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CA Electric Homes

See pdf file below.

Additional submitted attachment is included below.

California Electric Homes Program

21 DECARB 01 MARCH 2022

David Bezanson, Ph.D., CA voter

Thanks for orchestrating this demonstration project. This will help pave the way to all-electric new building codes for all kinds of buildings. In addition, it will improve efficient construction practices and drive down the costs of electric appliances. Sufficient incentives would expand statewide job growth in electric building construction, retrofits, and appliance manufacturing.
Please consider a microgrid, storage, and community PV solar or wind demonstration project for cities within a certain range of population. This would expedite the replacement of fossil fuel power plants with clean energy.

COST : BENEFIT ANALYSIS
This should be drafted soon after completion of the first building and updated as more buildings are completed. The purpose is to quantify the value to CA of new all-electric buildings, in order to obtain additional funding. Variables to be included are costs of an all-electric building v a comparable NG-powered building.
Construction costs
Cost estimate of annual heat and electric bills
Annual maintenance costs
Income tax revenue received (or due) from earnings of labor, contractor companies, and manufacturers
Local grid resilience, and decreased reliance upon NG peaker plants, from Vehicle Grid Interface, residential storage batteries, and behind the meter electricity generation.
Social Cost of Carbon is to be calculated at a zero discount rate in order to fairly account for intergenerational impact. This should use CO2e to incorporate the GHG impact lifecycle emissions of methane, carbon dioxide, particulate matter, and nitrous oxides. Each of these GHGs also have toxic effects. The federal government has determined the Value of a Statistical Life to be $10,000,000. This amount is to be used to estimate the cost of premature mortality.
Common airborne emissions from NG appliances are listed below.

* methane – causes shortness of breath and fatigue
* formaldehyde – causes wheezing, fatigue, cancer, birth defects, chronic asthma
* nitrogen oxides, e.g. nitrogen dioxide – causes chronic cardiovascular disease, chronic kidney disease, cancer, chronic respiratory disorders, acute respiratory infections
* particulate matter including PM<2.5um – causes preterm birth disorders, cancer, chronic kidney disease, chronic cardiovascular disorders, chronic neurodegenerative disorders, and exacerbates chronic respiratory disorders.

Those who live in areas where PM levels are high and who contract COVID-19 are more likely to die from the virus.

There is no lower threshold for the latter 2 emissions, below which there is no harm. I.e. any exposure inflicts some harm.
NG appliances and infrastructure that are in disrepair may emit dangerous levels of carbon monoxide. Of the above 5 emissions, the only one that may be filtered out by an HVAC system is PM. To capture the most damaging size of PM (<2.5um), a HEPA filter is required. Because all sizes and kinds of PM have toxic effects, increasing morbidity and mortality, and because it is the number one cause of premature mortality worldwide, it should be classified as a toxic.

GGRF USE OF CAP & TRADE REVENUE
The Greenhouse Gas Reduction Fund receives deposits of proceeds from the sale of allowances to polluters. The GGRF was created solely for projects that will decrease emissions more than a continuation of business-as-usual. However, for years, GGRF sums have been used in part for affordable housing. This increases emissions in Scopes 1, 2, and 3. Because all-electric buildings have lower emissions and costs in Scopes 1, 2, and 3 than NG-powered buildings, only all-electric buildings should receive funding from GGRF. However, GGRF funds should be allocated for all-electric buildings only if this decreases emissions more than other proven emission-reducing projects, e.g. replacement of NG power plants with non-carbonaceous renewable energy plants.

CONSTRUCTION COSTS
The cost of new all-electric construction is less than the cost of construction that has NG. All-electric buildings will help us provide more affordable housing, decrease costs of new government buildings - decreasing tax burdens, and increase profits of business (by decreasing their real estate costs).

Building a 2,500 sq. ft. house in San Francisco containing NG infrastructure costs $12,500 more than an all-electric house. Over the life of such an all-electric house, energy costs are $9,000 less than costs for a NG-enabled house. All-electric building codes are favored by electrical unions.

