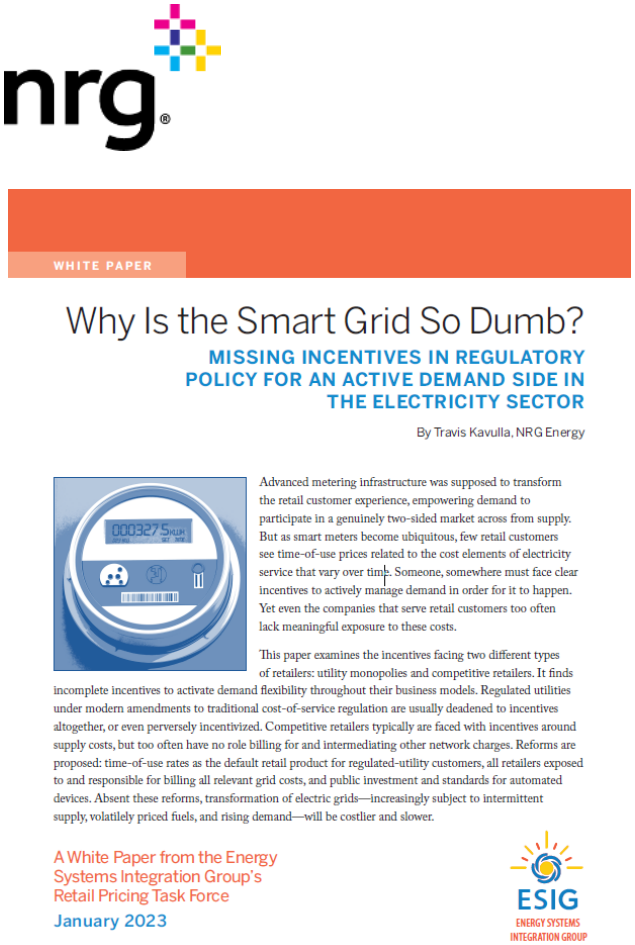


WHITE PAPER

Why Is the Smart Grid So Dumb?

MISSING INCENTIVES IN REGULATORY POLICY FOR AN ACTIVE DEMAND SIDE IN THE ELECTRICITY SECTOR

By Travis Kavulla, NRG Energy

Advanced metering infrastructure was supposed to transform the retail customer experience, empowering demand to participate in a genuinely two-sided market across from supply. But as smart meters become ubiquitous, few retail customers see time-of-use prices related to the cost elements of electricity service that vary over time. Someone, somewhere must face clear incentives to actively manage demand in order for it to happen. Yet even the companies that serve retail customers too often lack meaningful exposure to these costs.

This paper examines the incentives facing two different types of retailers: utility monopolies and competitive retailers. It finds incomplete incentives to activate demand flexibility throughout their business models. Regulated utilities under modern amendments to traditional cost-of-service regulation are usually deadened to incentives altogether, or even perversely incentivized. Competitive retailers typically are faced with incentives around supply costs, but too often have no role billing for and intermediating other network charges. Reforms are proposed: time-of-use rates as the default retail product for regulated-utility customers, all retailers exposed to and responsible for billing all relevant grid costs, and public investment and standards for automated devices. Absent these reforms, transformation of electric grids—increasingly subject to intermittent supply, volatilely priced fuels, and rising demand—will be costlier and slower.

A White Paper from the Energy Systems Integration Group's Retail Pricing Task Force

January 2023

ESIG
ENERGY SYSTEMS INTEGRATION GROUP

Why Is the Smart Grid So Dumb?

