Proceeding No. R.21-06-017

California Public Utilities Commission

High DER Proceeding

Track 2 Workshop1

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Energy Division

High DER Future Proceeding
(R.21-06-017)

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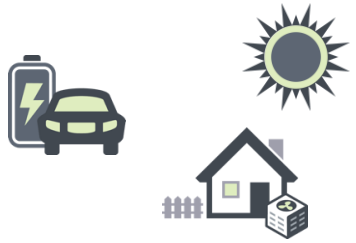
Three High DER Proceeding Tracks



1

Distribution Planning Process and Data Improvements

- Phase 1: Near-Term Actions
- Phase 2: Distribution Planning Process Improvements
- Topics:
  - IOU Distribution Planning Process Staff Proposal
  - Electrification Impacts and Potential Mitigation
  - Data Portal Improvements
  - Distribution Planning Community Input to Distribution Planning Needs

2

Distribution System Operational Needs and System Operator (DSO) Roles and Responsibilities

- Investigation of **operational needs** for a high DER future grid (2030-2035)
- **Gap analysis** of operational needs vs. the current capabilities of Distribution System Operators (Utilities)
- **Recommendation** to address identified gaps and **Future Grid development**
- Identification of future actions that could lead to a successor proceeding

3

Smart Inverter Operationalization and Grid Modernization Planning

- Phase 1: Smart Inverter Operationalization
- Phase 2: Grid Modernization Planning and Cost Recovery
- Topics:
  - Business Use Cases for Smart Inverters
  - DER Dispatchability
  - Smart Grid Investment Planning

Track 2 Scoping Questions (Revised Scoping Memo)

Track 2: Distribution System Operational Needs and System Operator Roles and Responsibilities

Question 1: What are the **operational needs** necessary to efficiently operate a high DER grid, unlock economic opportunities for DERs to provide grid services, limit market power, reduce ratepayer costs, increase equity, support grid resiliency, and meet State policy objectives?

Question 2: What are the **existing gaps and barriers** in achieving the needs identified above within our current Distribution System Operator (Utilities)? What are the **potential solutions** in overcoming these barriers?

ED Staff Presentation Overview

For Related Proceedings interacting with the "High DER Future" OIR:

Transportation Electrification (R.23-12-008), Microgrids (R.19-09-009), Interconnection (R.17-07-007), Demand Flexibility (R.22-07-005)

1) What are the **Objectives** of your related proceeding ; and

2) How can "High DER Future" **grid operations help** (contribute) or **hinder** (Challenge) the objectives of your related proceeding?

Vehicle-Grid Integration and High DER Future

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Vehicle-Grid Integration and R.23-12-008

Proceeding Overview:

- Aimed at furthering policy related to transportation electrification, including:
  - TE grid planning to support charging infrastructure deployment;
  - BTM infrastructure investment to support state goals;
  - Vehicle-grid integration (VGI); and
  - Ongoing TE policy development and collaboration.

- **VGI focus:**
  - Establish goals and targets for the advancement of VGI, assess programmatic and policy interventions, and affordability considerations, with a focus on:
    - 1) technology enablement,
    - 2) rates and demand flexibility programs;
    - 3) TE grid planning.

- **VGI and High DER future challenges:**
  - Determine achievable potential for V1G and V2G;
  - Address identified technical barriers to enable widespread deployment of VGI technologies;
  - Identify price signals and incentive opportunities to encourage customer behaviour.

Microgrids and High DER Future

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R.19-09-009: Microgrids Proceeding

- Microgrid does not have a fixed definition or imply a specific type of resources.
- For CPUC purposes, definition is in P.U.C. § 8370(d):

  > "Microgrid" means an interconnected system of loads and energy resources, including, but not limited to, distributed energy resources, energy storage, demand response tools, or other management, forecasting, and analytical tools, appropriately sized to meet customer needs, within a clearly defined electrical boundary that can act as a single, controllable entity, and can connect to, disconnect from, or run in parallel with, larger portions of the electrical grid, or can be managed and isolated to withstand larger disturbances and maintain electrical supply to connected critical infrastructure.

