



Supply-Side Pilot II Introduction

Supply-Side Pilot (SSP II) Design Features



SSP II is a demand response pilot integrated with CAISO wholesale markets with an emphasis on providing distribution grid value

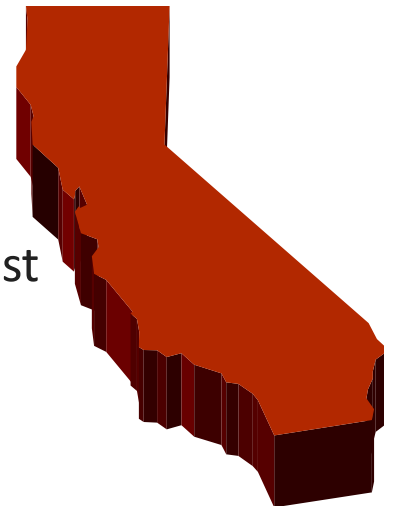
- Agenda
 - Design
 - Requirements
 - Settlements

Design > Requirements > Settlement

CAISO Markets In a Nutshell



- Four Basic Products
 - Energy – By Interval to Balance Supply and Demand
 - Non Spinning Reserves – Off-line, 10-Minute for Grid Contingencies
 - Spinning Reserves – Immediately Dispatchable for Grid Contingencies
 - Regulation – Instantaneous Supply and Demand
- Two Basic Market Timeframes
 - Day Ahead Market (DAM)
 - 24 Separate Hourly Solutions
 - 100% of AS Requirements Procured Based on Forecast
 - Real-time Market (RTM)
 - 15-Minute Capacity and Unit Commitment
 - 5-Minute Energy



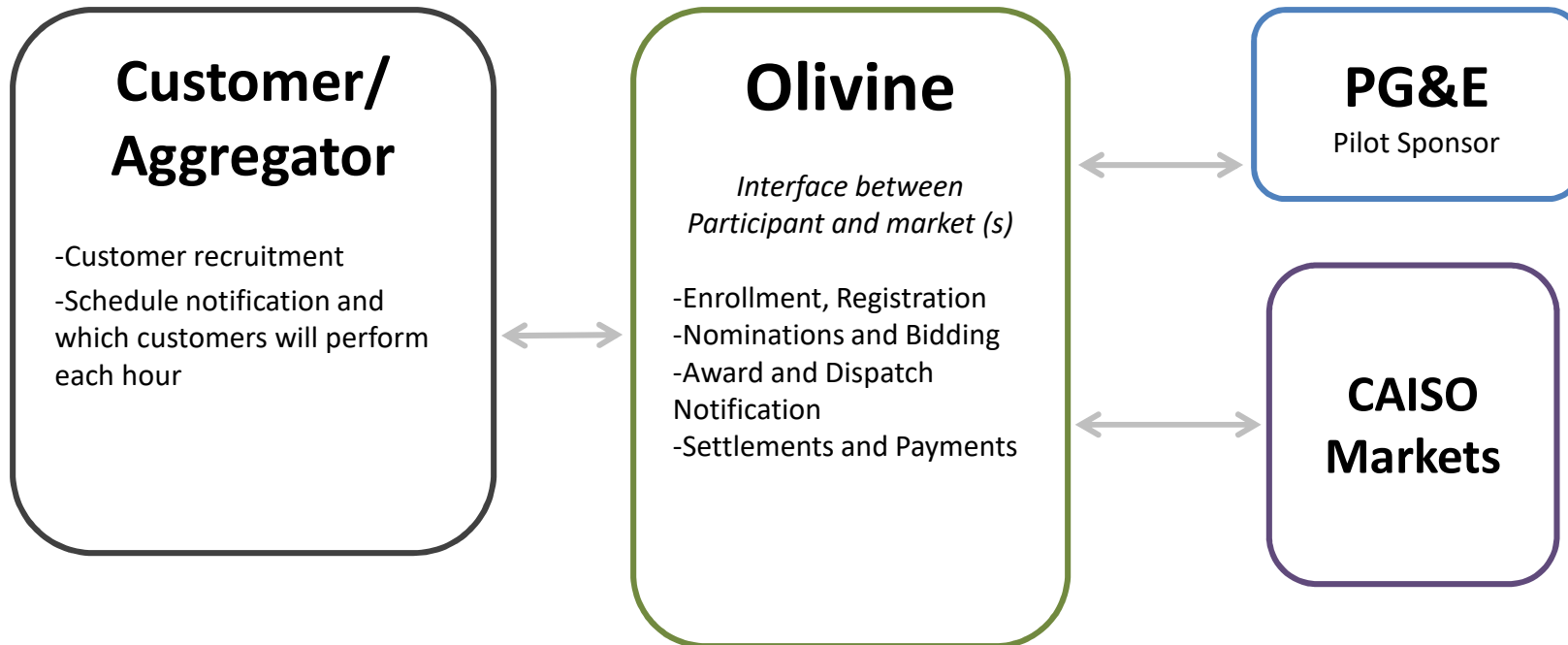
Supply-Side Pilot Design Features



Pilot Operations Overview:

- Nominate capacity into Pilot
- Bid day-ahead energy (DA)
 - C&I: Optionally bid into real-time energy (RT) & ancillary services (A/S) markets
- Respond to market awards by reducing load
- Performance calculated by “10-in-10” baseline
- Participant earns capacity payment (\$10/kW-month)
- Wholesale market settlements passed along directly to participant

