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Building Electrification and the CPUC

California Energy Commission

June 14, 2018

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The Problem We're Trying to Solve

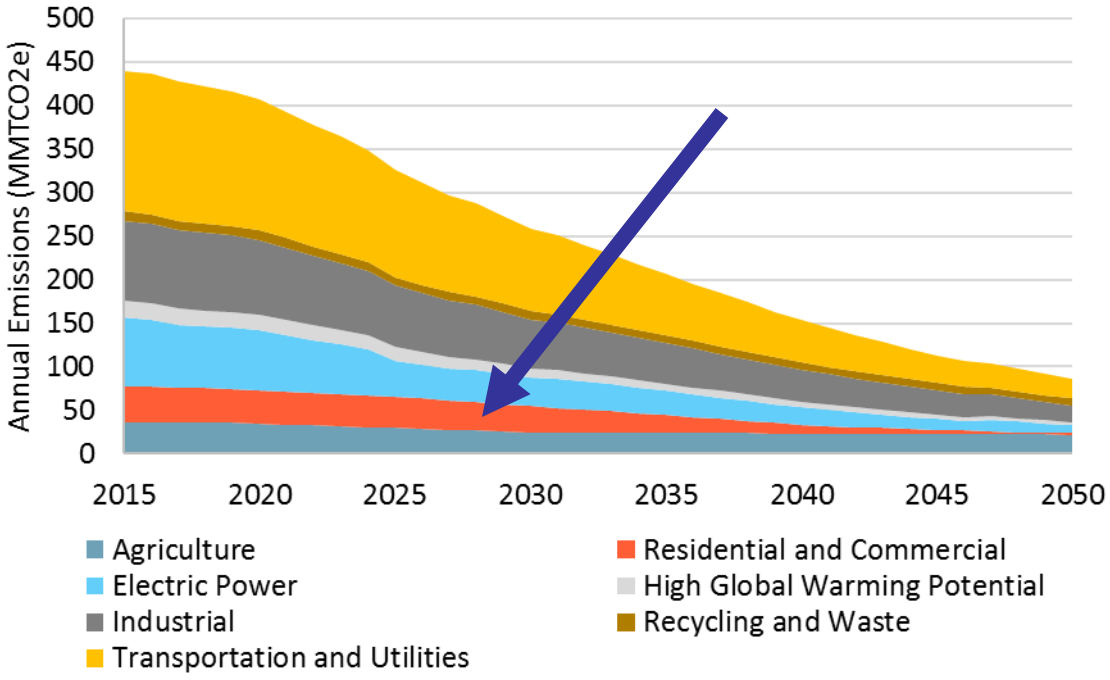


Chart: E3 2050 PATHWAYS Study (2018)

Many studies on deep decarbonization highlight the need to dramatically reduce GHG emissions from buildings.

Examples:

- Williams et al. (2012)
- Wei et al. (2013)
- E3 PATHWAYS Studies

CA Legislature Is Considering Building Decarbonization

- AB 3001 (Bonta): Would change building and public utilities code to encourage all electric buildings. Not advancing.
- AB 3232 (Friedman): Requires CEC to produce plans to make all buildings emission free by 2030. Advanced to Floor.
- SB 1477 (Stern): Would create a *Zero Emission Heating Market Transformation Fund* at State Treasury. Advanced to Floor.

CA State Agencies Are Acting on Building Decarbonization

- CEC: Electric appliances increase the Energy Design Rating of a building, per Title 24. Considering all-electric buildings in the IEPR
- CARB: Developing a feasibility study for zero carbon buildings, as well as a spreadsheet tool that measure GHGs from all aspects of a building
- Department of Communities Services and Development (CSD): Administers Low Income Weatherization Program. Calculates per-building energy and GHG savings.

Current and Future Building Decarbonization Activity at CPUC

- **Current CPUC Policy Activity**
  - Definitions: fuel switching vs. fuel substitution
  - Three Prong Test for use of EE funds
  - Integrated Resource Planning

