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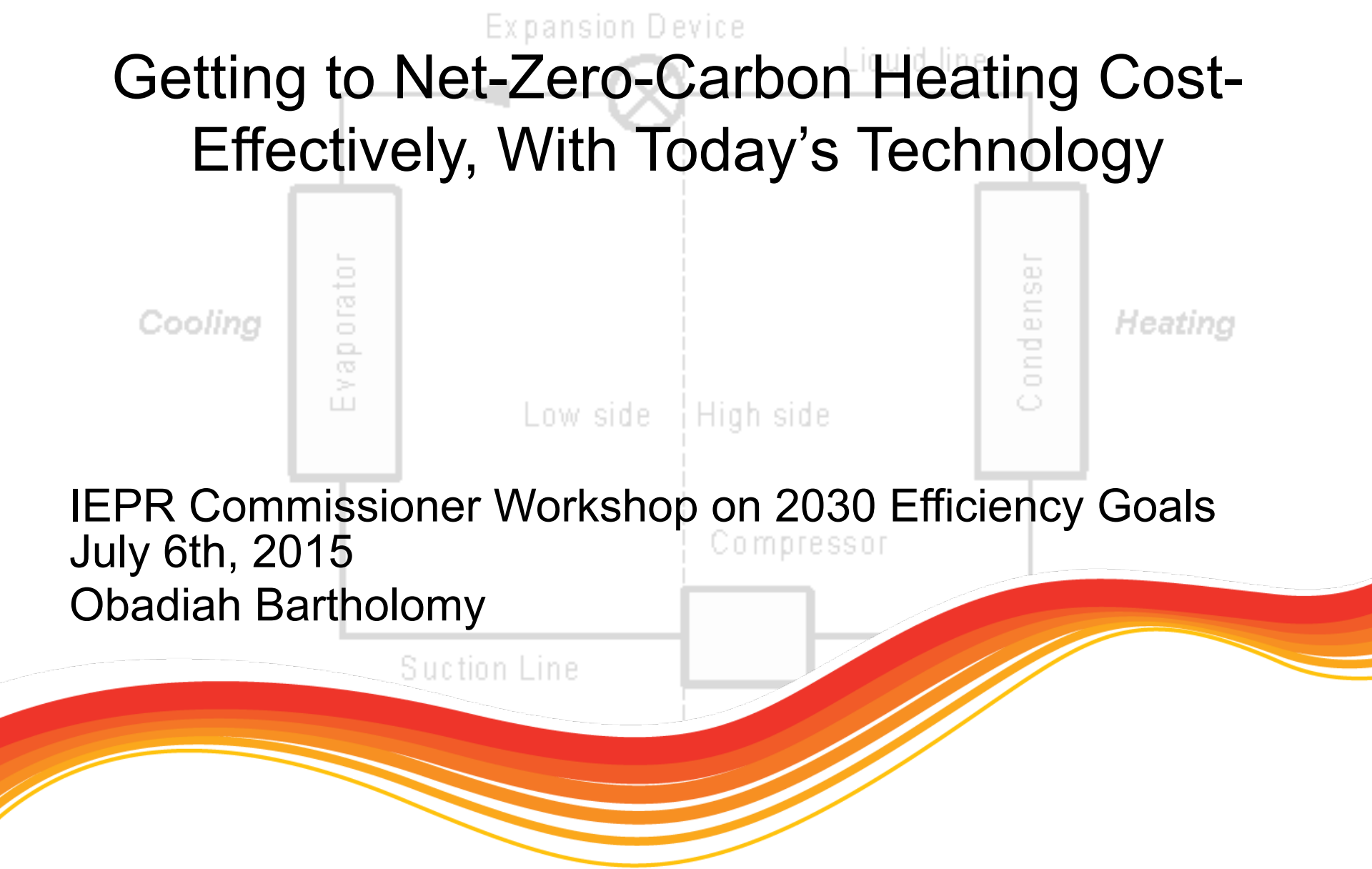
Getting to Net-Zero-Carbon Heating Cost-Effectively, With Today's Technology

