



2020 Load Management Rulemaking

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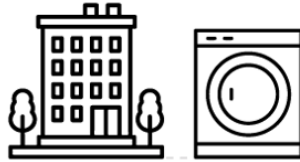
Leading the state to a 100% clean energy future.



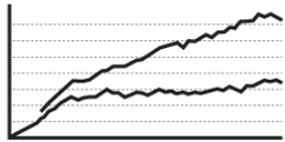
1974 Warren Alquist Act



Created the Energy Commission



Set building ^{load management} and appliance efficiency standards



Forecast electricity demand



Support R&D into non-conventional energy sources



Load Management Overview

What is Load Management?

The process of maintaining the electric supply-demand balance by adjusting the load rather than the power station output.



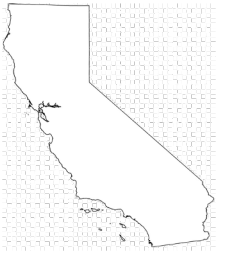


Why manage loads?

- Reduce greenhouse gas emissions
 - Avoid use of high-polluting peaking plants
 - Shift loads towards times of carbon-free energy production
- Improve grid reliability
 - Prevent transmission & distribution congestion
- Reduce system costs
 - Minimize electricity use when generation costs are high
 - Avoid construction of battery and power capacity
 - Reduce renewable curtailments
- Reduce customer bills
 - Enable load shift out of high cost hours



California Context & Goals



- Carbon-free grid by 2045 (SB100)
 - Fact: Solar and wind are inflexible and intermittent
 - Problem: Insufficient supply / renewable curtailment
 - Solution: Widespread, reliable load flexibility
- CEC tools
 - Investigate strategies to reduce GHG emissions (AB 3232)
 - Update Load Management Standards (Warren-Alquist Act)
 - Create standards for flexible demand appliances (SB 49)



