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Energy Policy Overview

Chuck Murray

May 20, 2007

EIA Energy Headlines for WA

The Grand Coulee Dam on Washington's Columbia River is the largest hydroelectric power producer in the United States, with a total generating capacity of 6,809 megawatts.

In 2013, Washington was the leading producer of electricity from hydroelectric sources and produced 29% of the nation's net hydroelectricity generation.

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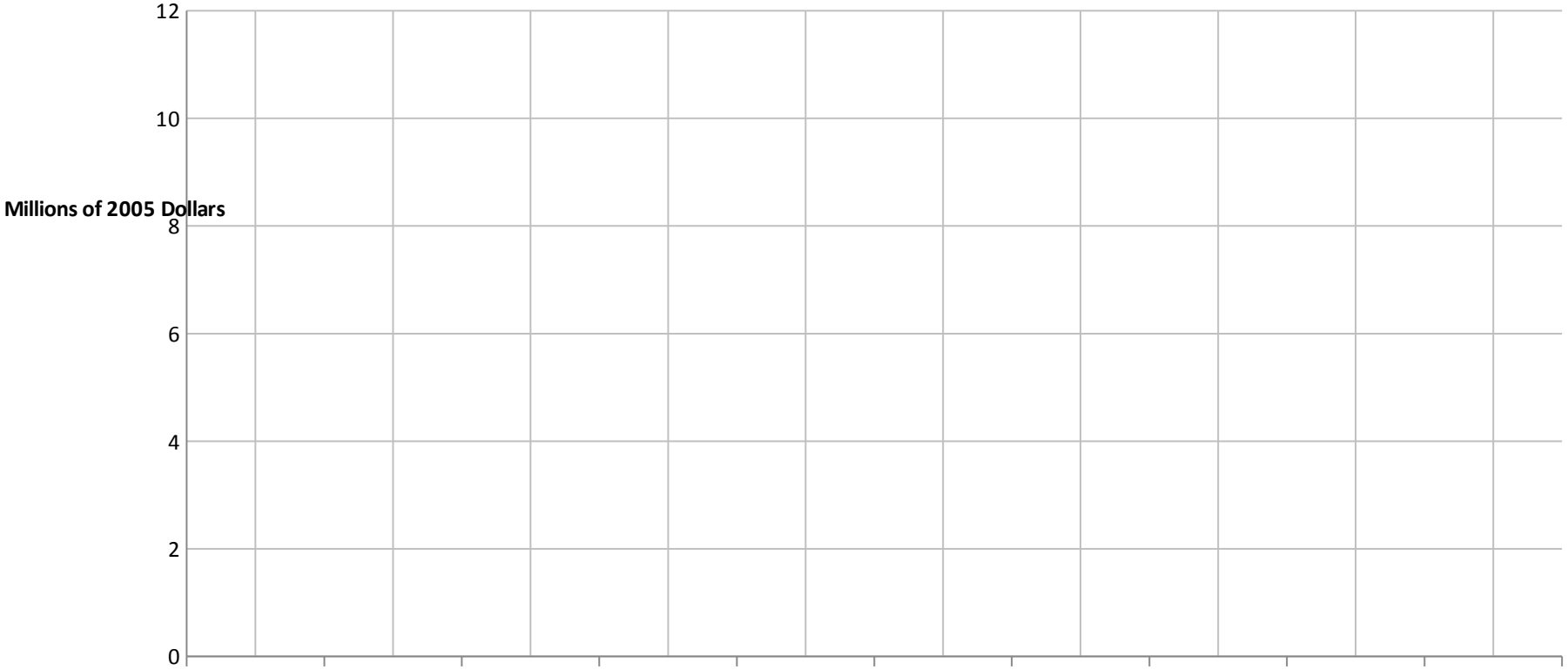
Although not a crude oil producing state

End-Use Energy Expenditures by Sector (1970-2012)



Source: EIA SEDS

Total Primary Energy Consumption by Source (1970-2012)