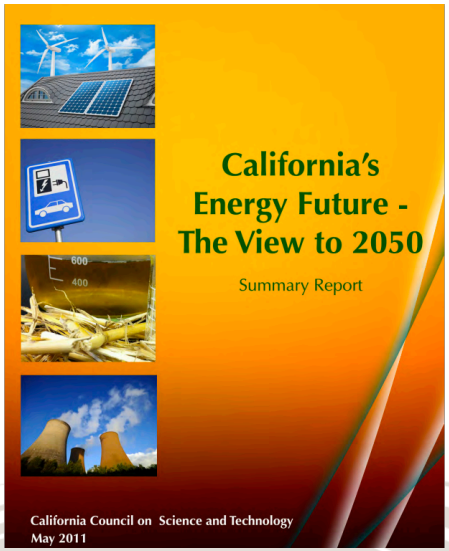


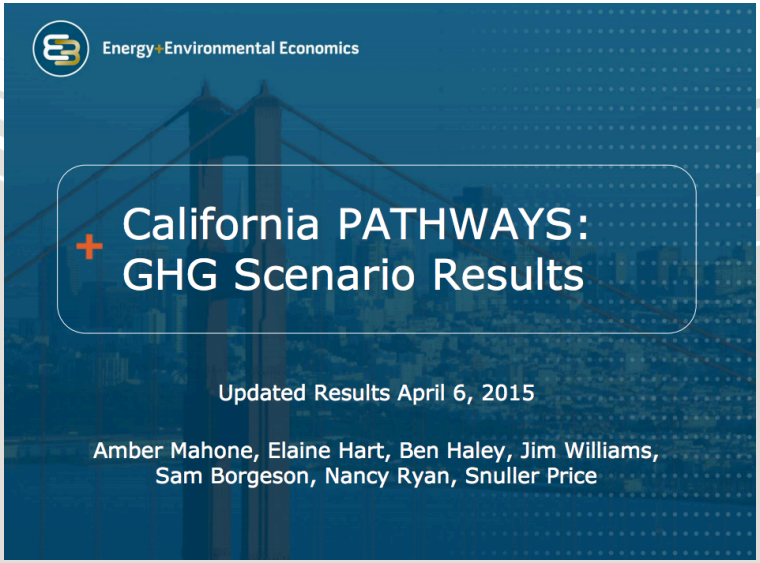
IEPR Commissioner Workshop on 2030 Efficiency Goals
July 6th, 2015

Obadiah Bartholomy

What role will Electrification of Building water and space heating play in meeting our 2050 Carbon Goals?

