Demand Response

2022-2041 Potential Assessment

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Potential Assessment Overview

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- Conduct assessment of residential and commercial sector demand response potential in the Tacoma Power service territory
- Estimate the amount of achievable technical potential (MW) for the 2022-2041 study period
- Primarily uses DR measure options and assumptions identified by the Northwest Power and Conservation Council in the 2021 Plan
- Uses Power Council methodology to analyze potential
- Separately analyzed winter and summer potential

Study Findings

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Winter DR Potential

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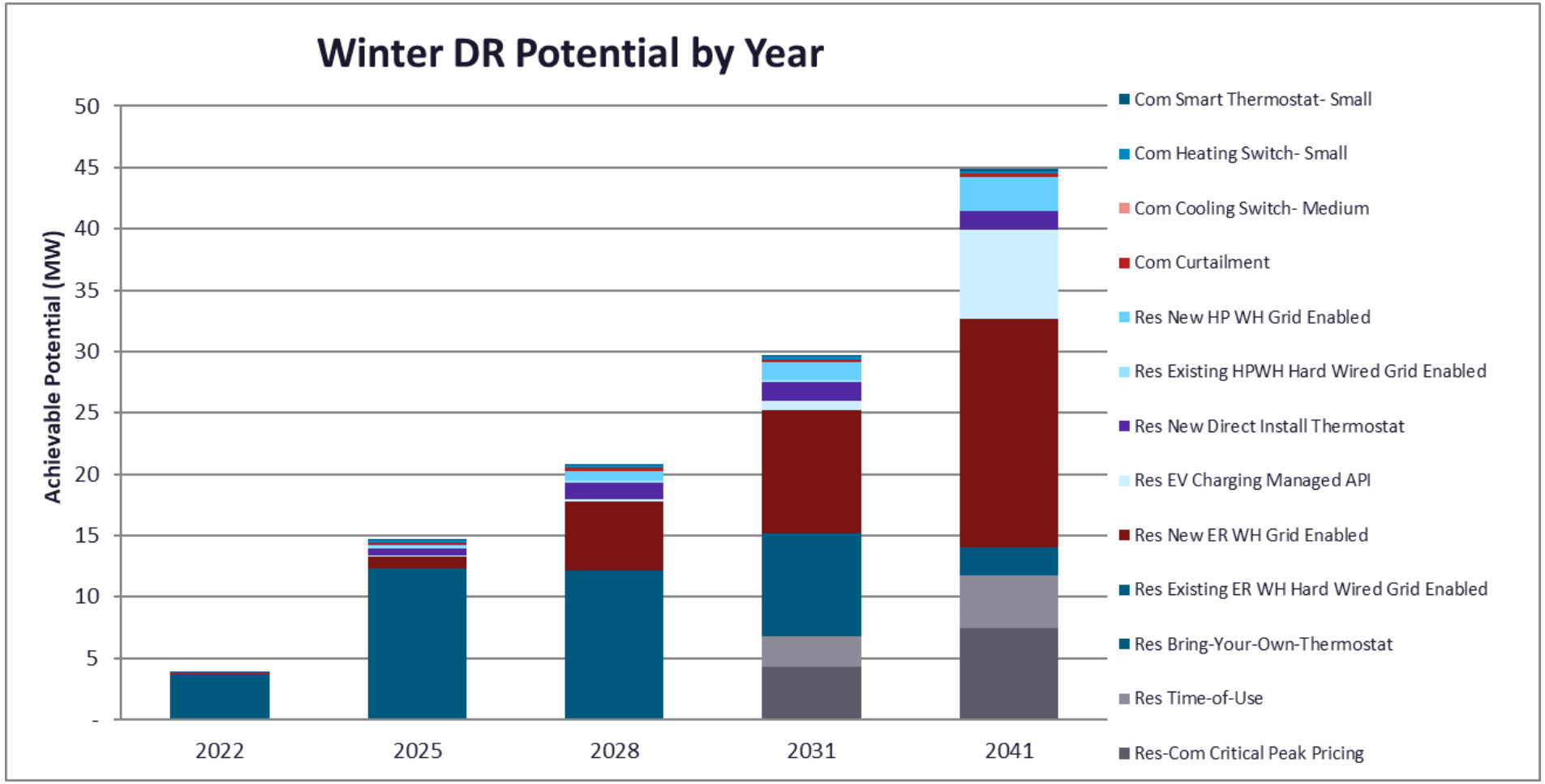
- In total, 45 MW of residential and commercial achievable technical potential
- Largest DR measures include grid enabled water heaters, commercial peak pricing, managed residential EV charging, residential time of use rates