Roles

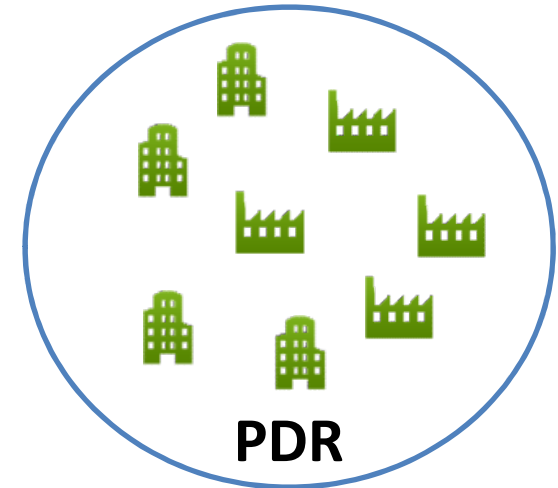


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Eligibility Criteria



- One PDR per participant
- All locations in a PDR must be:
 - Served by the same LSE
 - Located in the same Sub-LAP
- Underlying customer may **not** be enrolled in any other DR program before/while enrolled in SSP II (e.g. SmartRate, PDP)
- Each PDR must be able to provide four **(4)** consecutive hours of 100 kW minimum load shed



Eligibility Criteria



- 30 kW “Out of Market” Option (Residential Only)
 - Approved resources from 30-100 kW may participate in the SSP II without CAISO registration
 - Dispatches will occur according to CAISO price signals.
 - Participation can transition to CAISO once 100 kW achieved.
 - May pursue statistical sampling to form baseline for larger aggregations

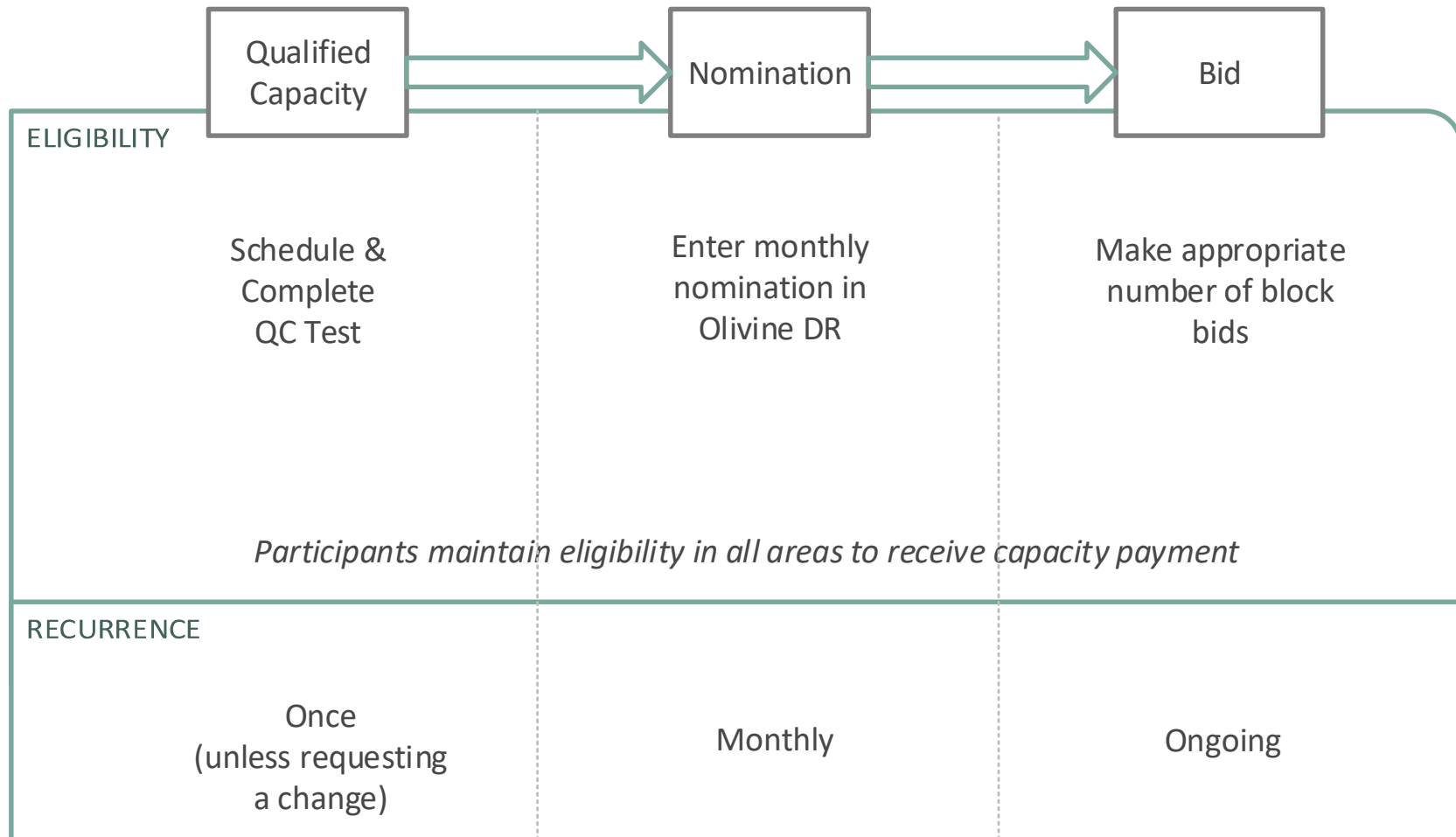
Pilot limitations



- Total capacity award may be limited
- All underlying customers must be interval metered
 - Limits on number of locations
 - Limits on registration changes

Enrollment Process	Responsible	Deadline <small>(in Calendar time before the first trade date, T)</small>
Declaration of Interest Form	Participant	
Enrollment Workbook, CISR Form, Customer Acknowledgement Forms (<i>Aggregators only</i>), Pilot Contact Form	Participant	T – 8 weeks
PG&E Eligibility Check	PG&E	T – 6 weeks
Participation Agreement Executed	Participant	T – 5 weeks
PDR registration at ISO	Olivine, ISO	T – 4 weeks
Pilot Training	Participant, Olivine	T – 3 weeks
Qualified Capacity Test	Participant, Olivine	T – 2 weeks
Hands-on Training	Participant, Olivine	T – 1 week
>>>Begin Market Operations		T