Source: EIA SEDS

Figure 1: Washington State Electric Utilities Aggregate 2013 Fuel Mix

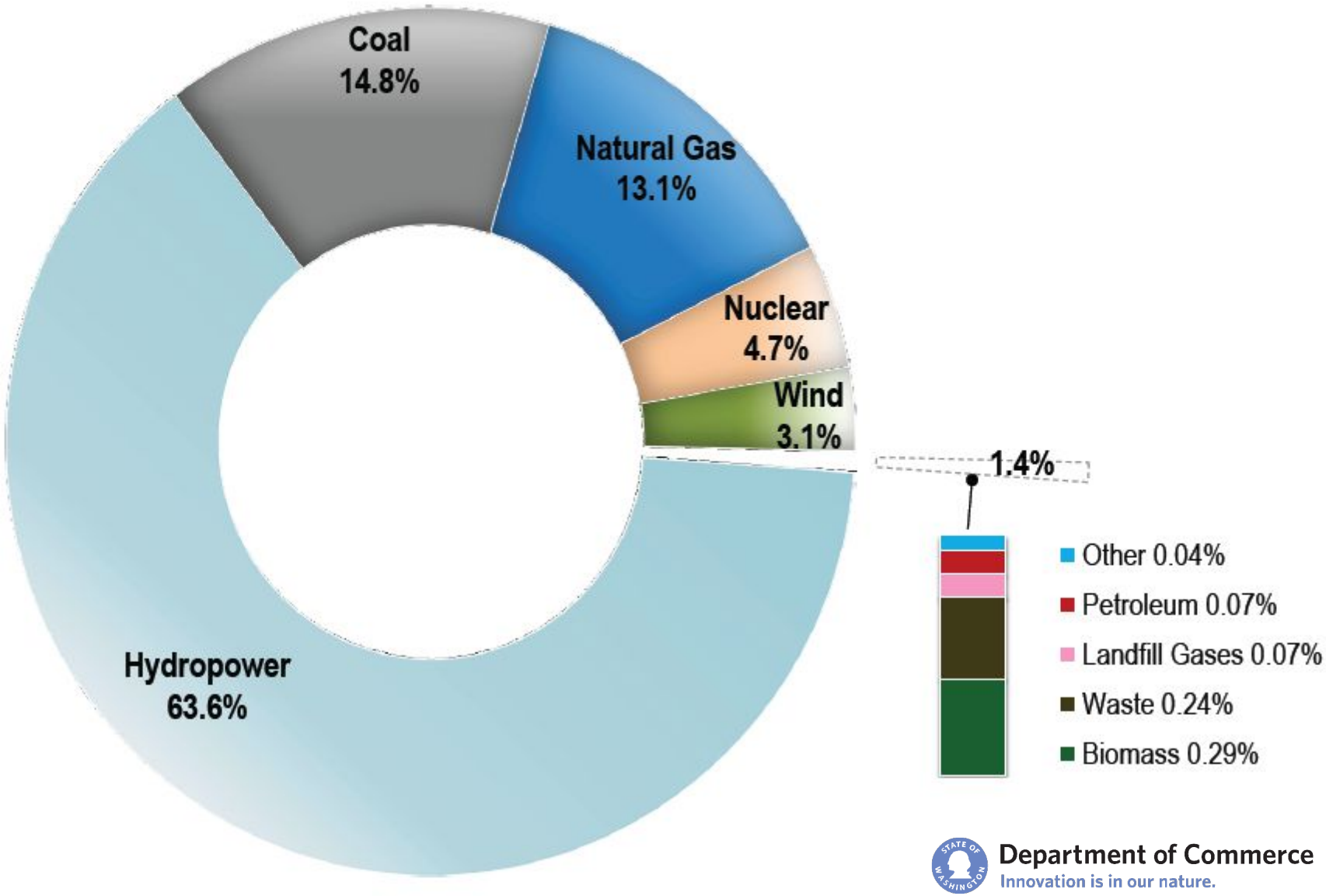


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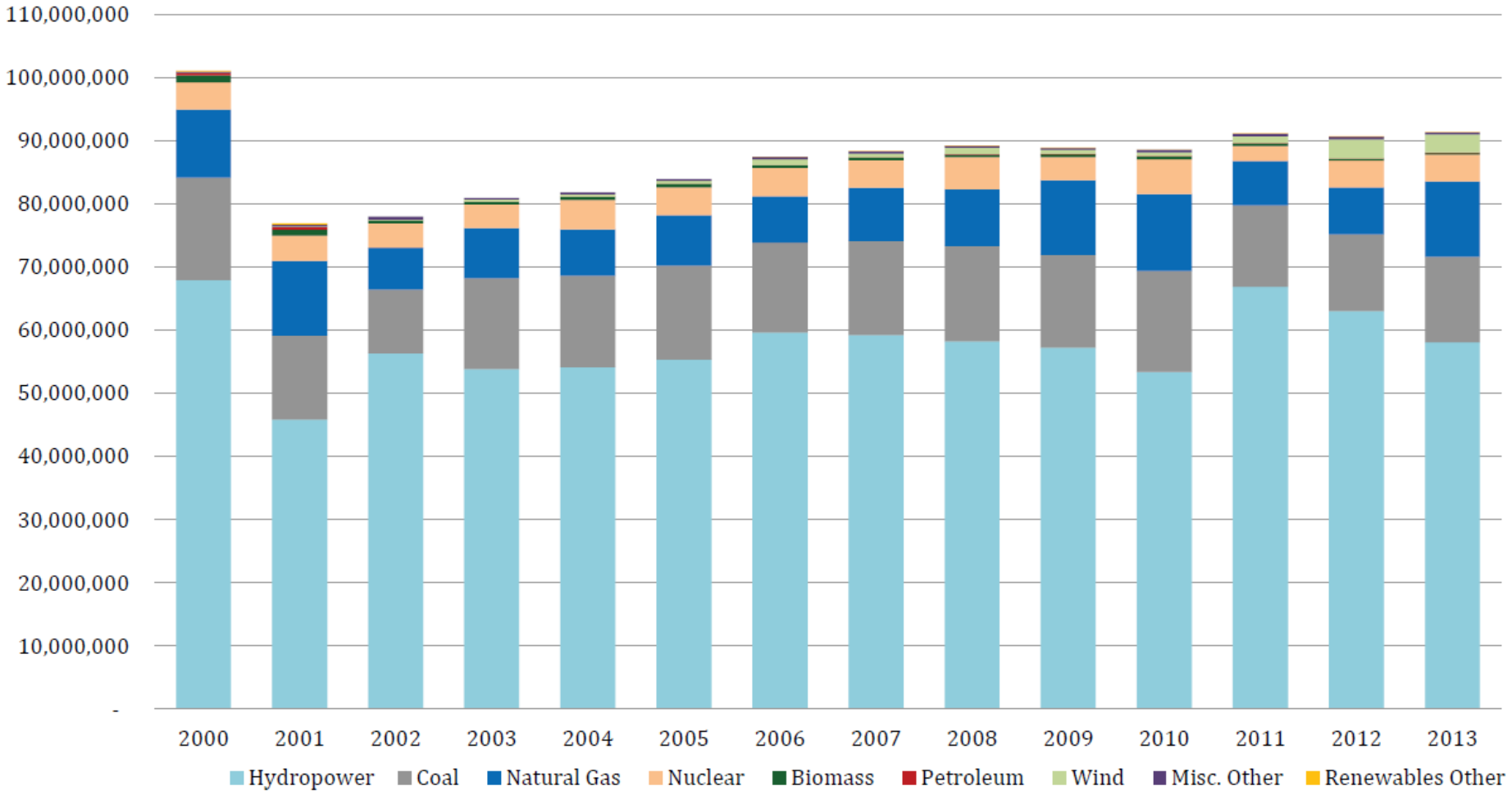
Figure 2: Washington State Electric Utilities Aggregate Fuel Mix 2000-2013 (Megawatt-hours)



Carbon Dioxide Emissions from Energy Use by Fuel Source (1960-2012)

Source: EIA SEDS, EPA, Kyoto Protocol

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Greenhouse Gas Emissions Limits

Greenhouse Gas Emissions Limits

- WA State greenhouse gas emissions reduction limits in law.
- (RCW 70.235.020)
  - Return to 1990 levels by 2020
  - By 2035, reduce emissions to 25% below 1990 levels
  - By 2050, reduce emissions to 50% below 1990 levels.

