The Avista 2015 Integrated Resource Plan

Presentation to the
Washington Utilities and Transportation Commission
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Agenda

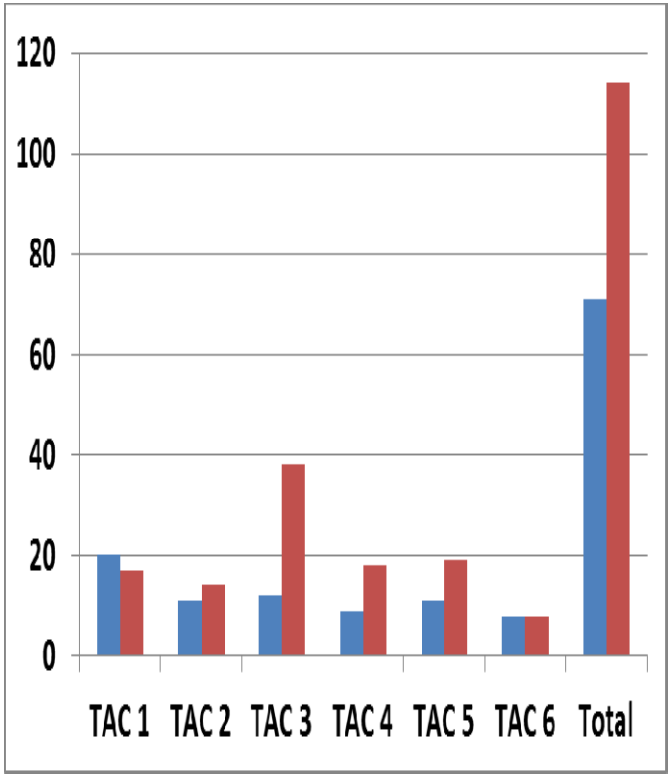
- Background
- Avista Loads and Resources
- Ancillary Services and Battery Storage
- Conservation and Demand Response
- Preferred Resource Strategy
- Tipping Point and Scenario Analyses

Background

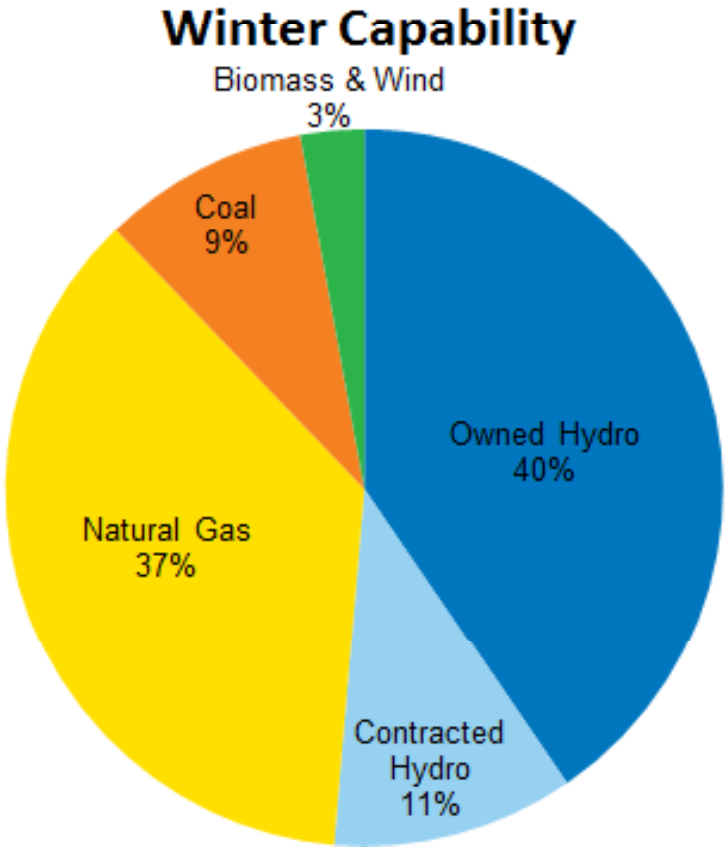
2015 IRP Public Participation

Rising Participation

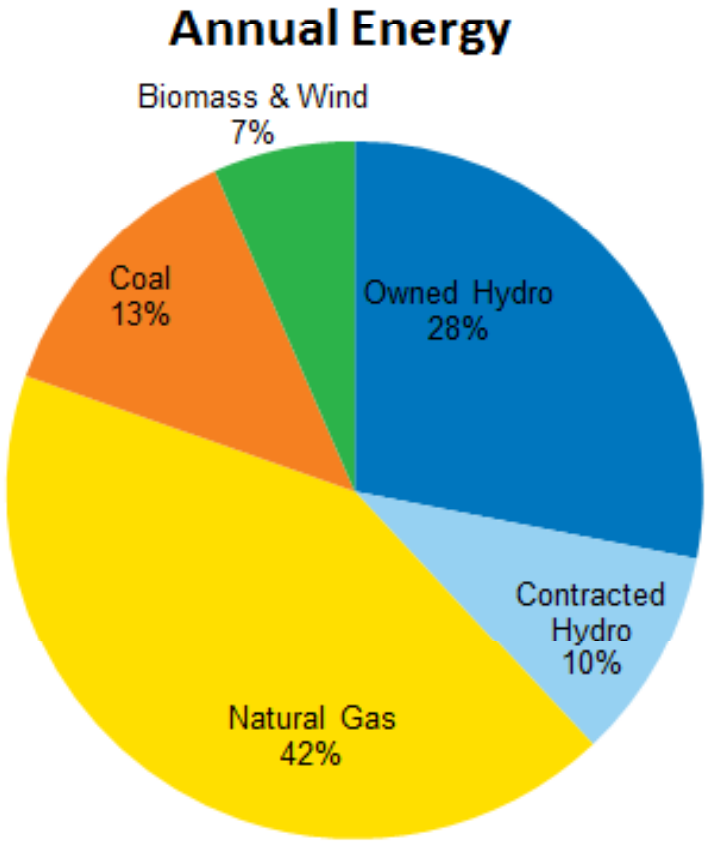
- 6 TAC Meetings
  - 2014: 5/29, 9/24, 11/21
  - 2015: 2/24, 5/19, 6/24
- Non-Avista IRP Attendance
  - 2013(blue) vs. 2015 (red)