- Current focus of R.19-09-009:
  - Development of tariffs to allow community microgrids (aka multi-property microgrids) to use utility distribution grid during microgrid islanding mode.
  - Implement Microgrid Incentive Program – Financial support for community microgrids in vulnerable and disadvantaged communities.

R.19-09-009: Microgrids Proceeding

- Microgrids can provide all the functionality of DERs, coordinate DERs and loads, and provide resiliency.
  - Site controllers can coordinate DERs and loads in some non-microgrid scenarios.
- High DER efforts on markets and services are broadly applicable to the DERs and loads within a microgrid that is in grid-connected mode.
  - High DER proceeding leads on these and microgrids proceeding ensures coordination.
- Common theme between proceedings is standardizing regulatory requirements.
  - For microgrids this increases the feasibility of project deployment.

R.19-09-009: Microgrids Proceeding

- High DER operations that include DERs and loads within microgrids in grid-connected mode are likely to be a source of blue-sky revenue for the microgrid.
  - This allows those resources and loads to meet multiple objectives and goals.
  - Achieved by treating DERs and loads in a microgrid in an equivalent manner as DERS and loads outside of microgrids.
  - Example – Storage within a microgrid may need to maintain a minimum state of charge for resiliency purposes but the incremental portion of the storage is available for market and program participation.
- If rules and eligibility for High DER operations have substantive differences for the DERs and loads within microgrids in grid-connected mode:
  - Unlikely to make most efficient use of available resources.
  - Less likely to create viable pathways for development of microgrids.

Interconnection and High DER Future

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Interconnection Proceeding

Current Rulemaking R.17-07-007 Objectives

- Streamline interconnection of generating distributed energy resources
- Incorporate the results of the Integration Capacity Analysis into the interconnection process through Limited Generation Profiles (LGP) (Issue 9, D.20-09-035)
  - Draft Resolution E-5296 (mailed on 1/21/24) adopts three different 24-value profiles and provides customer choice