Pilot Requirements (Overview)



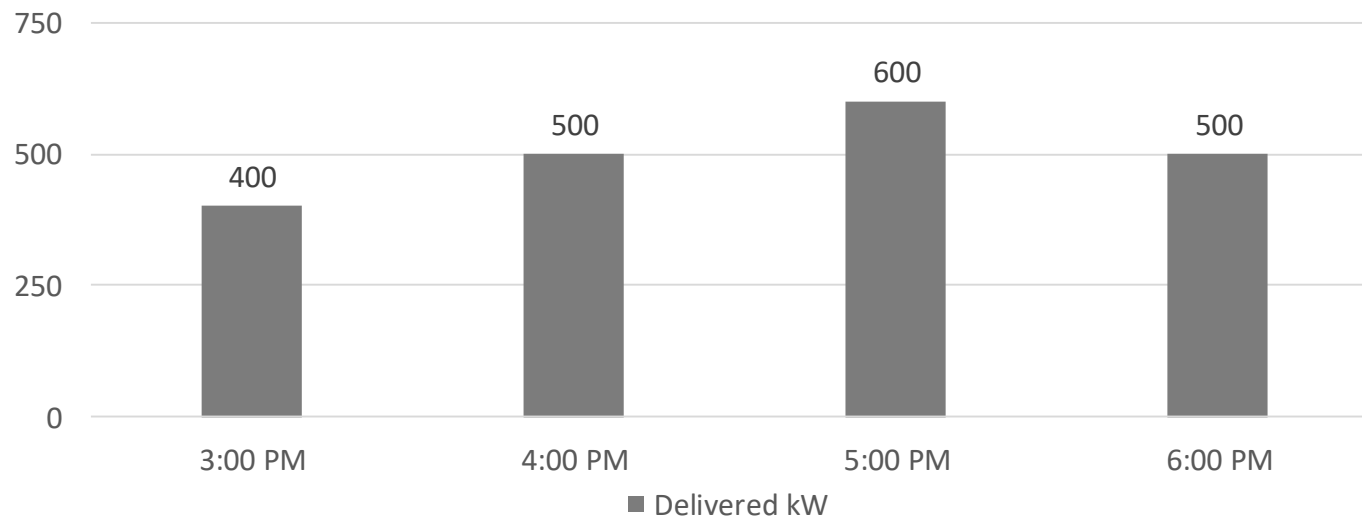
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Qualified Capacity (QC)



- QC = Max quantity biddable into the market
- Test of avg. energy delivered over the period

$$(400 + 500 + 600 + 500) / 4 = 500 \text{ kW Qualified Capacity}$$



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Nomination



- A monthly capacity commitment to deliver load shed for the pilot
- Forms the basis of the monthly capacity payment
- Nominations cannot exceed qualified capacity value (QC)

Bidding Requirements



- 4-hour blocks x 18 unique days = 72 bid hours
(\$10/kW-month)
- May enter bids for any hours (24 x 7)
- Dispatchable for at least 24 awards per month

Bidding Requirements (Summary)



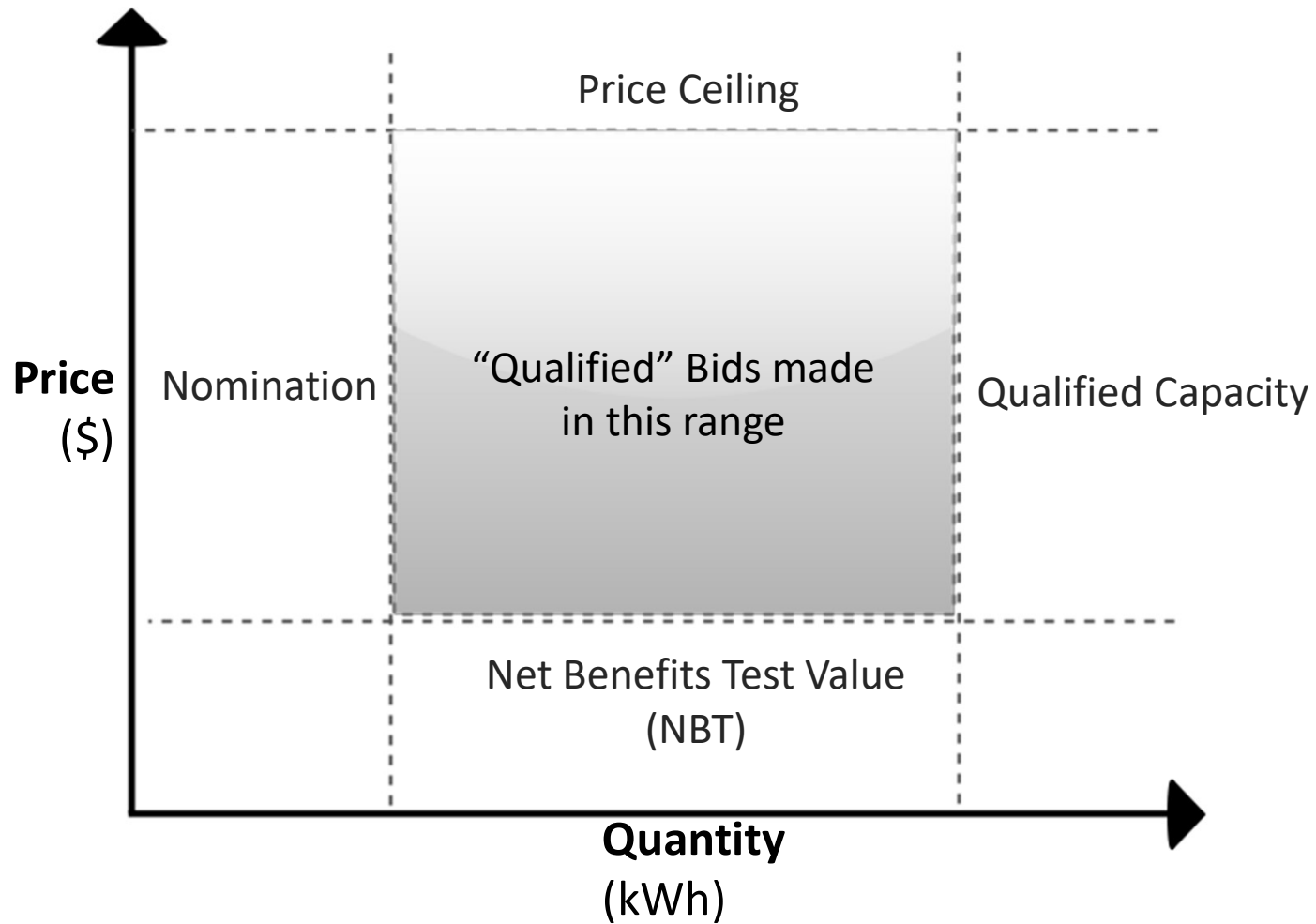
Bid Blocks	Total Bid Hours	Unique Days	Dispatchable at least	Capacity Payment
4-hour contiguous bid blocks	72	18	24 hours per month	\$10 kW-month