Avista 2016 Resource Mix



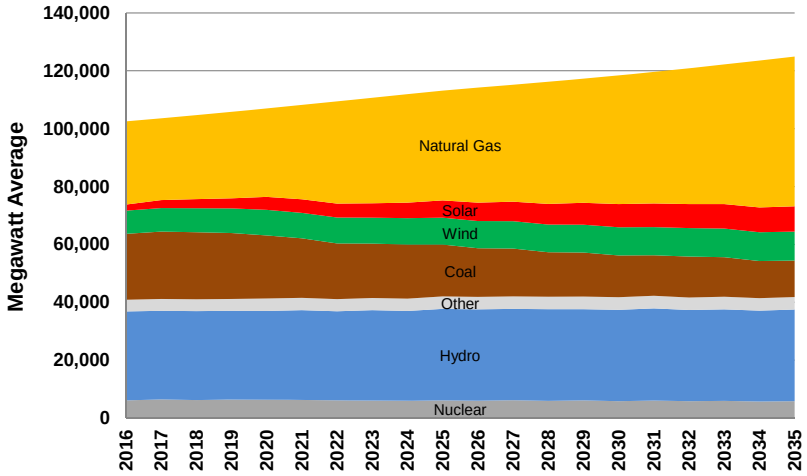
2,381 MW

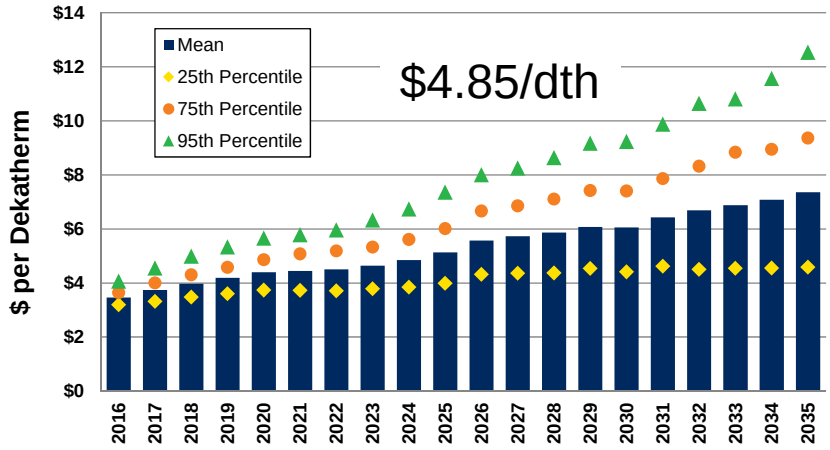


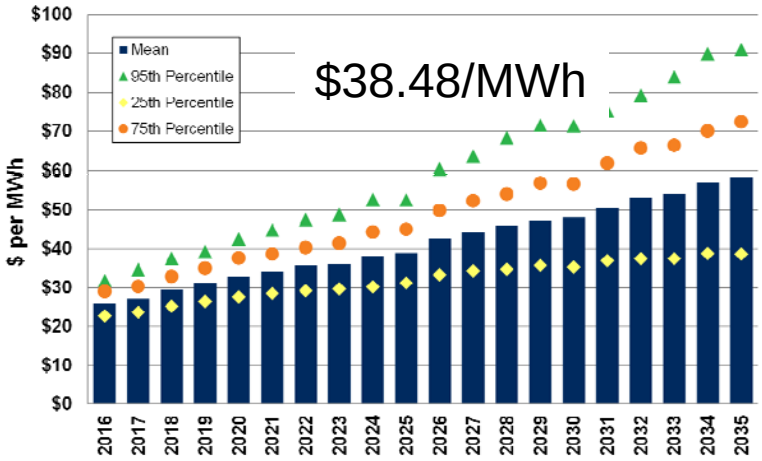
1,576 aMW

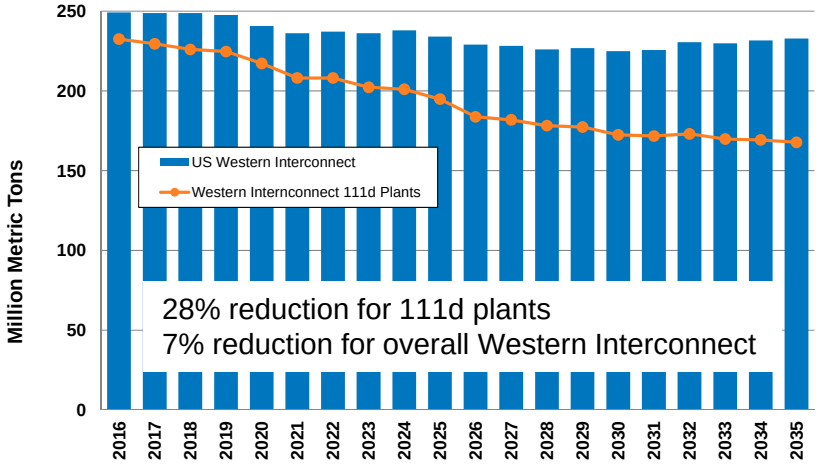
Western Interconnection Modeling

Less Coal, More Gas & Renewables, Low Prices, Lower Emissions





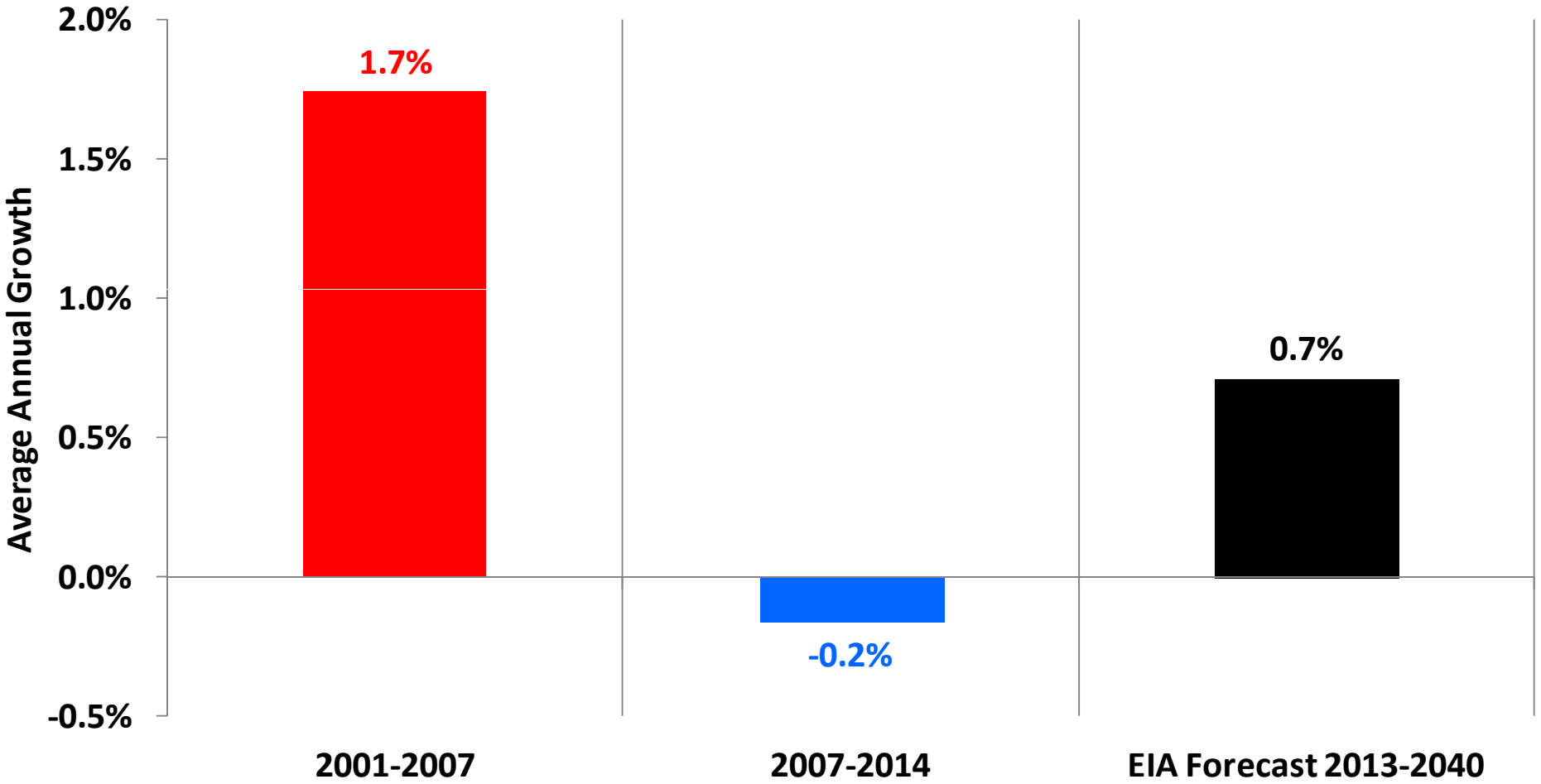




Avista Loads and Resource Position

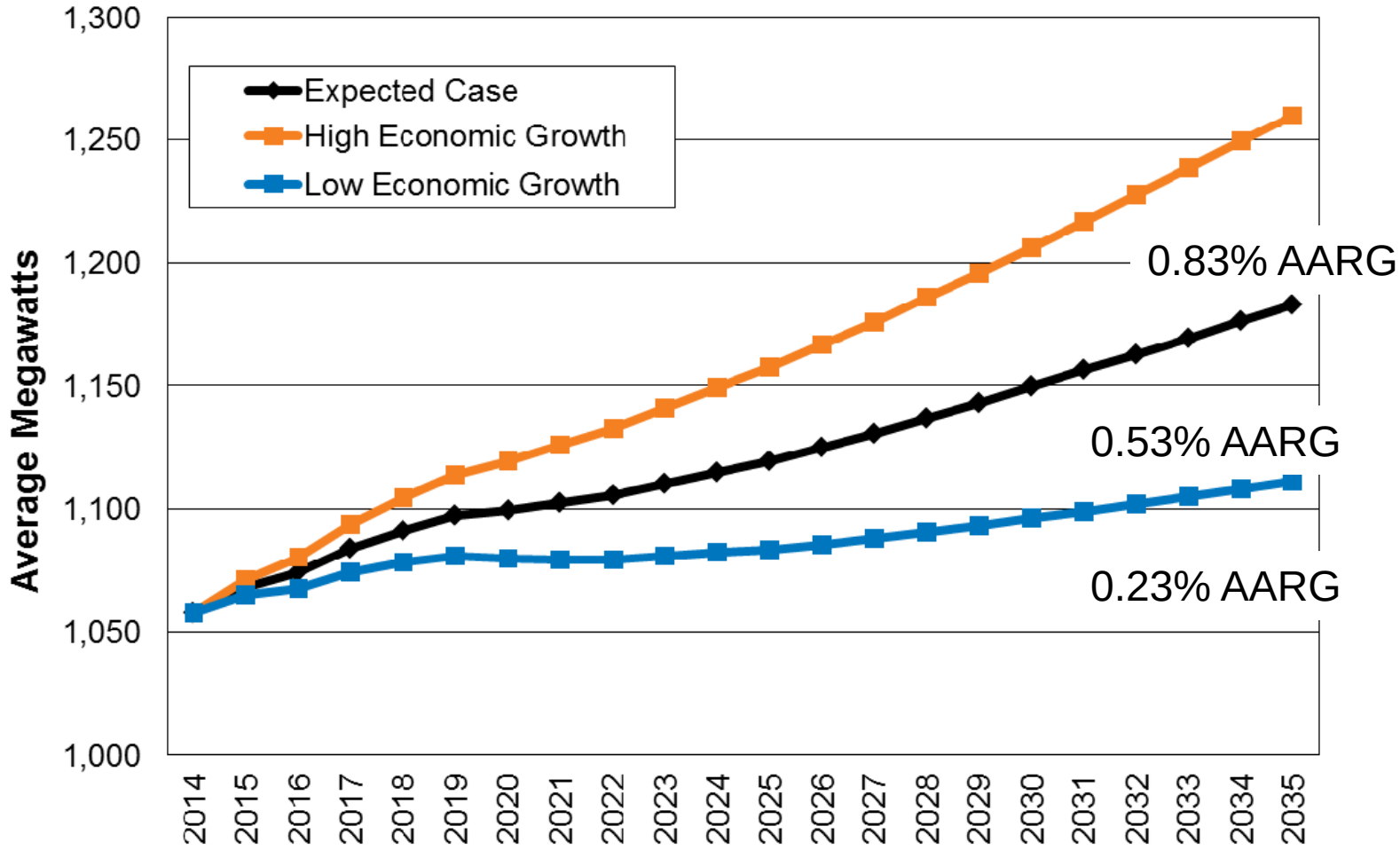
U.S. Electricity Consumption, 2001-2040

Positive Growth After Conservation



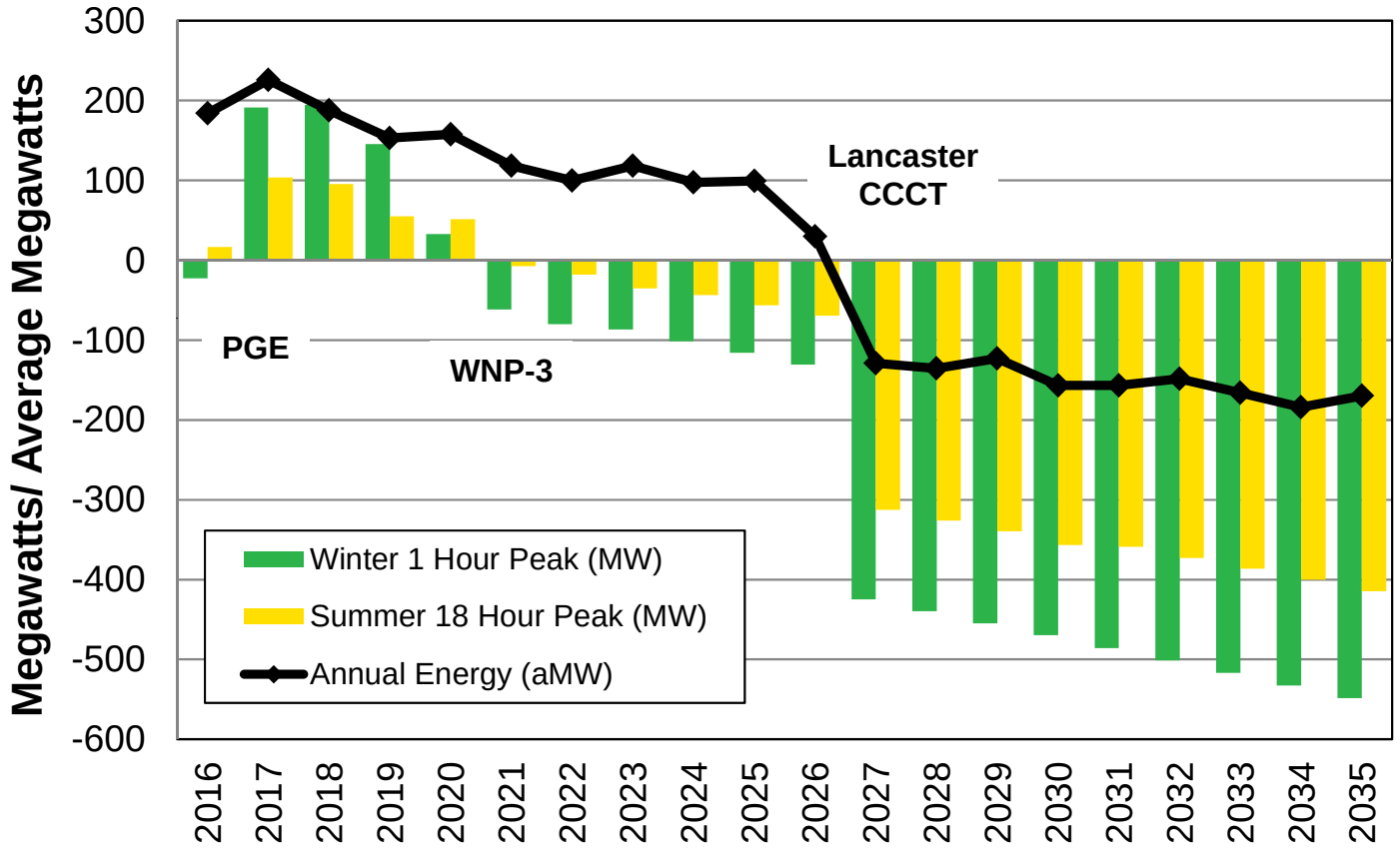
2015 IRP Load Growth Cases

~0.5% AARG in Base Case



Load & Resource Position

2021 is First Deficit Year



