GRID COORDINATION

Two signals. Six tests.

The grid has two problems. Few proposals solve even one.

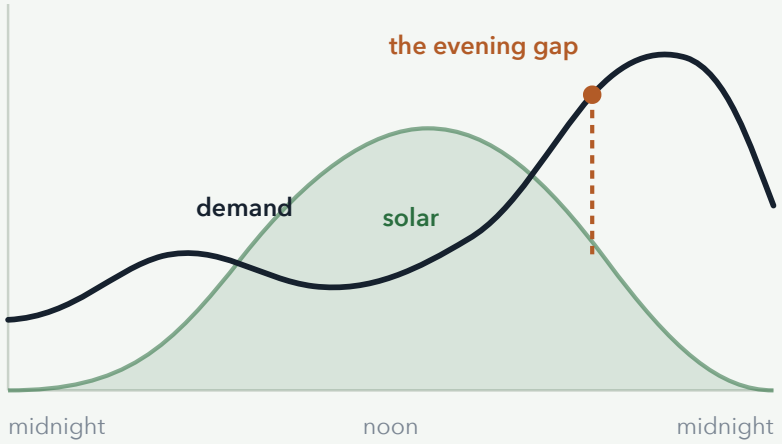
DC Jackson · grid-coordination.energy · August 2026

The grid has two problems, and they are not the same problem

PROBLEM 1

The whole state, hour by hour

Supply must match demand, always.

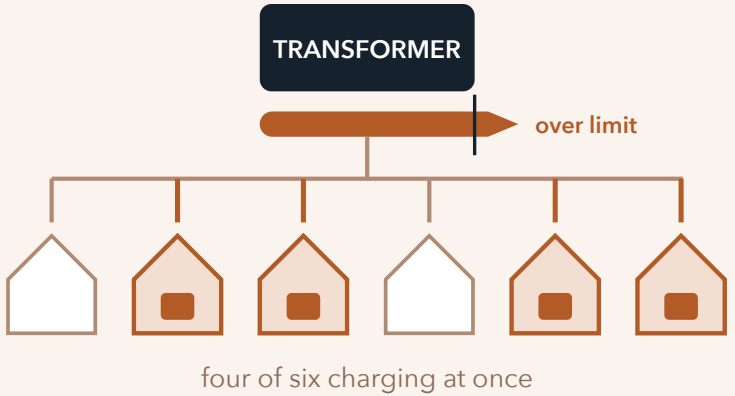


An economics problem. Move energy in time.

PROBLEM 2

One block, right now

The wire has a fixed capacity.



four of six charging at once

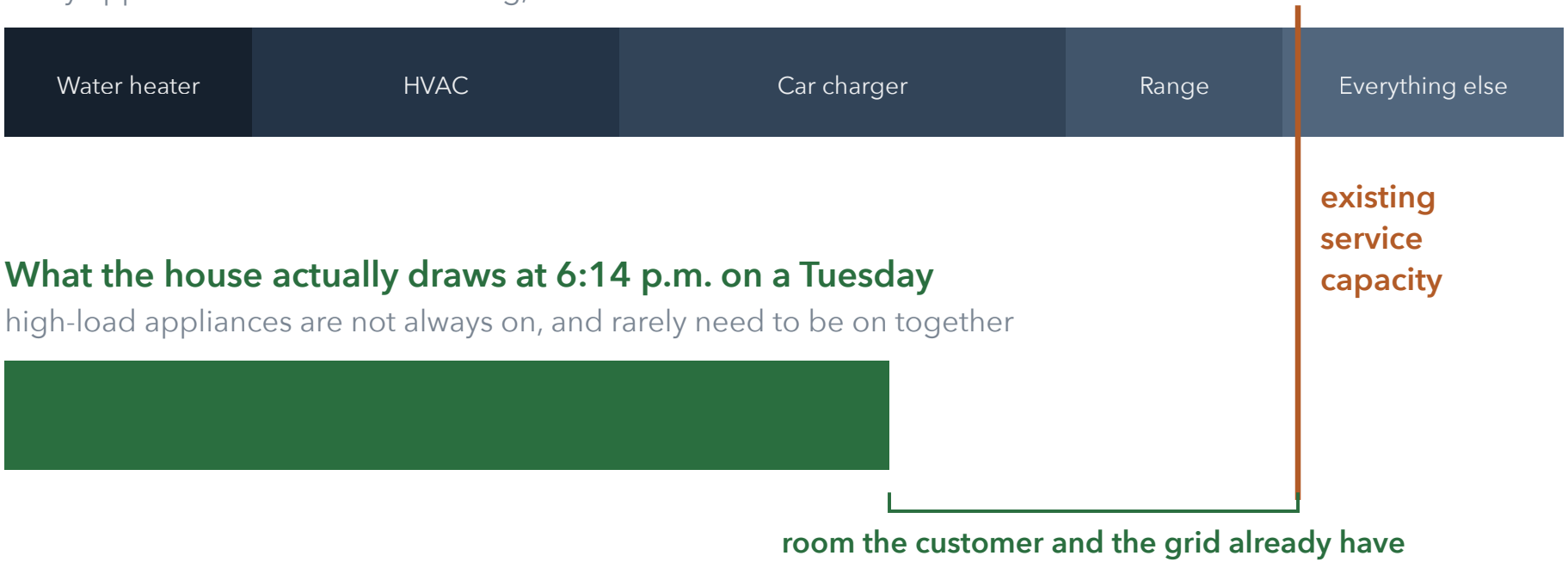
A physics problem. Cap power right now.