Load Flexibility in 2020

Load
Serving
Entities¹

DR event info

Aggregators
& Automation
Manufacturers

Control signals



DR Devices



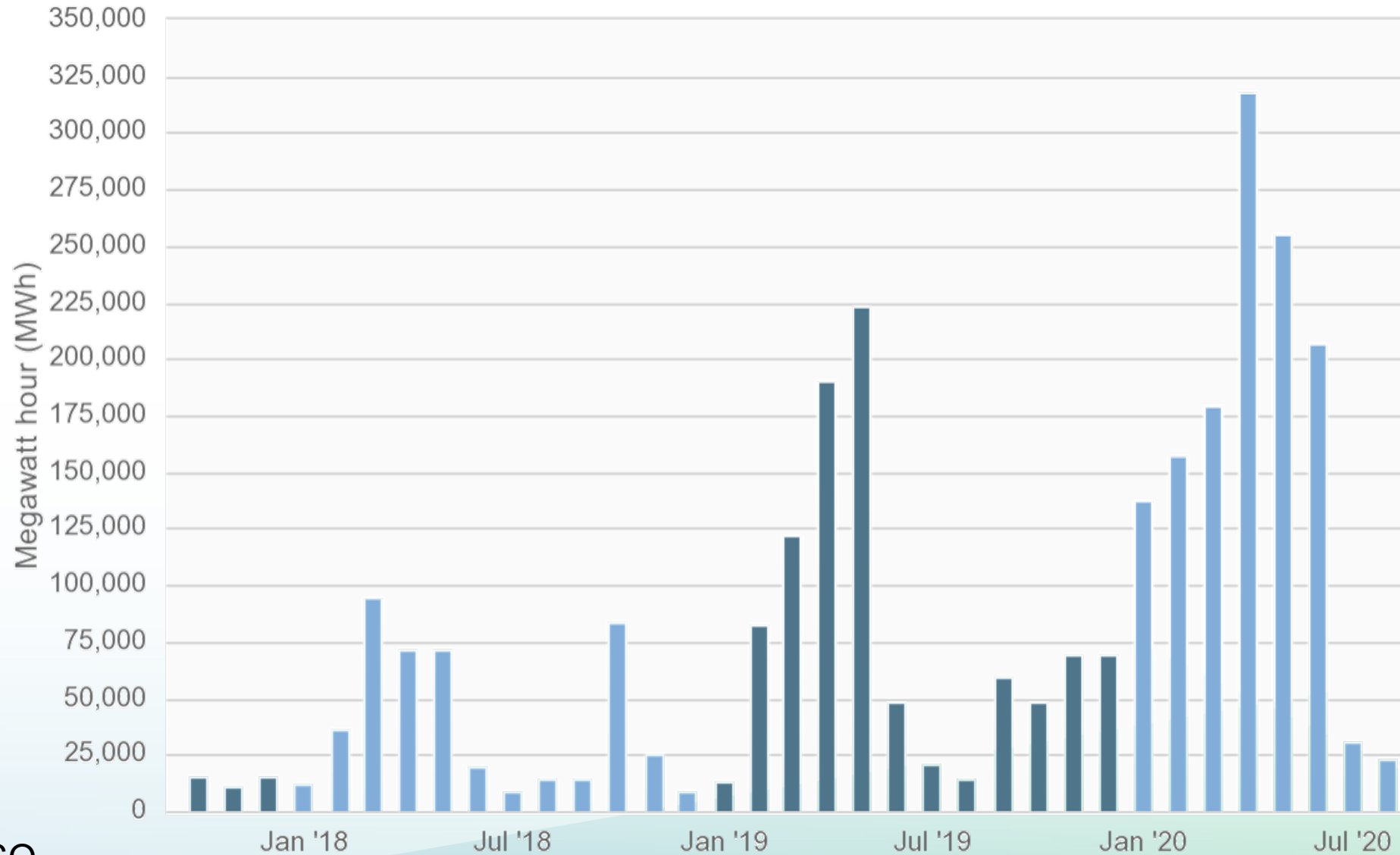
Connected
Devices

- Smart plugs
- Thermostats
- Energy management systems

1. IOUs, POUs, CCAs, Etc.



Wind and Solar Curtailment



Source: CAISO



Vision



1. CEC publishes a central statewide **Rate Database**
 - Time and location dependent electricity prices
 - Start with TOU, CPP, demand charges
2. Utilities establish
 - Load flexibility **programs** – response to price, GHG signals
 - Systems enabling third-party **energy services**
3. Vendors update their products to enable automated **signal response**
4. Consumers choose comfortable levels of **automation**
5. Demand-side gradually evolves into a **mass-market** flexible resource



CEC Load Management Authority

- The commission shall... adopt standards by regulation for a program of electrical load management for each utility service area.
- In adopting the standards, the commission shall consider, but **need not be limited to**, the following load management techniques:
 1. Adjustments in **rate structure** to encourage use of electrical energy at off-peak hours or to encourage control of daily electrical load.
 2. End use **storage systems** which store energy during off-peak periods for use during peak periods.
 3. Mechanical and **automatic devices and systems** for the control of daily and seasonal peak loads.
- Warren Alquist Act, 1974



History



- **1982** Load Management Standards
 - Time-varying rates **limited** by metering infrastructure
 - Real-time automation **limited** by communications and technology
 - Outcome: **less-than-ideal**
 - TOU rates for large customers
 - Direct load control “cycling” programs for AC, HW
- **2001** California Energy Crisis
 - Still no advanced metering infrastructure (AMI)
- **2001-2006** DR Committee under CEC’s Commissioner Rosenfeld
 - **Install AMI → TOU+automation → CPP+automation → RTP+automation**



California Done and To Do

Done

- ☑ **AMI:** statewide installation completed ~2013
- ☑ **TOU rates:** statewide default October 2020
- ☑ **CPP rates:** PG&E residential SmartRate and commercial options