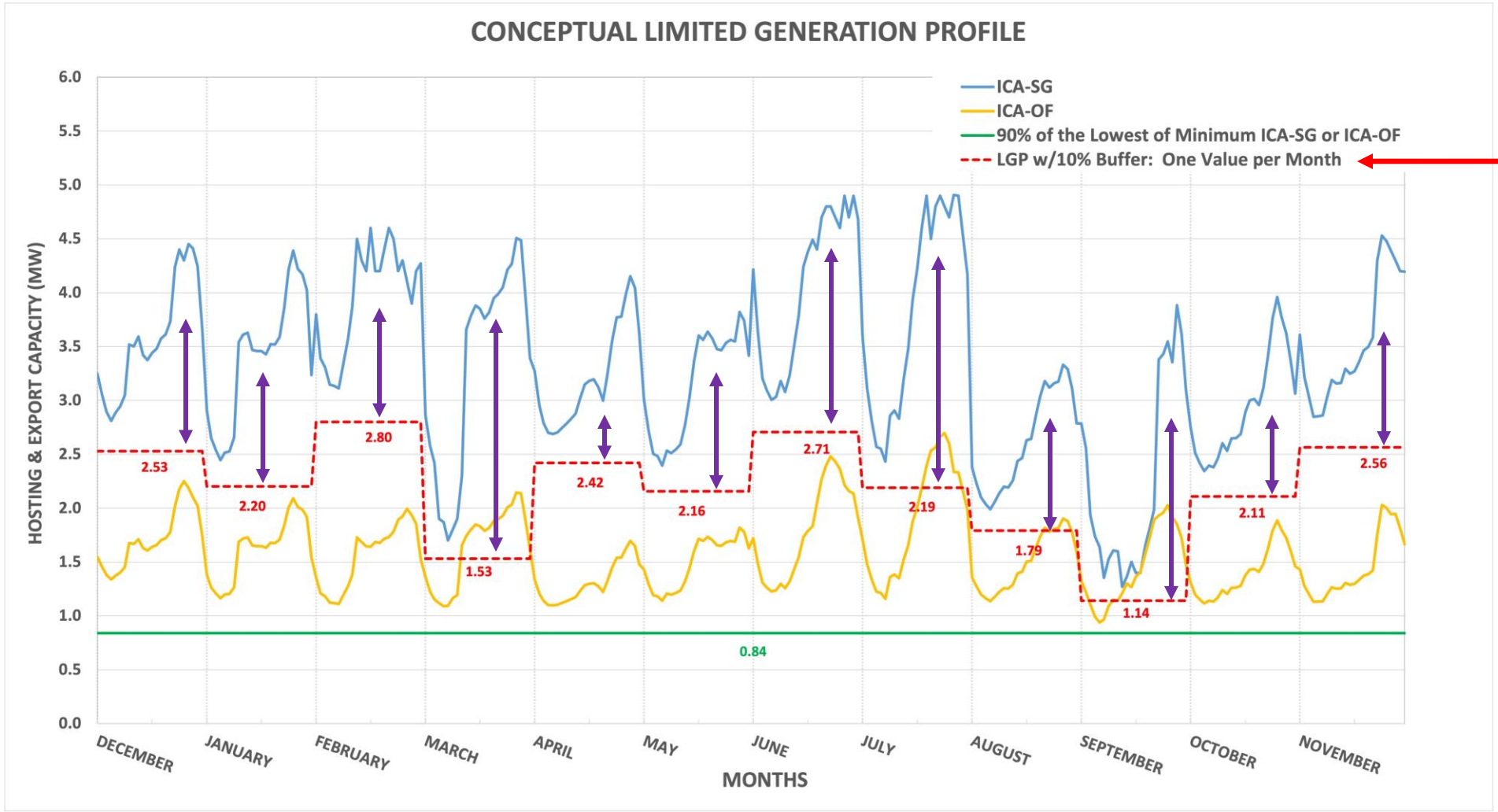
Interconnection Support for High DER Future & Rulemaking (R.21-06-017)

- Supports of a High DER future by enabling interconnection of generating systems through Rule 21
- Firm/Non-Firm interconnection agreements build on Limited Generation Profiles
  - LGP offers a variable export schedule as firm capacity with no ability to increase the export
  - In Firm/Non-Firm Capacity agreements (SIOWG) the LGP would become the firm-capacity limits, while allowing for additional non-firm capacity to meet grid needs

Interconnection Challenges

- How to avoid "stranded capacity" and grid upgrades
- Ensuring upgrades are performed only when the limit of the grid capacity has been reached while ensuring the safety and reliability of the grid
- Responsibility of Future Upgrades: Ratepayers or Developers or a shared mechanism?

Conceptual LGP and Firm/Non-Firm Capacity Agreements



Firm Capacity

Non-Firm Capacity; Granularity TBD

Figure 1: Conceptual illustration of the use of Limited Generation Profile using only one identical value per month (i.e., 12 different values per year). ***Note: A 12-value LGP is shown for simplicity. Draft Resolution E-5296 allows for three different profiles.***

California Demand Flexibility and High DER Future

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Demand Flexibility OIR (R.22-07-005)

