Electric Avoided Cost Meeting

1:30-3:30 p.m.

May 12, 2017

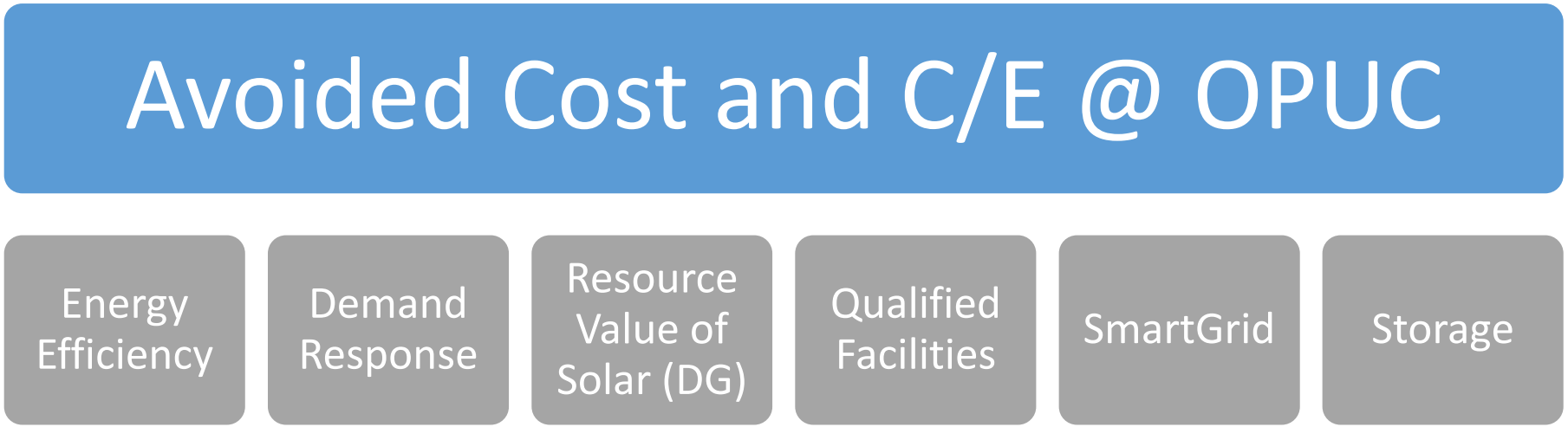
EnergyTrust of Oregon

Agenda

- Introduction
  - OPUC
  - Energy Trust
  - Schedule for updates
- Overview of Process to Update Avoided Costs
- Proposed Updates for 2017
- Possible Future Updates
- Overview of Inputs
- Q&A

Introduction from OPUC

- OPUC recommended that Energy Trust host this meeting
- OPUC exploring avoided cost across many dockets and as part of many forums



Introduction from Energy Trust

- Purpose of the meeting
  - To describe and get input on the process of assembling avoided costs
- Energy Trust uses avoided costs to value energy savings for planning and reporting
  - Prescriptive and custom measures
  - Programs

Schedule

- Already received inputs from utilities
- Avoided cost meetings May 12
  - Natural gas avoided costs
  - Electric avoided costs
- Updates completed for 2018 planning and implementation June 30

Avoided Costs

- Assign economic value to energy savings based on utility system benefits
- The “benefit” in benefit-cost ratios, along with non-energy benefits
- Used for reporting and testing for measures and programs

Avoided Cost Update Process

- Happens every two years for electric and gas
- Key inputs come from utilities and Power Council
- Energy Trust is largely a “taker” of inputs, i.e., we make the stew but don’t grow the vegetables
- We blend values from each utility by share of revenue

Current Total Resource Cost Test Formula

$$\frac{Benefit}{Cost}\,Ratio = \frac{(Avoided\ Costs + Non\ Energy\ Benefits)}{Costs}$$

$$\begin{aligned} Avoided\ Cost = \\ &(Forward\ Prices) \cdot (1 + Line\ Losses) \\ &\cdot (1 + 10\%\ Power\ Act\ Credit) \\ &+ Avoided\ T\&D \\ &+ Generation\ Deferral\ Value \\ &+ Risk\ Reduction\ Value \end{aligned}$$