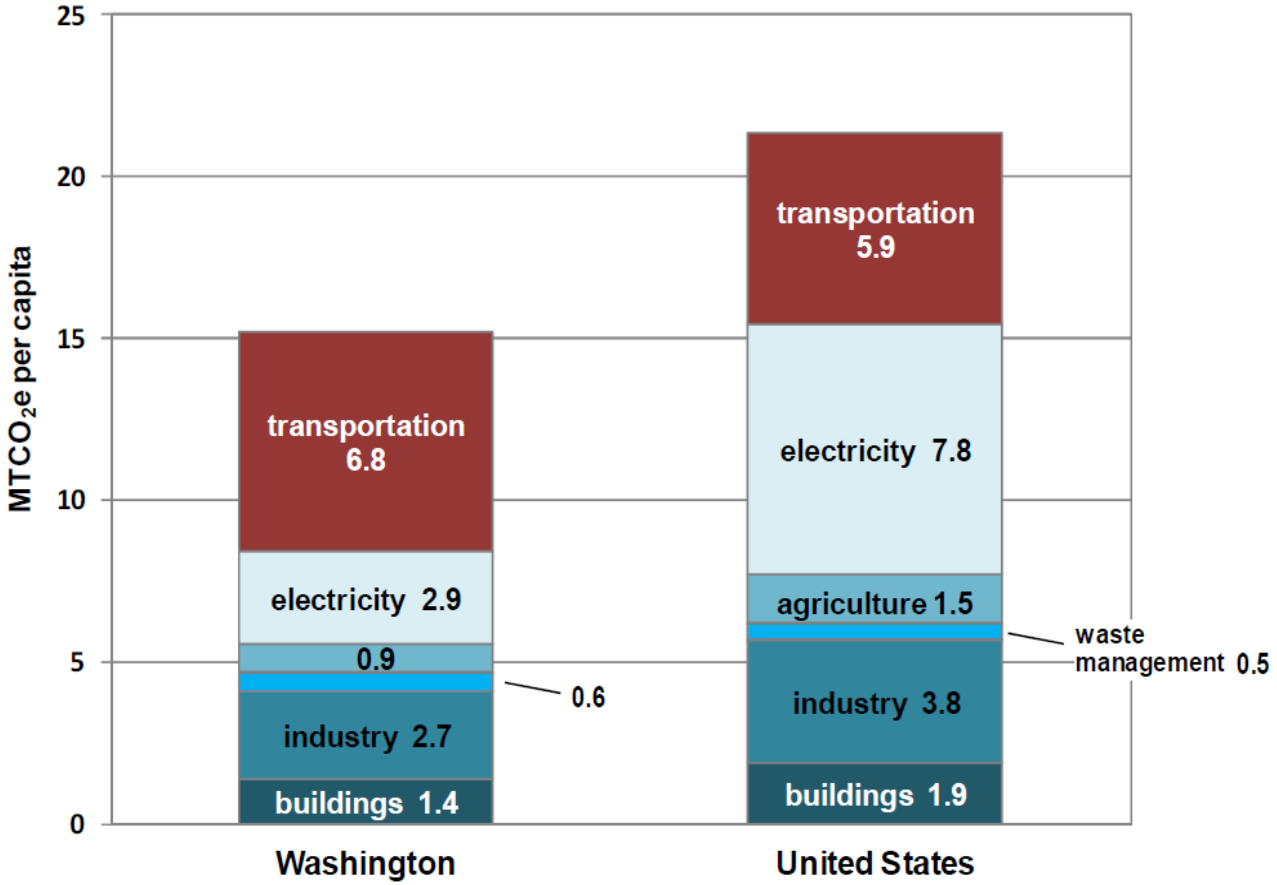


Figure 2-2: Greenhouse gas sources: Washington compared to national average. The average Washingtonian is responsible for a total of 15.2 $MTCO_2e$, the average American for 21.4 $MTCO_2e$. $MTCO_2e$ means metric tons of carbon dioxide equivalent. (W0002)