Balancing the state is an **economics** problem. Protecting the wire to a house is a **physics** problem. **Both land on the bill.** Peak we cannot shift is generation and transmission somebody has to build; a transformer we cannot protect is a street somebody has to dig up. Ratepayers fund both.

The current answer to problem 2 is a service upgrade

What the legacy electrical-code calculation adds up:

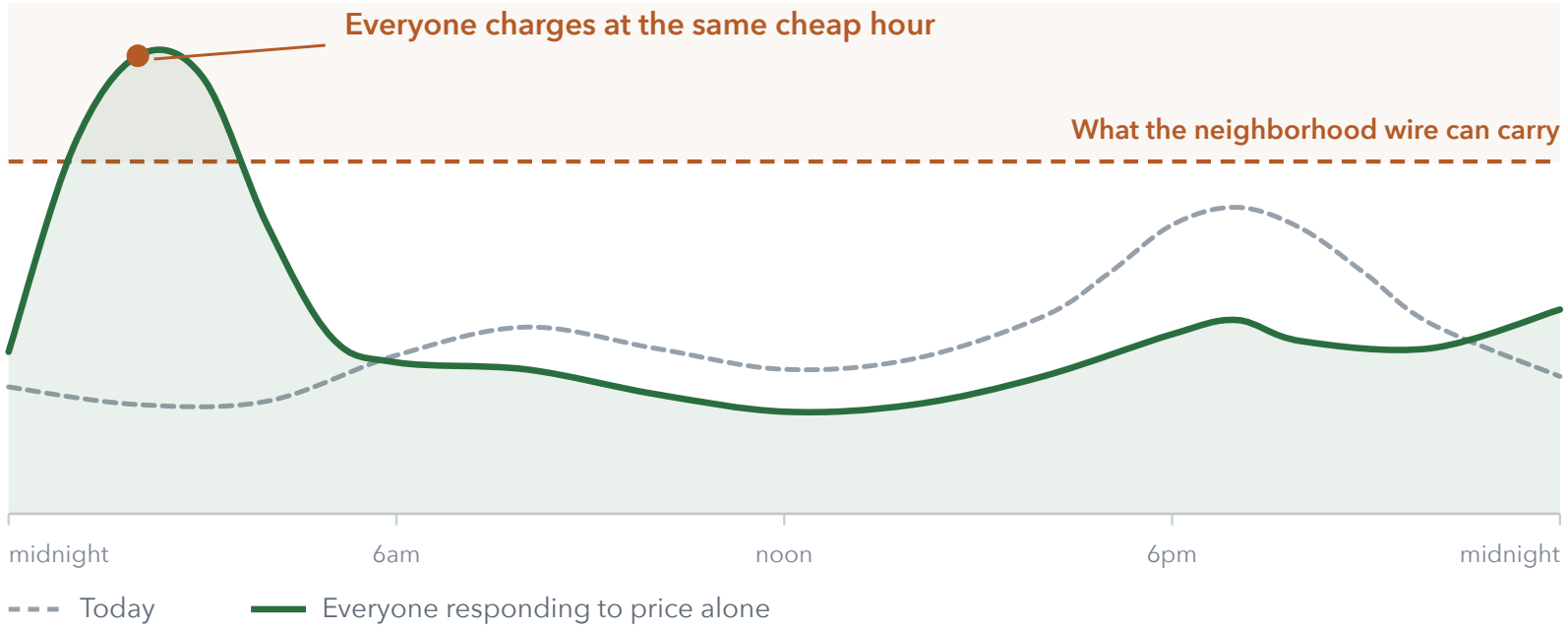
every appliance at its maximum rating, all in the same instant



