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IEPR comments

See attachment

Additional submitted attachment is included below.

October 21, 2018
Comments on IEPR 18-IEPR-01
Scott Shell, FAIA, LEED AP
Principal, EHDD (Architect)

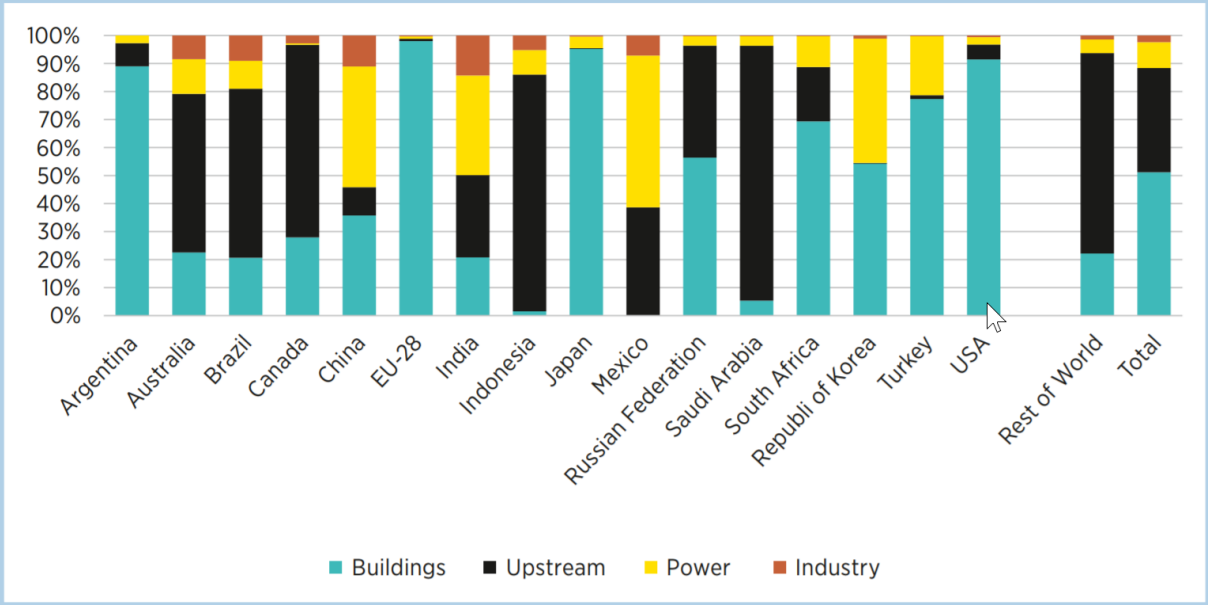
Stranded Assets (p 17)

IRENA analyzed the risk for "stranded assets"---infrastructure and buildings that need to be retrofit sooner than expected in order to reach climate goals. It found that buildings were at highest risk of stranding due to "delayed policy action" requiring low carbon designs. In the United States and the EU buildings comprised over 90% of the stranded assets.
http://www.irena.org/publications/2017/Jul/Stranded-Assets-and-Renewables

If low carbon technologies such as heat pumps are delayed due to slow policy adoption, it will be a very expensive for Californians to replace relatively new gas appliances with electric ones before their end of life. We can already see electrification is the required low carbon pathway, and the lowest cost option is to avoid installation of outmoded equipment as soon as possible. Moreover, switching from gas to electric will in some cases require upgrading of a building's transformers, feeders, and switchgear — further increasing costs.

The next code cycle will affect buildings completing construction in ~2025-2028, only 17-20 years until 2045 when California is committed to carbon neutrality. It is fiscally irresponsible to renovate or construct new buildings that will need to be retrofit in less than 20 years.

Figure 2: Stranded assets by sector and country with REmap



Source: IRENA analysis

Job Creation in Disadvantaged Communities (p 19)

170,000 new jobs will be created in these communities by 2030, and almost one million new jobs by 2050 according to the Exploring Economic Impacts study cited. These are jobs that cannot be outsourced to other countries.

Electrification supports more clean energy (p 21)
Electrification of buildings can play a significant role in helping California achieve it's 100% renewable energy goals cost effectively by shifting WHEN energy is used. Our architectural practice is currently designing buildings that concentrate heating, cooling and water heating in mid-day when ample renewable energy is available, and that reduce energy use in the early evening when renewables are declining. We can design buildings that ride out peaks and valleys in daily temperature swings by increasing the thermal mass exposed inside our buildings by using ground concrete floors or exposed acoustic metal deck with concrete fill, or by adding or phase change materials inside walls. This allows the HVAC to run more when renewable energy is available rather than at the grid peaks. Our campus projects often include thermal energy storage at a central plant that can also support expanded renewables on the grid by using ample renewable energy when it is available and low cost, such as Stanford's new Central Energy Facility. https://www.pge.com/pge_global/common/pdfs/save-energy-money/savings-programs/zero-net-energy-program/ZNE-Case-Study-Buildings-Vol3.pdf

Equipment Replacements (p 24)
120 volt heat pump water heaters are currently available, including by one of the largest manufacturers Rheem. It requires that the appliance runs in heat pump mode, rather than electric resistance mode. I've been doing this with a family of 4 including two teenagers with no problems. Sanden is also developing a 120 volt HPWH as well. There is not a technical hurdle here as much as lack of a developed market. If the CEC can show manufacturers a future timeline for incentives and mandates they will produce these products.