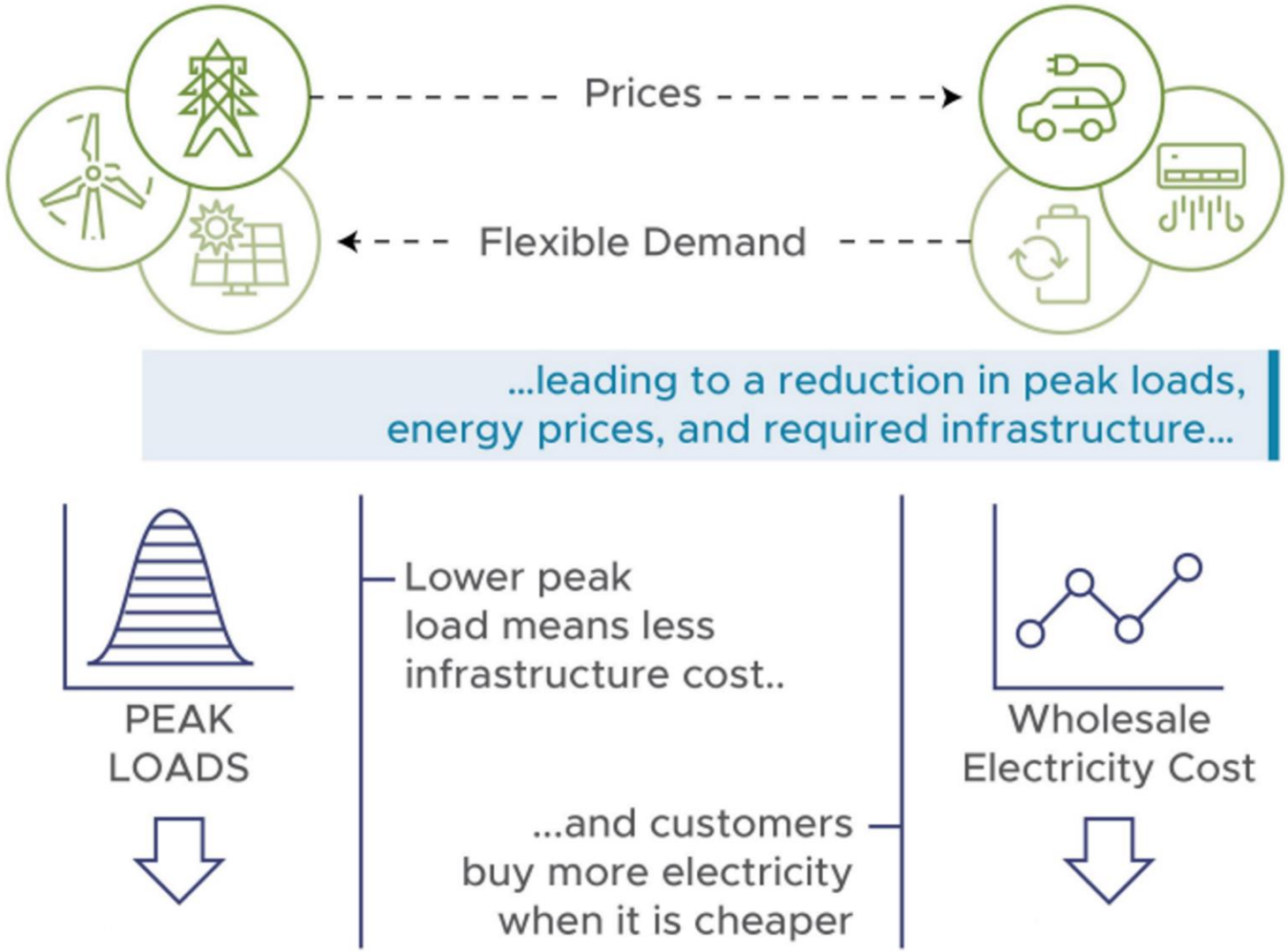
Summary and Goals

1. **Develop policies to achieve widespread customer adoption of automated demand flexibility solutions throughout the state**
   - Reduce long-term system costs through more efficient pricing of electricity to:
     - Make electricity bills more affordable and equitable, and,
     - Enable widespread building/transportation electrification.
   - Develop scalable solutions that accommodate participation by both bundled and unbundled customers
2. **Ensure IOUs comply with CEC's adopted Load Management Standards (LMS) Amendments for dynamic hourly, cost-based rates**

Tie-in to High DER Proceeding

1. **How can IOUs utilize dynamic distribution prices to delay/reduce distribution system upgrades?**
2. **How can existing DSO systems be used to enable dynamic distribution prices?**