Ancillary Services and Battery Storage

New Resources Ancillary Services Values

Modest Benefits to Avista

- New Resources Included in Study
  - 100 MW CCCT
  - 100 MW LMS
  - 100 MW Reciprocating Engines
  - 25 MW Diesel Back-Up Generator

Resource	Ancillary Services Capabilities	Value ($/kW-Yr)
100 MW CCCT	Load Follow/Spin/Reg	$ -
100 MW LMS	Load Follow/Spin/Non-Spin/Reg	$ 1.12
100 MW Recips	Load Follow/Spin/Non-Spin	$ 0.61
20 MW Diesel	Non-Spin Only	$ -

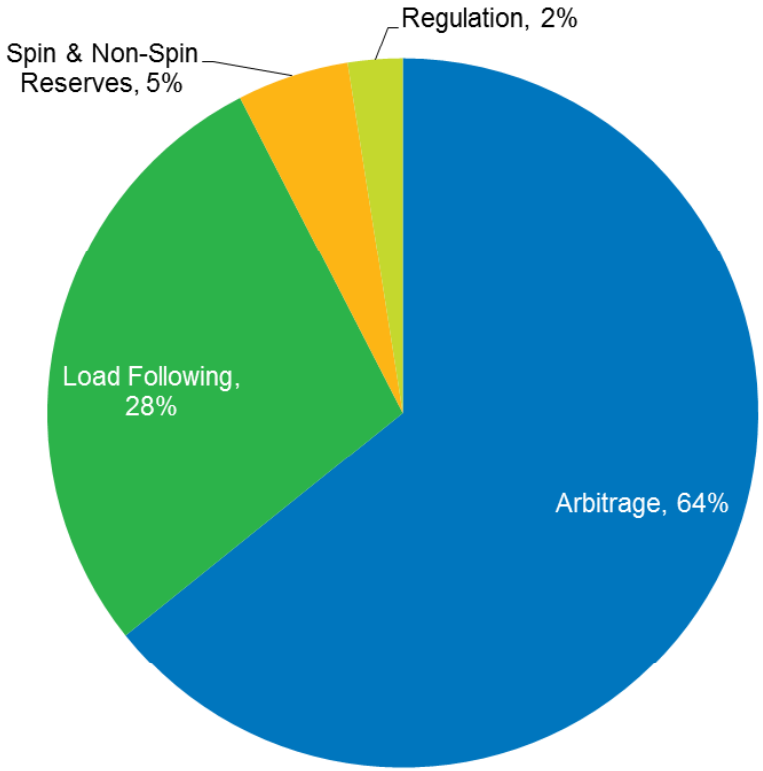
- Model Input
  - Based on Historical Data of Years 2010-14
  - Portfolio Contracts adjusted to Year 2020 Conditions
  - Load adjusted to Year 2020 Conditions

