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California Public Utilities Commission

EV Specific Rates and CPUC Energy Division CalFUSE Staff Proposal

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Retail Rates Section | Energy Division

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Summary

- **Multiple options to support Vehicle-Grid Integration**

  I. Optional EV TOU rates with reduced demand charges or demand charge "subscriptions".

  II. EV RTP rate options and V2G Export compensation pilots

  III. Emergency Load Reduction Program (ELRP)

  IV. Submetering protocols

  V. "CalFUSE" CPUC Energy Division Staff proposal

I. EV TOU Rates

- **SCE Charge Ready Program (TOU-EV-7/8/9)**
  - No monthly demand charges till 2023, 5-year phase in afterwards
  - E.g., TOU-EV-8 off-peak = $0.176/kWh (summer), $0.108/kWh (winter)
- **PG&E Schedule BEV**
  - Super off-peak (9am-2pm) = $0.1485/kWh
  - Discounted "Subscription"-based demand charges: e.g., $62/mo for 50-kW
- **SDG&E EVHP**
  - Super off-peak (12am-6am) = $0.10/kWh
  - "Subscription"-demand charge: e.g., $190/mo for 50-kW

II. EV Dynamic Rate Pilots

- **PG&E Commercial EV Day Ahead RTP (CEV DAHRTP) rate (D.21-11-017) – October 2023**
  - Optional day-ahead, hourly RTP rate for Commercial EV customers.
  - Includes a dynamic MGCC Adder and a time-differentiated Revenue Neutral Adder
  - Distribution rate includes demand charge-"Subscription"
  - Cost-based export rate-rider (in proceeding: A.20-10-011)
- **SDG&E GRC Phase 2 RTP rate & High-Power EV(HPEV) RTP Rate (A.21-12.006/A.21-12.008)**
  - Applications for C&I RTP pilot and RTP export rate-rider for HPEV customers have been consolidated into a single proceeding.
  - Rate design includes day-ahead hourly market prices, CPP adders for MGCC.
  - SDG&E to revise its applications in supplemental testimony based on ED staff guidelines.

Note: Both the above pilots offer dynamic generation rates and do not include dynamic distribution rates.

III. ELRP Option A.5: VGI Aggregation

ELRP established in D.21-03-056
VGI-specific program modifications established in D.21-12-015

Program availability:	May-October Seven days a week; 4-9pm
Event duration:	1 hour min; 5 hour max
Annual dispatch limit:	Up to 60 hrs
IOU minimum VGI aggregation dispatch:	**30 hours per season**
Consecutive day dispatches:	No constraints
Compensation rate:	**$2/kW of Incremental Load Reduction (ILR)**

VGI Event Triggers

- **CAISO-Declared System Events**
  - Alert (day-ahead)
  - Warning (day-of, several hours ahead)
  - Emergency (day-of, 30-60 min ahead)

- **IOU Discretion**
  - High Location Marginal Prices (CAISO energy market)
  - Forecasted grid stress conditions
  - To meet 30-hour minimum VGI aggregation dispatch per season

VGI Aggregation (ELRP A.5) Eligibility

- **An eligible aggregator can manage a portfolio that combines any numbers of EVs and charging stations**
  - Both V1G and V2G (export with bi-directional charger) is allowed
- **Eligibility Requirements:**
  - A customer site within an aggregation cannot be simultaneous enrolled in a supply-side (CAISO market-integrated) DR program.
  - All sites within the VGI aggregation must be located within the distribution service area of a single IOU.
  - A VGI aggregation should contribute ILR > 25kW for a minimum of one hour during an ELRP event
  - NOTE: NEM customers with EVs meeting the above requirements are eligible
- **An EVSE meter or EVSE sub-meter may be used to determine the ILR**

IV. Submetering Protocols

- **PD adopting EV submetering protocol and EVSE communication protocols issued (June 20th) in R.18-12-006**
- **Goals:**
  - Reduce cost of EV charging
  - Consumers can avoid having to install a separate utility meter
  - Can use a submeter to have EV charging measured and billed separately
  - Customers can enroll in EV-specific rate independently

V. The "CalFUSE" Staff Proposal

Executive Summary

Staff Proposal

Pursue joint reforms of DR programs and Rate structures to

Promote *Unified Strategies* for Demand Management and Grid Optimization to

Achieve widespread adoption *of demand flexibility solutions*.