The top bar is a calculation. **The bottom bar is a measurement.**

We charge customers for a peak that does not happen, because we have no way to promise that it will not.

Price solves problem 1. It cannot see problem 2.



Highly dynamic pricing is the right answer to problem 1, and the most important thing California is doing here.

It should be pursued harder, not hedged. **Dynamic pricing reduces capacity problems. It cannot eliminate them**, because the price is a statewide number and the constraint is on one street.

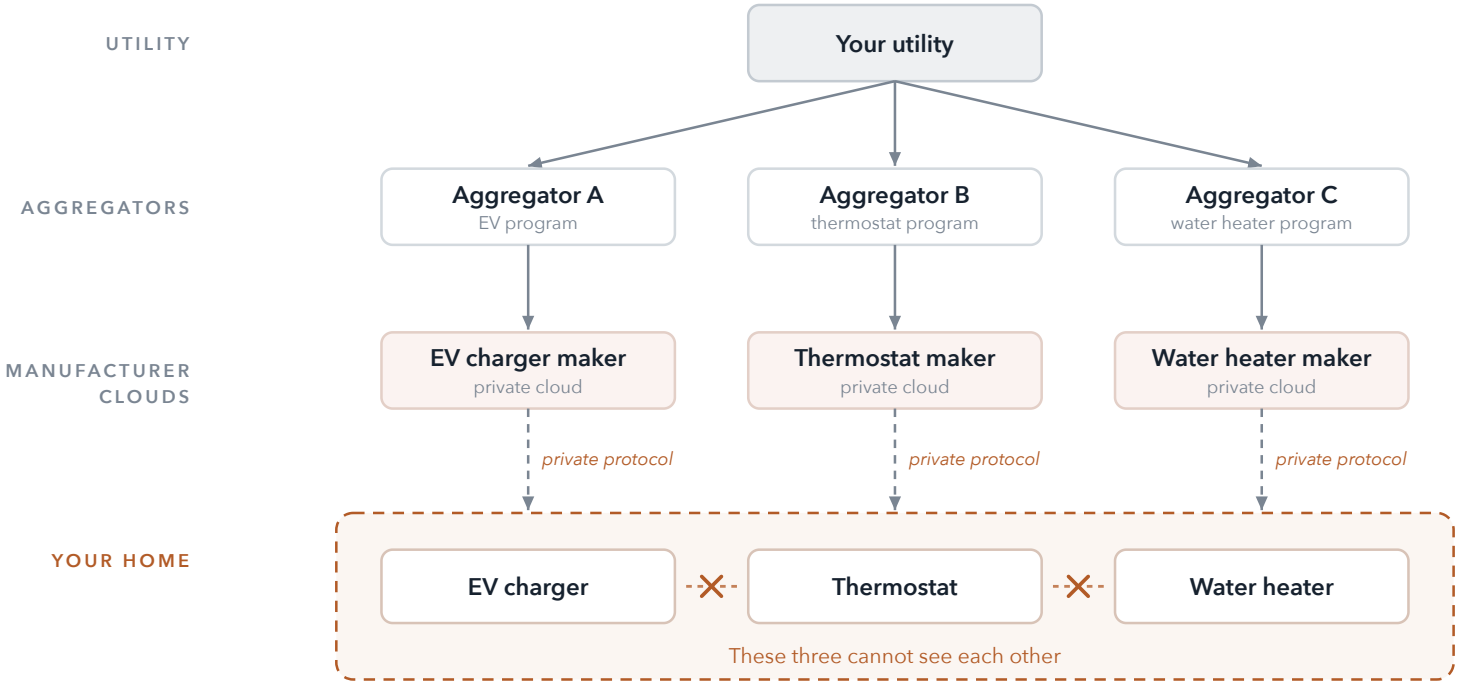
One signal cannot do both jobs

	A DYNAMIC PRICE	A PER-CUSTOMER POWER LIMIT
What it is	What energy costs right now	How much power this connection may draw right now
What it protects	Statewide supply and demand	The physical limit of one wire
What it does	Moves energy across time	Moves nothing. Caps power, immediately
Without it	Nobody has a reason to shift	Nothing stops everyone shifting at once

