, 14 The Shakeout Scenario Supplemental Study, Fire after Earthquake, prepared for the US Geological Survey and CA Geological Survey, C.E. Scawthorn S.E. Spa Risk LLC, 2008 https://pdfs.semanticscholar.org/ccb9/b7786761464797f25de0abb35bfb30a0d4d0.pdf

[25] https://www.gov.ca.gov/2019/04/23/newsom-warns-of-wildfire-risk-to-urban-communities-across-state/

power, and remain reliant on gas appliances and gas back up generation several months after the fire as their sole source of building energy.

As Californians plan for and try to cope with power shutdowns, the demand for combustion-based fossil fuel backup generators has furthermore been rising as much as 1400%, which is not good news for decarbonization and air quality efforts.[26]

California policymakers must recognize the great extent to which gas provides critical resources for Californians when electricity becomes unavailable, while enabling the transition toward renewable and zero carbon gas, just like California is planning for electricity.

Some may say that solar and battery storage will be enough. But solar panels, while an extremely important and valuable technology in the building decarbonization effort, are prone to failing during smoky fire conditions, will not supply power during a shutdown unless they are not grid-tied, and in worst case, are prone to melting in fires or collapsing when buildings are severely damaged in earthquakes. We need diversified sources of decarbonized generation that can work in all situations.

Where backup power supply is concerned, battery storage is an excellent solution for short-duration storage and generation, but is not technically capable of providing long-duration storage and generation across all weather and circumstances.

Fuel cells, on the other hand, are capable of providing zero emissions long-duration storage and electricity generation onsite or on microgrids, even under extreme conditions. When powered by renewable gas, such as hydrogen, fuel cells are the ideal decarbonized electricity option for a disaster-prone state like California. Fuel cells withstood the 2019 Ridgecrest earthquakes, Sonoma fires in 2018 and the 6.0 magnitude Napa earthquake in 2014, and they provided continuous generation to nine microgrids during four storms that buffeted the East Coast from

[26] https://www.sfchronicle.com/business/article/Demand-for-generators-lights-up-as-PG-E-power-14054242.php

March 2-22 in 2018 and caused millions to lose power.

Fuel cells emit zero criteria pollutants, and when fueled by renewable hydrogen, emit zero criteria pollutants or greenhouse gas over their lifecycle. Fuel cells fueled by renewable gas, such as hydrogen, therefore ought to be included as eligible in California's building decarbonization programs. Excluding them would be the antithesis of supporting decarbonized building electricity pathways that maximize resiliency and advance zero emissions.

The bottom line is we believe homeowners and developers should have options. Neighborhoods needing new construction, and especially in view of the state's vulnerability to natural disaster, should not be forced to choose decarbonization pathways that compromise resiliency or that have the unintended consequence of increasing reliance on fossil fuels for back up generation.

H. Renewable hydrogen is being pursued for building heating and appliance applications in countries and regions around the world, where it is being recognized that a diverse approach will be required to achieve to deep decarbonization that includes efficiency, electrification, renewable hydrogen, and other renewable gas, among other strategies.

Examples of hydrogen for building applications being pursued in Europe include:

- In the United Kingdom (U.K.), where the HyDeploy Project plans to blend up to 20% hydrogen as part of their decarbonization efforts.[27]
- One of the anchor projects is taking place at Keele University, which is exploring hydrogen blending into its private gas network beginning in 2019 to reduce carbon emissions from heating buildings.[28]
- Blending hydrogen with natural gas across the U.K. is estimated to reduce 6 million tons of carbon annually, the equivalent of taking 2.5 million cars off the roads.[29]

[27] https://networks.online/gphsn/news/1000904/trial-explore-blending-hydrogen-gas-network
[28] https://networks.online/gphsn/news/1000904/trial-explore-blending-hydrogen-gas-network
[29] https://www.telegraph.co.uk/business/2018/01/06/hydrogen/

- Leeds, one of the largest cities in the U.K., also launched the Leeds H21 City Gate hydrogen project[30] in 2016, targeting the conversion of the existing natural gas supply and distribution system to deliver hydrogen to consumers.
- Northern Germany is similarly soon to begin blending 20% hydrogen produced by renewable electricity into the gas distribution grid. This fall, 400 heating systems and other customer devices will be installed to demonstrate hydrogen's compatibility with household appliances.[31]
- South Australia plans to transition to a renewable hydrogen economy to achieve low emissions across sectors and become a global hydrogen market leader.[32]

Notably in Europe, the heat pump market[33] is far ahead of California's,[34] but as promising a solution as they are for efficient heating and cooling, the European Commission forecasts that even in its high electrification scenario for deep decarbonization, only two thirds of buildings would adopt heat pumps by 2050.

Indeed, the European Commission found that the only way to achieve economy-wide 90+% greenhouse gas emissions below 1990 levels by 2050 was to aggressively pursue a diversified approach that focuses neither solely on electrification nor gaseous fuels, but rather both pathways. Net carbon neutrality by 2050 (as California's Executive Order B-55-18 calls for) would require additional efficiency and carbon capture or management of land sinks and a circular economy.[35]

California ought to similarly recognize that diversified approaches to deep decarbonization and carbon neutrality are needed and encourage such approaches in the building sector and beyond.

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[30] https://www.northerngasnetworks.co.uk/2016/07/12/watch-our-h21-leeds-city-gate-film/

[31] https://www.eon.com/en/about-us/media/press-release/2019/hydrogen-levels-in-german-gas-distribution-system-to-be-raised-to-20-percent-for-the-first-time.html

[32] http://www.renewablessa.sa.gov.au/content/uploads/2019/09/south-australias-hydrogen-action-plan-online.pdf

[33] *European Heat Pump Statistics and Market Report 2018* finds a growing market four years in succession, with over 10 million units sold. https://www.researchandmarkets.com/research/6sgzkn/european_heat?w=5

[34] *Decarbonization of Heating Energy Use in California Buildings*, Synapse Energy Economics, Inc; October 2018; p. 1 – States that heat pumps " today represent a small share of California's market, due to regulatory barriers and higher upfront costs in older homes."

[35] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018DC0773&from=EN

III. CONCLUSION

Rather than dictate all-electric as the required pathway to decarbonization, California ought to grant developers and communities flexibility to decide the best pathway for their requirements, as long as the pathway achieves sufficient lifecycle greenhouse gas emissions reductions. Eligible pathways ought to include energy efficiency, plus electrification and renewable gas in whatever combination makes most sense for any given project. We believe this will be protective of resiliency, which is so critical to the lives and well-being of Californians, in addition to expediting decarbonization. We also urge California's funding programs to decarbonize buildings to reflect this flexible, diversified approach.

Thank you for your consideration.

/s/ Emanuel Wagner

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