- Run Scenario: for each new resource
  - Base Case Run with Existing Portfolio of Year 2020 Conditions
  - Energy-Only Run (i.e., no ability to generate ancillary services)
  - Energy/Capacity Run (i.e., ability to generate energy *and* ancillary services)

Ancillary service value will be unique to each system

2015 IRP Value Streams of Storage

~$36/kW-Year Total (First Year Value) for Power Supply



Battery Value Summary by Size

Battery Cap (MW)	Annual Value	Annual Value/KW
35	$ 1,201,590	$ 34.33
30	$ 1,024,569	$ 34.15
25	$ 923,291	$ 36.93
10	$ 381,407	$ 38.14
5	$ 189,000	$ 37.80
1	$ 36,862	$ 36.86

2MW - 6MWh Storage System

($/kW-yr Levelized)

- Energy: < $0
- Ancillary services: $59.0
- Line losses: TBD
- System peak reduction: $121.2
- Power supply risk reduction: $0
- Distribution/transmission Investment avoidance: $27.7
- Reliability: TBD
- Power quality: >$0.8
- Externalities: $0

Total Value: **$198 per kW-yr**

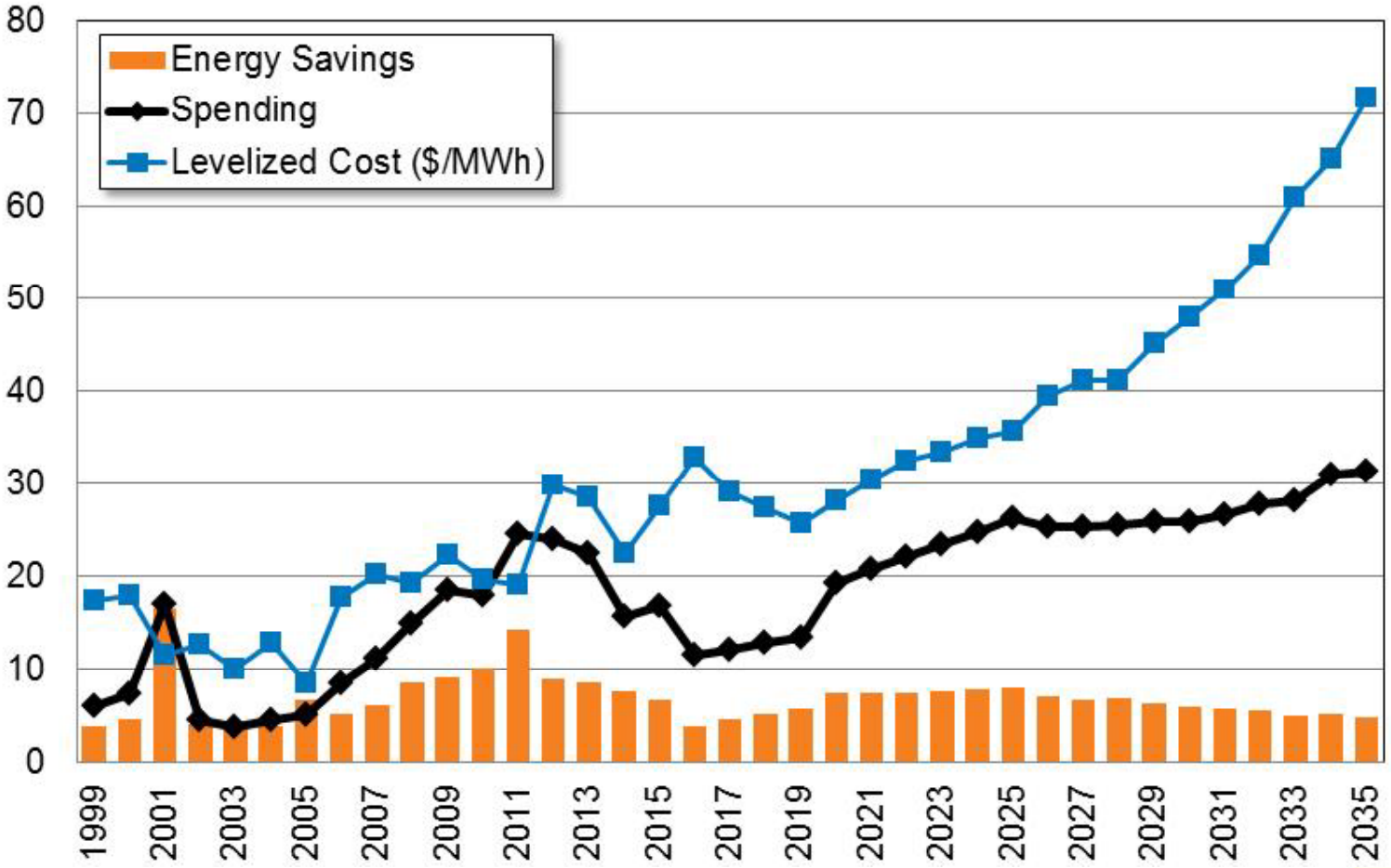
- Storage cost very by technology, capacity, and storage capability
- For this analysis it is assumed to cost **$437 per kW-yr**

Current Valuation:
PV value: $4.8 million
PV costs: $10.6 million
NPV: -$5.8 million

Conservation and Demand Response

2015 IRP Energy Efficiency Forecast (aMW)

Risings Costs, Moderating Acquisition



Generation Resources Conservation

Facility	Brief EEM Description	Measure Life (yrs)	Electric Savings (kWh)	Gas Savings (therms)
Boulder Park	Control Room Lighting	15	3,931	
	Generating Floor Lighting High Bays	15	16,099	
	Replacing Engine Bay Lights	15	6,736	
	Replace Exterior Wall Packs	15	16,054	
	Instrument Air Cycling Air-Dryers	12	10,074	
	Oil reservoir heaters fuel conversion	15	525,600	-23,911
Cabinet Gorge	Lighting Retrofit (Savings estimated)	15	300,000	
Coyote Springs	Control Room Lighting	15	6,368	
	Generating Floor Lighting High Bays	15	85,778	
	Roadway Lighting	15	1,085	
	Air-Compressor VFD	12	130,000	
	Retrofit Air-Dryer with Dew-Point Controls	12	25,000	
Kettle Falls Generationg Station	Plant Lighting	15	150,190	
	Plant Lighting Controls	15	183,058	
	Yard Lighting	15	48,180	
	Forced Draft Boiler Fan VSD	12	700,000	
Little Falls Dam	Lighting Retrofit (Currently Under Construction)	15	TBD	-
	Speed Controls Cooling/Exhaust Fans	12	247,909	
Long Lake Dam	Generating Floor High Bays	15	17,441	
	Exterior Wall Packs	15	2,084	
	Variable Speed Stator Cooling Blowers	12	135,000	
Nine Mile Dam	Lighting Retrofit (Currently Under Construction)	15	TBD	-
North East Combustion Turbine	Halogen Pole Lights	15	5,146	
Noxon Rapids Dam	Full LED Lighting Upgrade (Completed)	15	382,115	
Post Falls Dam	Control Room T12s	15	1,776	
	Generating Floor HPS	15	3,312	
Post Street Upper Falls Dam	Utility Men Break Room Lighting	15	2,151	
	Control Room Lighting	15	4,340	
	Network Feeder Tunnel Lighting	15	8,344	
Rathdrum CT	Roadway Lighting	15	16,273	
	Halogen Pole Lights	15	3,200	