Everyone in this room already lives with a power limit: it is the main breaker in your garage, and nobody has ever called it tyranny. The transformer on your street is the same device one size up, shared with five or six neighbors, except it has no breaker. It just cooks quietly for years, and then fails on the hottest day.

These two can be legislated separately. Different signals, different timescales, different failure modes. They meet in exactly one place: the thing in the house that decides what runs.

Four companies must agree before one water heater turns down



How can a customer's appliances and DERs be orchestrated when every one of them is controlled separately, and somewhere else?

And any of it can be switched off. On October 25, 2025 Google ended cloud support for first and second generation Nest thermostats: those homes lost every ability to respond to an outside signal, on a date the manufacturer chose.

THE COMMISSION HAS ALREADY ASKED THE QUESTION

> "What hardware, software, or data sharing safeguards may be needed to ensure that customers can obtain a flexible connection without being restricted by proprietary arrangements?"

Assigned Commissioner and ALJ ruling, July 7, 2026, seeking comment on the Assigned Commissioner's Proposal on Flexible Service Connections. Grid modernization rulemaking R.21-06-017, Question 8 to parties.

Six tests for any flexibility proposal

Rate designs, appliance standards, virtual power plant programs, capacity and interconnection proposals. Every one of them will use the words flexible, smart, and customer choice. **Many of them also insert a new gatekeeper between the grid and the customer.**

1. Does the grid send the home **an objective**, or does it **operate the appliance**?
2. Does the open interface reach **the appliance itself**, or stop at **the manufacturer's cloud**?
3. Can the customer choose **who optimizes their home**, including doing it themselves?
4. Can the customer take **the signals directly from their utility**, or is a **middleman required**?
5. Does the limit **hold at the customer's connection**, when the internet does not?
6. Does the customer **who cannot respond** end up better off, or worse?

Test 1: send an objective, not a command

ADDRESSED TO
the water heater at 42 Main Street

TURN OFF NOW.