Forward Prices

- Forecasts of marginal supply costs from each utility
  - Covering high and low load hours (to represent on and off-peak pricing)
  - By month and year
  - Forecast of future wholesale market prices
  - Includes forecasted utility costs of carbon compliance
- Weighted for each load shape for each end use

$$
\begin{aligned}
Avoided\ Cost = \\
&(Forward\ Prices) \cdot (1 + Line\ Losses) \\
&\cdot (1 + 10\%\ Power\ Act\ Credit) \\
&+ Avoided\ T\&D \\
&+ Generation\ Deferral\ Value \\
&+ Risk\ Reduction\ Value
\end{aligned}
$$

NW Power Act Credit

- NW Power Act: Gives energy efficiency a 10% cost advantage
- 839a(4)(D): For purposes of this paragraph, the "estimated incremental system cost" of any conservation measure or resource shall not be treated as greater than that of any non-conservation measure or resource unless the incremental system cost of such conservation measure or resource is in excess of 110 per centum of the incremental system cost of the nonconservation measure or resource.
- *[Northwest Power Act, §3(4)(0), 94 Stat. 2699.]*

$$
\begin{aligned}
&Avoided\ Cost = \\
&\quad (Forward\ Prices + Avoided\ T\&D) \cdot (1 + Line\ Losses) \\
&\quad \cdot (1 + 10\%\ Power\ Act\ Credit) \\
&\quad + Avoided\ T\&D \\
&\quad + Generation\ Deferral\ Value \\
&\quad + Risk\ Reduction\ Value
\end{aligned}
$$

Avoided Transmission and Distribution Costs

- Saving energy defers or eliminates capital expenses to expand and/or maintain transmission & distribution infrastructure
- These values are intended to represent long-term effects; the values for deferring specific projects in specific locations is considered separately

$$
\begin{aligned}
Avoided\ Cost = \\
&(Forward\ Prices) \cdot (1 + Line\ Losses) \\
&\cdot (1 + 10\%\ Power\ Act\ Credit) \\
&+ Avoided\ T\&D \\
&+ Generation\ Deferral\ Value \\
&+ Risk\ Reduction\ Value
\end{aligned}
$$

Generation Deferral Value

- Energy efficiency also defers the need to build generation/capacity resources
- Counted when utilities are not “sufficient”—when they do not have enough resources to meet projected load