Travis Kavulla
Vice President of Regulatory Affairs, NRG

California Public Utilities Commission
R.22-07-005 Working Group 1
May 26, 2023

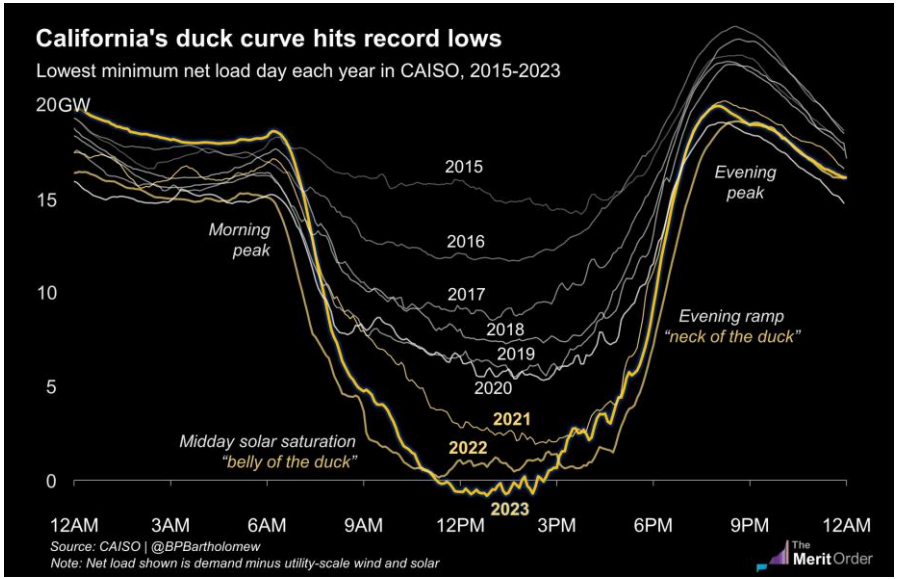


Someone, Somewhere Should Be Exposed to a Fully Dynamic Price

Supply growing more volatile and peaky …even as demand growth returns

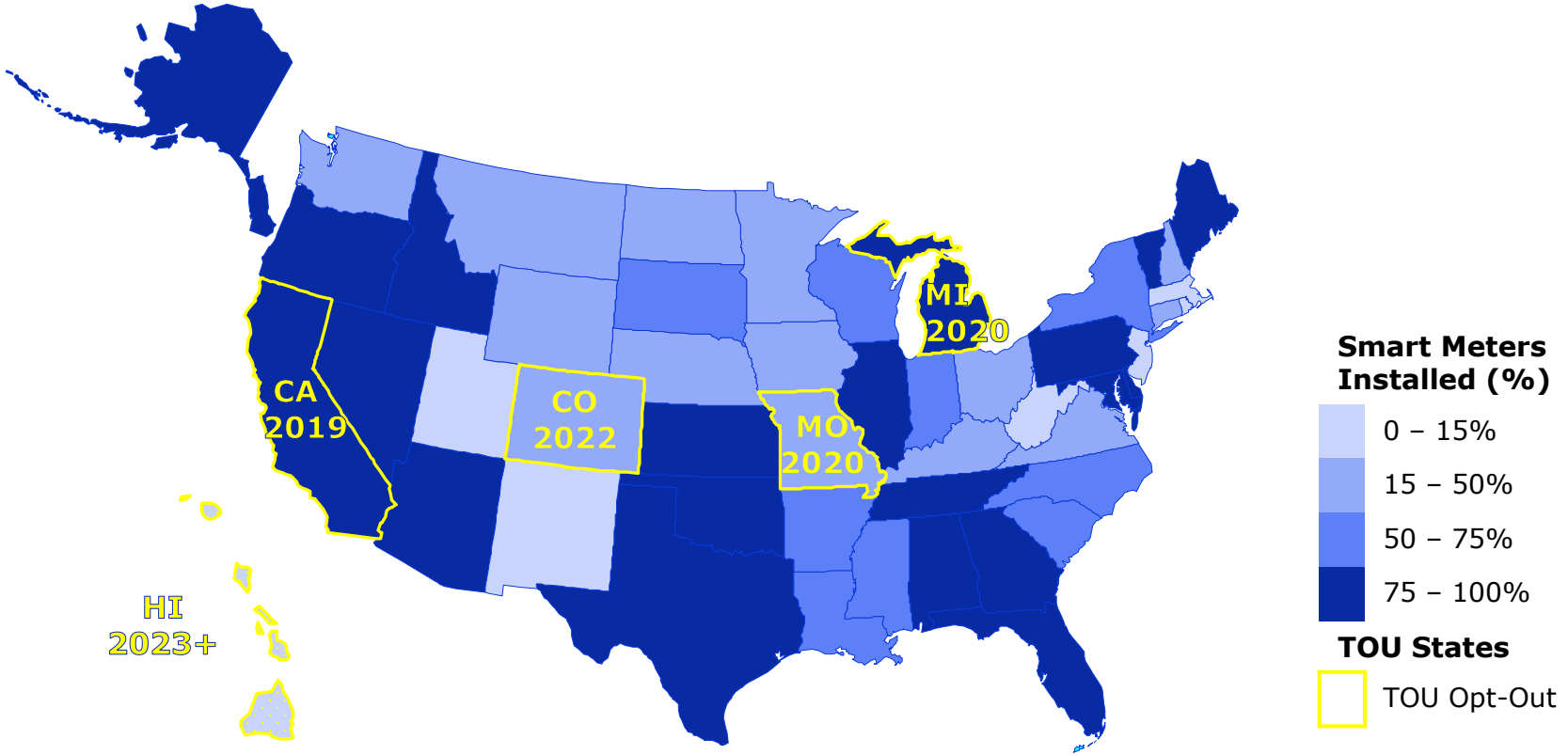
Demand has increasingly obvious role to play