Vision for Demand Flexibility

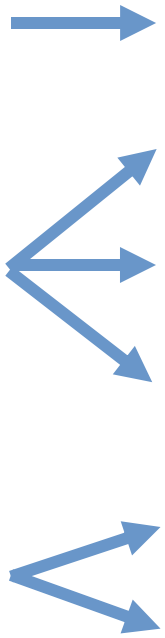


- ➔ Widespread adoption of demand flexibility solutions
- ➔ Reduced peak loads, energy prices, infrastructure needs
- ➔ Reduced cost of service

Image Source: PNNL DSO+T Study January 2022

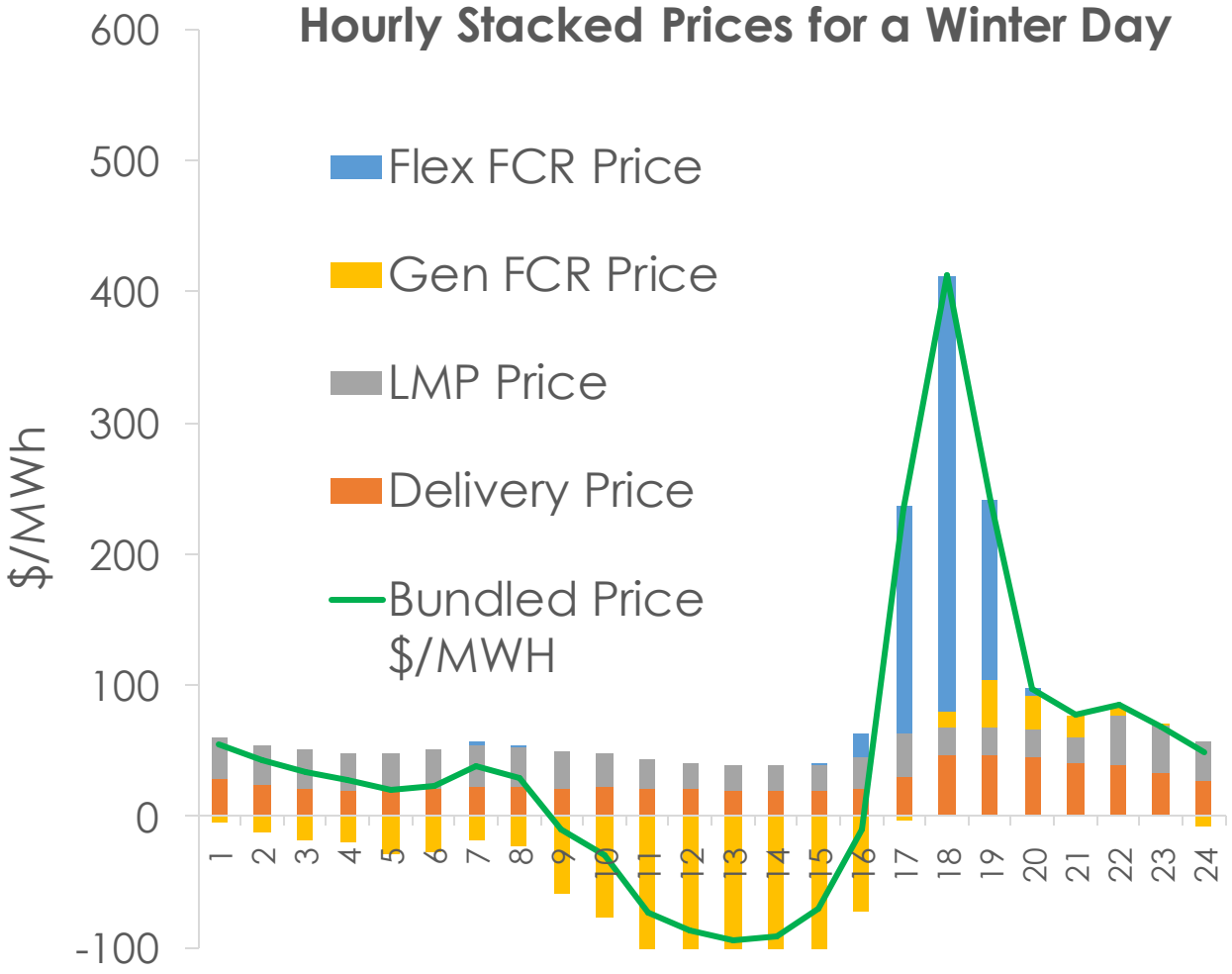
California Flexible Unified Signal for Energy – CalFUSE "Framework"