Policy Objective: Improve demand-side resource management…

- Through more effective demand response (DR) and retail rate structures,
- That leverage opportunities enabled by long term electrification and DER deployment,
- To better address grid issues associated with the growth of renewables, electrification, and DER adoption, and support California's clean energy goals.

Present

Basket of Rates
(cost recovery / allocation, equity)

Basket of Supply-Side Programs
(market integrated)

Distribution Level DR

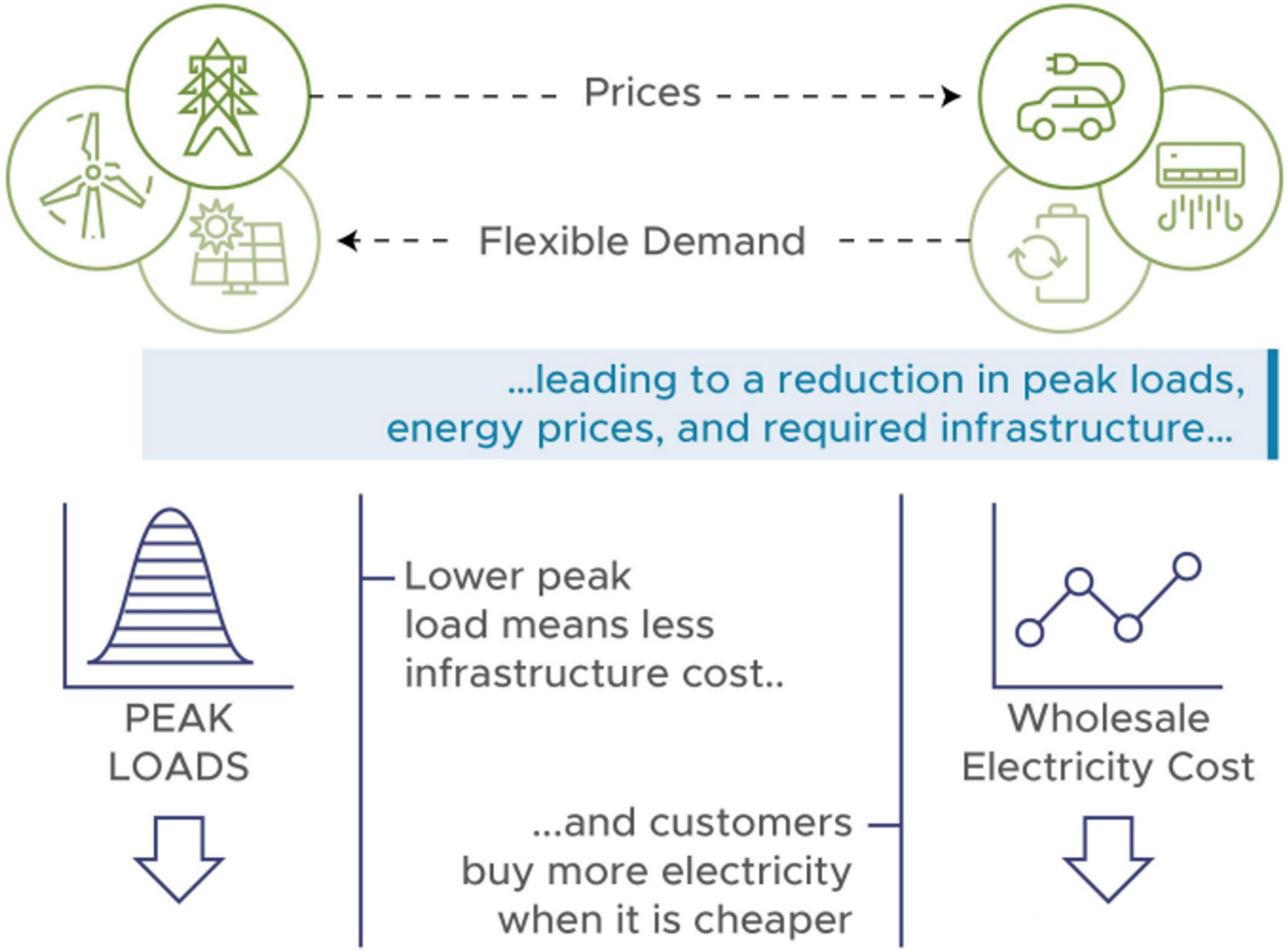
Future

Demand Side: Flexible Unified Signal for Energy in California (CalFUSE)

- ➔ Complex, inefficient, expensive, confusing
- ➔ Difficult to scale, Limited adoption
- ➔ High cost of controls, automation

- ➔ Reduced complexity, Single point focus
- ➔ Highly scalable, widespread adoption
- ➔ Reduced cost of controls, automation

The "CalFUSE" Vision



➔ *Widespread adoption of demand flexibility solutions*

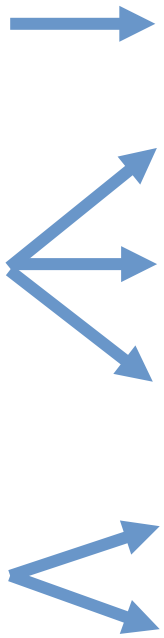
➔ Reduced peak loads, energy prices, infrastructure needs

➔ Reduced cost of service

Image Source: PNNL "DSO+T Study", January 2022

The CalFUSE "Framework"

Three Pillars	Six Elements
Price Presentation	Element 1: Standardized price access
Rate Reform (Three-prong strategy)	Element 2: Real-time energy prices
	Element 3: Real-time capacity prices
	Element 4: Bidirectional prices
Customer Options for Energy Optimization	Element 5: Subscription option
	Element 6: Transactive option