Action Item from 2013 IRP Identified 0.35 aMW Of Technical Potential

Demand Response Costs & Potential

Much Higher Costs than NPCC; None Selected in PRS

DR Option	MW Potential	$/kW-Yr Avg
Direct Load Control	7.16	189.93
Firm Curtailment	17.46	219.05
Time-Of-Use	4.38	776.94
Critical Peak Pricing	13.12	226.86

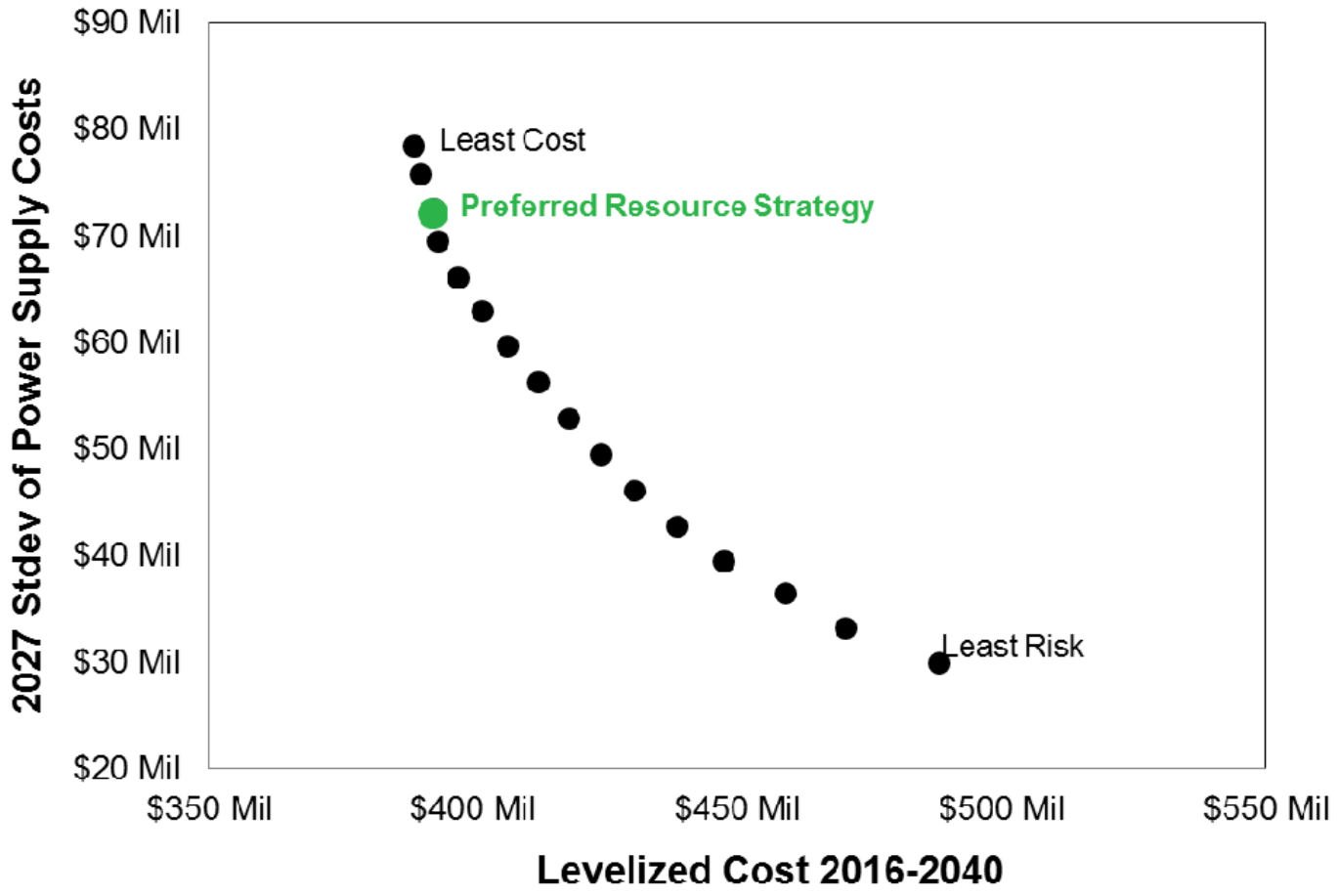
Avista 2015 DR Study

NPCC DR Study
(winter capacity)

Bucket	2012 $/kW-Yr Avg	2035 MW Potential
1	25.00	1,450
2	54.00	1,200
3	77.00	75
4	189.00	800
Total	**73.20**	**3,525**
Avista 5% Share		***176***