- "Retail rate design reduces the amount of capacity procured and triples the capacity contribution of solar in the electrification scenario."
  - PJM, Energy Transition in PJM: Emerging Characteristics of a Decarbonizing Grid (May 17, 2022)
- "The Pilot results indicated that customers, both overall and low- and moderate-income customers specifically, responded to the rate by shifting usage off-peak … by 9.3 percent to 13.7 percent in the summer months and by 4.9 percent to 5.4 percent in the winter months."
  - Staff, MD PSC, Re: PC44 Rate Design Work Group Leader's Report and Recommendations on Full-Scale Time of Use Rate Offerings (June 3, 2022)
- New York's Climate Leadership Council estimates a $41B cost to deep decarbonization with 'uncontrolled' electrification -- $28B with efficient rate design



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AMI is widely deployed nationally… and California uses it for retail pricing

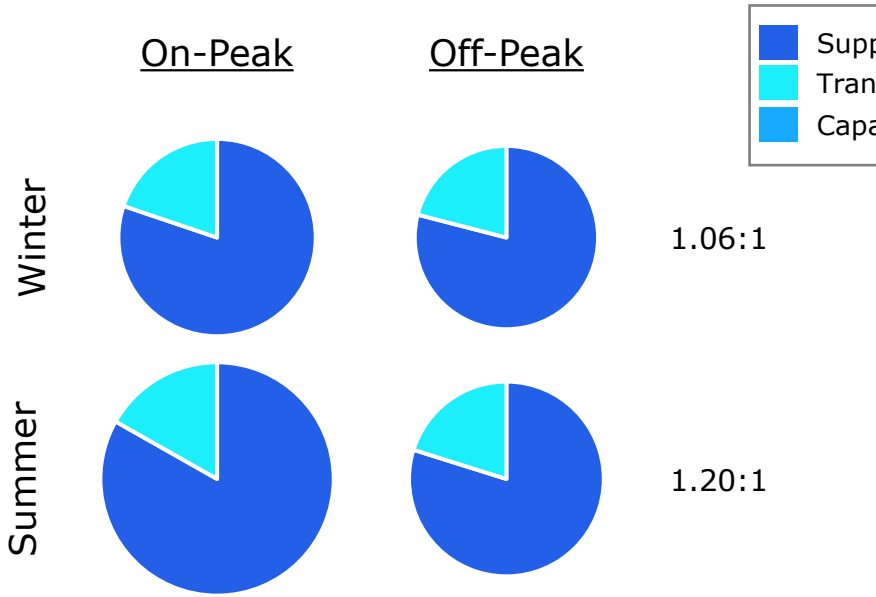


Adapted from: Cooper and Shuster, "Electric Company Smart Meter Deployments: Foundation for a Smart Grid," Institute for Electric Innovation, April 2021, p. 3.