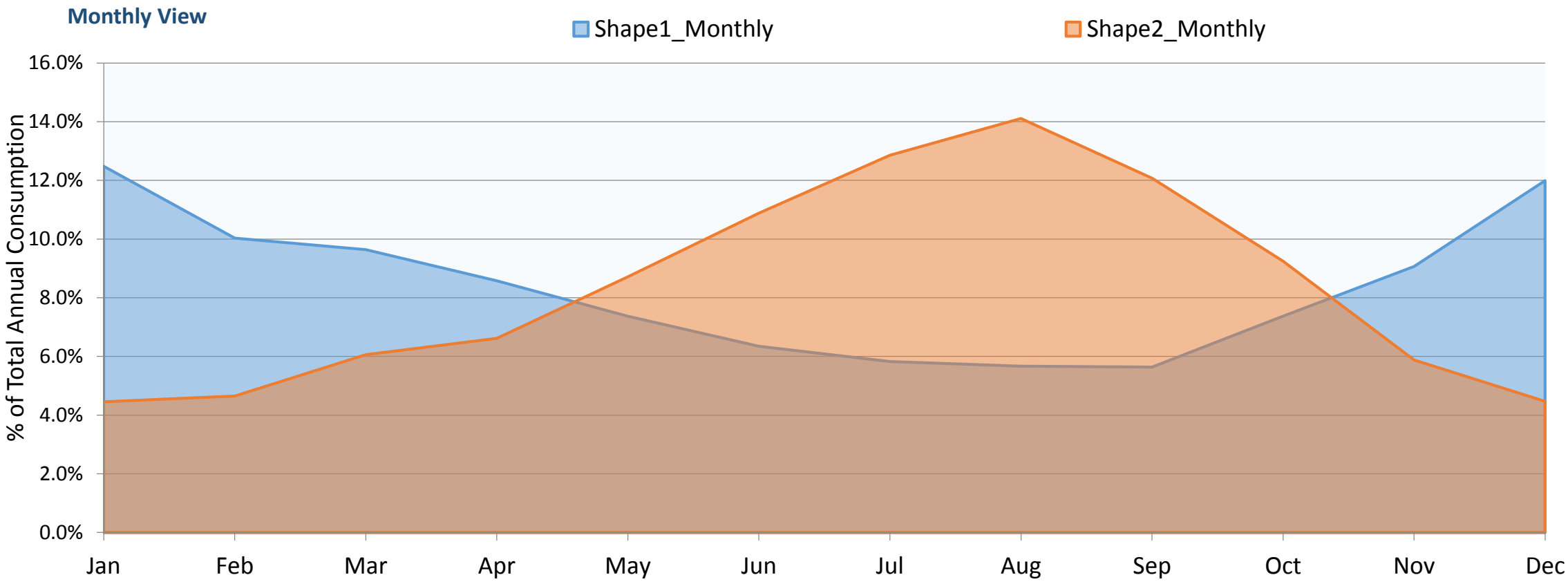
$$
\begin{aligned}
Avoided\ Cost = \\
&(Forward\ Prices) \cdot (1 + Line\ Losses) \\
&\cdot (1 + 10\%\ Power\ Act\ Credit) \\
&+ Avoided\ T\&D \\
&+ Generation\ Deferral\ Value \\
&+ Risk\ Reduction\ Value
\end{aligned}