A COMMAND FROM OUTSIDE

ADDRESSED TO
42 Main Street

THIS HOUR: 41¢
NEXT HOUR: 30¢

YOUR CONNECTION
6 kW IMPORT UNTIL 6 PM

AN OBJECTIVE

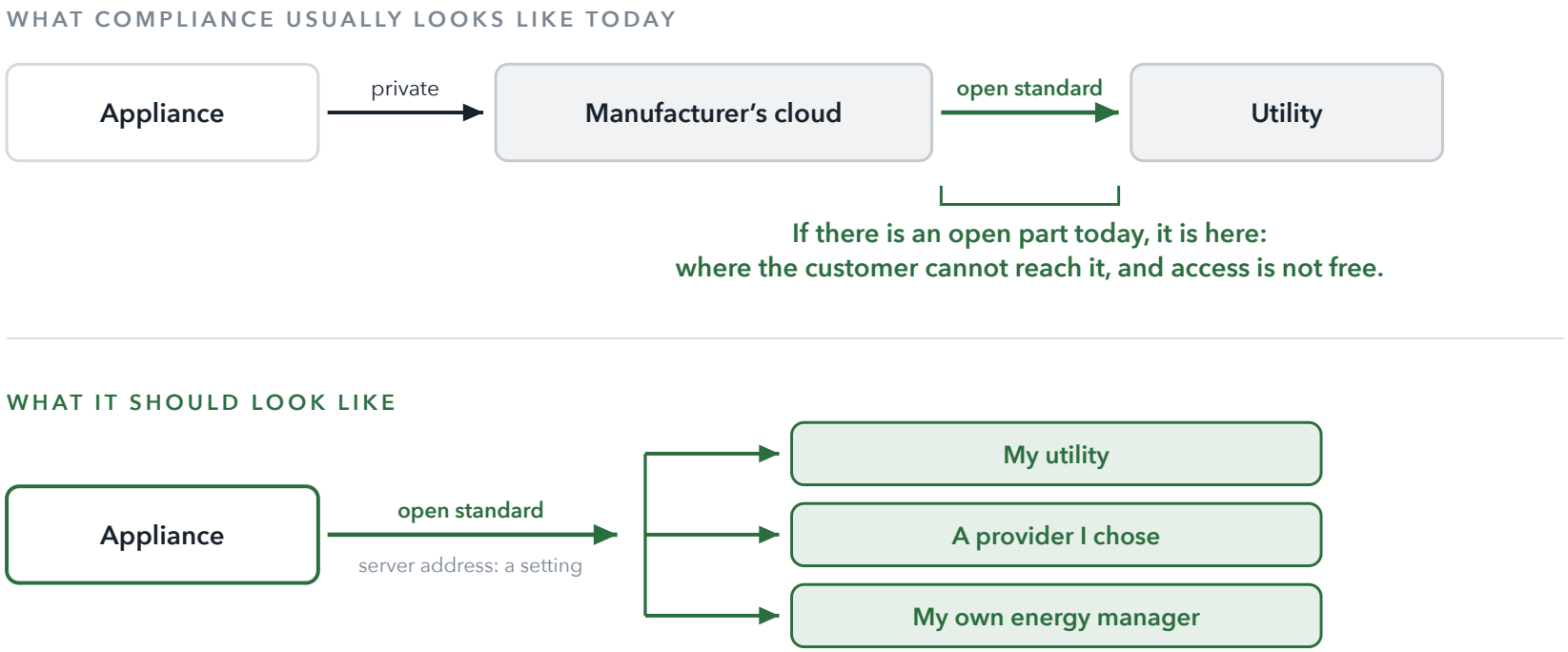
Same kilowatts. **Only one of them has to know what is inside your house.**

To be clear about which control is at issue: **a customer operating their own equipment, through a controller they chose, is exactly right.** What does not belong at the grid boundary is a grid party or a manufacturer holding that control instead.

PASSES an hourly price and a connection limit, published to everyone.

FAILS a program that needs the ability to command a named appliance in a named house.

Tests 2, 3 and 4: open all the way to the appliance



One setting. Three legitimate answers. **The customer picks.**

PASSES the server address is a setting the owner can change, and a tariff any customer can take without a third party.
FAILS an appliance that meets the standard only through a cloud the manufacturer can switch off.

Test 5: the limit is on the connection, not the device

One customer, one connection, one limit (import and export). A modern home has solar, a battery, one or two car chargers, a heat pump and a heat pump water heater, all at once. The limit belongs on the wire, not on any one appliance.

Two things need to know it, and everything else in the house does not. The **UL 3141 listed power control system** that enforces it, because enforcement has to happen where the whole site's draw is visible, not inside one appliance. And the **energy manager** that plans against it, so the house schedules inside the envelope instead of colliding with it. They can be the same device.

It must survive the network. A home that already has today's prices and today's limit keeps behaving correctly with no connection at all.

PASSES a limit for the whole service connection, retained and acted on locally.
FAILS a rule written for one device category that ignores the other five in the same house.

Test 6: the customer who cannot respond

The first objection to hourly prices and per-customer limits is that the affluent optimize and everybody else gets rationed. It is the right question and it deserves the first answer, not the last.