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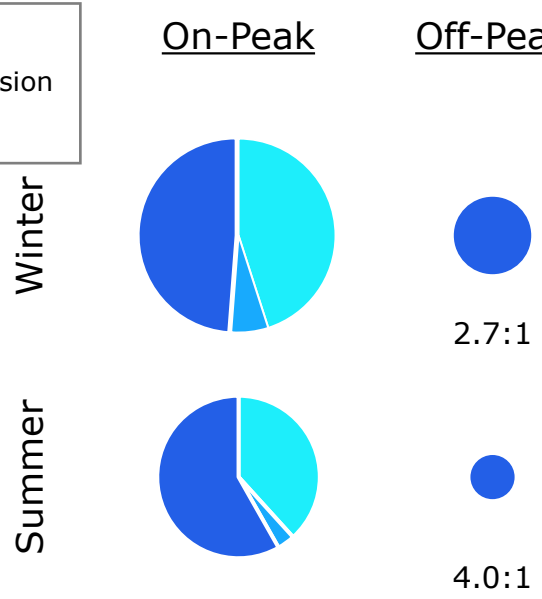
Peakier TOU tariffs send a stronger price signal

PG&E's TOU-C is a relatively flat TOU tariff



Shows the energy (with capacity implicit) and transmission elements of PG&E's TOU-C tariff for Over Baseline Allocation usage.

Illustrative TOU price spread of 3x for MA Nat Grid

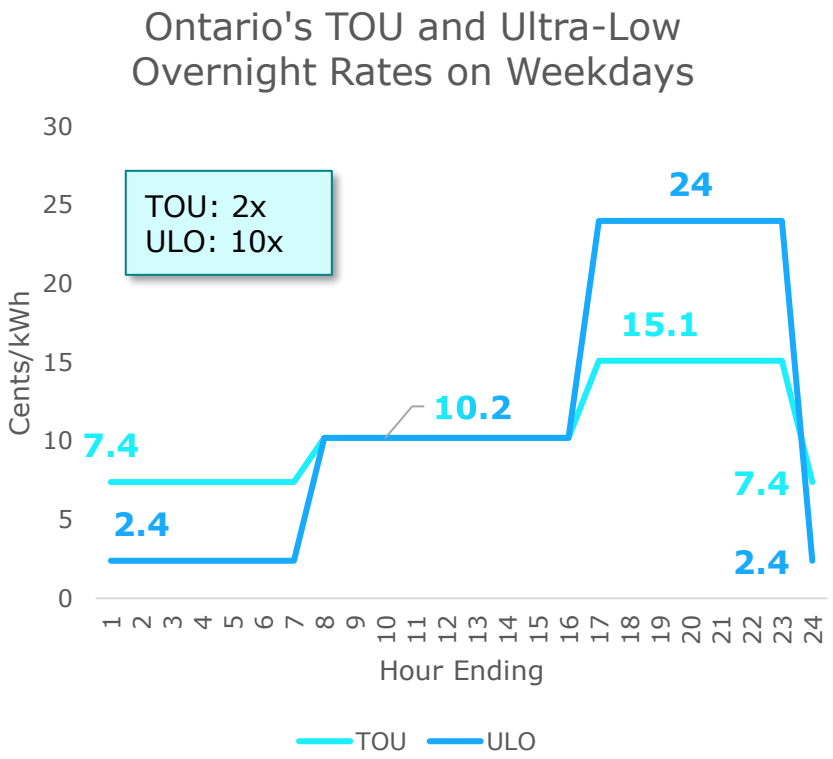


- 4 3-month pricing seasons and on-peak hours 7am-11 pm.
- The supply prices shown based on hourly 5x24 DA ISO-NE settlement prices at MASSHB, 2018-2022.
- Capacity prices from ISO-NE and allocated to on-peak hours.
- Transmission prices from National Grid, but adjusted to apply to on-peak hours.