$$

Risk Reduction Credit

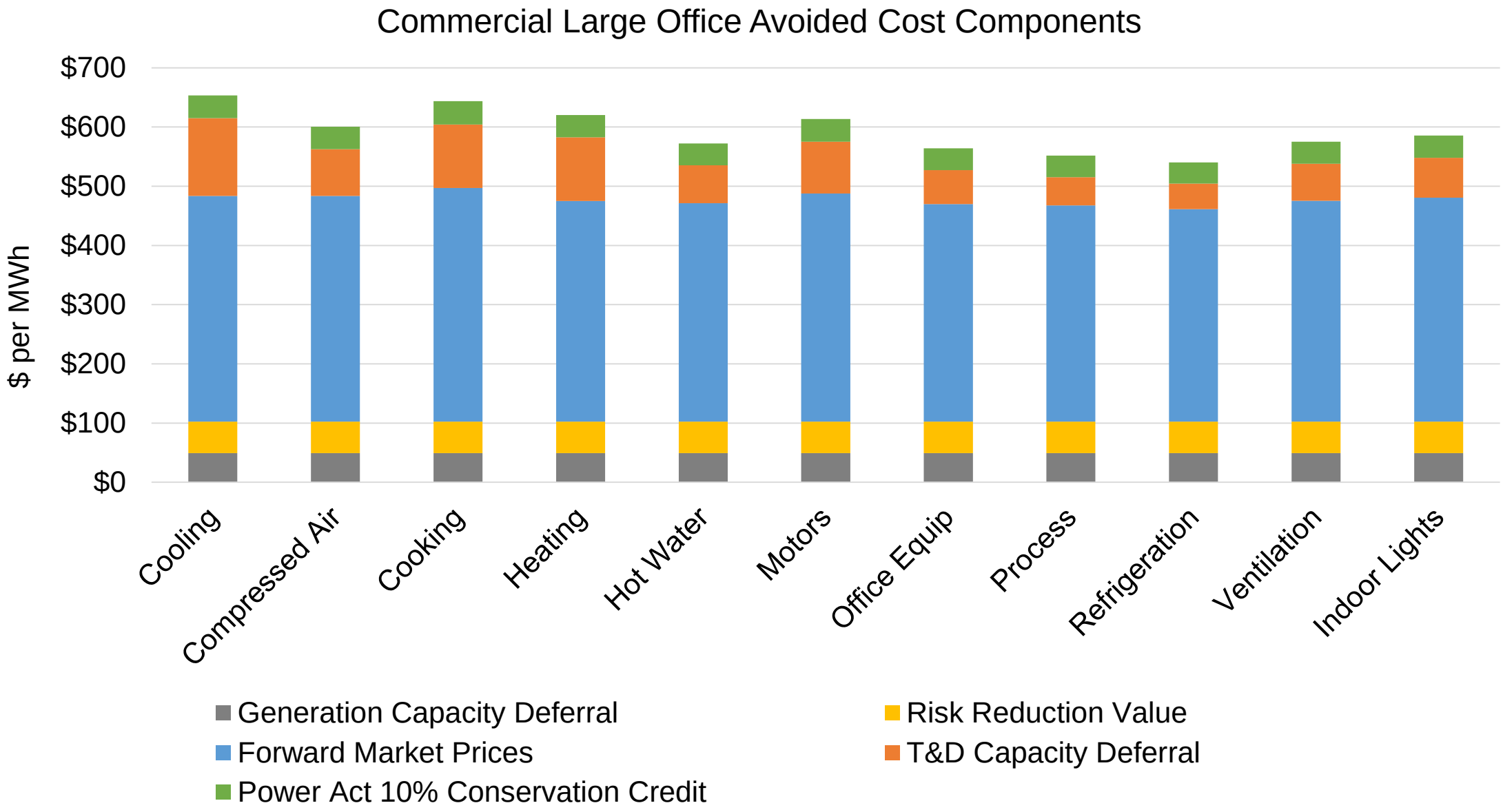
- Pursuing energy efficiency instead of other resources reduces risk:
  - Cost-effective energy efficiency is purchased in smaller increments
  - Protects from price risk/volatility