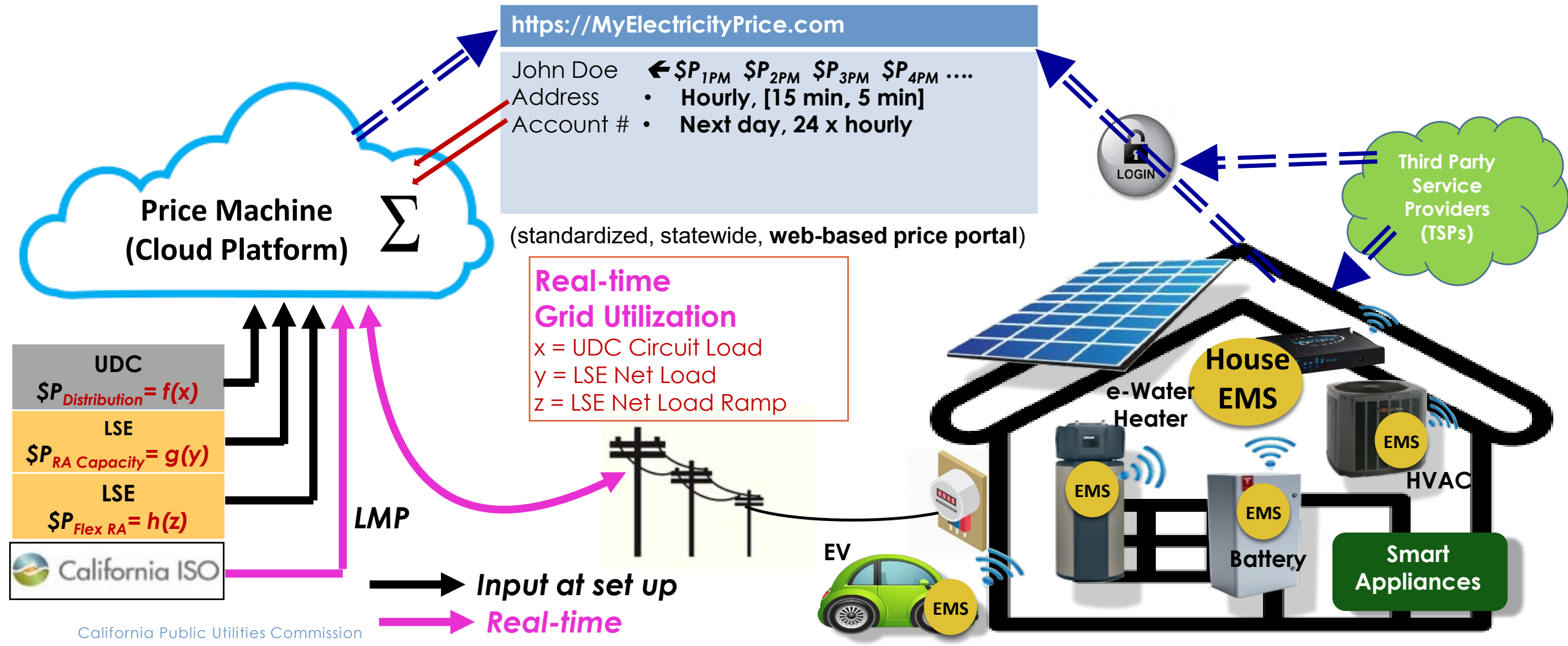
Role of Third Parties

Third parties expected to play a major role in the implementation of CalFUSE.

The CalFUSE "ecosystem" could include:

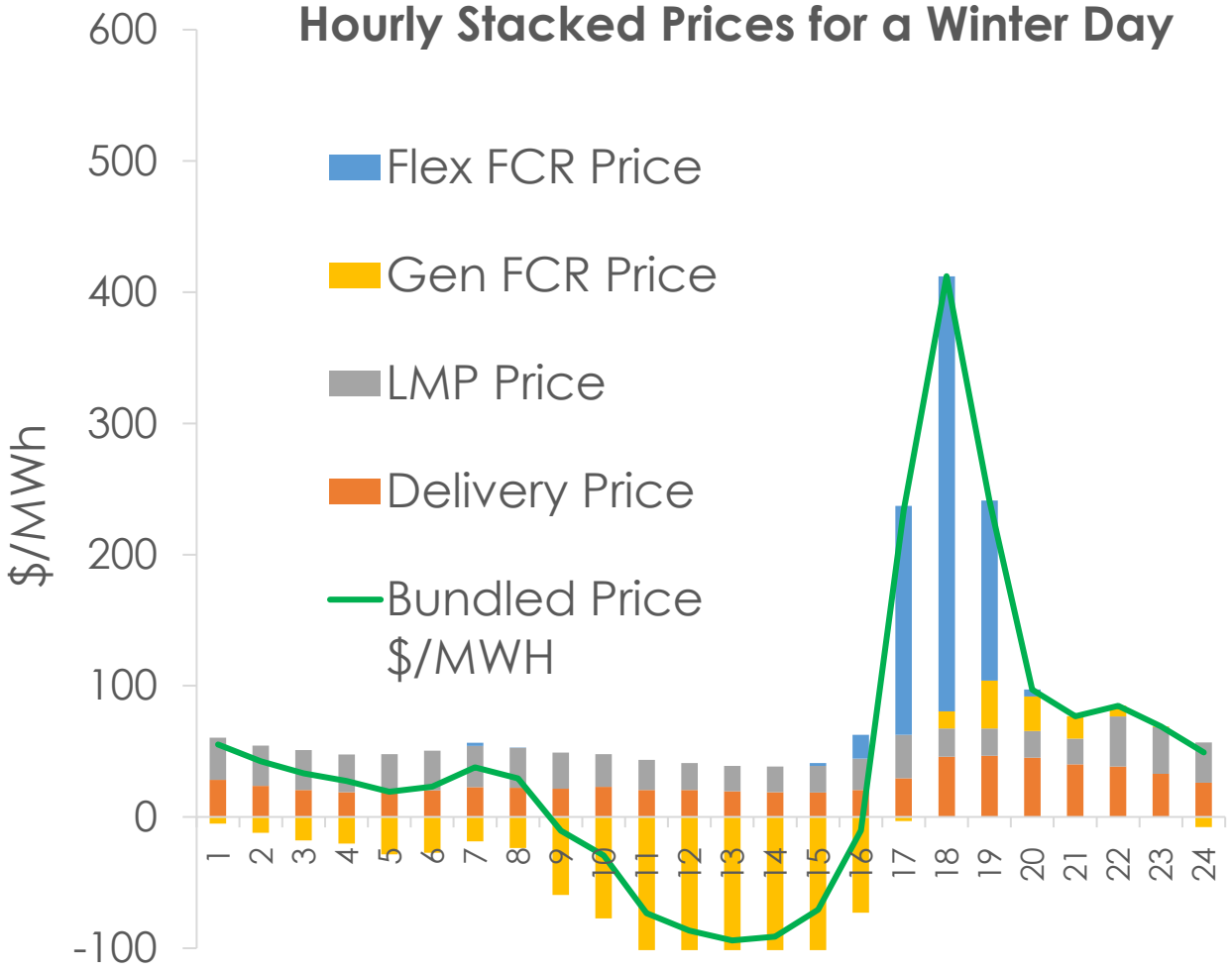
- **Application developers** focused on making the CalFUSE price signal accessible to customers and devices,
- **Device manufacturers** integrating the necessary functionality to enable the devices to interact with the CalFUSE signal,
- **Automation service providers** layering intelligent algorithms or artificial intelligence to optimize device behavior in response to the CalFUSE signal,
- **Energy management service providers** offering services to customers for managing multiple smart devices and optimize customer's bills, and
- **DER operators or aggregators** pooling together and leveraging multiple customers and their devices as a resource and offering services to LSEs or UDCs, etc.