Sumer DR Potential

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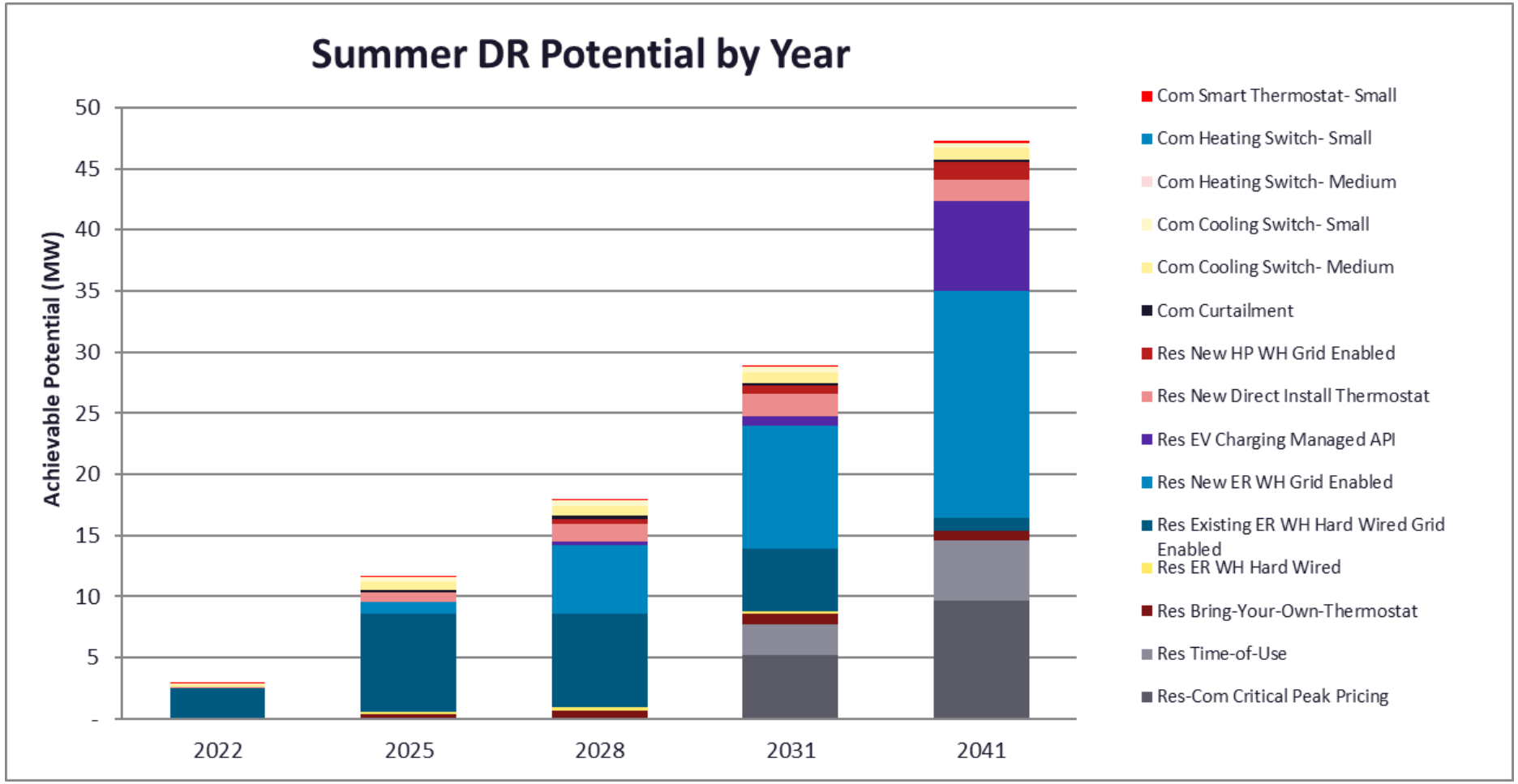
- In total, 47 MW of residential and commercial achievable technical potential
- Largest DR measures include grid enabled water heaters, commercial peak pricing, managed residential EV charging, residential time of use rates



Measure Characteristics Matter

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Factors that drive the MW impact and cost per MW

- Ramp rate deployment schedule
- Amount and timing of load reduction per unit
- **Costs:** Per unit measure cost, fixed administrative costs, maintenance costs

Other considerations

- Some measures overlap and require a net calculation, for example Critical Peak Pricing rates drive similar impacts to an end-use such as a grid enabled water heater