$$
\begin{aligned}
Avoided\ Cost = & \\
& (Forward\ Prices) \cdot (1 + Line\ Losses) \\
& \cdot (1 + 10\%\ Power\ Act\ Credit) \\
& + Avoided\ T\&D \\
& + Generation\ Deferral\ Value \\
& + Risk\ Reduction\ Value
\end{aligned}
$$

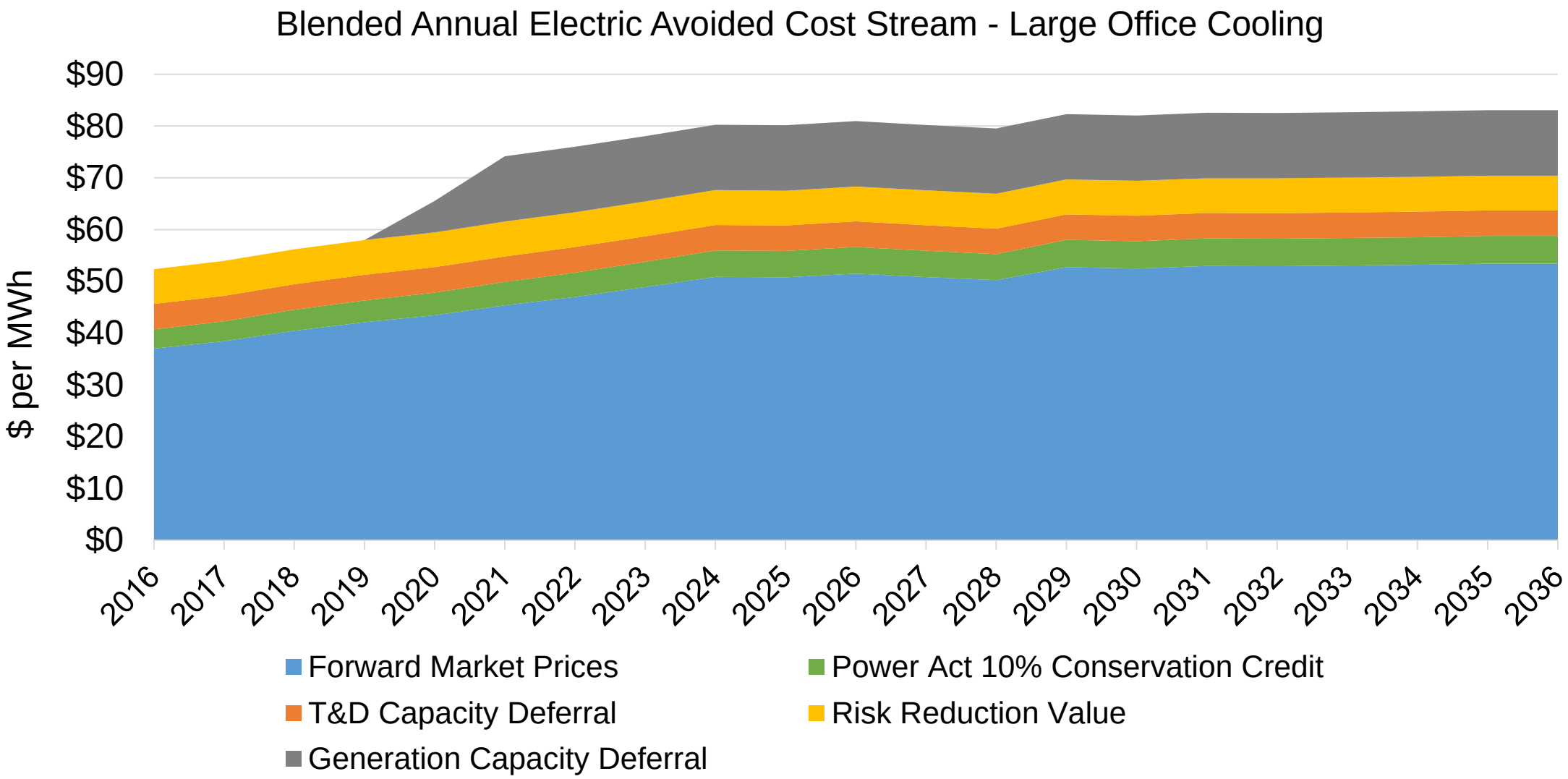
Shape to NWPCC Load Profiles



Example of Differences by End Use



2016 Electric Avoided Cost Buildup



Proposed Changes to Avoided Cost Methodology

- Incorporate as many years of price forecasts that utilities have available.
- Replacing a method for interpolating value between measure lives with the actual value of the savings for each measure life.
- Apply 10% conservation adder to T&D and generation capacity deferral.

$$
\begin{aligned}
&Avoided\ Cost = \\
&\quad (Forward\ Prices) \cdot (1 + Line\ Losses\ and\ transmision) \\
&\quad \cdot (1 + 10\%\ Power\ Act\ Credit) \\
&\quad + Avoided\ T\&D \cdot (1 + 10\%\ Power\ Act\ Credit) \\
&\quad + Generation\ Deferral\ Value \cdot (1 + 10\%\ Power\ Act\ Credit) \\
&\quad + Risk\ Reduction\ Value
\end{aligned}
$$

Possible Changes for Later

- Assign peak generation capacity value *for each load* shape, as opposed to assuming a flat load shape.
  - If we can start with $/kW we can assign a peak value for each load shape based on its coincidence factors and the load factors for each utility.
- Use utility specific peak definitions to calculate T&D and generation capacity deferral values, as opposed to NWPCC regional definition.

- Include generation capacity value starting in the first year of the analysis period regardless of sufficiency/insufficiency period.