To Do

- ☒ **TOU and CPP automation**
- ☒ **RTP rates + automation**

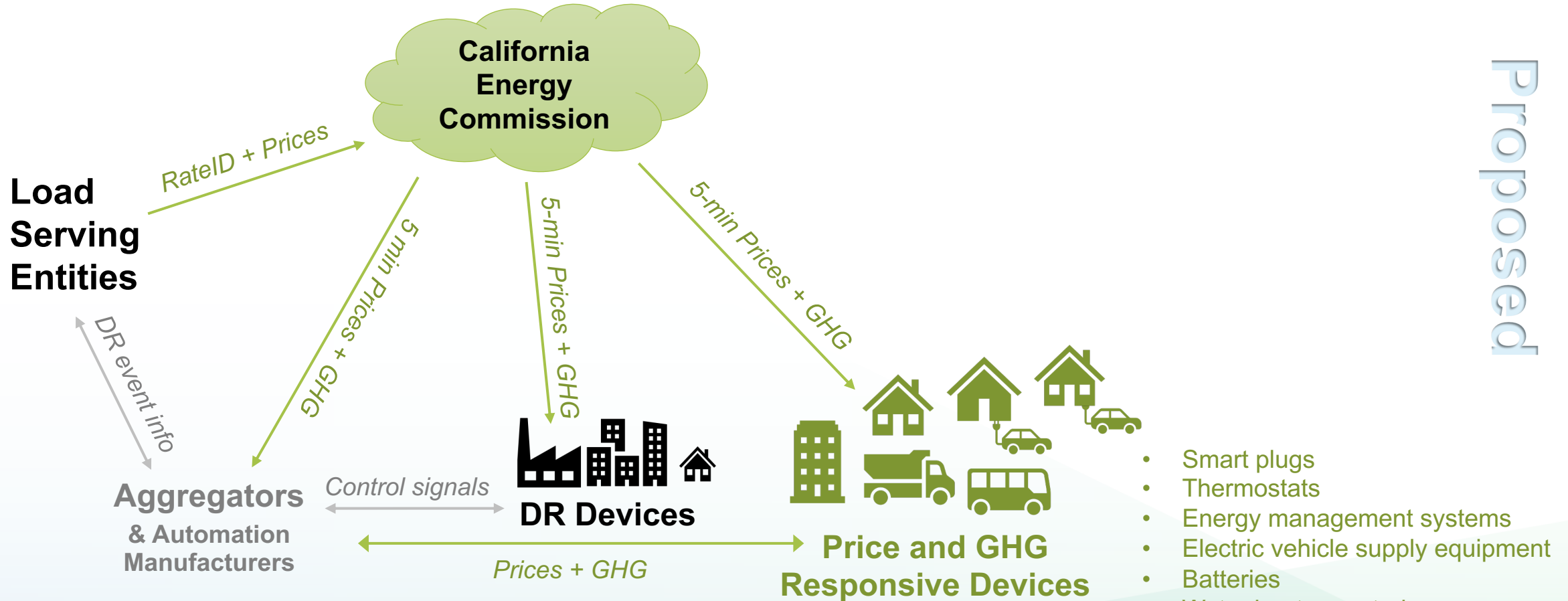


2020 Proposed Amendments

1. LSEs maintain accuracy of data in CEC's Rate Database
2. LSEs provide a standard way for third parties to access customer rate identifiers (e.g. Green Button Connect)
3. LSE's offer customers load flexibility programs
4. LSEs include load flexibility rates, programs, and technologies in customer education and outreach programs
5. LSEs propose time and location sensitive electricity rates