2012 WA ST Energy Strategy

Transportation

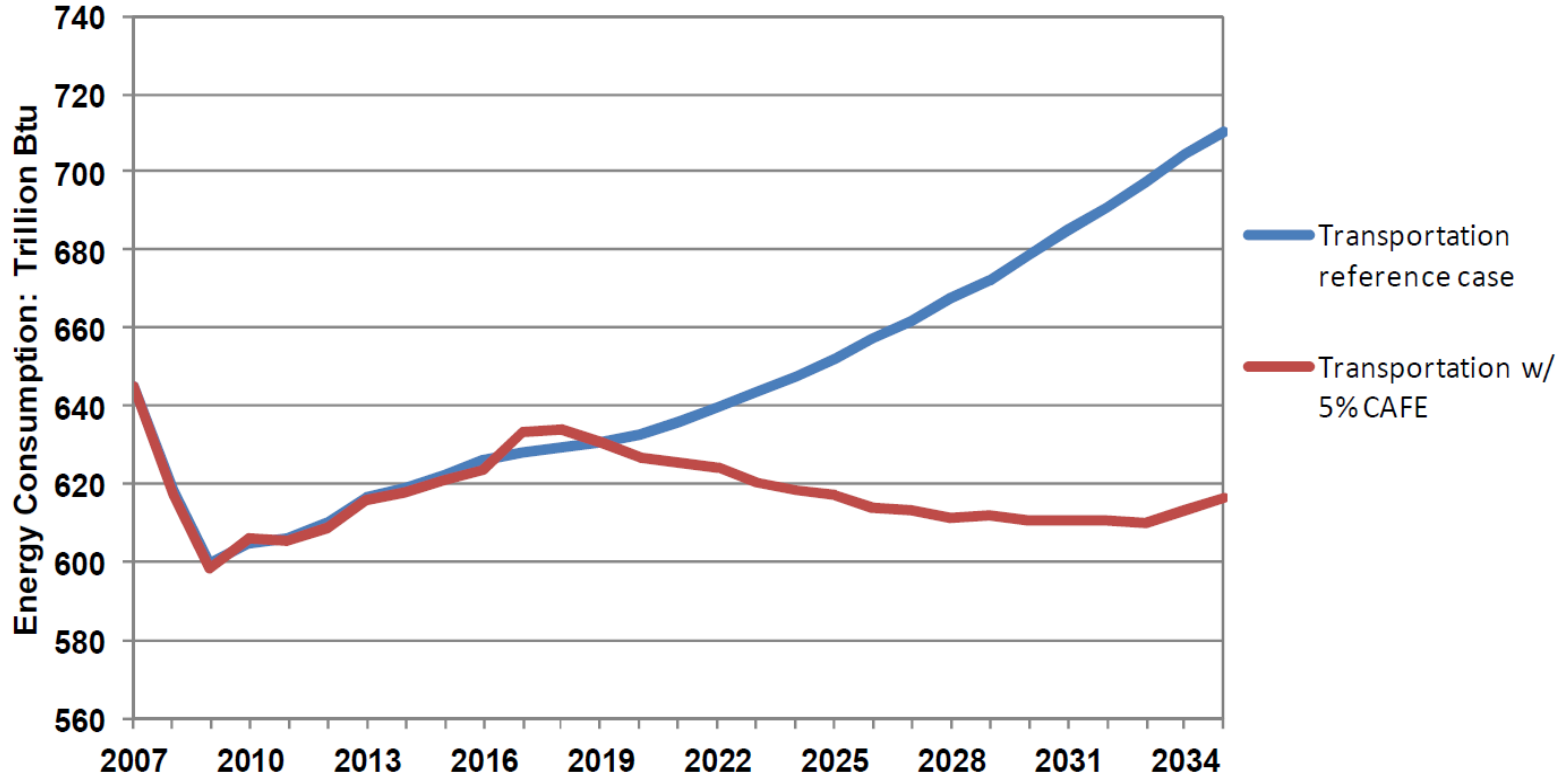
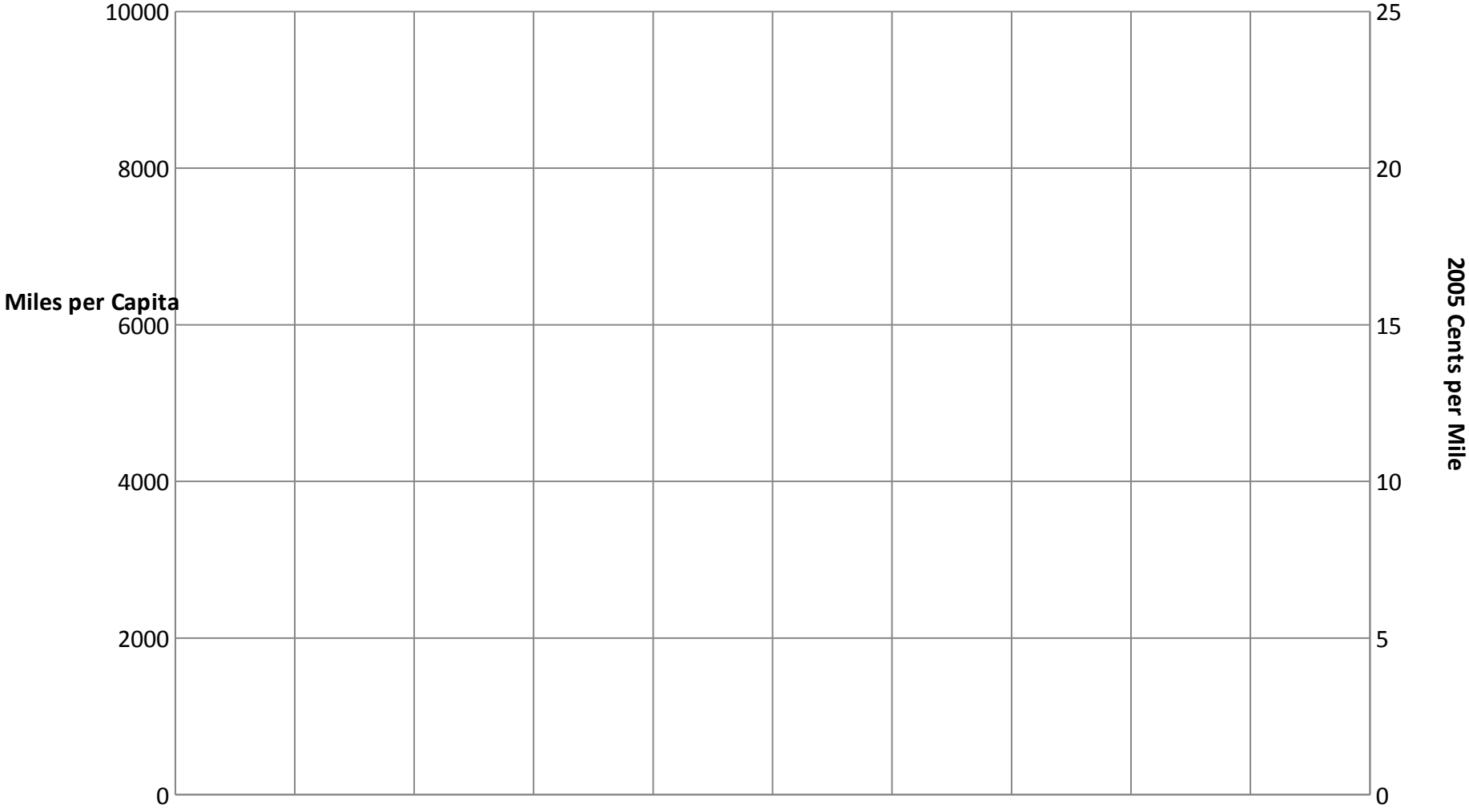


Figure 3-1: Effect of the July 2011 CAFE agreement on Washington transportation sector energy consumption. The blue reference case reflects the prorated Energy Information Administration projections offered in the Annual Energy Outlook 2011 as used elsewhere in this Energy Strategy. The red line reflects the projected consumption with the new agreement applied. (W0011)

Fuel Cost of Driving and Miles Driven per Capita (1970-2010)



Source: WA DOT, FHWA, OFM, EIA SEDS, CEA

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	vehicles and fuels	travel efficiency	pricing
3.4 near-term recommendations These are mature policy concepts, or pilot projects to test newer policy concepts.	**3.4.1** electric vehicle support **3.4.2** RFS **3.4.3** diesel engine fuel efficiency improvements	**3.4.4** Commute Trip Reduction program expansion **3.4.5** smart growth and transportation planning **3.4.6** transportation systems management **3.4.7** Regional Mobility Grants	**3.4.8** electric vehicle mileage pricing pilot **3.4.9** car sharing and mileage based insurance
3.5 long-term policy options These are candidates for long-term policy and require piloting or additional analysis before deployment.	**3.5.1** revenue neutral feebate **3.5.2** low carbon fuel standard **3.5.3** advanced aviation fuels **3.5.4** improvements to railroads	**3.5.5** comprehensive trip reduction program **3.5.6** energy efficient transportation choices	**3.5.7** emerging pricing methods - congestion pricing - mileage pricing - cordon pricing **6** carbon pricing