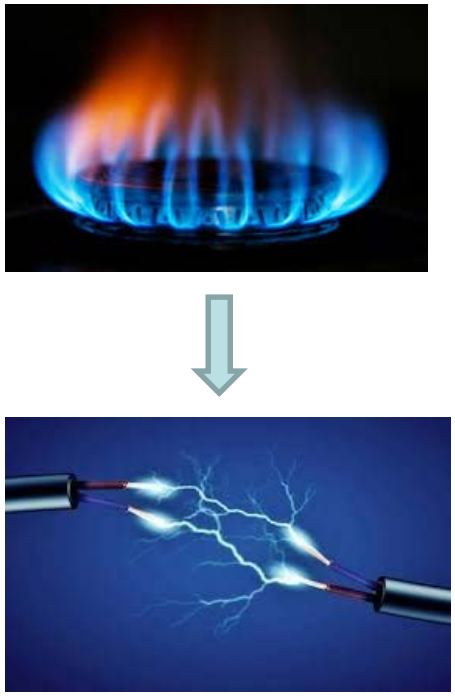
- **Future CPUC Policy Activity**
  - Possible Policy Approaches
    - All electric tariff
    - Resource acquisition: incentives, financing, emerging tech
    - Market transformation

CURRENT CPUC BUILDING DECARBONIZATION ACTIVITY

CPUC Definitions

Fuel Switching: Refers to using a CPUC-regulated fuel to replace a fuel outside CPUC jurisdiction (gasoline → electricity)

Fuel Substitution: Refers to replacing one type of CPUC-regulated fuel with another (natural gas → electricity)



Fuel Substitution Example #1: Space Heating

Space heating: the gas version

Space Heating: the electric version (an electric heat pump)

Fuel Substitution Example #2: Water Heating

Water heating: the gas version

Water heating: the electric version (an electric water heater)

Fuel Substitution Example #3: Cooking

Cooking: the gas version

Cooking: the electric version (induction stove)

Fuel Substitution Example #4: Pasteurization

Pasteurization: the gas version (heat based)

Pasteurization: the electric version (UV-based)

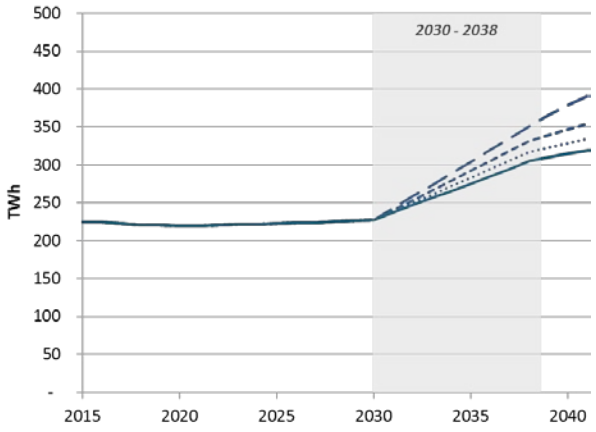
CPUC Three Prong Test

- The **Three Prong Test** was established by two CPUC decisions in 1992 (test is not statutory)
- Purpose of test is to determine whether energy efficiency funding can be used for the purpose of **fuel substitution.**
- Focus is on energy reduction NOT on GHG emissions.
- The three prongs are:
  1. Program must not increase source BTU consumption
  2. Program must be cost effective (have a TRC and PAC benefit/cost ratio of 1 or greater)
  3. Program must not adversely impact the environment
- Intervenors filed a motion on June 8, 2017 to refine the three-prong test in the Energy Efficiency proceeding (R.13-11-05) – now under consideration by Administrative Law Judge

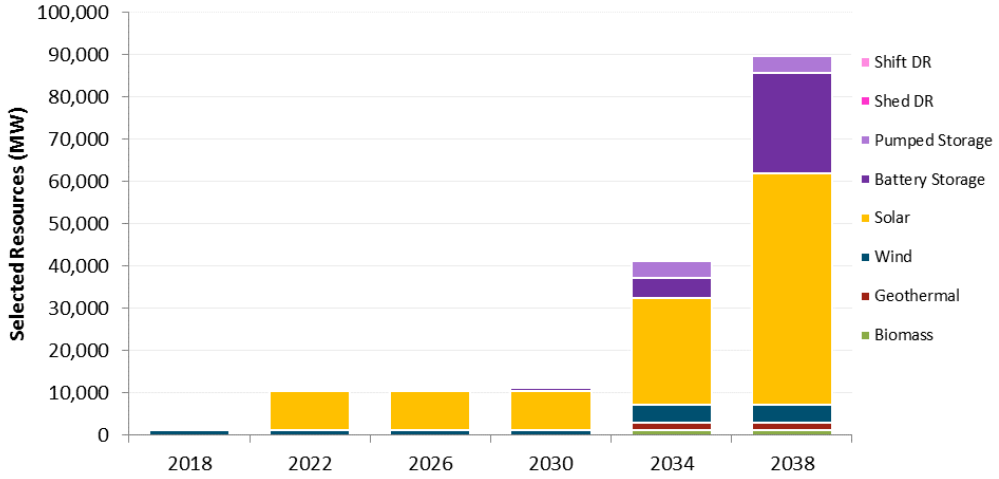
CPUC's IRP Examined Impacts of Future Electricity Growth