SSP II Participation



- Bids have both a price and quantity
 - Price Floor = Net Benefits Test Value
 - Price Ceiling = \$150/MWH
- Bids & awards are hourly
- Timelines:
 - Bids: 8:30am the day before
 - Awards: by 1pm the day before (if available)
- OpenADR optional

Bidding Requirements (Day-ahead)



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Settlement



Two sources of revenue for SSP:

- 1. Capacity Payments:** Dependent on fulfillment of pilot requirements above
- 2. Wholesale Energy Payments:** All payments & charges from wholesale market are passed along directly to participants

How is performance measured?

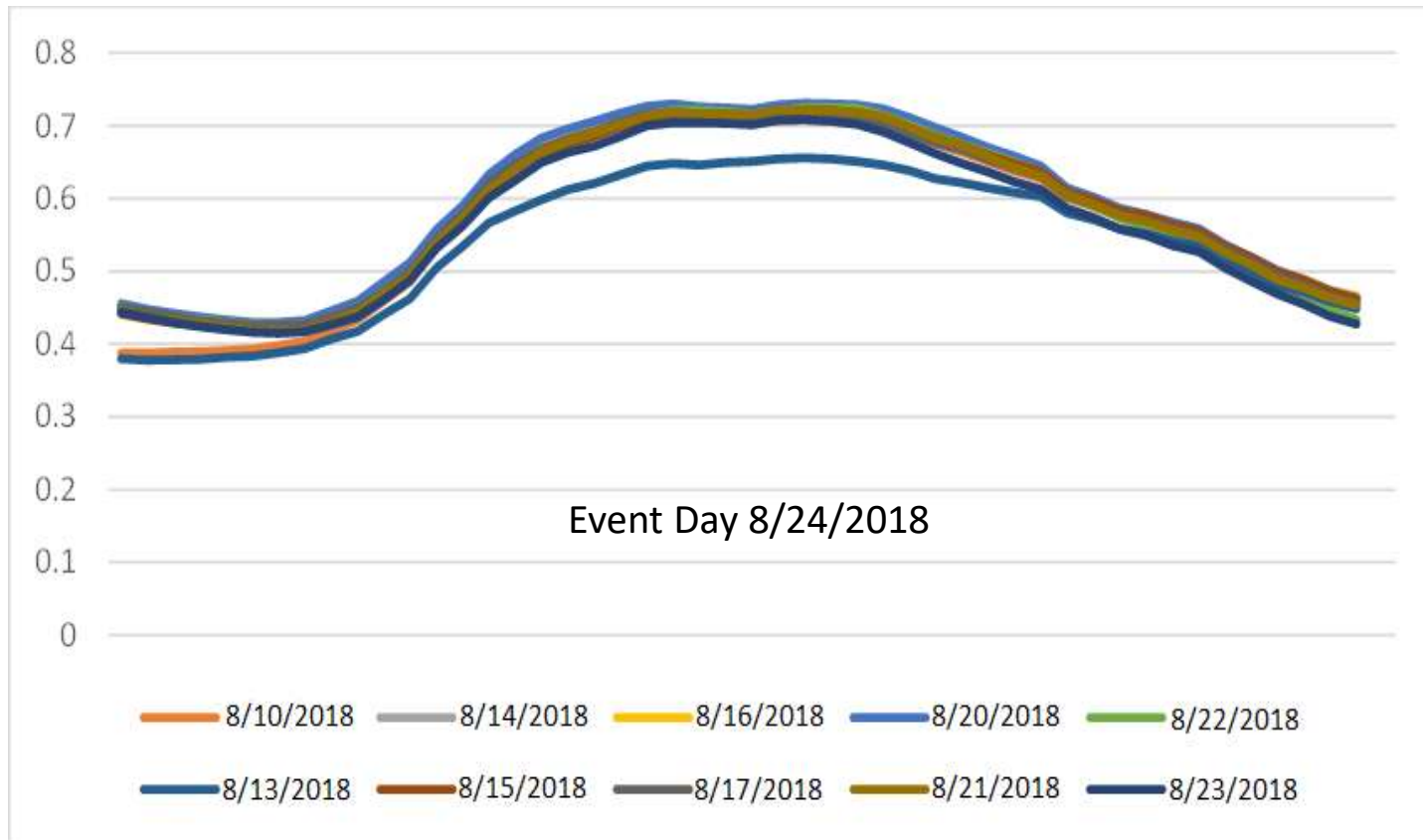


- “10-in-10” Baseline calculates an average of the **whole premises (i.e., no sub-metering)** meter data
 - Based on 10 previous similar days
 - Day-of adjustment capped at $\pm 20\%$
 - 45-day look-back period
 - Determines load reduction or “pseudo-generation”
- Applies to capacity and energy settlements