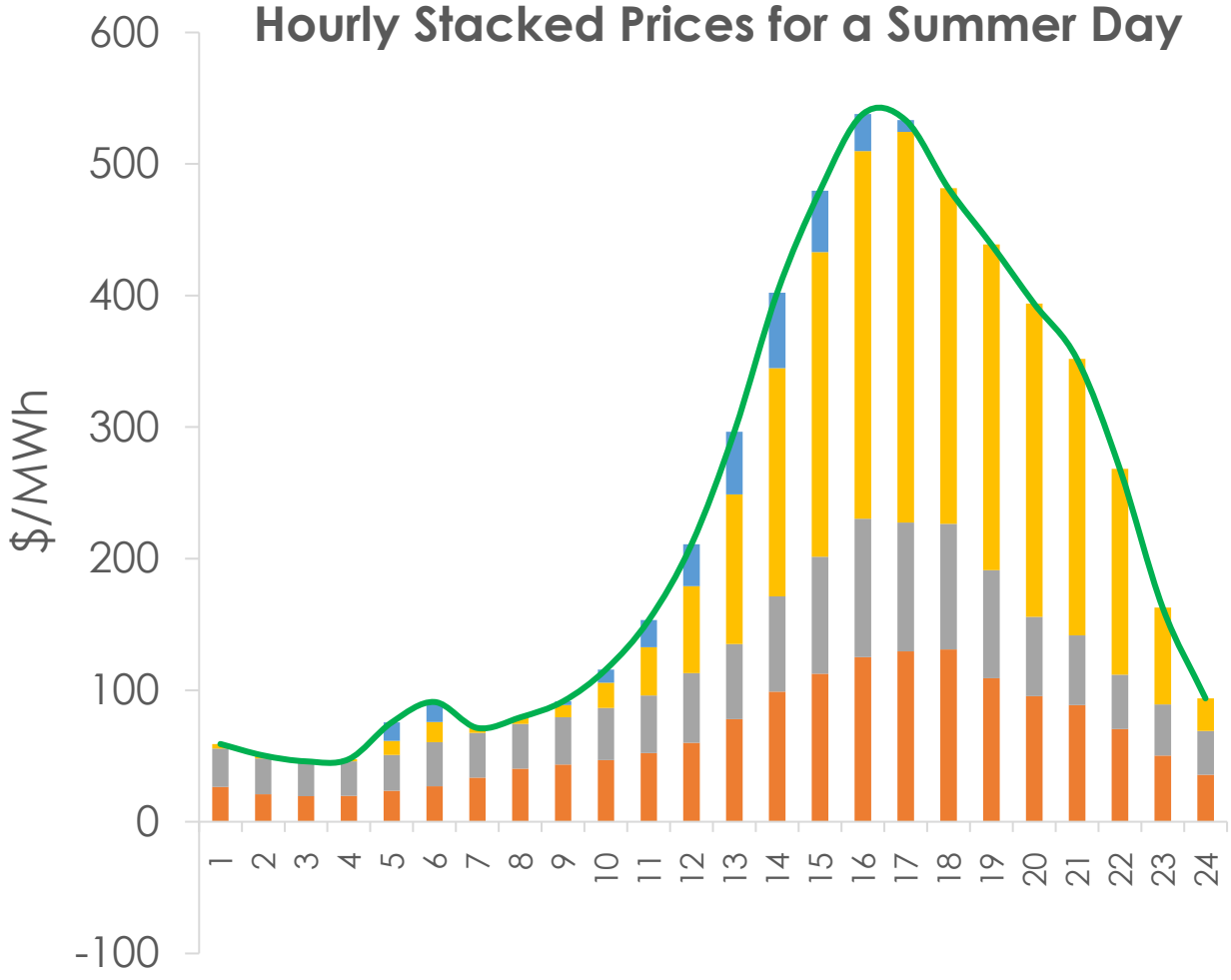
Locational, Dynamic Energy and Capacity Prices