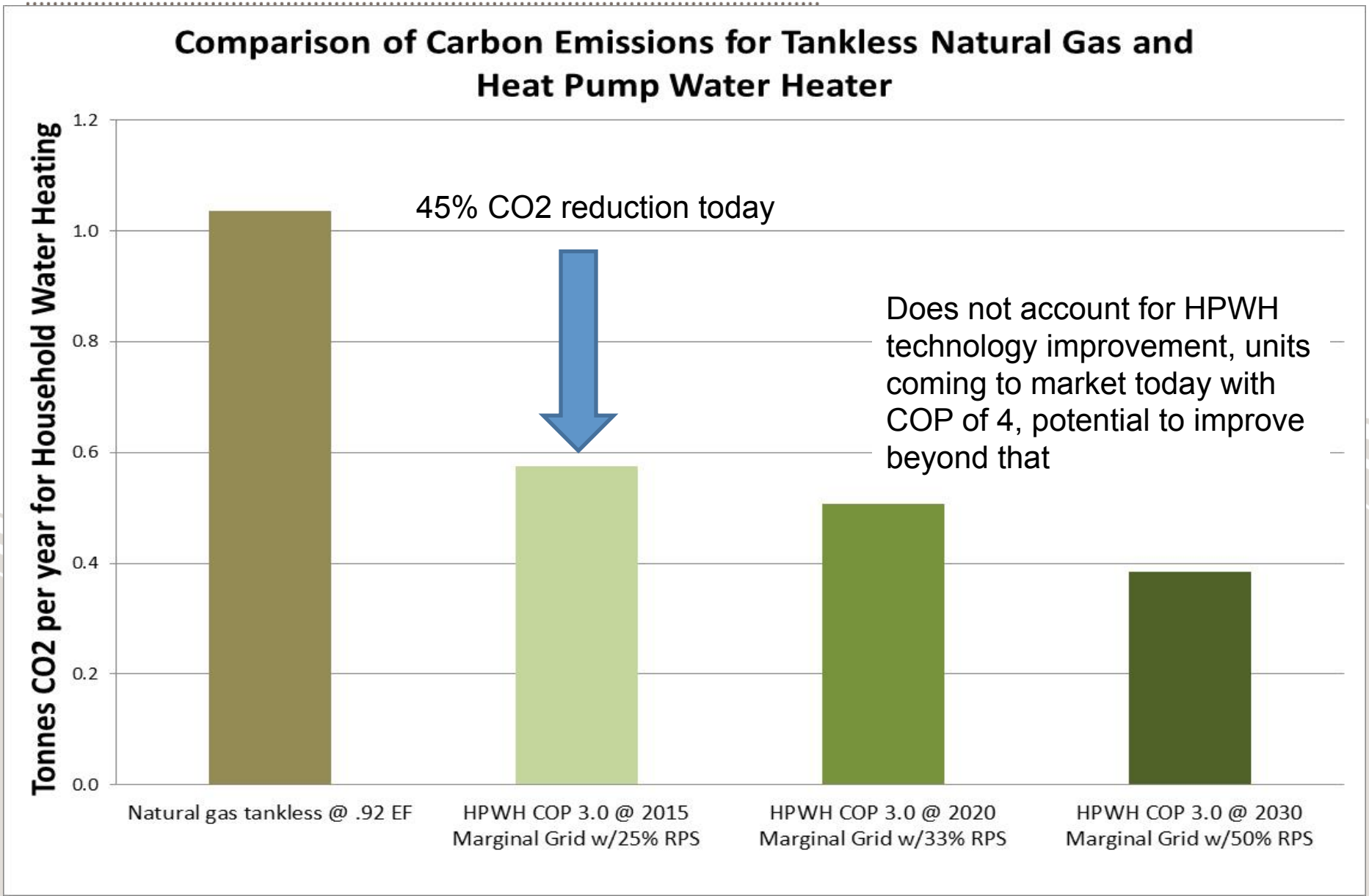
- CCST 2011 study 'California's Energy Future – The View to 2050' states that to meet our targets we need to electrify 70% of building space and water heating