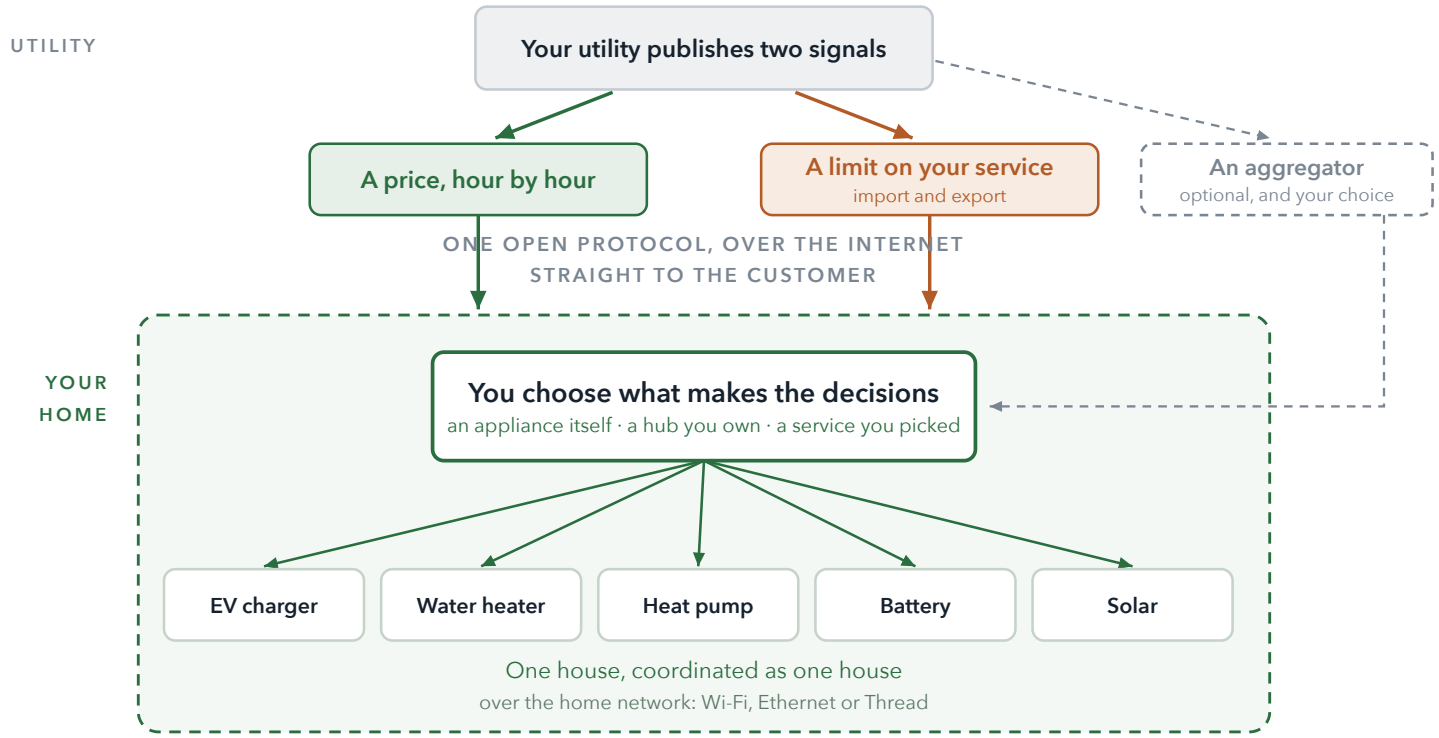
	TO JOIN A PROGRAM TODAY	TO READ A PUBLIC SIGNAL
An enrollment	Required	Nothing
A credit relationship with a third party	Required	Nothing
A particular brand of device	Usually	Any device that can reach the network

Nobody should have to watch a price. The appliance watches the price. The customer sets a preference once.

Many customers who cannot shift are paying today for a grid sized to everyone else's worst hour. Capital spending that never enters rates is their benefit, and it is the largest one.

Dynamic pricing asks less of people than a virtual power plant does. Everyone already pays for VPP incentives through rates. PNNL's DSO+T study found participants **and non-participants** both saw bills fall 10 to 16 percent.

The same house, with the door open



Half of this is already running. A free, public server carries real hourly California prices and grid emissions on an open standard, and free open-source home automation software receives it and orchestrates the household's loads against it. No account, no contract, no enrollment. PG&E is piloting the other half with AMI 2.0 (HomeBoost and PanelBoost).

What not to mandate

IF THE RULE SAYS	WHAT YOU WILL ACTUALLY GET
"Must support [named standard, 2019 edition]"	Compliance frozen at the state of the art in 2019, and a vendor incentive to do nothing further
"The manufacturer shall provide a grid interface"	A cloud interface. The appliance still speaks nothing open, and it dies when that cloud does
"Customers participate through a program administrator"	Every customer needs a third party's permission before they can help the grid
"Each inverter shall be controllable"	Five separate control paths into one house and nobody managing the total
"The appliance shall run between 9 a.m. and 3 p.m."	A load shape frozen into regulation. It cannot follow a price, cannot respect a limit, and cannot change when the grid does

Name the capability in the rule, and the standard in an appendix you can update without reopening the rule. Write it at the appliance, not at somebody's server.