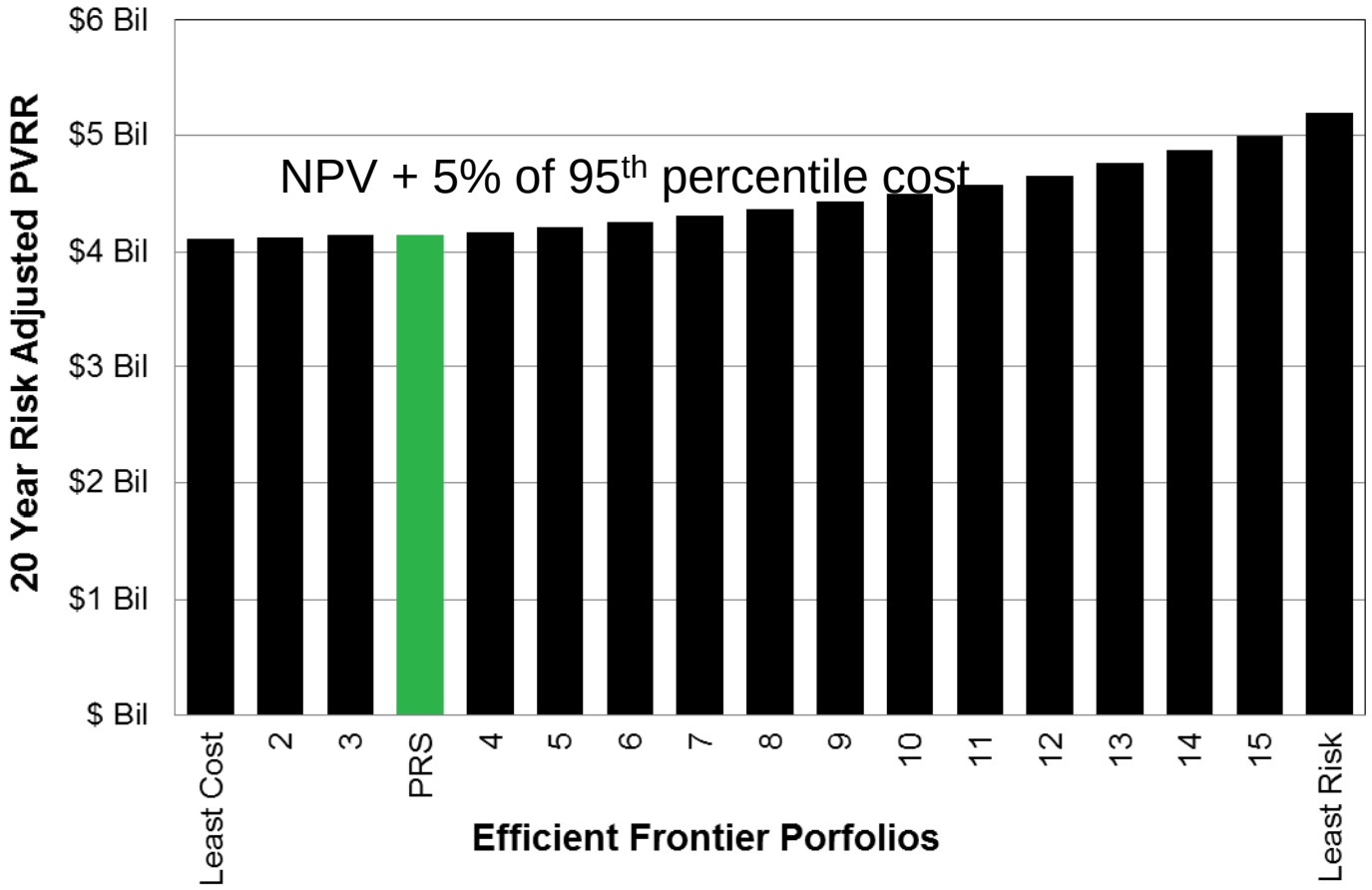
Preferred Resource Strategy

2015 IRP Efficient Frontier



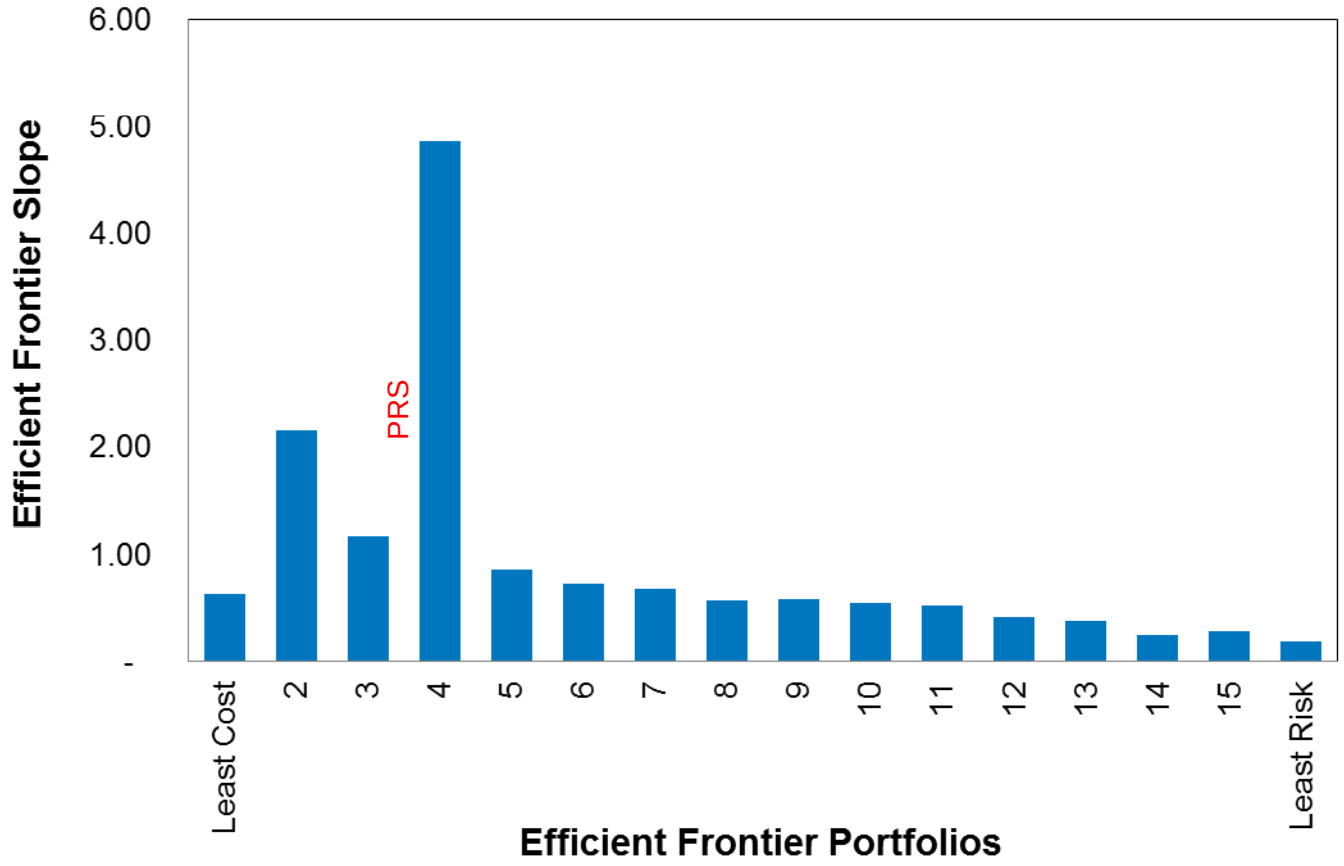
2015 IRP Risk-Adjusted PVRR

NPV + 5% of 95th Percentile Cost



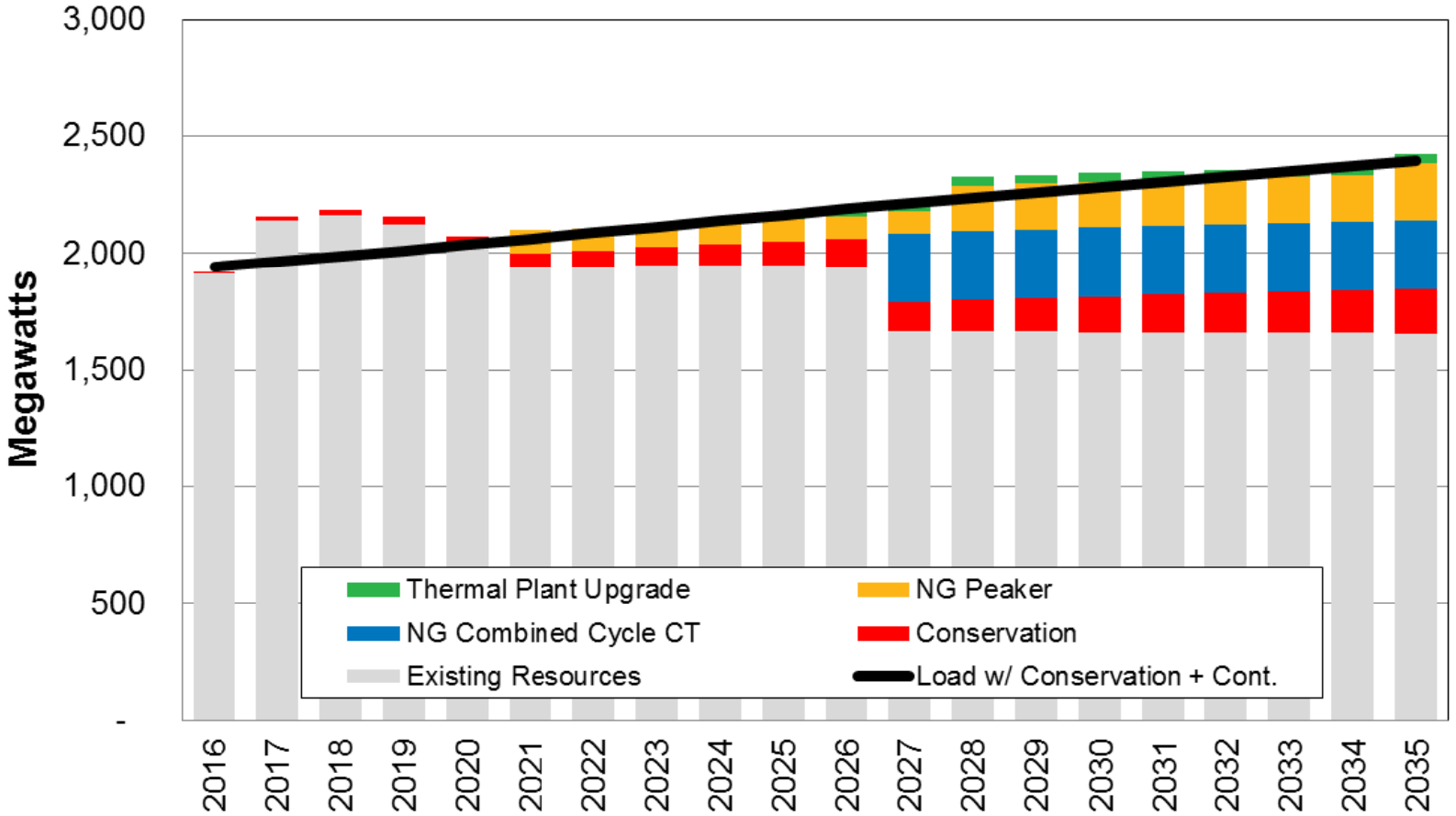
2015 IRP Risk-Adjusted PVRR

Point-To-Point Derivatives



2015 IRP Load and Resource Additions

Conservation and Gas



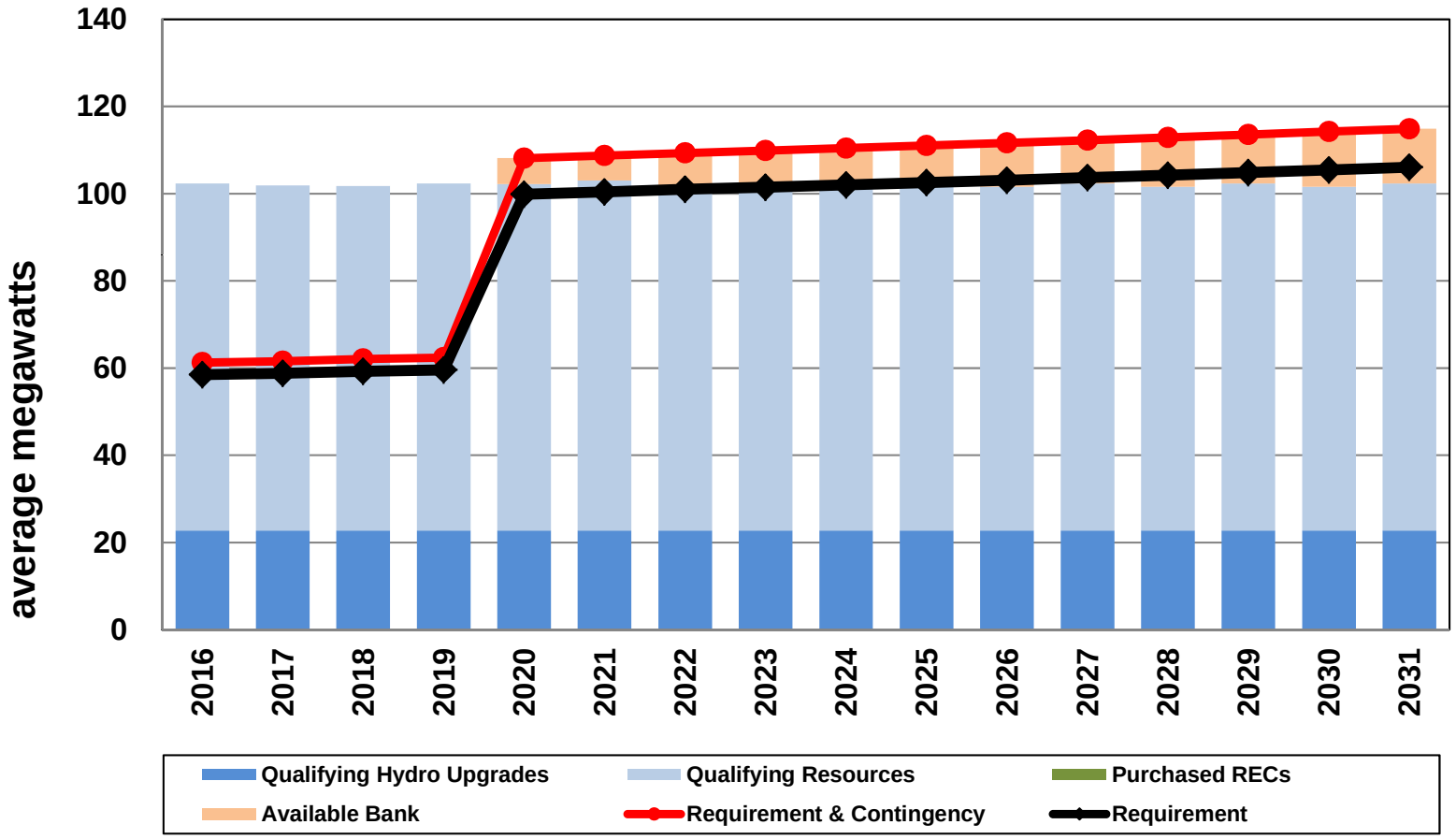
Shown position is 1-hour winter peak

2015 IRP: Preferred Resource Strategy

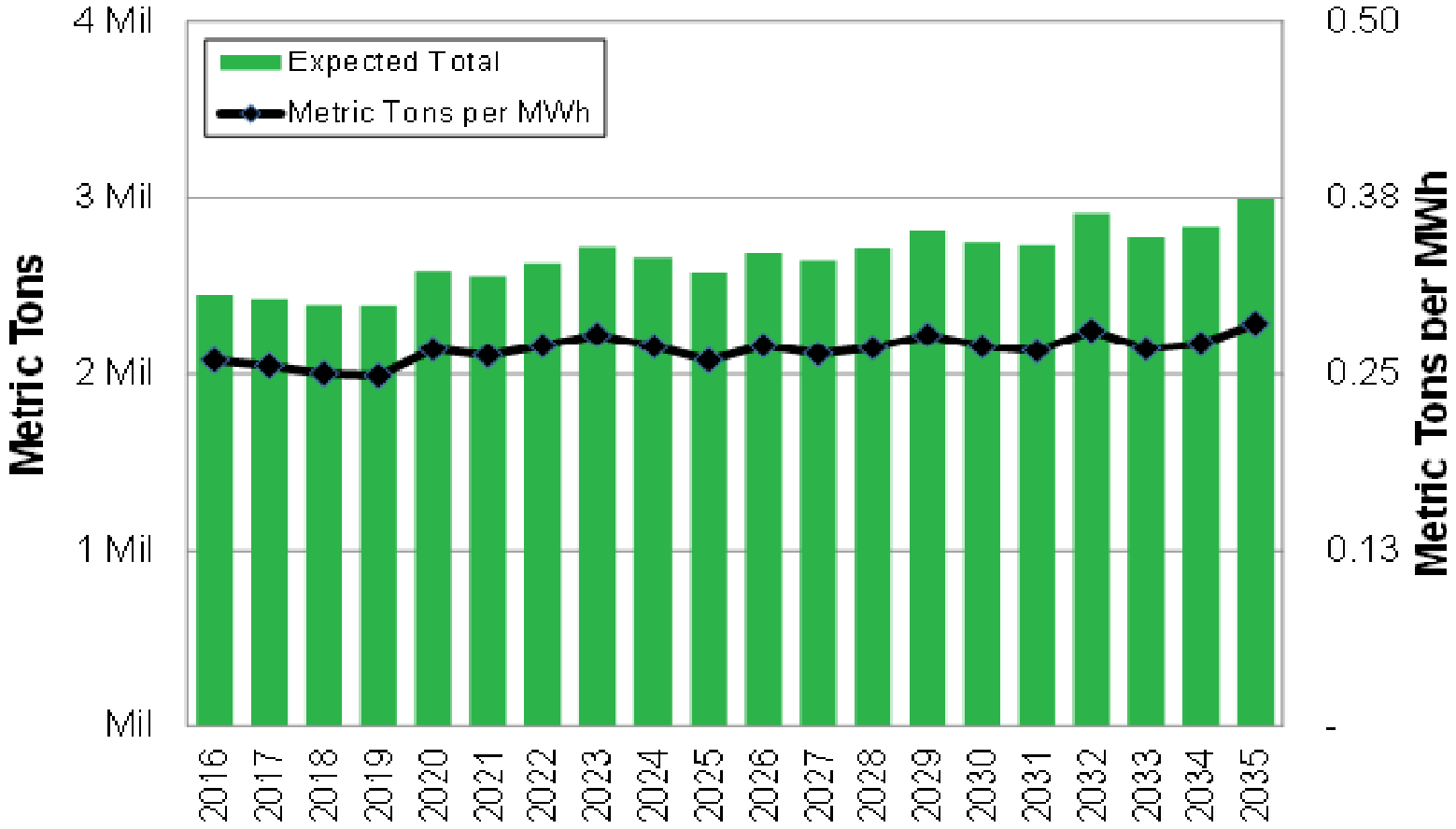
Resource	By the End of Year	ISO Conditions (MW)	Winter Peak (MW)	Energy (aMW)
Natural Gas Peaker	2020	96	102	89
Thermal Upgrades	2021-2025	38	38	35
Combined Cycle CT	2026	286	306	265
Natural Gas Peaker	2027	96	102	89
Thermal Upgrades	2033	3	3	3
Natural Gas Peaker	2034	47	47	43
Total		**565**	**597**	**524**
Efficiency Improvements	**Acquisition Range**		**Winter Peak Reduction (MW)**	**Energy (aMW)**
Energy Efficiency	2016-2035		193	132
Distribution Efficiencies			<1	<1
Total			**193**	**132**

Washington RPS Position (aMW RECs)