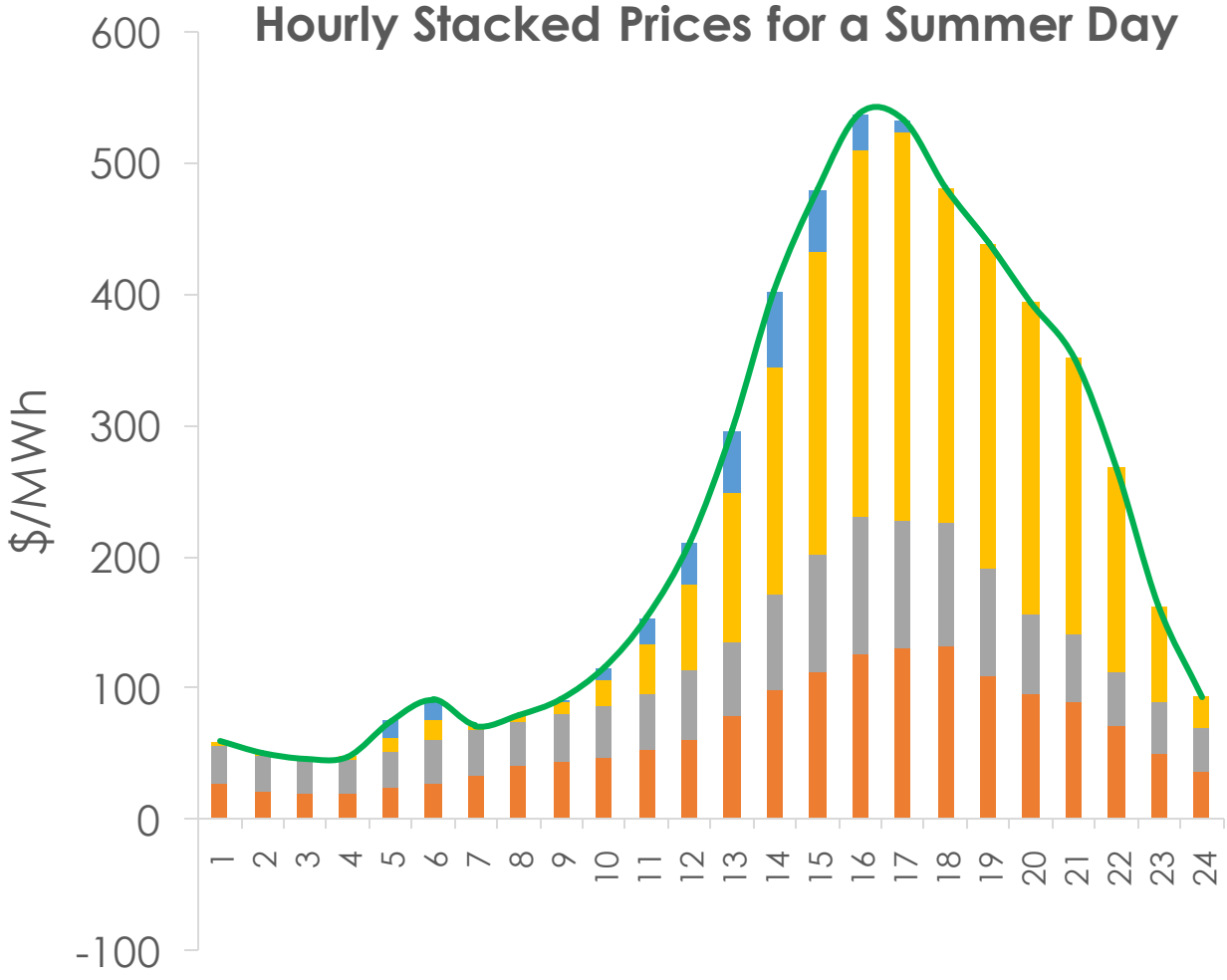
Three Pillars	Six Elements
Price Presentation	Element 1: Standardized price access
Rate Reform (Three-prong strategy)	Element 2: Real-time energy prices
	Element 3: Real-time capacity prices
	Element 4: Bi-directional prices
Customer Options for Energy Optimization	Element 5: Subscription option
	Element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