POOL CONTROLS, ADOPTED 2023, THE FIRST IN THE NATION

The rule wrote the answer, not the capability

THE SIX TESTS	POOL CONTROLS, TITLE 20 SECTIONS 1690 TO 1697
1. An objective, not operation	**No objective is sent at all.** The rule fixes the hours instead: 9 a.m. to 3 p.m., nothing automatic 4 to 9 p.m. (1693(b)(2)(C)(1))
2. Open to the appliance	**Partial.** Open standards are required, for the **consent** functions only (1693(b)(6)(B))
3. A server the customer chooses	**Not addressed**
4. Direct from the utility	**Not addressed.** A vendor-exclusive, cloud-only design complies
5. A limit that holds locally	**No limit of any kind**, and no way to receive one
6. The customer who cannot respond	**The only one it answers**, by brute force, while those remain the right hours

A fixed clock cannot tell a house importing from a strained grid at 6 p.m. from a house running its pump off its own battery at 6 p.m. It treats them identically.

> **The three still open have no proposed rule text yet.** That is where to write the capability instead of the clock.

FDAS should be one standard for all appliances, not one per appliance

We do not need OCPP for chargers, CTA-2045 for water heaters, AHRI 1380 for HVAC and IEEE 2030.5 for inverters: a protocol per appliance category, and a rulemaking behind each.

Every one of them needs the same two facts, and only those two. What power costs now and next, and how much this connection may draw. A water heater does not need a water heater vocabulary to know either one.

Grid to house, over the Internet. One open protocol carrying both, with the server address a setting the customer controls. **OpenADR 3 does this today.**

House to appliance, over the home network. The same two facts to every device in the building, whatever it is. **Matter does this today.**

This is less regulation, not more. One capability written once, instead of a rulemaking per appliance forever, each going stale the day it is printed.

> Every appliance in the house is wired to one electrical code. Nobody wrote a separate code for water heaters, and the signals that tell them what to do should arrive the same way.

BACKUP

Detail

A time-of-use rate is a price stream with fewer changes

The signal carries what power costs now and over the coming hours. A schedule, not a single number. That forward view is what lets a house plan ahead.

Highly dynamic pricing is the destination, and nothing has to wait for it. A flat rate is a price stream with no changes at all. Same mechanism, same appliance, same software, whatever tariff the customer is on. The appliance never needs a tariff engine, only an interval consumer.

What that asks of the Commission: require tariffs to be published in a machine-readable, computable form. The open **Utility Rate Plan Exchange (URPX)** standard, hosted by LF Energy, is built for exactly this.

And what it asks the Commission to retire: tariff attributes a price stream cannot carry. A **demand charge** is the clearest example: it prices a peak after the fact, so no device can act on it from the signal alone.

> Every customer can be served by the same mechanism today, whatever tariff they are on. The rate can get more dynamic later without touching a single appliance.

Three levers, three proceedings, all already open

CPUC

Attach an open-access condition to the flexible service connection ordered in **D.26-02-025**: the limit must reach the customer in an open, machine-readable form, with no enrollment and no intermediary.

Extend the standard offer beyond PG&E and SCE.

Require tariffs published machine-readable and computable, so **any** rate becomes a price stream.

CEC

The one adopted standard writes the answer into the rule. Pool controls must ship a schedule running 9 a.m. to 3 p.m., never automatically 4 p.m. to 9 p.m. Nothing requires them to receive a price, a signal, or a limit over an open protocol, on the Internet or the home network.

Thermostats, EV charging and home batteries are still open. **Make tests 2, 3 and 5 explicit** there.

The Legislature

AB 1787 is held in Senate Appropriations. It has been carried once, so it can be carried again, and it is one clause short: it gives the customer access to their **data**. Add access to the **signals**, and the right to point their own equipment at a server of their choosing.

THE ASK

None of this needs a new proceeding. It needs one sentence in the ones you already have open. Tell me which, and I will draft it and file it this month, at no charge.