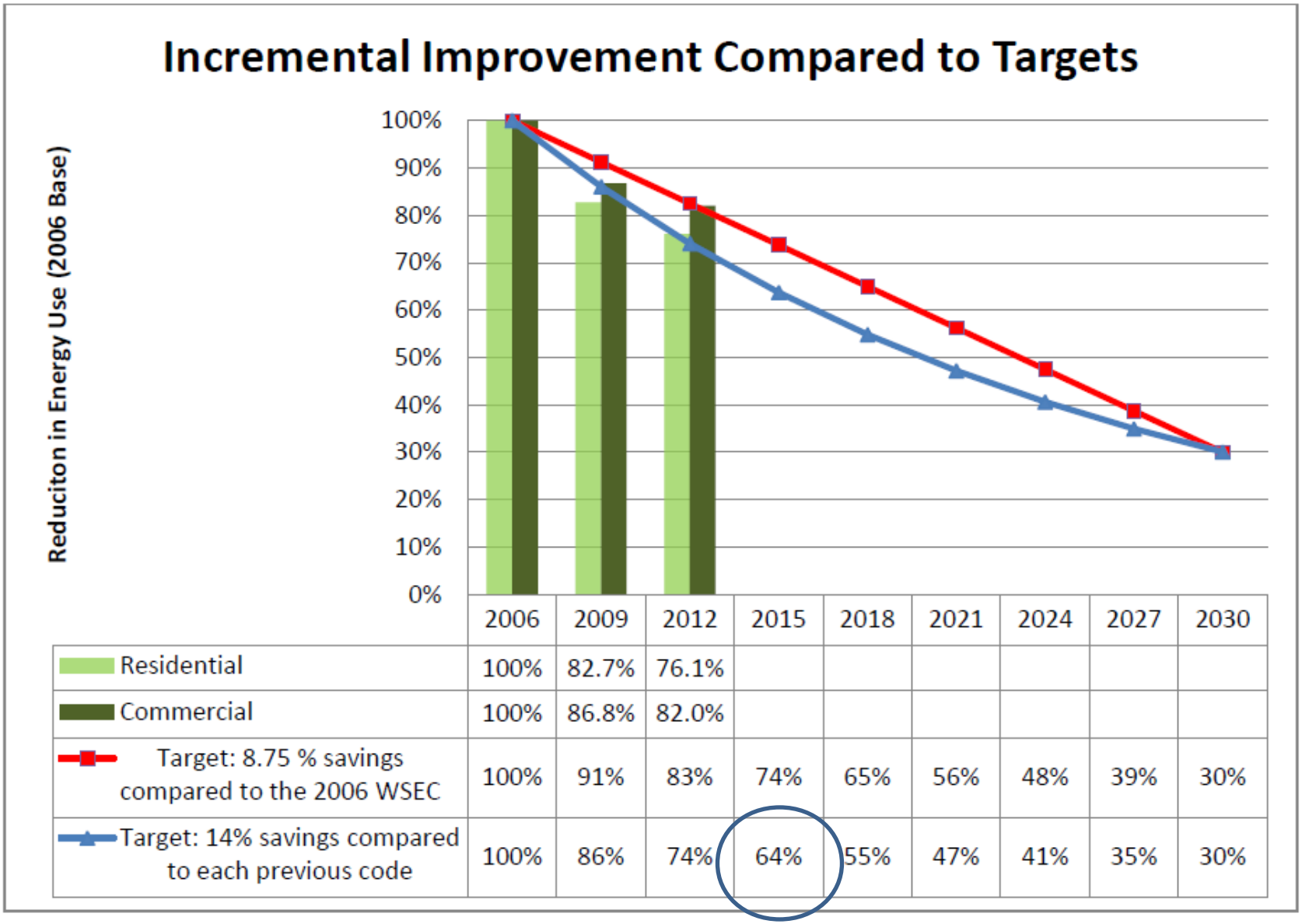
Residential / Commercial /

Energy Consumption by Sector 2012
Billion Btu

Two Leading Existing Policies

- Energy Independence Act (Initiative 937) sets energy conservation and renewable energy targets. Large utilities must acquire renewable resources like wind and solar to meet part of their electricity needs and must implement all cost-effective energy-efficiency measures. (RCW 19.285)
- The State Energy Codes adopted from 2013 through 2031 must incrementally move towards achieving seventy percent reduction

Energy Code



	2006	2009	2012	2015	2018	2021	2024	2027	2030
Residential	100%	82.7%	76.1%						
Commercial	100%	86.8%	82.0%						
Target: 8.75 % savings compared to the 2006 WSEC	100%	91%	83%	74%	65%	56%	48%	39%	30%
Target: 14% savings compared to each previous code	100%	86%	74%	64%	55%	47%	41%	35%	30%