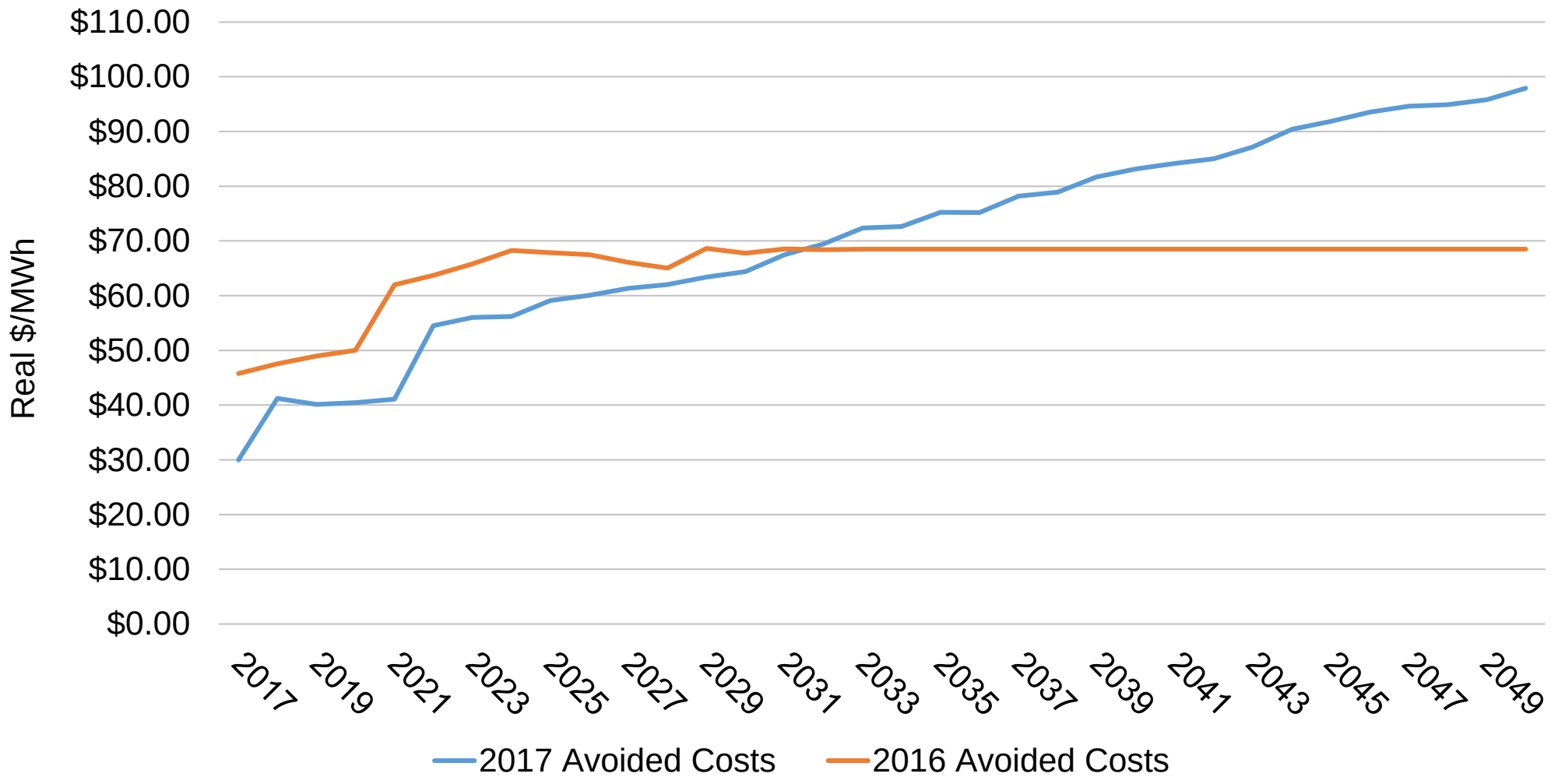
Updated PGE Inputs

Year	Forward Market Price - HLH ($/MWh)	Forward Market Price - LLH ($/MWh)	T&D Capacity Deferral ($/KW-yr)	Generation Capacity Deferral ($/MWh)	Risk Reduction Value ($/MWh)	RPS Reduction Benefit ($/MWh)
2017	$24.65	$22.33	$33.26	$0.00	$5.08	$1.43
2018	$21.85	$19.45	$33.26	$14.06	$5.08	$1.43
2019	$20.63	$18.52	$33.26	$14.06	$5.08	$1.43
2020	$20.37	$18.46	$33.26	$14.06	$5.08	$1.90
2021	$21.23	$18.84	$33.26	$14.06	$5.08	$1.90
2022	$34.75	$32.20	$33.26	$14.06	$5.08	$1.90
2023	$36.14	$33.78	$33.26	$14.06	$5.08	$1.90
2024	$36.29	$34.06	$33.26	$14.06	$5.08	$1.90
2025	$38.80	$36.05	$33.26	$14.06	$5.08	$2.57
2026	$39.71	$37.03	$33.26	$14.06	$5.08	$2.57
2027	$40.89	$38.43	$33.26	$14.06	$5.08	$2.57

Previous PGE Inputs

Year	Forward Market Price HLH ($/MWh)	Forward Market Price LLH ($/MWh)	T&D Capacity Deferral ($/KW-yr)	Generation Capacity Deferral ($/MWh)	Risk Reduction Value ($/MWh)
2016	$39.13	$29.30	$31.28	$0.00	$10.38
2017	$40.54	$30.23	$31.28	$0.00	$10.38
2018	$42.82	$31.53	$31.28	$0.00	$10.38
2019	$44.22	$32.91	$31.28	$0.00	$10.38
2020	$44.65	$34.59	$31.28	$0.00	$10.38
2021	$55.08	$25.88	$31.28	$11.13	$10.38
2022	$56.80	$27.62	$31.28	$11.13	$10.38
2023	$58.96	$29.69	$31.28	$11.13	$10.38
2024	$61.29	$32.22	$31.28	$11.13	$10.38
2025	$60.92	$31.77	$31.28	$11.13	$10.38
2026	$60.57	$31.43	$31.28	$11.13	$10.38