Example – SCE/TeMix "RATES" Pilot

Composite Hourly Prices based on Hourly Capacity Utilization & CAISO LMP



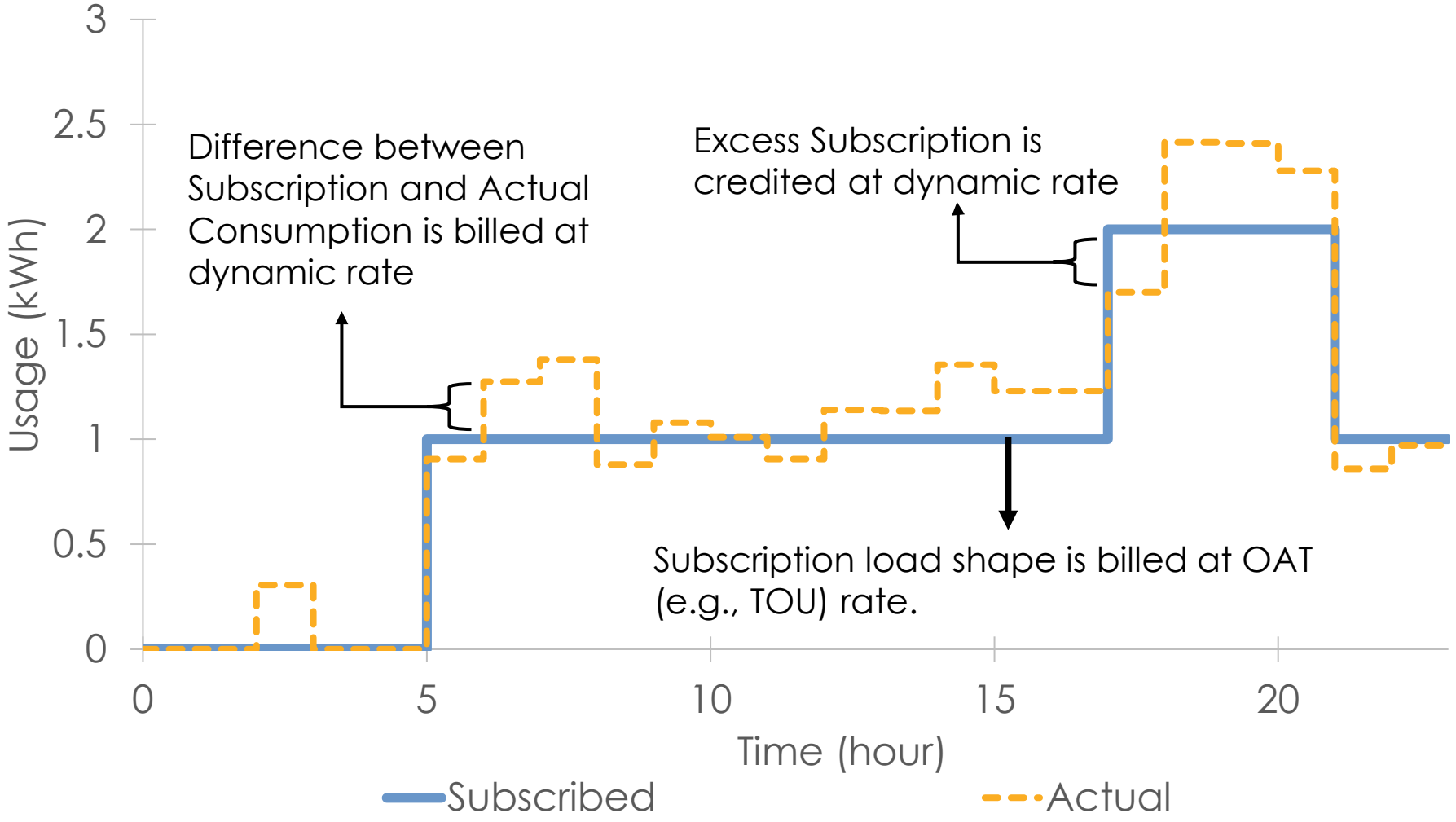


FCR = Fixed Cost Recovery

Source: SCE / TeMix "RATES" Pilot funded by CEC (EPIC)

Customer-Specific Baseline Subscriptions

Historic Load Shape & Energy Quantity at OAT Price



- Stabilizing Element (Hedge) for Both Customers and Utilities
- Options for subscriptions shape include:
  - Customer-specific,
  - class-averaged,
  - climate-zone weighted.

Transactive Platform

1. Import / Export @ Current Price
2. Fixed Price Subscriptions

https://MyElectricityPrice.com

John Doe ← SP_{1PM} SP_{2PM} SP_{3PM} SP_{4PM} ….
Address • **Hourly, [15 min, 5 min]**
Account # • **Next day, 24 x hourly**

LOGIN

(standardized, statewide, **web-based price portal**)

Price Machine (Cloud Platform) Σ

Real-time Grid Conditions
x = Circuit Aggregate Load
y = LSE Aggregate Load
z = LSE Net Load Ramp