I937 – Renewables

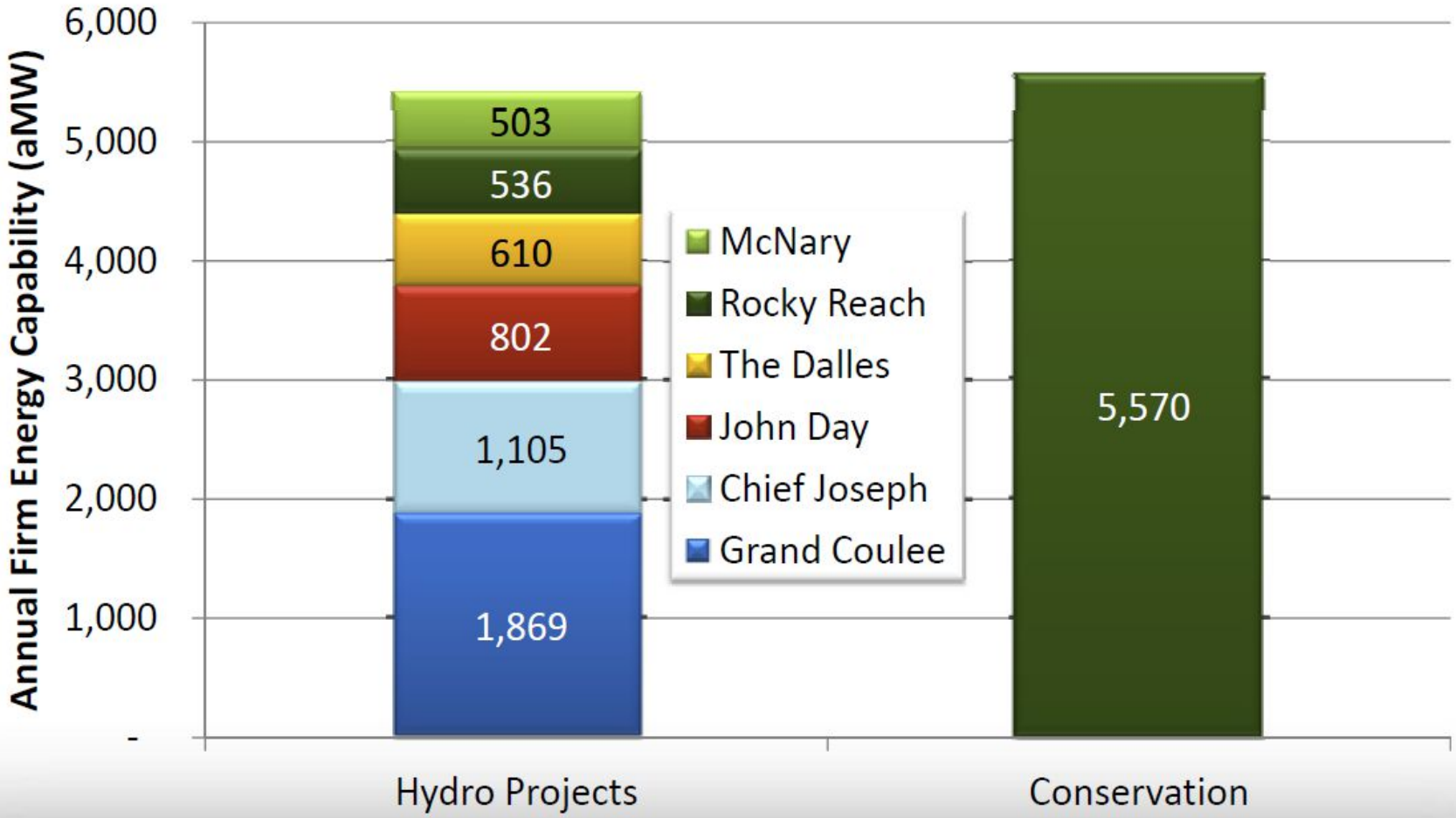
15% of load by 2020

I937 – & Continuing NW Conservation Achivement

Since 1980, over half of the region's growth in demand for electricity has been met with energy efficiency. Major accomplishments include:

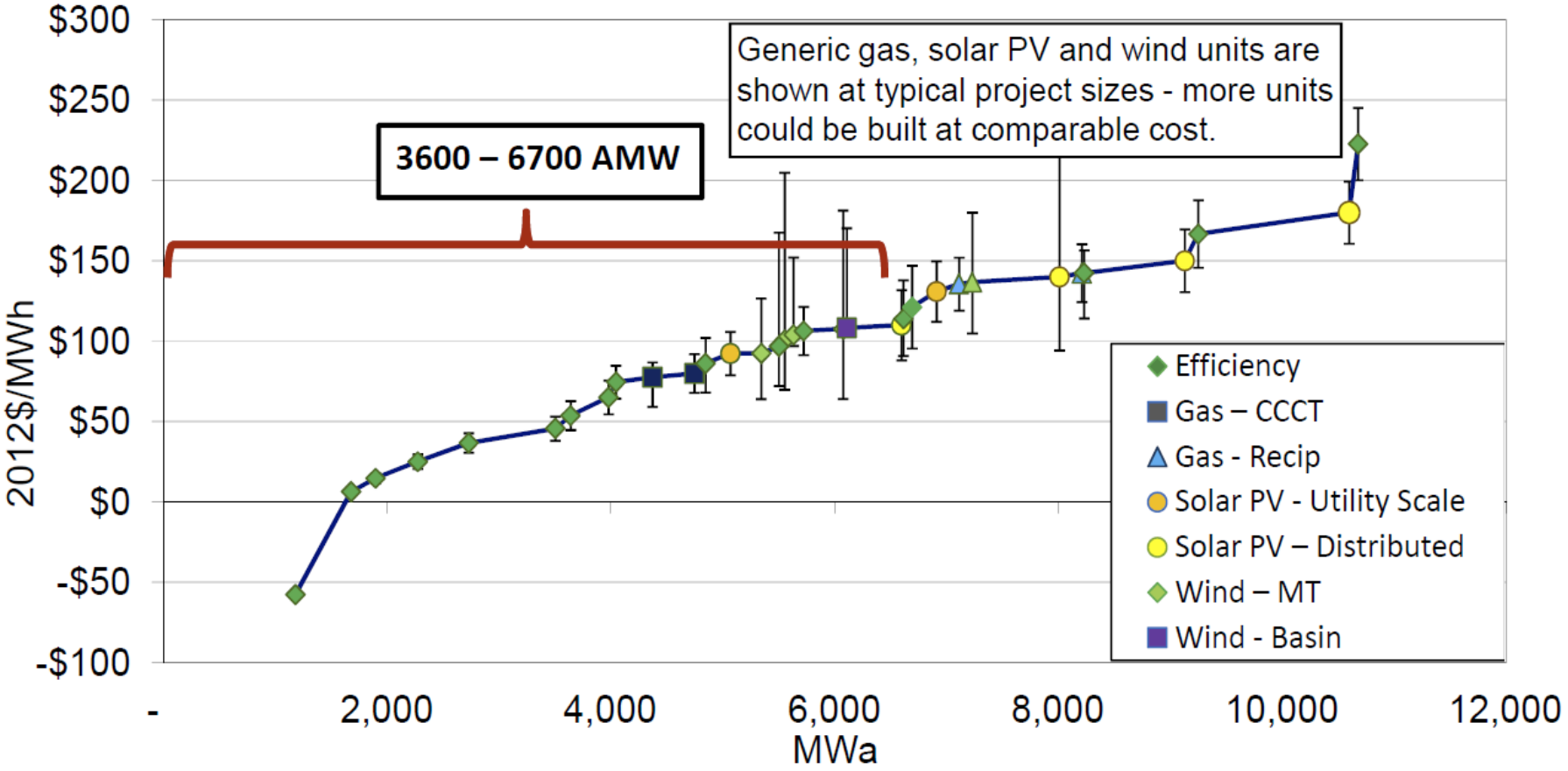
Over 5,600 average megawatts saved—enough to power the state of Oregon and western Montana

Savings from Energy Efficiency Since 1978 Exceeds the Annual Firm Energy Output of the Six Largest Hydro Projects in the Region