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Ontario’s new, peakier TOU plan

- Time-of-use is the default plan for customers of a regulated utility in Ontario
- Beginning May 2023, utilities are allowed to offer a new, peakier TOU plan called Ultra-Low Overnight (ULO)
- Pilot programs have shown the peakier TOU evokes more demand response

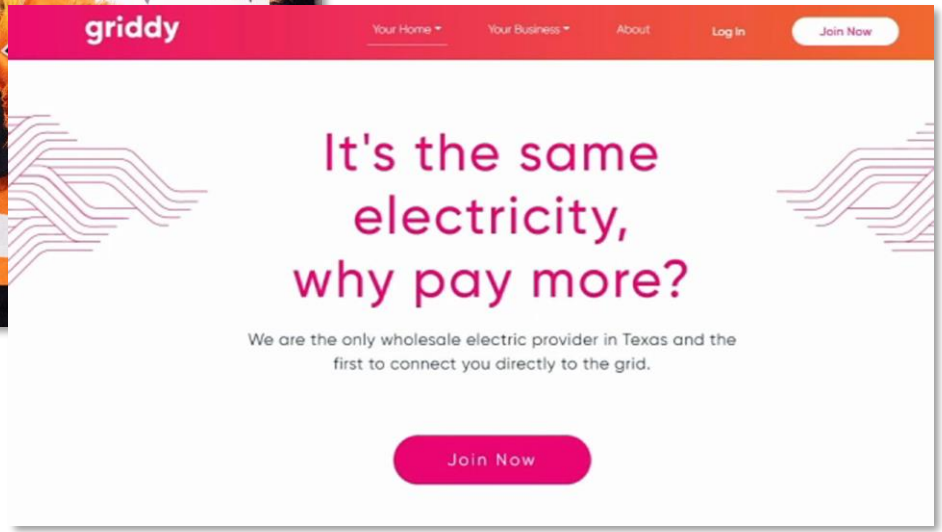


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What about a fully dynamic retail price?



- Griddy (not to be confused with Gritty) offers a cautionary tale
- Griddy, an ERCOT REP/LSE, offered to pass through wholesale energy pricing directly to retail customers for a small monthly subscription fee



- Catastrophically failed during Winter Storm Uri when wholesale prices = $9,000/MWh
- Griddy, an exception that proves the rule: *Intermediaries* bear an important role standing between wholesale market & retail customers

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But *someone* should face/manage the full-strength price signal (or pass it down to customers)