UDC
$SP_{Distribution} = f(x)$

LSE
$SP_{RA\ Capacity} = g(y)$

LSE
$SP_{Flex\ RA} = h(z)$

California ISO

LMP

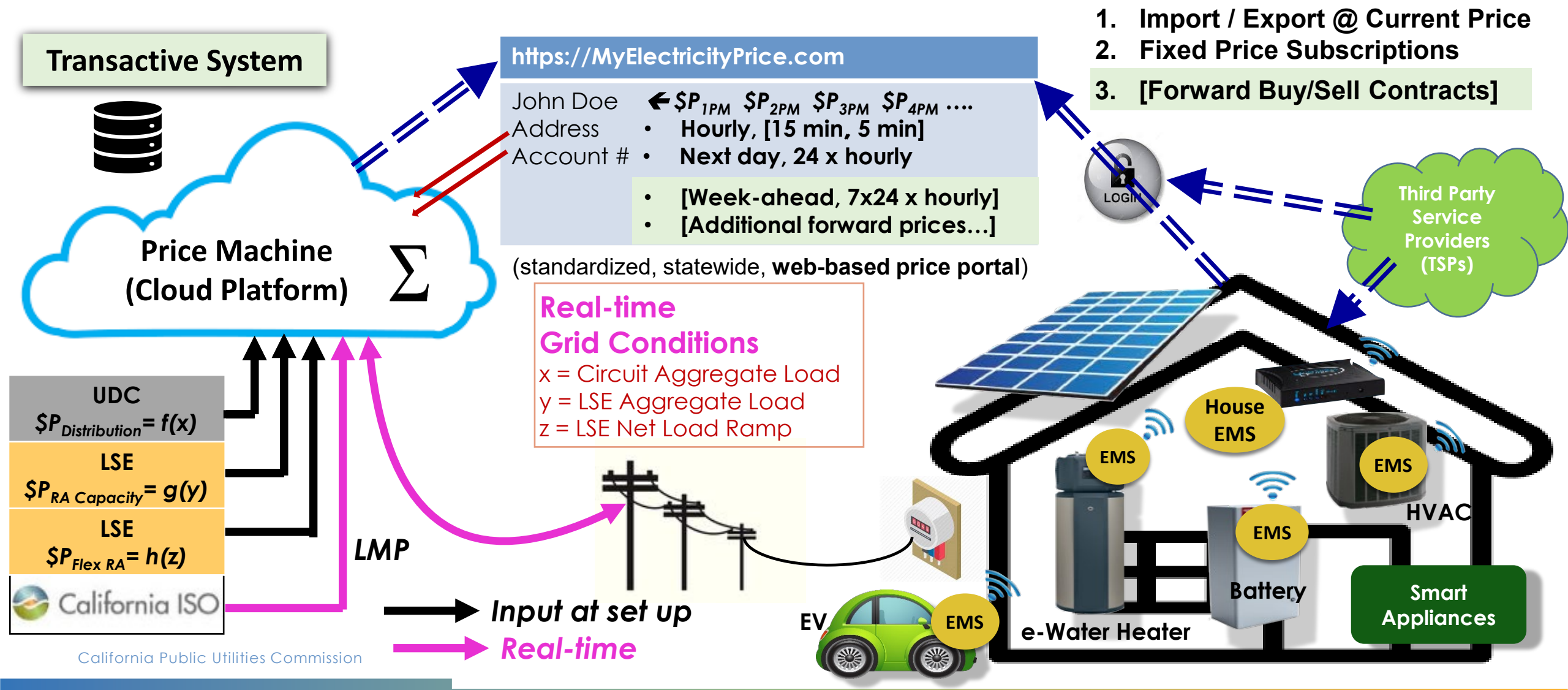
Input at set up

Real-time

Third Party Service Providers (TSPs)

House EMS
EMS
EMS
EMS
EMS
HVAC
Battery
Smart Appliances
e-Water Heater
EV

Transactive Platform



Upcoming CalFUSE Pilots

- **CalFUSE Pilots authorized by Summer Reliability OIR Phase 2 (D.21.12.05) to launch on May 1**
- **VCE/PG&E "AgFIT" agricultural pumping dynamic rate pilot**
  - Jointly implemented by Polaris, TeMix, VCE, and PG&E
  - Authorized for 5MW (~1MW enrolled)
  - Provides farmers week-ahead prices which they can use to pre-schedule irrigation cycles using TeMix Transactive Layer
- **SCE "RATES Phase 2" dynamic rate pilot**
  - Open to all C&I and residential SCE customers
  - Will be available across SCE service territory

California Public Utilities Commission

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