Almost

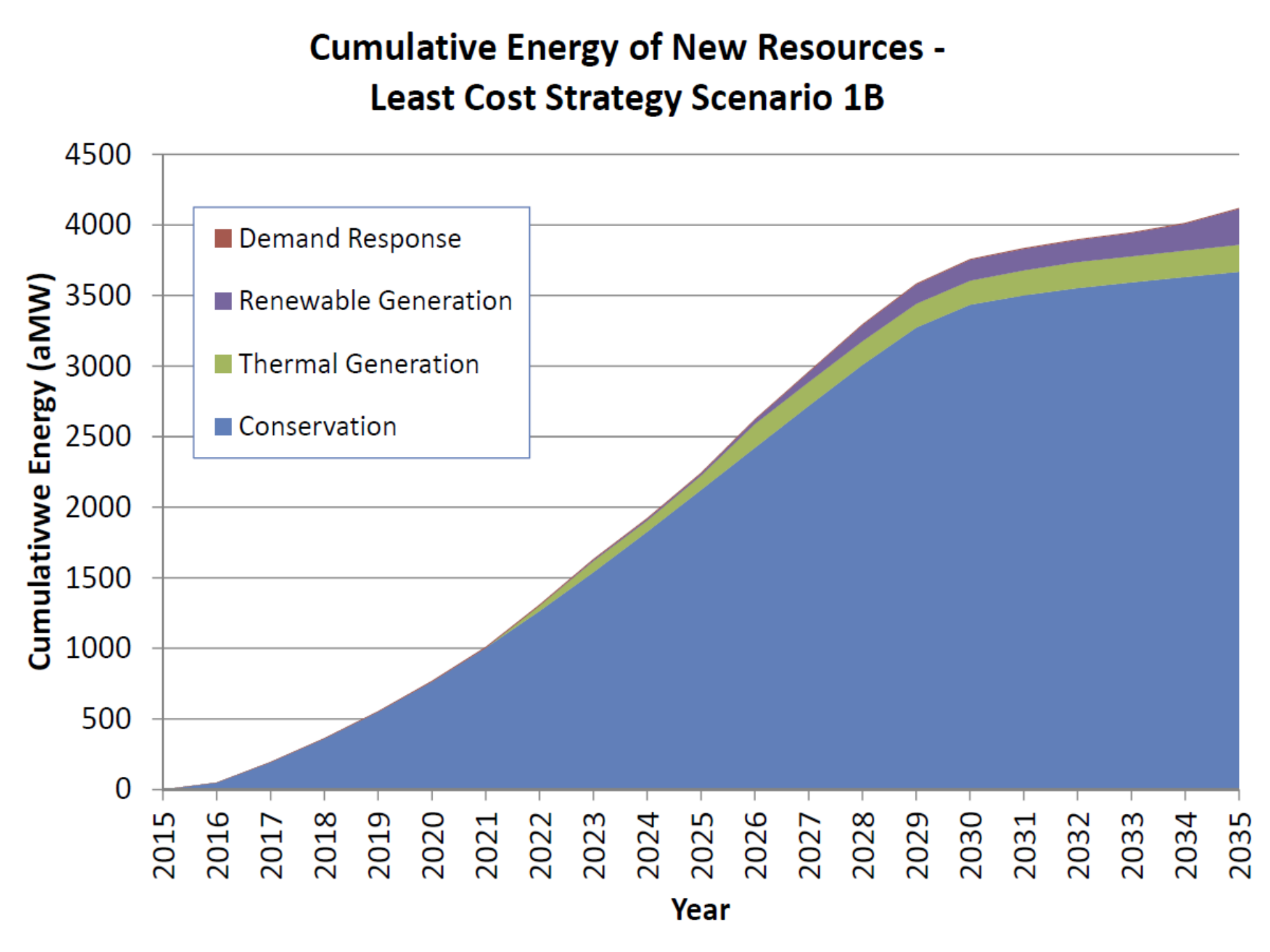
2035 Resource Portfolio Analysis on One Slide