Where California actually stands

DRIVER	WHERE IT STANDS
CalFUSE	CPUC staff framework, June 2022, for a single universally available dynamic price signal. A white paper name, not a decision or a program
Load Management Standards	Large IOUs: an hourly, marginal cost-based rate for every customer class by January 1, 2027. Large CCAs: that rate or a qualifying program by July 1, 2027
Rate design	D.25-08-049, August 2025. Guidelines for designing demand flexibility rates; the rates themselves are still in testimony. Remaining issues moved to R.26-04-009, opened April 2026
Flexible service connections	D.26-02-025, February 10, 2026. PG&E and SCE to establish a standardized tariffed flexible connection. Load behind a certified power control system is excluded from the connected load calculation
Appliance standards	One adopted: pool controls, September 29, 2025. It mandates a preconfigured schedule (1693(b)(2)(C)(1)) and open standards for the **consent** functions (1693(b)(6)(B)), but no ability to receive a price, a signal or a limit, and no customer-configurable server. Thermostats, EV charging and home batteries are open dockets with no rule text
Legislation	AB 1787 held under submission in Senate Appropriations, August 13, 2026. The regulators are moving; the statute is not

Why some standards are hurting, not helping

CTA-2045, marketed as EcoPort. Washington, Oregon, Colorado and New York require the socket on new electric water heaters. Nothing above it was ever standardized, so every vendor's module speaks its own language upstream, and the module a customer has to buy and install runs well over $150. **The open interface stops at the socket. The standard is obsolete and should be retired, not written into new rules.**

AHRI 1380. The standard permits local interfaces over Ethernet or CTA-2045-A. **No shipping product implements either.** Vendors satisfy it by routing the equipment through their own cloud over a private protocol, so it certifies the cloud, not the appliance.

IEEE 2030.5. Strong at commanding one inverter. But one inverter is the wrong unit for a house with solar, a battery and two bidirectional chargers: control each separately and nobody manages the total. **What belongs there is one import and export limit for the whole connection.**

OCPP. Built for commercial and public EV charging. **Almost no** US residential chargers implement it, and where it is supported the connection is not offered to the customer: it points at the vendor cloud. **There is no need for a protocol unique to EV chargers.**

Two open standards already support every one of these principles, and both ship today.

OpenADR 3 carries prices, events and limits from the utility to the customer's own equipment, **over the Internet**. The server address is the customer's setting.

Matter carries the same information to every device inside the house, **over the home network**.

The manufacturer's real objection, and the answer

What they say: the cost of the parts, and a ten-year support obligation on a device they no longer control.

The customer already paid for the parts. Every one of these appliances ships with a microcontroller and a Wi-Fi radio, on the customer's receipt. The customer still cannot talk to the thing they bought without going through the manufacturer.

What the closed path actually protects: the customer relationship, the customer's usage data, and a share of whatever that customer's load shifting earns.

None of those three are theirs. The usage data is private, and it belongs to the customer. The incentive is paid for the customer's forbearance, not for the manufacturer's software. And a customer-configurable server **reduces** the obligation they say worries them: they stop being the mandatory operator of a cloud service for the life of the appliance.

> The hard part was never the technology. It is that nobody is required to open the door.

Is a customer-configurable server a security hole? No.

It is a setting, in the same sense that choosing an email provider is a setting. The manufacturer still ships a working default. What changes is that the default is not a lock.

The two signals have different risk profiles, and that is the whole answer. Server choice affects **price** response, which is economic: a wrong price costs money, not safety. It does not affect the **limit**, which is enforced at the connection independently of anything the customer configured.

Today's arrangement is the larger attack surface: dozens of vendor clouds, none subject to utility-grade review, each holding the ability to operate appliances inside homes directly.

> A price is a one-way number. A command is a key to somebody's house.

EVERYTHING HERE IS PUBLIC AND FREE

Where to find all of this

This deck, and the one-page handout	grid-coordination.energy/presentations
The price server, with client tutorials	github.com/grid-coordination/price-server-user-guide
Home Assistant integration, in the HACS default repository	github.com/grid-coordination/openadr3-ven-hass
Open-source libraries (Clojure and Python)	github.com/grid-coordination
My CEC docket comments and the California policy record	grid-coordination.energy/policy
OpenADR 3, the grid-to-customer standard	openadr.org
Matter, the in-home standard	csa-iot.org
URPX, machine-readable tariffs, hosted by LF Energy	lfenergy.org/projects/utility-rate-plan-exchange-urpx

No account, no contract, no enrollment on any of it. Every link in this deck is live and clickable in the PDF.