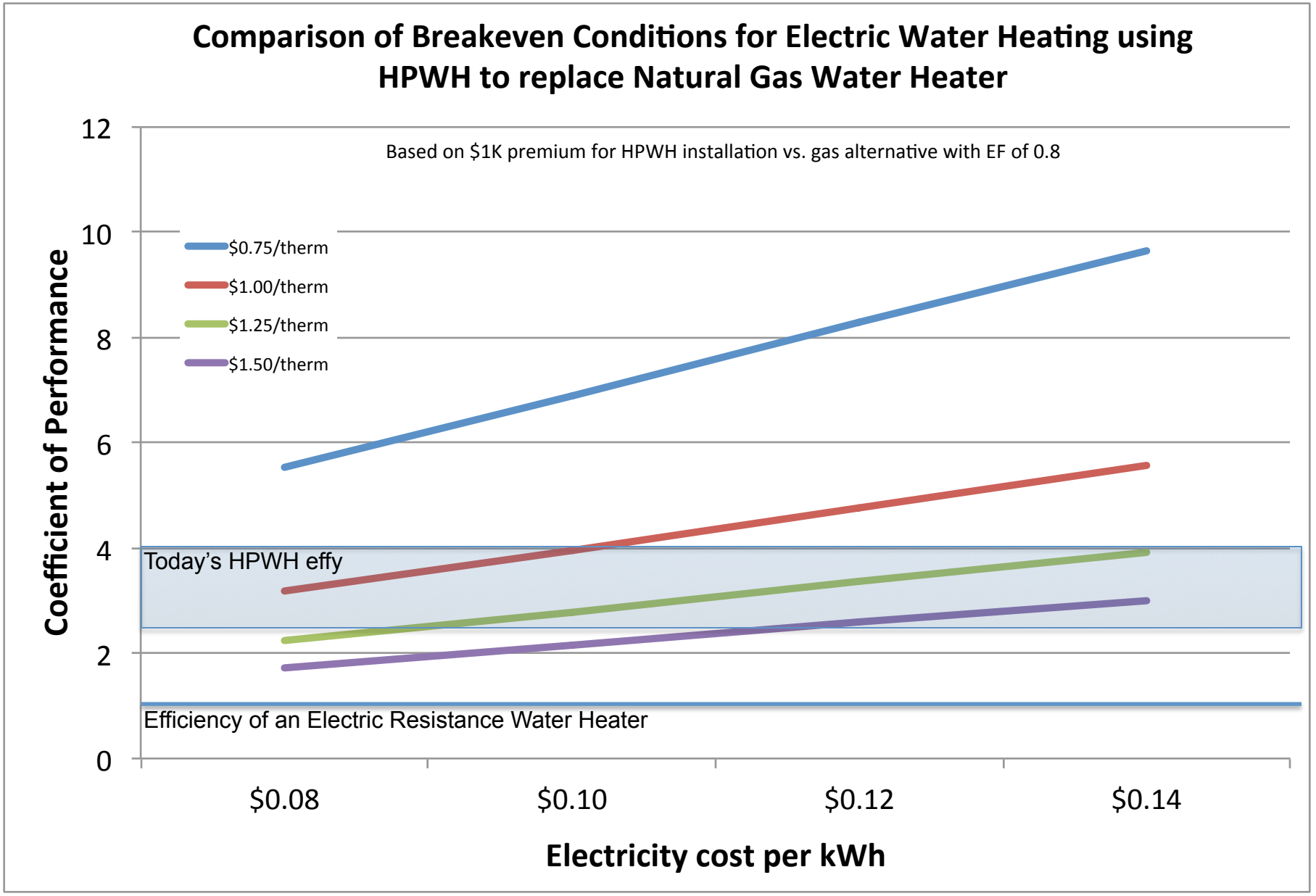


E3 Pathways Analsysis, April 2015:
"If biomass is used for liquid transportation fuels, over 50% of new sales of space conditioning & water heating are electric in 2030 (straight line)"

Opportunity: More efficient air-source heat pumps provide an opportunity to decarbonize space and water heating today

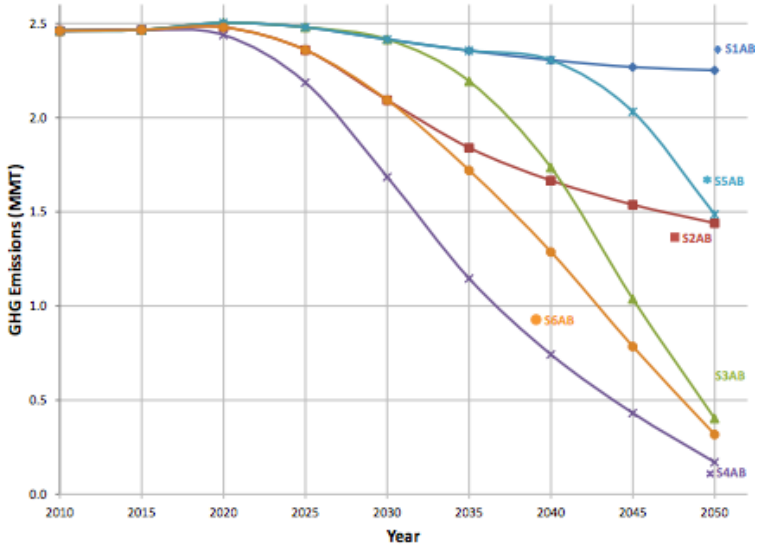


But are they ‘cost-effective?’



How soon do we need to start?

- SMUD contracted with ICF in 2012 to examine stock turnover and timing necessary to meet CCST targets for electrifying space and water heating
- Results indicated fuel-switching deployment would need to begin between 2015 and 2020 in order to meet long-term goals



What are barriers to deployment?

- Utility tiered electric rate structures vs. TOU or real-time pricing
  - Arrival of sub-$1/Watt installed solar will create significant opportunity for low-cost renewable electricity that can be stored in hot water
- Title 24 and TDV preference for natural gas does not recognize flexibility of controllable loads to avoid high demand periods, embedded retail rate structures also harm cost-effectiveness calculation
- Higher up-front cost creates need to rebate or install in new construction, need an efficiency framework that values carbon reduction
  - A focus on carbon for efficiency goals would provide right policy signal to allow fuel-switching to become a significant strategy