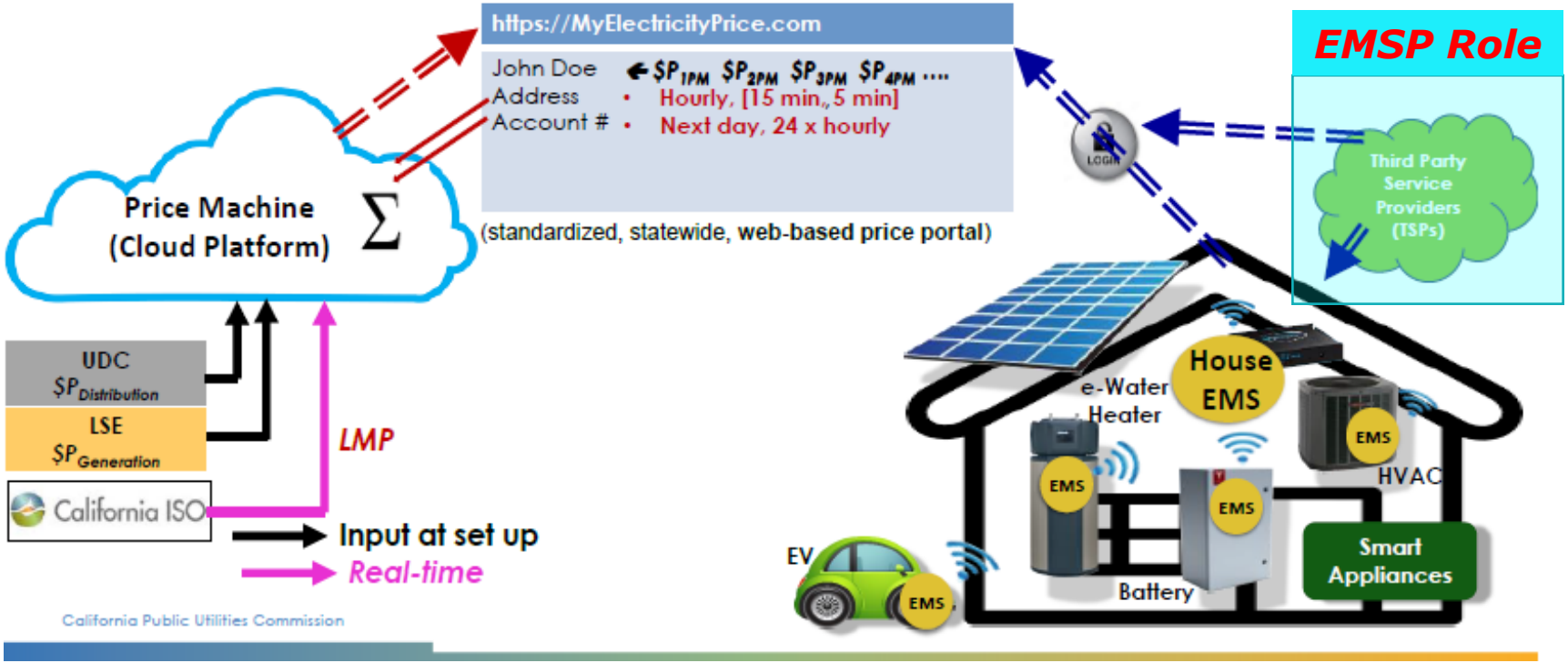
> 4.1.4 Role of Third Parties in Implementation of CalFUSE Framework

- Devices to access and interact with price signals
- "Automation service providers" (ASPs) to optimize device behavior
- **"Energy management service providers" to manage devices and optimize customer bills**
- DER aggregators offering services to LSEs and UDCs

Not discussed extensively as part of previous Working Groups

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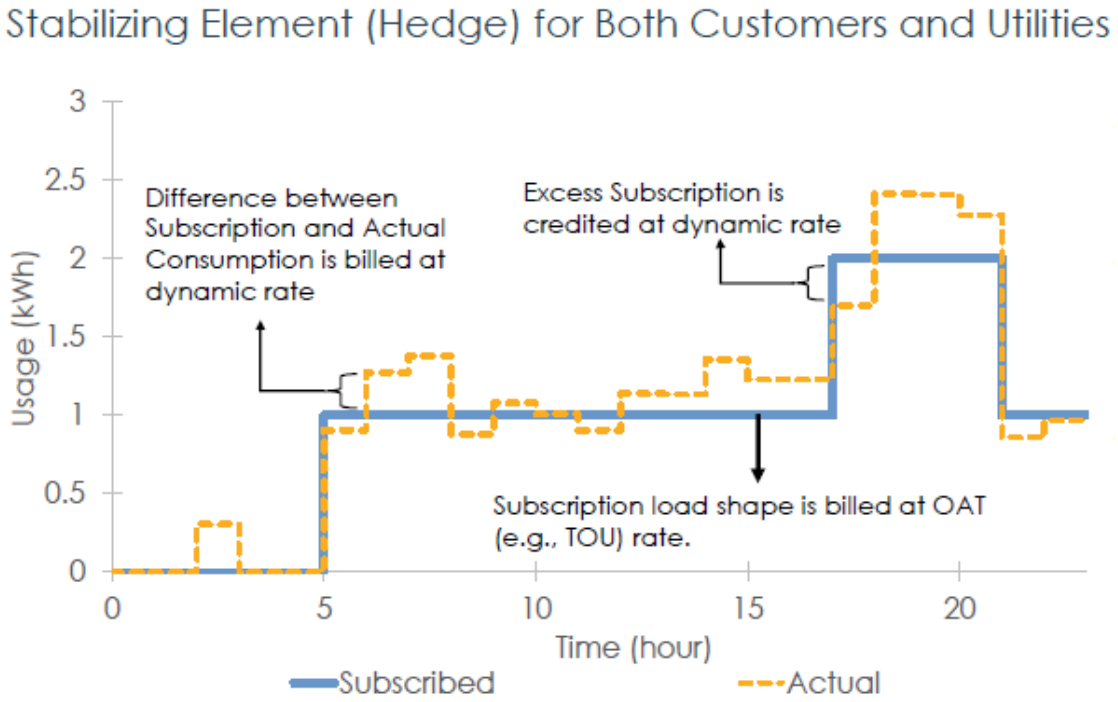
EMSPs can provide a broker-and-insurance role