Baseline Step #1



- Identify 10 similar, non-event days

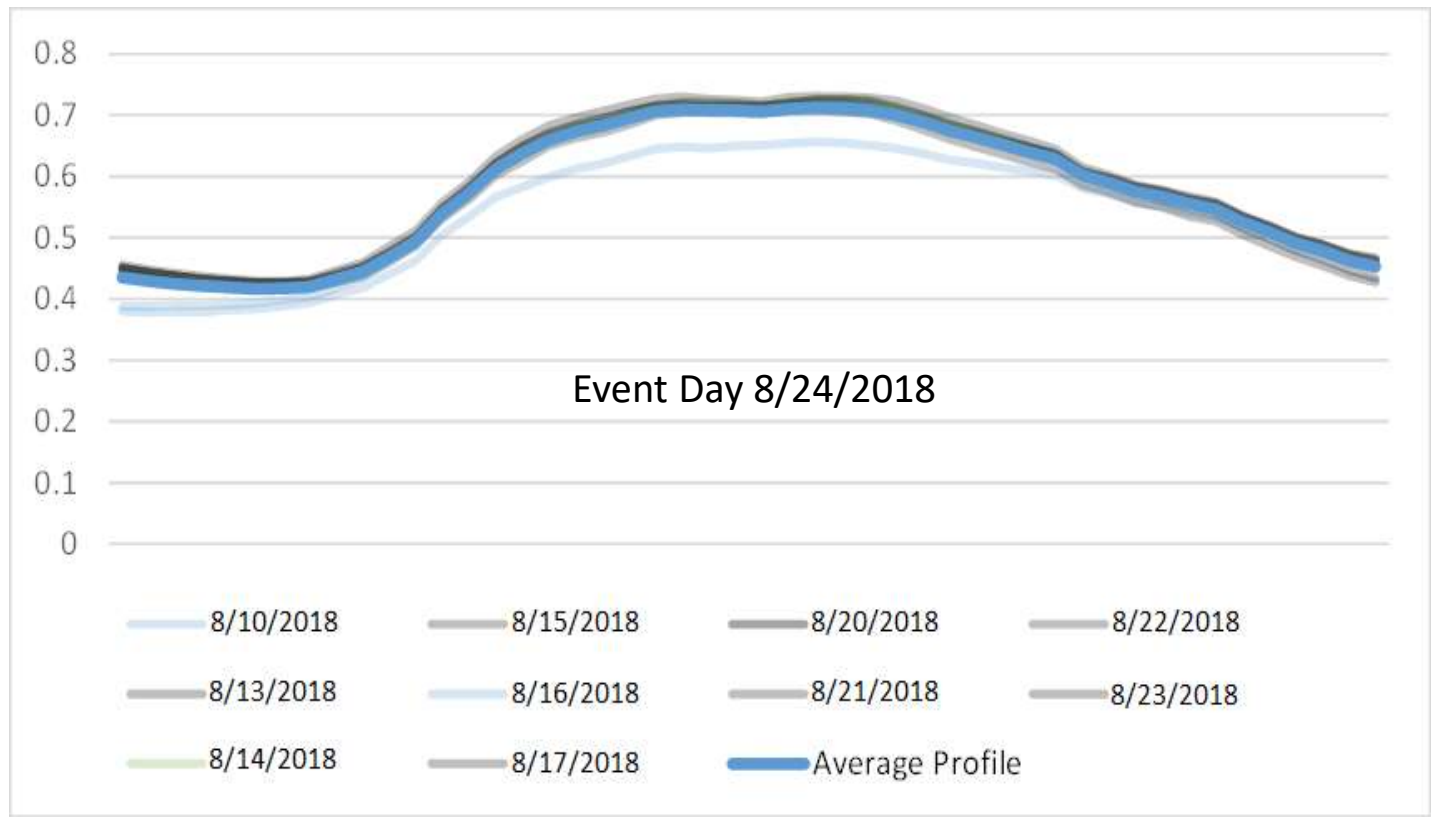


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Baseline Step #2



- Calculate Average Profile

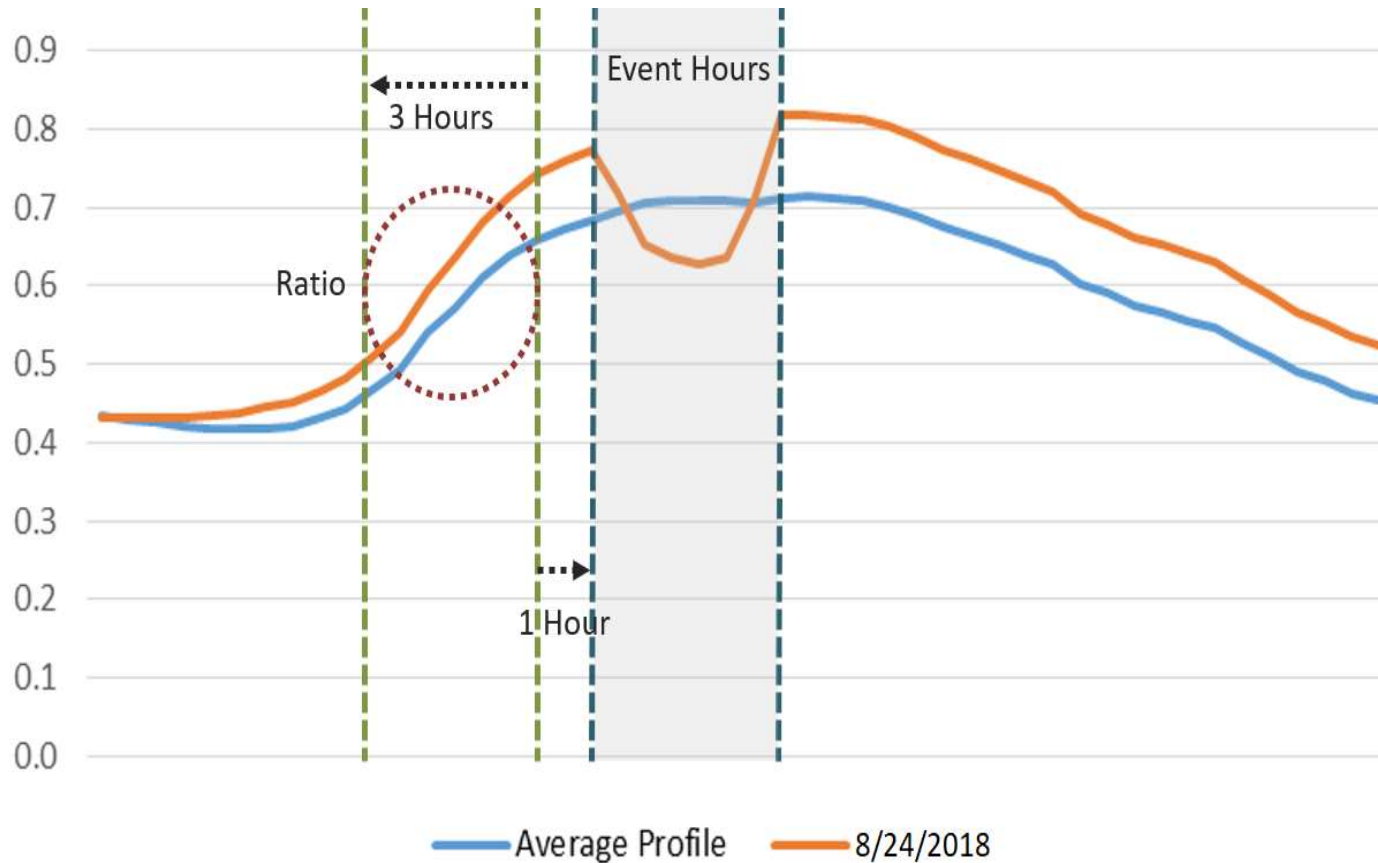


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Baseline Step #3



- Determine day-of adjustment

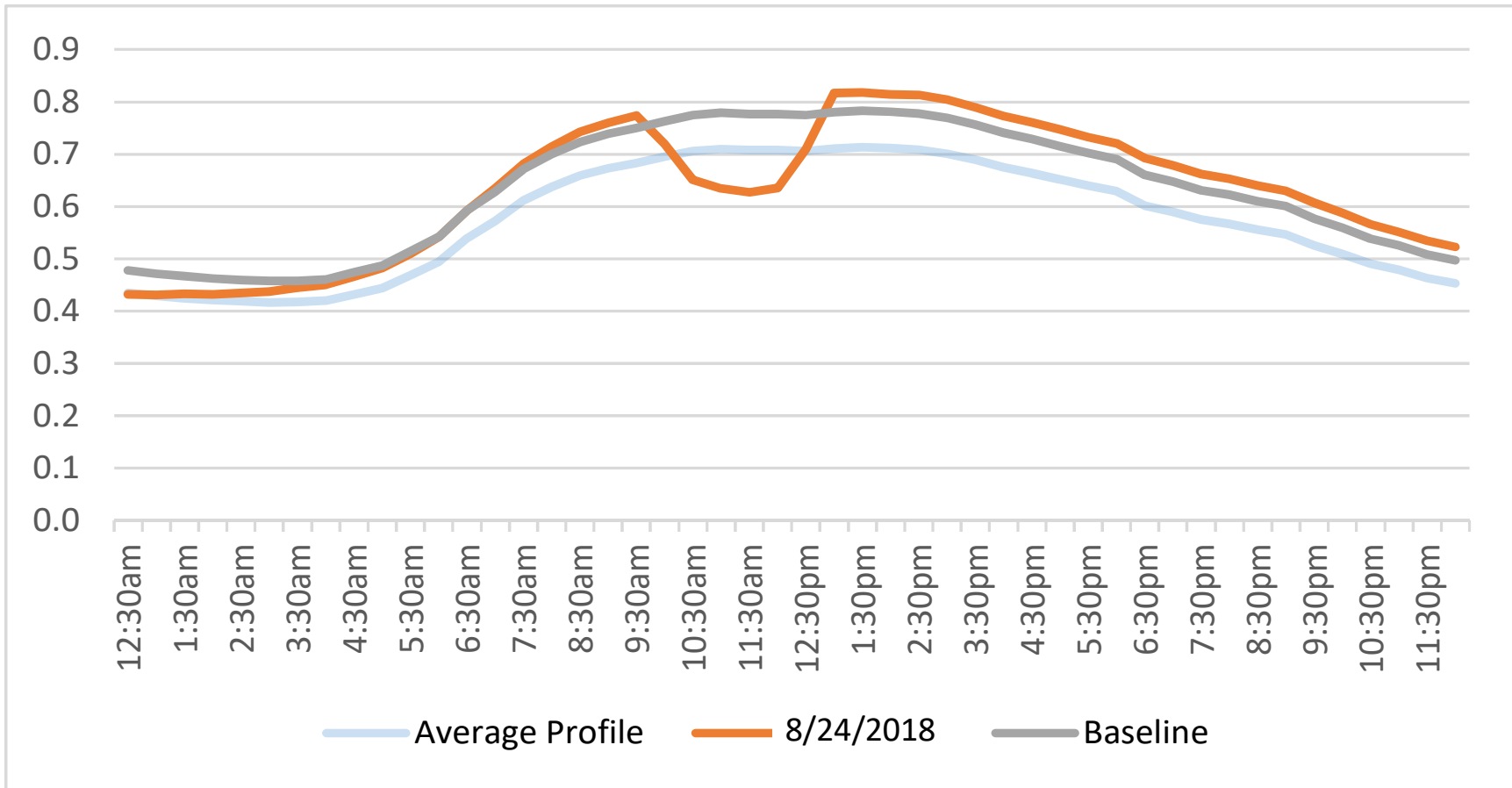


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Baseline Step #4



- Apply day-of adjustment to create baseline

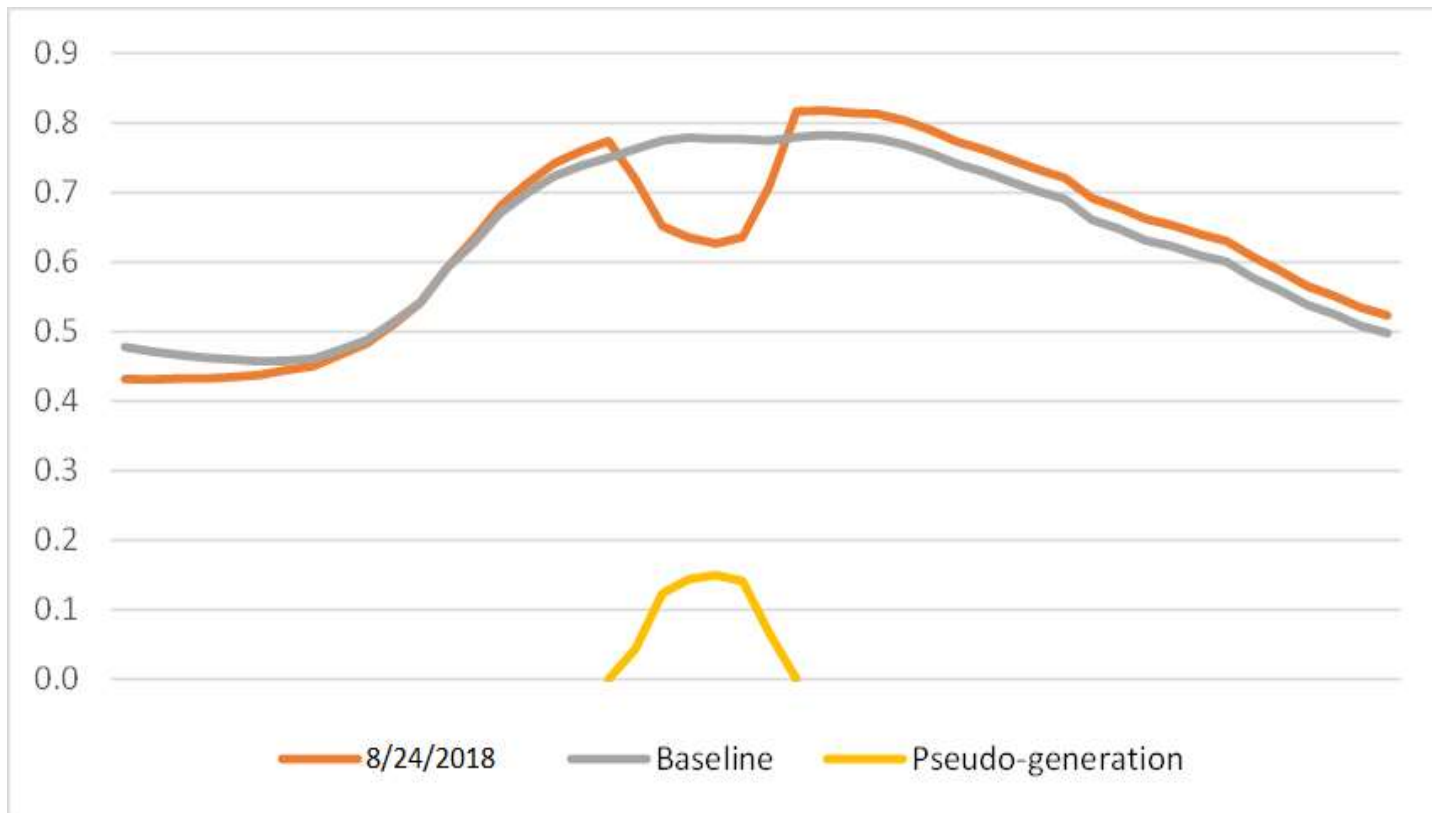


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Performance Calculation



- Baseline minus event day



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Capacity Payments



- If monthly pilot requirements are met, then:

Capacity payment =

[Capacity Price] x [Nomination] x [Monthly Performance]

- **Capacity Price:** \$10/kW-month
- **Nomination:** Monthly kW number chosen by participant
- **Monthly performance:** (see next slide)

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Adjustment Factor



- Performance values rounded up for settlement:

Raw Performance	Adjusted Performance
$0.75 < x$	1.00
$0.50 < x \leq 0.75$	0.75
$0.25 < x \leq 0.50$	0.50
$0 < x \leq 0.25$	0.25
$x \leq 0$	0

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Wholesale Energy Payments



- ISO Day-ahead (DA) awards settled at DA energy clearing price
- Any over-delivery and under-delivery are settled at the Real-time (RT) Uninstructed Imbalance Energy price

$$\begin{aligned} &\text{Wholesale Settlement} = \\ &\{ \text{DA energy price} \times \text{DA award} \} \\ &\quad \pm \\ &\{ \text{Over/Under Delivery} \times \text{RT price} \} \end{aligned}$$