Cost of gas infrastructure (p 26)
Gas service is not available to many parts of the state, especially many low income, rural, or agricultural areas. The cost of gas piping to and inside a home should be considered discretionary costs and should be included in cost effectiveness tests.

Stranded gas infrastructure (p 26)
A viable solution based on rational planning is required to maintain gas pipelines in the face of shrinking demand due to energy efficiency, a warming climate, and increasing renewable energy. Fewer and fewer customers cannot pay for an ever larger share of this infrastructure. The Netherlands is removing gas service one neighborhood at a time:
http://energypost.eu/a-revolution-the-netherlands-kisses-gas-goodbye-but-will-it-help-the-climate/
It would be most cost effective to identify areas in need of expensive maintenance or with constrained supply or other challenges to be removed from service first; rationally pruning the gas tree. Californians will need to help fund this transition in an equitable manner.

Consumer Acceptance (p 27)
Cooking is a key consumer acceptance issue to address. The good news is that people who try induction cooking like it. Consumer Reports rated kitchen stoves in 2018 and induction stoves were 5 of the top 10 models, including the top 2 models. Performance is far superior to conventional electric stoves.

Electricity Rates to Support Decarbonization (p 27)
Projections from LBNL show increasing curtailment of renewable energy in the years ahead as California approaches its increasing renewable energy targets. There are more frequent negative electric rates mid-day, which will lower the value of additional solar energy, making it

more expensive to reach required RPS standards. Rates should reflect the carbon value of electricity to incentivize building owners and designers to shift load to those hours. Electrification of buildings will further support the ability to use renewable energy during the hours it is available. Smart Home controls including Google Home, Alexa, and others have expanded dramatically in the last year along with compatible appliances, and they simplify shifting the time that energy is consumed for many appliances such as water heaters, space heating, dishwashers, and laundry. We need rates to incentivize their use to support a low cost pathway for a high renewable future.

Reducing Methane Emissions (p 28)

Over a 20 year period methane is 86 times more potent than CO2. Because of the critical need to reduce GHG's quickly, this 20 year time frame should be considered in addition to the 100 year timeframe noted in this section. Addressing short lived climate pollutants is one of the most cost effective ways to quickly reduce GHG emissions. Reducing methane leaks should be weighted more heavily to acknowledge this opportunity.

Navigant Study on Renewable Gas (p 29)

The Navigant study has numerous false assumptions including:

1. A COP of 2.0 for Heat Pump Water Heaters which should be 3.0-3.5 and will increase over time.
2. Similar faulty assumptions for COP of space heating.
3. The electrical rate does not include the baseline quantities which would significantly alter the cost impacts.
4. The cost assumptions for installation are not representative of California, but based on very expensive rates in Palo Alto.
5. The study assumes 2/3's of Renewable Gas is coming from Energy Crops that are not identified. California is facing reduced water availability so increasing crops for fuel is not viable. Globally increasing population growth will require farmland for growing food to avoid price shocks that adversely affect lower income populations.

California should support ongoing research in converting agricultural waste and woody biomass into fuel, but this is a long term research agenda for hard to decarbonize sectors, not a near term scalable fuel option.

CPUC efforts (p 34)

Rate design should support California's goals of reducing emissions rather than energy. For decades the focus has been on Energy rather than Emissions, and it is deeply imbedded in all aspects of policy and thought. A concerted effort is required to shift the focus to Emissions, in particular with rate design.

Recommendations (p 46)

1. Market Development Collaborative: add water heating, and add a clear focus on retrofit ready solutions.
2. Articulate a clear timeline for phasing in low GWP refrigerants to give manufacturers time to respond, and assurance there will be a market for new refrigerants and associated equipment.

3. Articulate a clear timeline for heat pump adoption and desired COPs to give manufacturers confidence to bring new products to market.
4. Electric vehicle sales are expanding quickly and have a major role to play in balancing our grid to allow for more renewable energy. 30% of new car sales in Palo Alto last year were electric: https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf Require pre-wiring for car charging in new and renovated residential buildings; require car charging in all commercial facilities with parking as daytime charging will best support additional renewables. Installing these circuits at time of construction are much more cost effective than retrofits.