LOW EMBODIED CARBON
Contractors receiving incentives for all-electric buildings should be constructed with state of the art materials that have low embodied carbon. See SB 1297
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB1297
Metals, glass, and cement should be manufactured using combustion-free renewable energy. For cement, instead of using Portland cement, cement substitutes should be used which require much lower energy input during manufacturing. Exterior materials

(e.g. roofing, siding, and exposed concrete) should have surfactants or additives that sequester carbon.

STANDBY GENERATORS

PV solar generators and battery-powered generators would qualify for an all-electric building. Another generator technology that should meet this qualification is hydrogen with a fuel cell-based design. Hydrogen produced from non-carbonaceous renewable electrolysis must be used to meet the qualification. Electrolysis of water, using only renewable electricity, has lower lifecycle emissions (of toxics and GHGs) than other H2 production technologies.

Hydrogen Gas Onsite Generator Market 2022 Product Category, Application and Specification, Sales Area and Its Competitors - MarketWatch

EFFICIENT PV SOLAR PANELS

Only the most efficient solar panels should be used. The efficiency of many brands is in the 20 to 23% range. Using existing technology, flat panels with 30% efficiency can be manufactured. Compared to flat panels, bifacial designs add 8% more efficiency. To avoid supply-chain bottlenecks and imports of low-efficiency panels, collaborate with industry associations, the Legislature, and agencies to develop increasingly-efficient solar panel manufacturing in CA.

HEAT PUMPS FOR HVAC AND WATER HEATING

Emissions reduction from replacing NG heating with electric heat pumps (EHP) is far greater than the emissions from refrigerant leakage. The greatest emissions reduction, however, is achieved by using EHPs that use natural refrigerants such as CO2. These have been in use in some nations for nearly ten years and are available in the US.

Most EHPs manufactured in the US use HFC refrigerants with a GWP of at least 2,000. R-32 is also used, which has a GWP of 675. In contrast, CO2 has a GWP of 1 and propane has a GWP less than 15.

A climate emergency could be declared and The Defense Production Act could be invoked to scale up production of EHPs in the US. CA EPA regulations should be modified to allow the use of low-GWP natural refrigerants, including CO2 and propane..

https://www.fluorocarbons.org/applications/heat-pumps/

https://www.smallplanetsupply.com/sanc02

https://www.racplus.com/news/honeywell-launches-r515b-its-latest-nonflammable-hfo-as-r134a-replacement-04-02-2020/

https://www.washingtonpost.com/world/2022/03/08/eu-russian-gas/

https://rmi.org/eu-looks-to-cut-reliance-on-russian-gas-with-new-investment-in-heat-pumps//?utm_medium=email&utm_source=spark&utm_content=spark-b&utm_campaign=2022_03_10&utm_term=button

JUST TRANSITION PLAN
Develop a plan to provide training and benefits to fossil fuel workers possessing some transferable skills that are needed in the all-electric building and allied sectors.

JUST TRANSITION - Google Docs

FUNDING
If the demonstration project is a success, make plans to expand and fund building electrification. Consider government/private partnerships, publicly-owned CCAs and utilities, green bonds, and public banks.

RESOURCES

https://www.aceee.org/about-us

https://energystorage.org/about-esa/

https://ultralowcarbonsolar.org/

https://www.solar.com/learn/solar-panel-efficiency/

https://www.commondreams.org/views/2021/09/15/reducing-energy-consumption-only-long-range-solution-climate-change

https://rmi.org/grid-interactive-efficient-buildings-are-easier-than-they-sound/?utm_medium=email&utm_source=spark&utm_content=spark&utm_campaign=2021_12_02

https://insideclimatenews.org/news/27012022/inside-clean-energy-solar-power-efficiency/?utm_source=InsideClimate+News&utm_campaign=baa30e4bfe-&utm_medium=email&utm_term=0_29c928ffb5-baa30e4bfe-329124685

https://www.utilitydive.com/news/californias-omission-of-community-solar-from-distributed-energy-policies-i/618451/?

Community Energy Resilience - The Climate Center