- Future decarbonization of transportation and building sectors drives need for additional renewable energy and storage capacity
- Distributed energy resources, including energy efficiency, demand response, battery storage, and rooftop PV can help meet new load

load growth



renewables + storage growth



Charts: CPUC 2017 Integrated Resource Plan, Post-2030 Sensitivities

FUTURE CPUC BUILDING DECARBONIZATION ACTIVITY

Future Building Decarbonization Policy Activity at CPUC

- **Possible Program Approaches**: CPUC staff are currently exploring future program approaches to facilitate building decarbonization.

  1. All Electric Tariffs

  2. Resource Acquisition:
     - Incentives (eg Rebates)
     - Financing (eg Loans for all-electric customers)
     - Emerging Technology

  3. Market Transformation

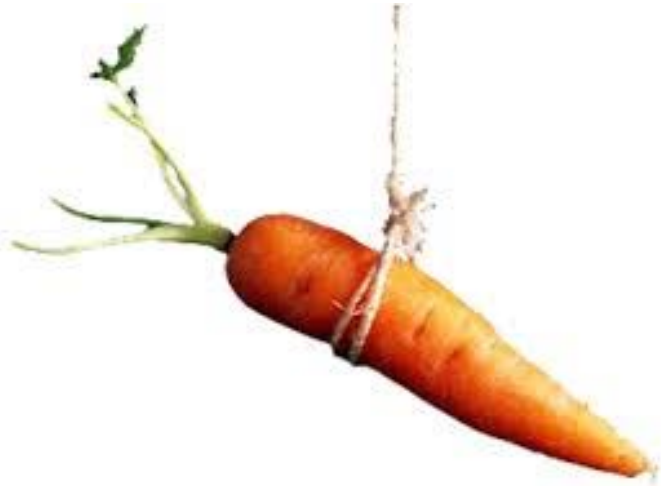
  Overall: Focus goals on GHG emission rather than energy reduction.

Approach #1: All-Electric Tariff

- Customers receive a lower rate per kWh as they have higher electricity consumption
- Currently this is available for the already existing electric homes
- Revenue requirement may need to be made up for by increased rates for dual fuel customers

Approach #2A: Incentives

- Currently, electric appliances receive only small portion of EE incentives
- New incentives could be offered but decline over time as market uptake increases, similar to California Solar Initiative (separate from or part of EE programs)
- Incentives could be scaled to the amount of GHGs the appliance will reduce over its lifecycle
- Incentives could be offered for panel upgrades or rewiring to accommodate an all electric building



Approach #2B: Financing

- On-bill financing could provide low- or no-interest loans for electric appliances
- Could have dedicated financing program for customers wishing to have all electric home or business
- Could target in disadvantaged communities

Image: Conroy Refrigeration & HVAC

Approach #2C: Emerging Technology

- Could develop “technology priority maps” to prioritize all electric appliances
- This would provide a pipeline for products to go from the development stage to market adoption
- For example, a “grid interactive electric water heater” is now available, but is not part of the demand response programs

Approach #3: Market Transformation

- Market transformation (MT) programs are typically multi-faceted strategies aimed at reducing barriers and moving technologies into standard practice or into code

- Energy Division now considering a market transformation framework

    - Comprehensive approach encompassing rebates and targeted efforts to remove barriers to adoption.
    - For example, a marketing campaign could address customer concerns that heat pumps are in adequate for cold climates.

Example of Combining Program Concepts

- Title 24 now requires solar on new residential construction
- Net Energy Metering (NEM) continues to offer bill credits for excess energy produced
- Program could combine wholesale NEM compensation for rooftop PV with an extra incentive for heat pump water heaters and demand response
- With the right mix of T24 requirements and design credit options, new buildings could become even more valuable grid assets

Photo: UnderstandSolar.com

Next Steps

1. Consider possible policy approaches
2. Track pending legislation
3. Track progress of related activities at sister agencies and collaborate as appropriate
4. Monitor progress of relevant pilot, demonstration, and other related activities at CPUC jurisdictional and non-jurisdictional utilities:
    - San Joaquin Affordable Energy rulemaking: goal is to provide affordable energy to disadvantaged communities in San Joaquin Valley without access to gas service
    - SCE: Has goal of 1/3 space and water heating electrical by 2030.
    - SMUD: Offers incentive for electric appliances in new home construction.
    - Sonoma Clean Power/PG&E: Offering incentives for fire victims to rebuild all electric homes

Discussion