MW Impact vs. Cost

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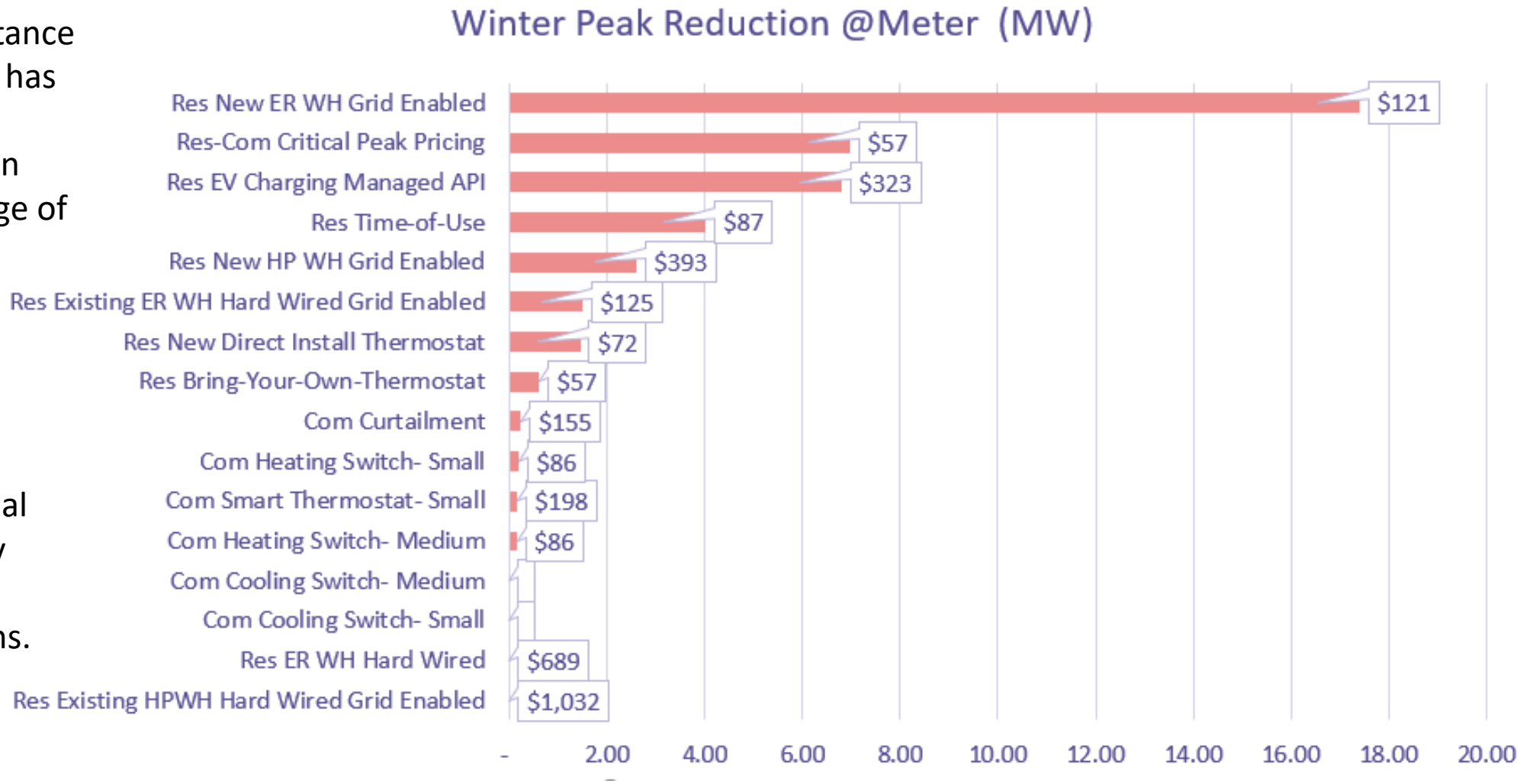
Residential resistance water heater DR has some of highest potential and is in the medium range of costs

Rates-based programs have a little less potential but are relatively low-cost and are promising options.



Note: Bars represent winter peak reduction potential for each measure and boxes to the right of the bars present their $/MW cost.