Covered through End of IRP Forecast Timeframe



Avista GHG Emissions Forecast



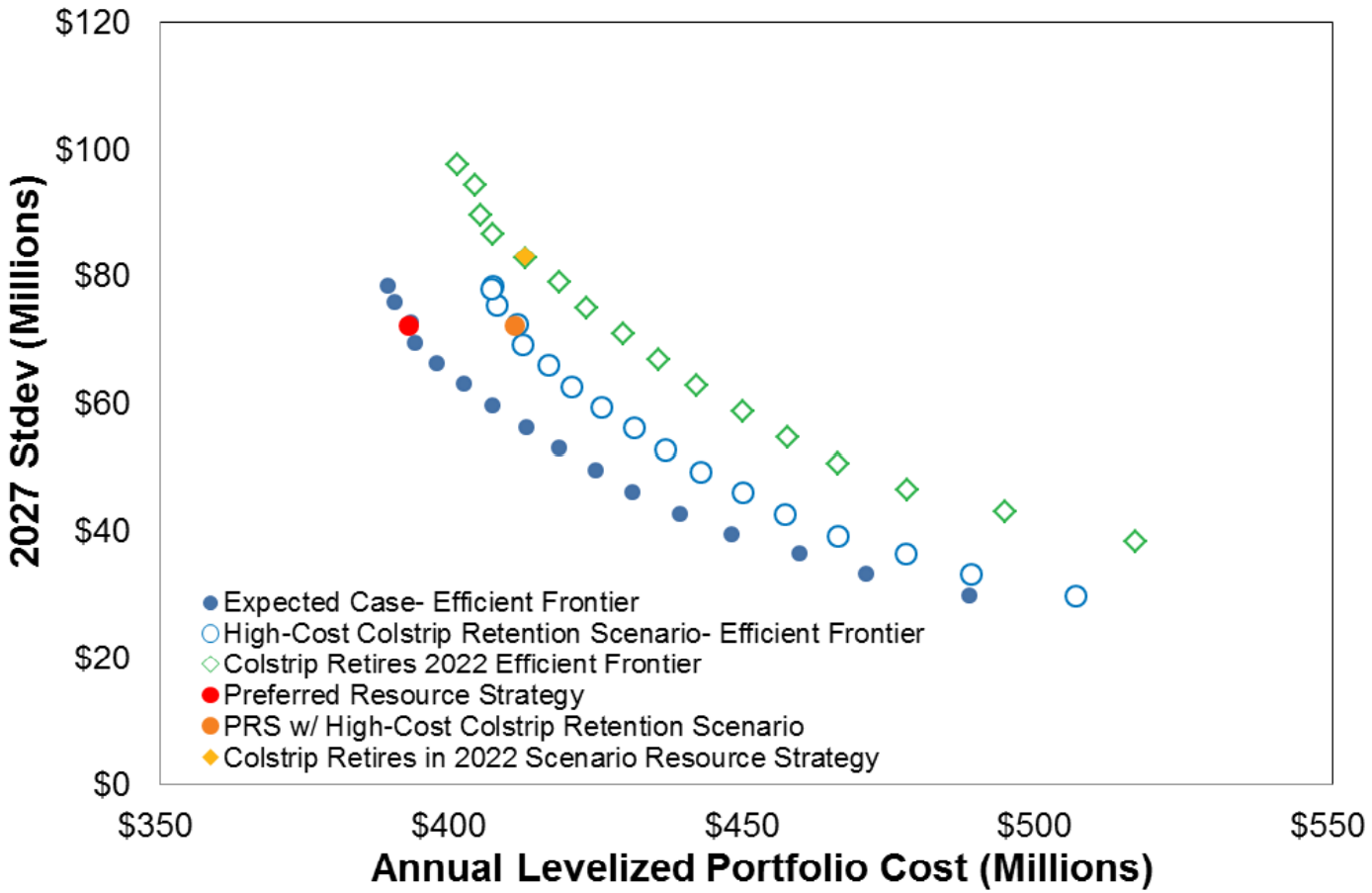
Tipping Point and Scenario Analyses

Tipping Point Analysis

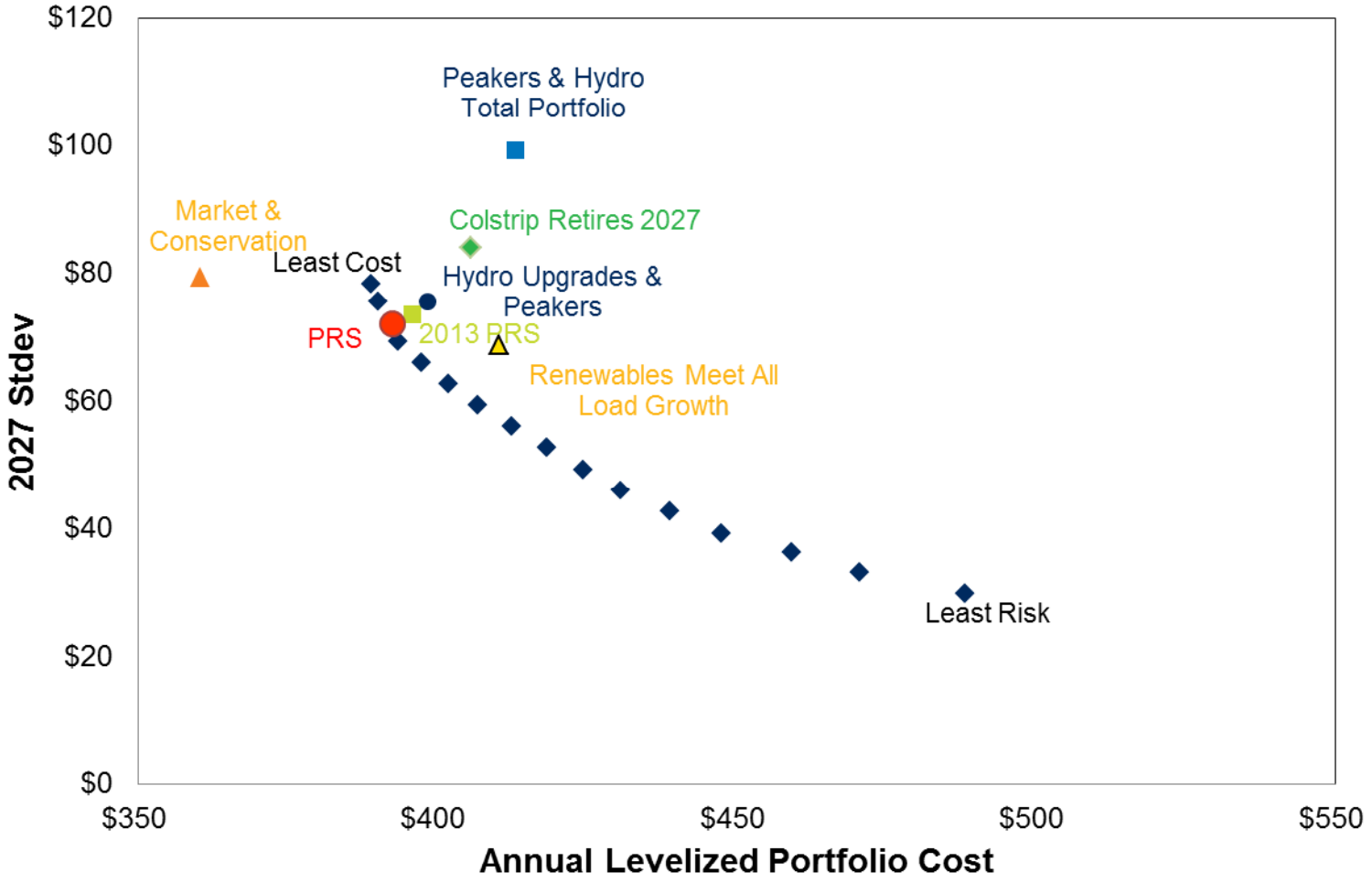
- Lower cost points where PRiSM selects a given resource
- All capital costs are in 2014 dollars
- Utility Scale Solar:
  - *$1,300/kW would have to decline to $671/kW to be selected in 2022 (-48%)*
- Utility Scale Energy Storage:
  - *$2,736/kW, would have to decline to $770/kW in 2021 (-72%)*
  - *With distribution benefits, decline would be closer to 50% based on preliminary analyses*
- Demand Response:
  - *$217/kW-yr (levelized nominal) would have to decline to $117/kW-yr (-46%)*

Colstrip Retirement Impacts

All Modeled Scenarios Show Higher Customer Costs



2015 IRP Other Strategies Summary



Thank You