PGE Comparison



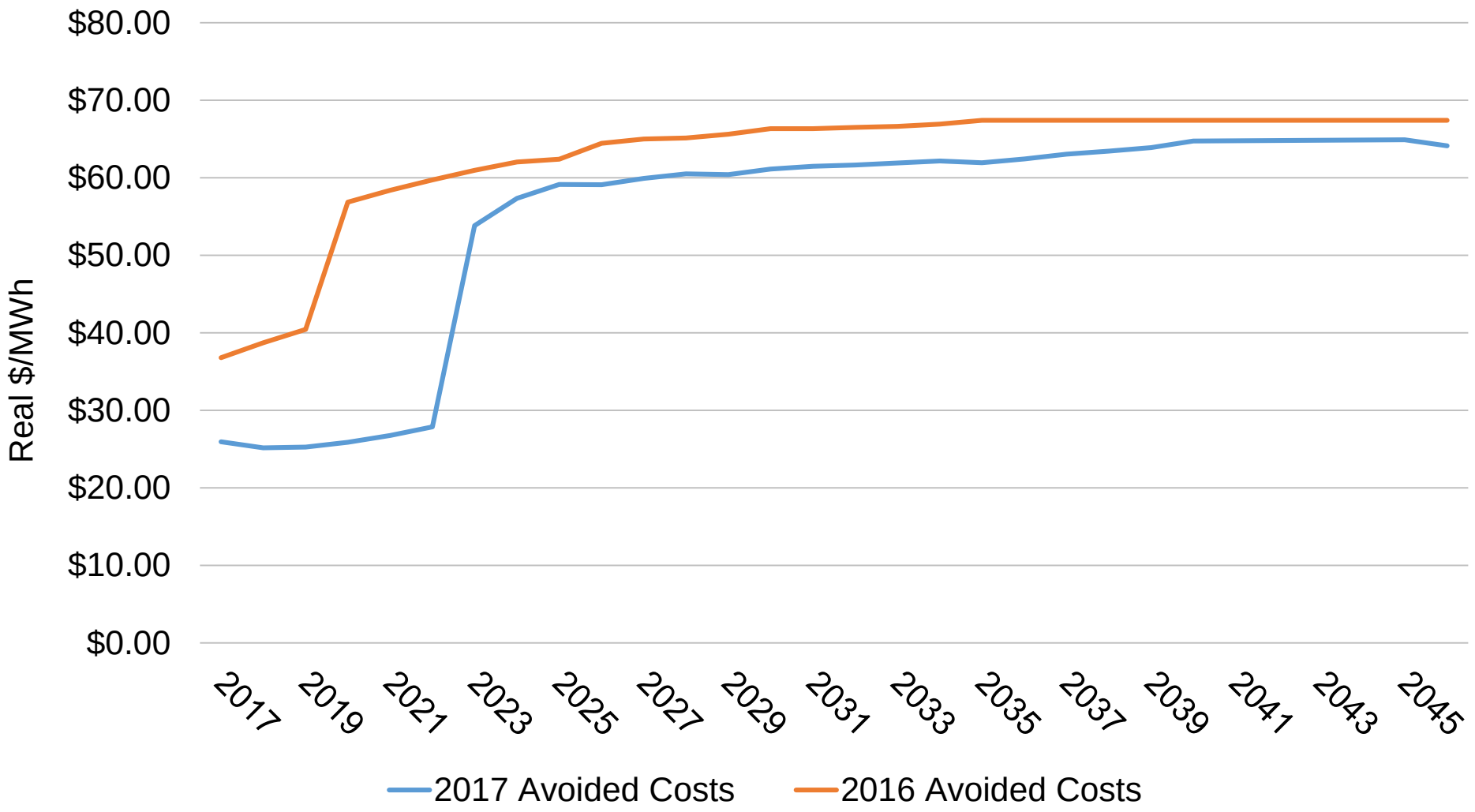
Updated Pacific Power Inputs

Year	Forward Market Price - HLH ($/MWh)	Forward Market Price - LLH ($/MWh)	T&D Capacity Deferral ($/KW-yr)	Generation Capacity Deferral ($/MWh)	Risk Reduction Value ($/MWh)
2017	$27.46	$21.31	$13.56	$0.00	$1.56
2018	$26.51	$20.67	$13.56	$0.00	$1.56
2019	$26.91	$20.50	$13.56	$0.00	$1.56
2020	$27.75	$20.85	$13.56	$0.00	$1.56
2021	$28.31	$22.11	$13.56	$0.00	$1.56
2022	$29.45	$23.15	$13.56	$0.00	$1.56
2023	$32.97	$27.11	$13.56	$22.23	$1.56
2024	$36.26	$30.83	$13.56	$22.23	$1.56
2025	$38.05	$32.67	$13.56	$22.23	$1.56
2026	$37.94	$32.69	$13.56	$22.23	$1.56
2027	$38.75	$33.50	$13.56	$22.23	$1.56

Previous Pacific Power Inputs

Year	Forward Market Price HLH ($/MWh)	Forward Market Price LLH ($/MWh)	T&D Capacity Deferral ($/KW-yr)	Generation Capacity Deferral ($/MWh)	Risk Reduction Value ($/MWh)
2016	$38.50	$29.14	$55.03	$0.00	$1.46
2017	$40.48	$30.18	$55.03	$0.00	$1.46
2018	$42.71	$31.79	$55.03	$0.00	$1.46
2019	$44.84	$33.08	$55.03	$0.00	$1.46
2020	$46.79	$34.40	$55.03	$14.80	$1.46
2021	$47.69	$36.57	$55.03	$14.80	$1.46
2022	$48.29	$38.64	$55.03	$14.80	$1.46
2023	$49.67	$39.74	$55.03	$14.80	$1.46
2024	$50.74	$40.82	$55.03	$14.80	$1.46
2025	$51.26	$40.99	$55.03	$14.80	$1.46
2026	$53.77	$42.63	$55.03	$14.80	$1.46

Pacific Power Comparison



Q & A

Thank You

Spencer Moersfelder, Planning Manager
Spencer.Moersfelder@energytrust.org
503.445.7635

EnergyTrust of Oregon