2020 Proposed Amendments



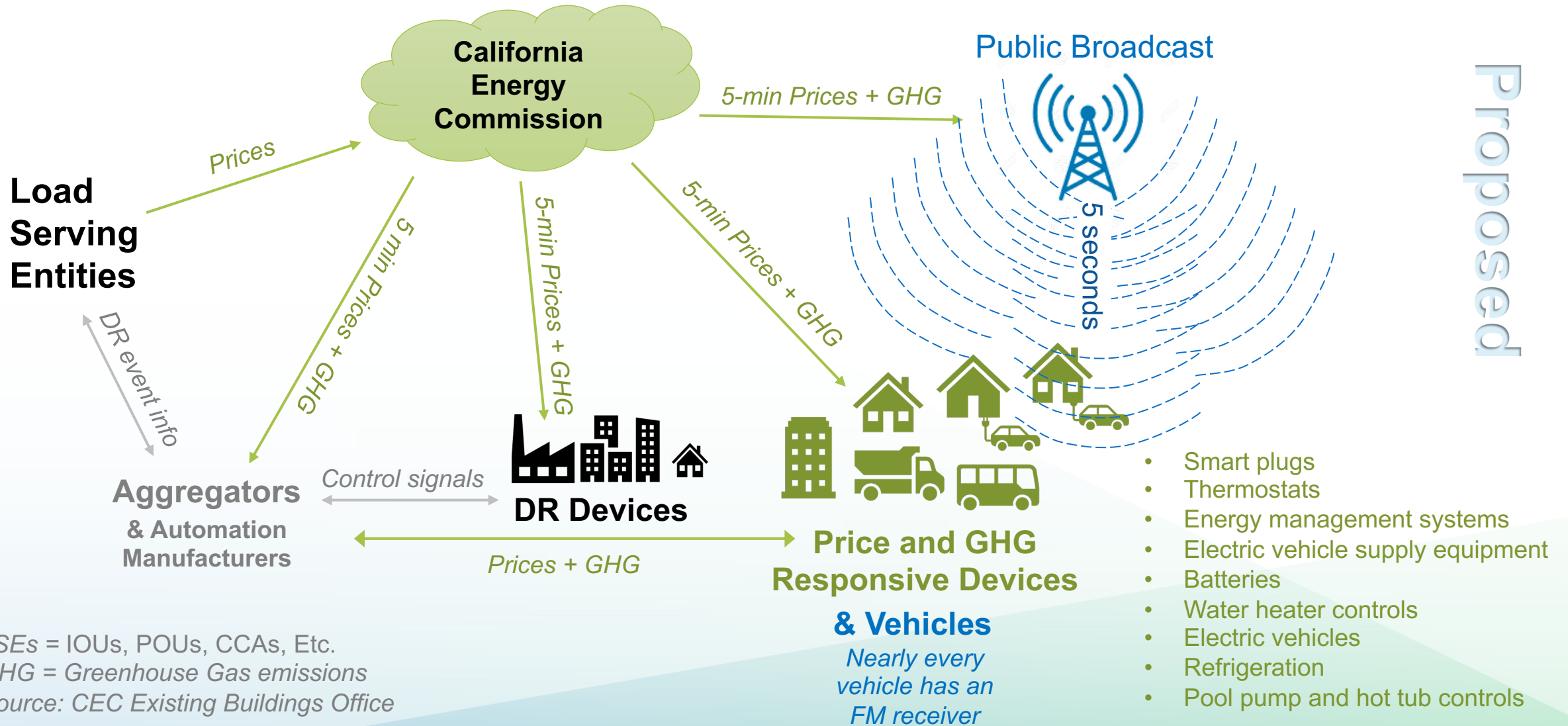
Proposed

- Smart plugs
- Thermostats
- Energy management systems
- Electric vehicle supply equipment
- Batteries
- Water heater controls
- Electric vehicles
- Refrigeration
- Pool pump and hot tub controls

LSEs = IOUs, POU, CCAs
 GHG = Greenhouse Gas emissions
 Source: CEC Existing Buildings Office



Longer Term Vision (~2025)



LSEs = IOUs, POUs, CCAs, Etc.
 GHG = Greenhouse Gas emissions
 Source: CEC Existing Buildings Office

& Vehicles
Nearly every vehicle has an FM receiver



Customer Benefits

- Universally accessible and free
- 100% voluntary
 - Customer can choose a time-dependent rate or program, or neither
 - Customers can choose to automate price response, or not
 - Customers can choose their own level of response to prices
- Bill savings by avoiding peak rates
- Lower system costs → Lower rates



Potential targets – C&I



- State Water Project and Ag water pumps – pump controls
- Data centers – HVAC controls, non-urgent compute tasks
- Electric vehicles – Fleet EV supply equipment
- Water heating – heating controls
- Pools and hot tubs – pump and heating controls (e.g. hotel chains)
- Battery storage – charging controls
- Refrigerators & freezers – compressors and anti-sweat heaters
- Heating and Air conditioning