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CalFUSE Recommendation #5: Monthly subscriptions

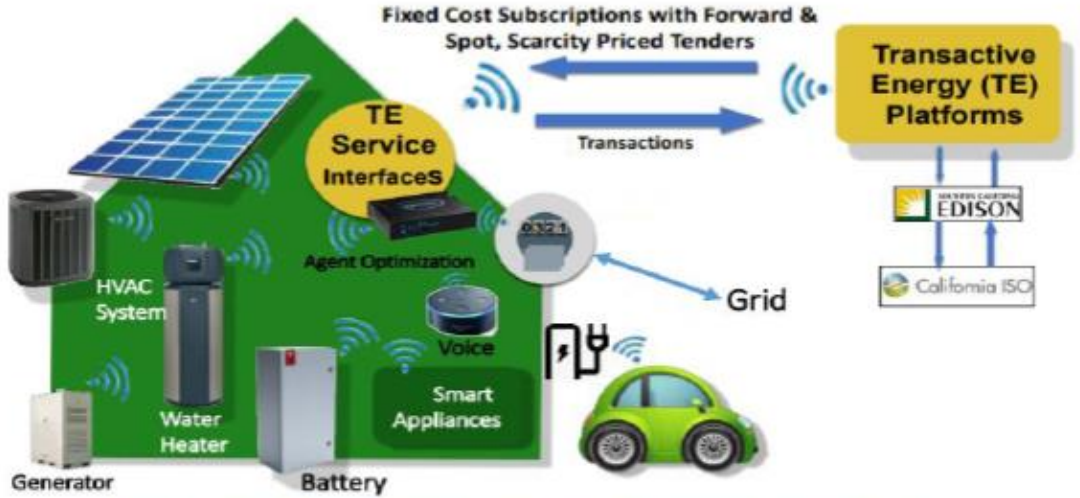
- Subscriptions offered by LSE
- EMSPs could evaluate offers and manage risk
  - Hedges
  - Comprehensive device management



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CalFUSE Recommendation #6: Transactive features

- Short term (hours or days) offers from LSEs
- EMSPs could evaluate offers and manage risk



lic Utilities Commission

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Billing All Elements

The other piece of the pie often isn't on the table

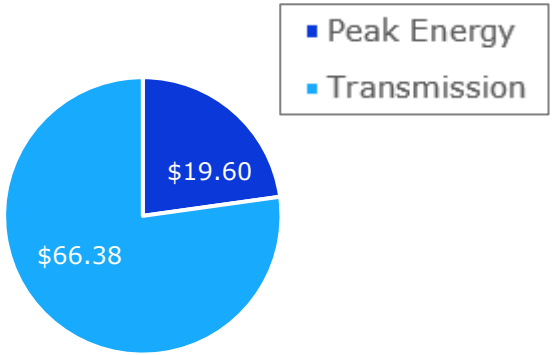
- The largest driver of Demand Response in ERCOT is the savings that derive from avoiding transmission costs through the 4CP transmission cost allocation methodology.
- C&I customers are able to avoid substantial transmission costs based on peak load reduction during the summer months.
- But *residential* customers are billed transmission costs on a year-round, per-kwh-basis in competitive territories. Accordingly, competitive retailers and their residential customers can obtain no significant benefit from residential demand reductions of avoided transmission costs.