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ISO Calculation: Example



Assumptions:

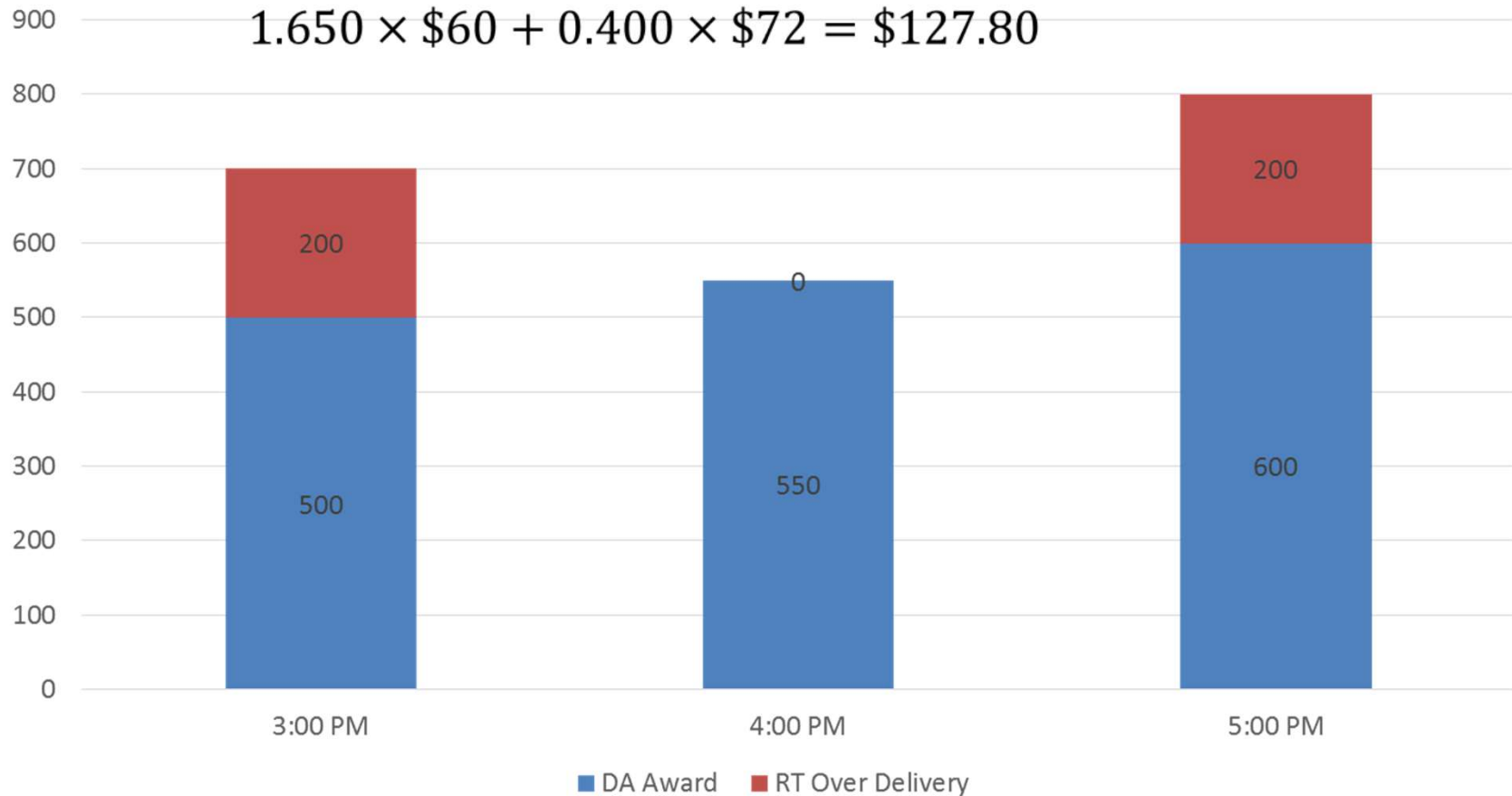
- Assume award is for 3 consecutive hours
- Day-ahead energy price is \$60.00 / MWH
- Real-time imbalance energy price is \$72.00 / MWH

ISO Calculation: Over-Delivery



$$DA\ Award \times DA\ Price + Over\ Delivery \times RT\ Price =$$

$$1.650 \times \$60 + 0.400 \times \$72 = \$127.80$$



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ISO Calculation: Under-Delivery



$$700 \text{ DA Award} \times \text{DA Price} + \text{Under Delivery} \times \text{RT Price} =$$
$$1.650 \times \$60 - 0.600 \times \$72 = \$55.80$$



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Real-time (RT) & Ancillary Services (A/S)



- Both are optional
- No enablement funds available
- No additional pilot capacity payments; wholesale settlements are still passed through
- Have additional requirements
- Requires minimum three months active participation in Day-ahead (DA) SSP
- A/S requires 500 kW and longer timelines

Real-time (RT) Participation



- Requires minimum three months active participation in Day-ahead (DA) SSP
- RT Market bids are hourly
- If awarded, participant receives RT Dispatches in 5-minute intervals:
 - Requires RT Control (OpenADR); must be able to respond to dispatch signals
 - Signals come 2 ½ minutes before dispatch interval

Real-time (RT) Participation



- Bids initially entered in DA
- If no awards, must bid those hours in RT
- Participants may provide conditional bids to be sent RT or enter bids manually:
 - May insert/edit bids until 2 hours before trade hour
- RT bid prices & quantities:
 - No RT bid price ceiling
 - Hours with dispatches for bids at or above nomination count towards 24 hours

Conclusion: *Participant Next Steps*



- Complete DOI forms as soon as possible
 - 1 resource per participant, with limits on capacity & number of locations
- Contact:
 - pge-pilots@olivineinc.com
 - <http://olivineinc.com/ssp/>