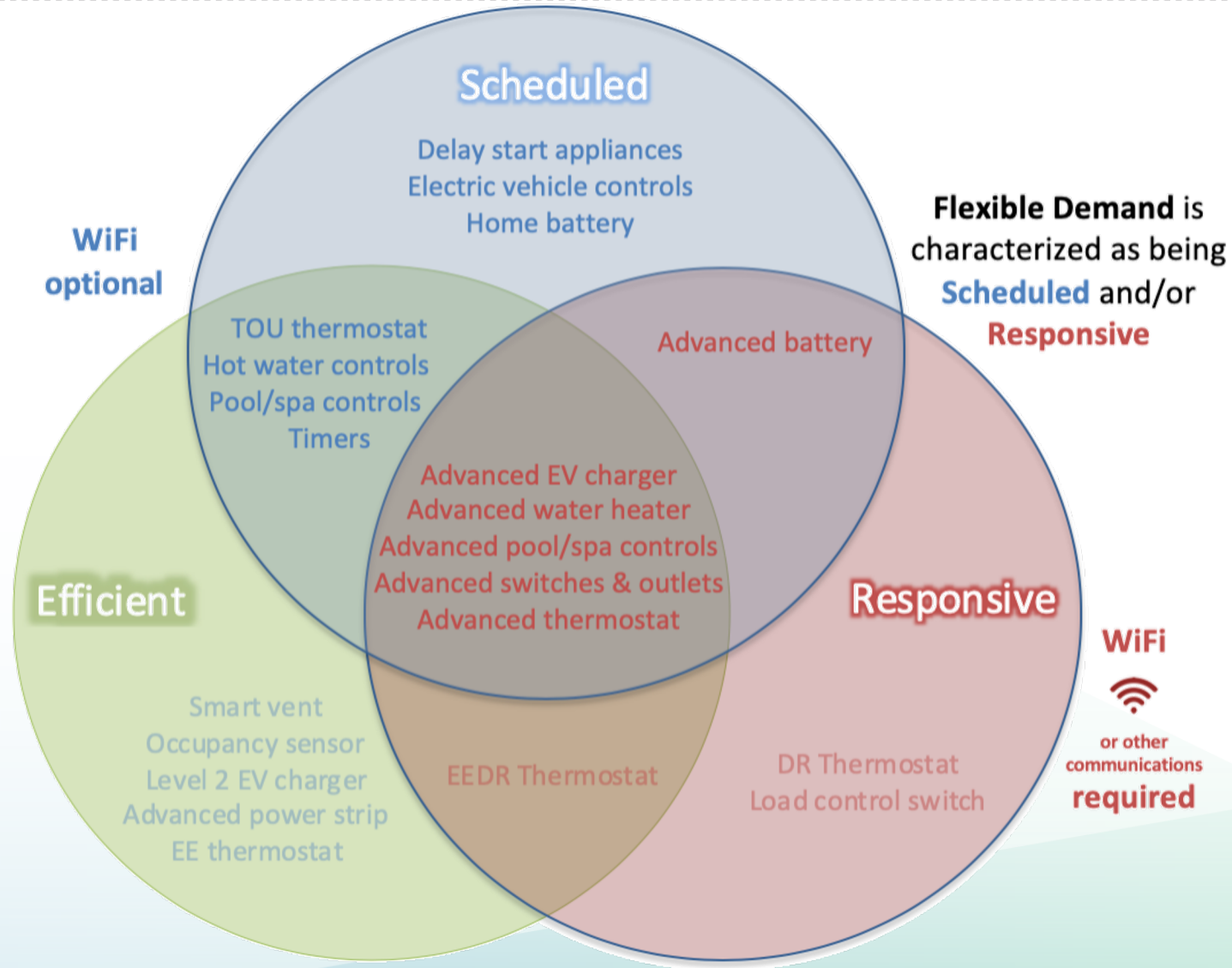
Potential Targets - Residential



- Electric vehicles – EV supply equipment
- Water heaters – heating controls
- Pools – pump controls
- Hot tubs – pump and heating controls
- Battery storage – charging controls
- Refrigerators & freezers – compressors and anti-sweat heaters
- Heating – Thermostats
- Air conditioning – Thermostats



Flexible Appliances and Controls





Demand Flexibility Timeline

Year	Milestone
2022	Load Management Standards go into effect
2023	Time-dependent rates available to Internet devices
2024	Flexible demand appliance standards
2025	Load flexibility programs at top 5 utilities + CCAs



For more information



- CEC staff contact
 - Karen.Herter@energy.ca.gov
- CEC Standards
 - [2020 Load Management Rulemaking Docket 19-OIR-01](#)
 - [2020 Load Management Rulemaking website](#)
 - [Load Management Standards: CCR Title 20 §1621-1625](#)
 - [Flexible Demand Appliance Standards: PRC 25402](#)
 - [Warren-Alquist Act: PRC 25403.5](#)
- Technology Demonstrations and Pilots
 - [SMUD 2010 Small Business OpenADR to FM broadcast pricing pilot](#)
 - [PGE 2016, FM broadcast to CTA-2045 water heater case study](#)
 - [BPA 2018 FM broadcast to CTA-2045 water heater study](#)
- Other
 - [CEC 2003, Feasibility of Implementing Dynamic Pricing in California](#)