Example of Texas supplier's avoidance of 1 kw of residential consumer use during each of 4 highest-peak hours during summer

Peak energy costs



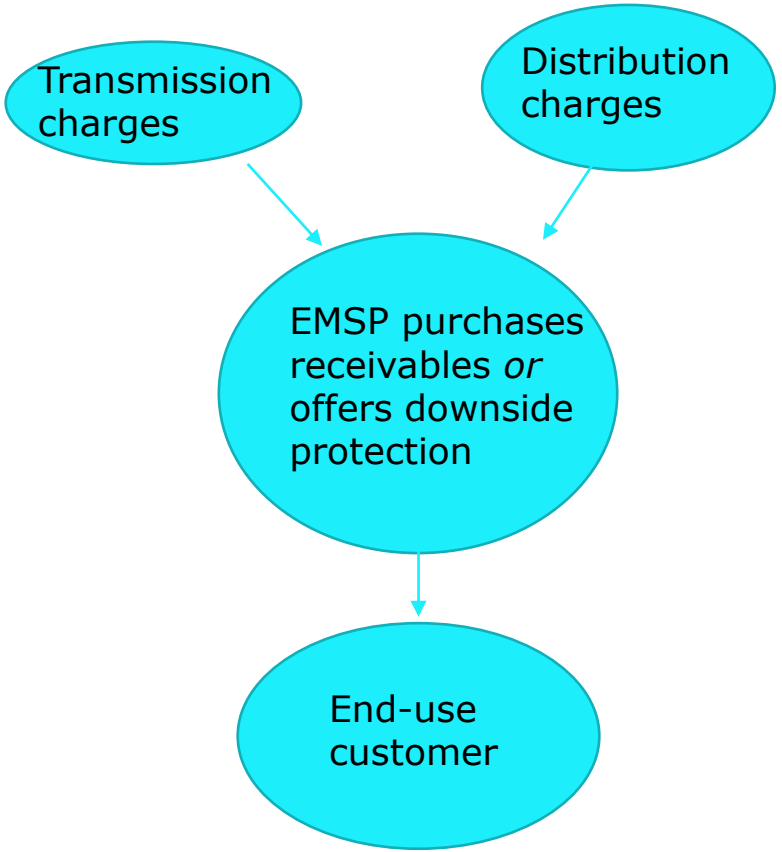
Peak energy + transmission costs



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Customers need not be exposed to complex T&D charges… But *Someone* should be

- Demand flexibility related to time-differentiated network pricing can result from
  - a demand charge (3-part pricing)
  - allocation to peak energy pricing (TOU), or
  - dynamic T&D rates that scale with capacity utilization (like this proceeding has discussed)
- An EMSP should be entitled to intermediate more complex network pricing elements, by
  - 'Purchase of receivables' construct, presenting to customer a less-dynamic rate, or
  - Pass through of T&D charges, but with financial downside financial protection
- EMSP may or may not have brokerage role to play in T&D rates – but EMSP continues to play 'insurance' role, with ability to activate in-premises demand as physical hedge



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Ensuring Incentives Exist for Demand Flexibility



Utility ‘opt-out’ rate should be a default TOU with substantial differentials between tiers (or possibly a dynamic rate with some requirement for intermediation)



Intermediaries can be positioned to active demand through prices or rebates or other inducements, if

- Get to manage not just energy supply costs, but all rate elements
- Get access to AMI data / have customers’ loads settled on AMI
- Present the customer bill



Public investment/standards for devices

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