SCE CalFUSE Pilot – Illustrative Winter/Summer Prices

Composite Hourly Prices based on Hourly Capacity Utilization & CAISO LMP

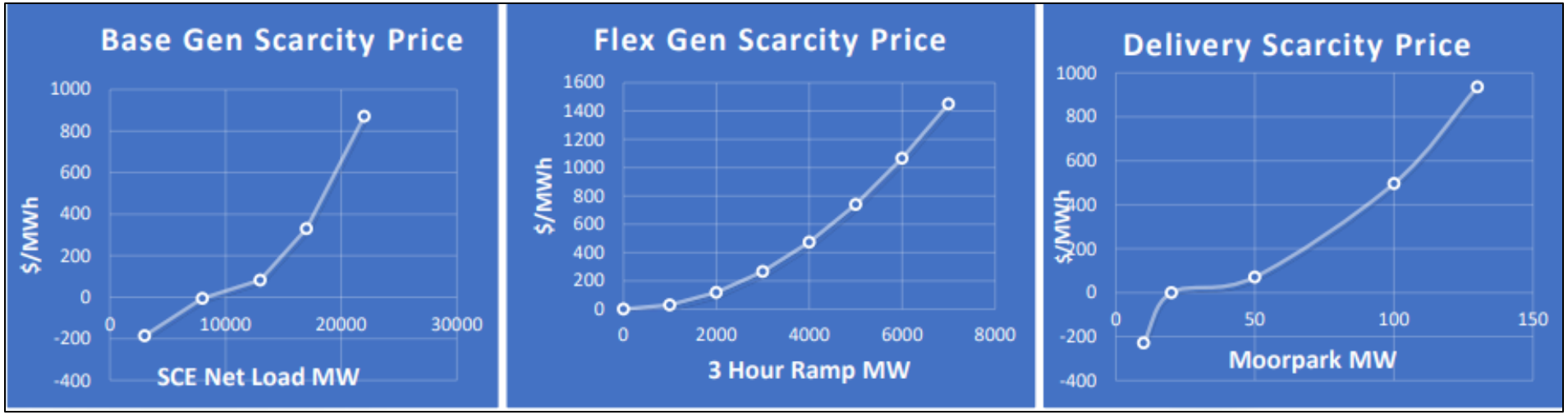




FCR = Fixed Cost Recovery

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

Form for Dynamic Generation/Distribution Prices



- **ED Staff Recommendation: Dynamic prices should be scarcity prices (function of load)**
  - System load for generation, local distribution load for distribution
- **Challenge for High-DER Future: Can existing IOU systems be used to enable the systems/process for dynamic pricing?**
  - Currently CalFUSE pilots are relying on 3rd-party forecasts for generating distribution load forecasts
  - Example solution: Integrate SCADA data with price machine to generate local distribution load forecasts

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Backup Slides

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We Anticipate a High-Penetration Distributed Energy Resource (DER) Future

"This OIR anticipates a high-penetration DER future and seeks to determine how to optimize the integration of millions of DERs within the distribution grid while ensuring affordable rates."

– High DER OIR at p. 9

"This OIR neither seeks to set policy on the overall number of DERs nor does it seek to increase or decrease the desired level of DERs. This OIR focuses on preparing the grid to accommodate what is expected to be a high DER future and capture as much value as possible from DERs as well as mitigate any unintended negative impacts."

– High DER OIR at p. 10