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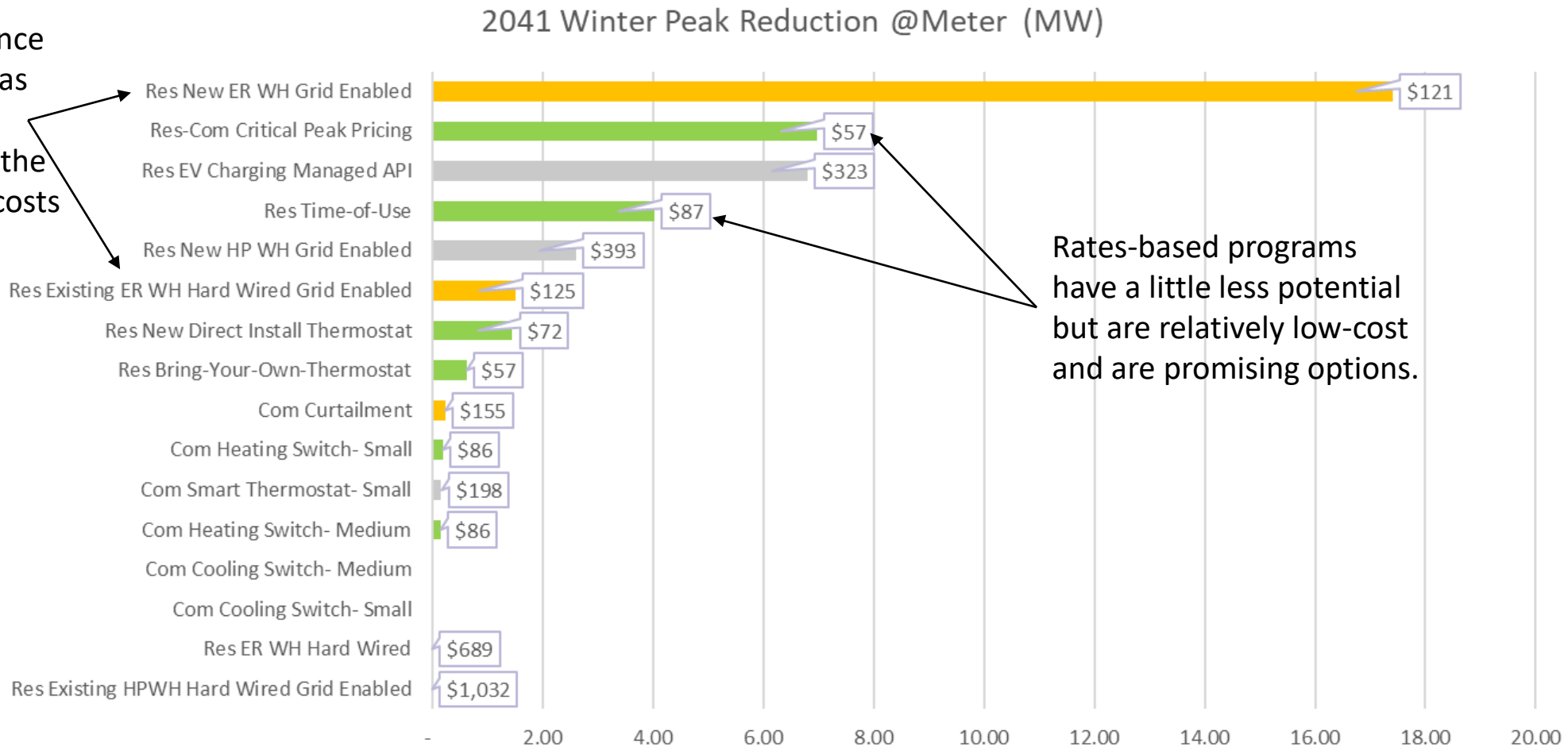

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Ramp Rates
Grid Enabled Water Heater Example

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- Ramp rates determine the annual rate of deployment of a DR option
- A significant factor in many DR options is the customer timing to replace a piece of equipment with one that incorporates a grid managed technology (often a replace on burn-out decision)
- Program adoption is another significant factor, how many eligible for the program choose participate
- Single family annual water heater replacements is about 3,300 per year, the ramp rate of grid enabled water heaters averaged 2,500 per year, about 75% - an optimistic participation rate

Demand Response in the IRP

How did we use results from the DR Potential Assessment?

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Resources Considered

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Residential electric resistance water heater DR

- Largest source of residential & commercial DR potential
- 19.6 MW of technical potential in winter by 2028 identified in potential assessment
- Fixed & variable cost assumptions taken from potential assessment

Industrial DR

- No true potential assessment to inform assumptions
- Fixed & variable cost assumptions based on NWPCC assumptions in 2021 Plan

DR Resource Addition in IRP

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- Our 2022 IRP identifies the addition of 10MW of demand response as our preferred strategy to shore up small adequacy risks that we might face if we find ourselves in a future where the Western grid becomes increasingly unreliable.

- 10MW was selected because it was “just enough” to meet resource adequacy need

- Assumes a mix of residential and industrial (3MW of resistance water heaters and 7 MW of industrial)

Cost Assumptions - Detail

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Residential ERWH DR	Incentive cost ($/kW-year)	Fixed Annual Admin Costs (includes one-time setup cost)	Effective $/kW-year for 3MW
2022	$70.81	$1,760,989	$658
2031	$99.41	$346,230	$215
2041	$115.51	$93,974	$147

Industrial DR	Incentive cost ($/kW-year)	Fixed Annual Admin Costs ($/kW-year)	One-time Setup Cost	Effective $/kW-year for 7MW
2022	$40	$10	$150,000 + $10/kW	$81
2031	$40	$10	$0	$50
2041	$40	$10	$0	$50