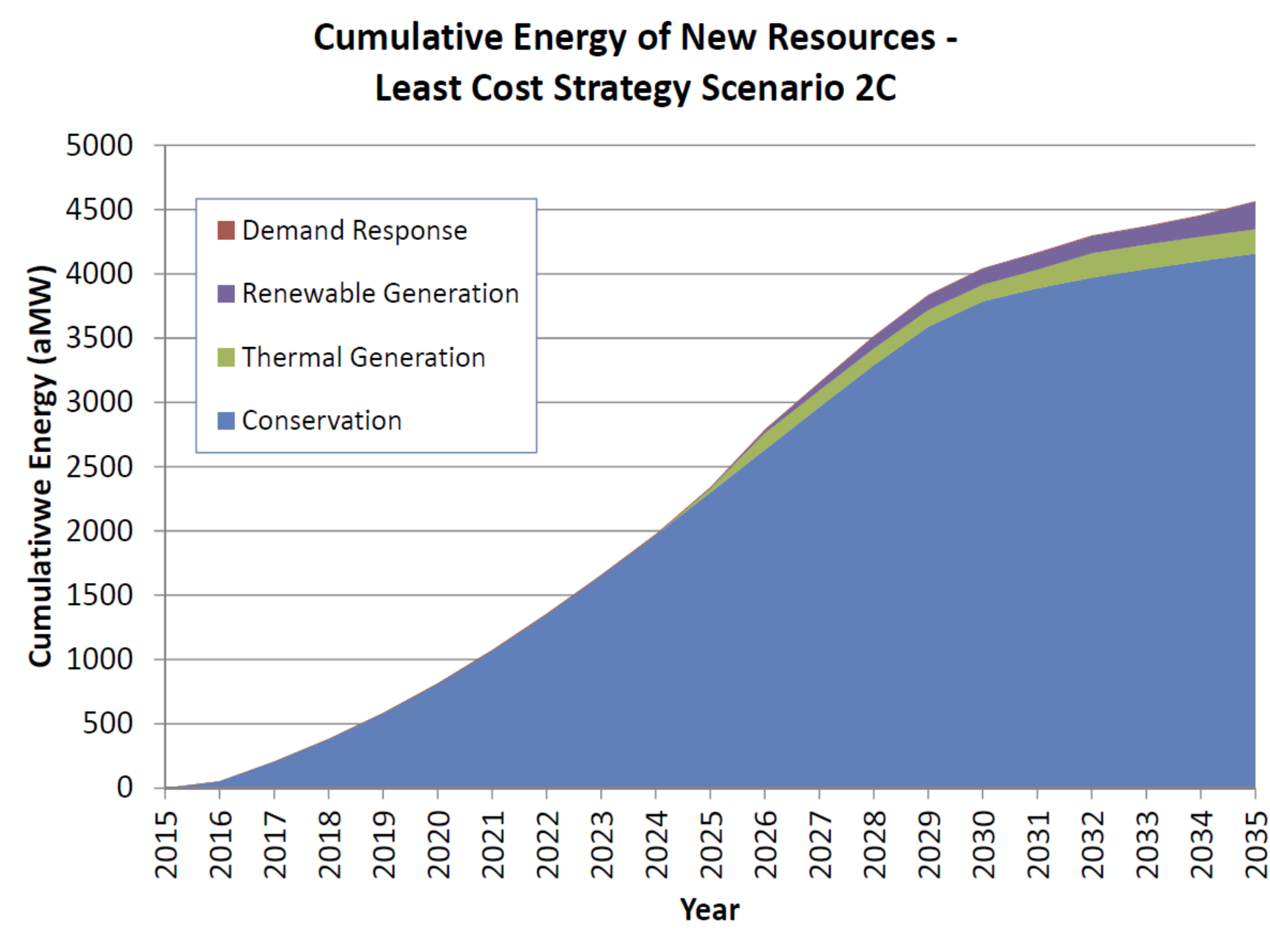


While the "All Resource Energy Supply Curve" tells use what to acquire, it doesn't tell us *how much, when or the costs and risks* of acquisition!

RPM Scenarios

- Scenarios:
  - 1B – Current policy with no penalty for CO2 emissions
  - 2C – Current policy plus an uncertain penalty for CO2 emissions


Cumulative Energy of New Resources -
Least Cost Strategy Scenario 1B
Demand Response
Renewable Generation
Thermal Generation
Conservation
Cumulativwe Energy (aMW)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
Year


Cumulative Energy of New Resources -
Least Cost Strategy Scenario 2C
Demand Response
Renewable Generation
Thermal Generation
Conservation
Cumulativwe Energy (aMW)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
Year

Energy Management

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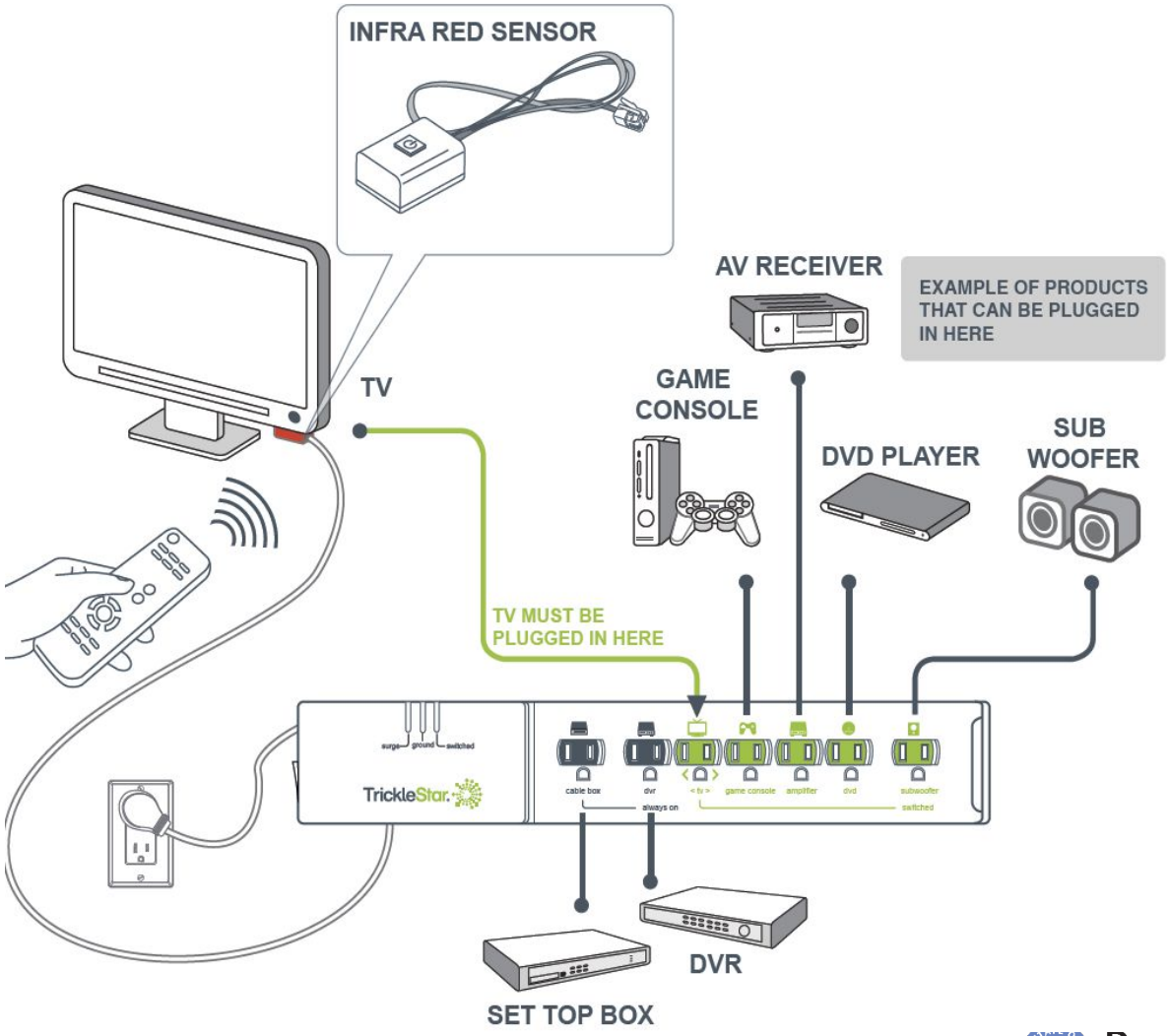
Energy Management

Designed for Off

Energy Management

Not Designed for OFF

Energy Management



Energy Management

- Obtain management support for long-term energy reduction goals
- Dedicate staff, including an energy champion, to oversee and monitor energy management planning and implementation
- Develop and regularly update energy management plans
- Implement a system for tracking energy use
- Quantify energy savings from energy-efficient equipment upgrades

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Energy Management

Energy Efficiency

150 HP	EF@75% load	Hours/Year	Cost Year
Standard	94.3%	4500	$32,039
Premium	96.5%	4500	$31,309
			$730

Energy Management

150 HP	EF@75% load	Hours/Year	Cost Year
Premium	96.5%	4500	$31,039
Premium	96.5%	3900	$27,134
			$3,905

Energy Management

- Obtain management support for long-term energy reduction goals
- Dedicate staff, including an energy champion, to oversee and monitor energy management planning and implementation
- Develop and regularly update energy management plans
- Implement a system for tracking energy use
- Quantify energy savings from energy-efficient equipment upgrades

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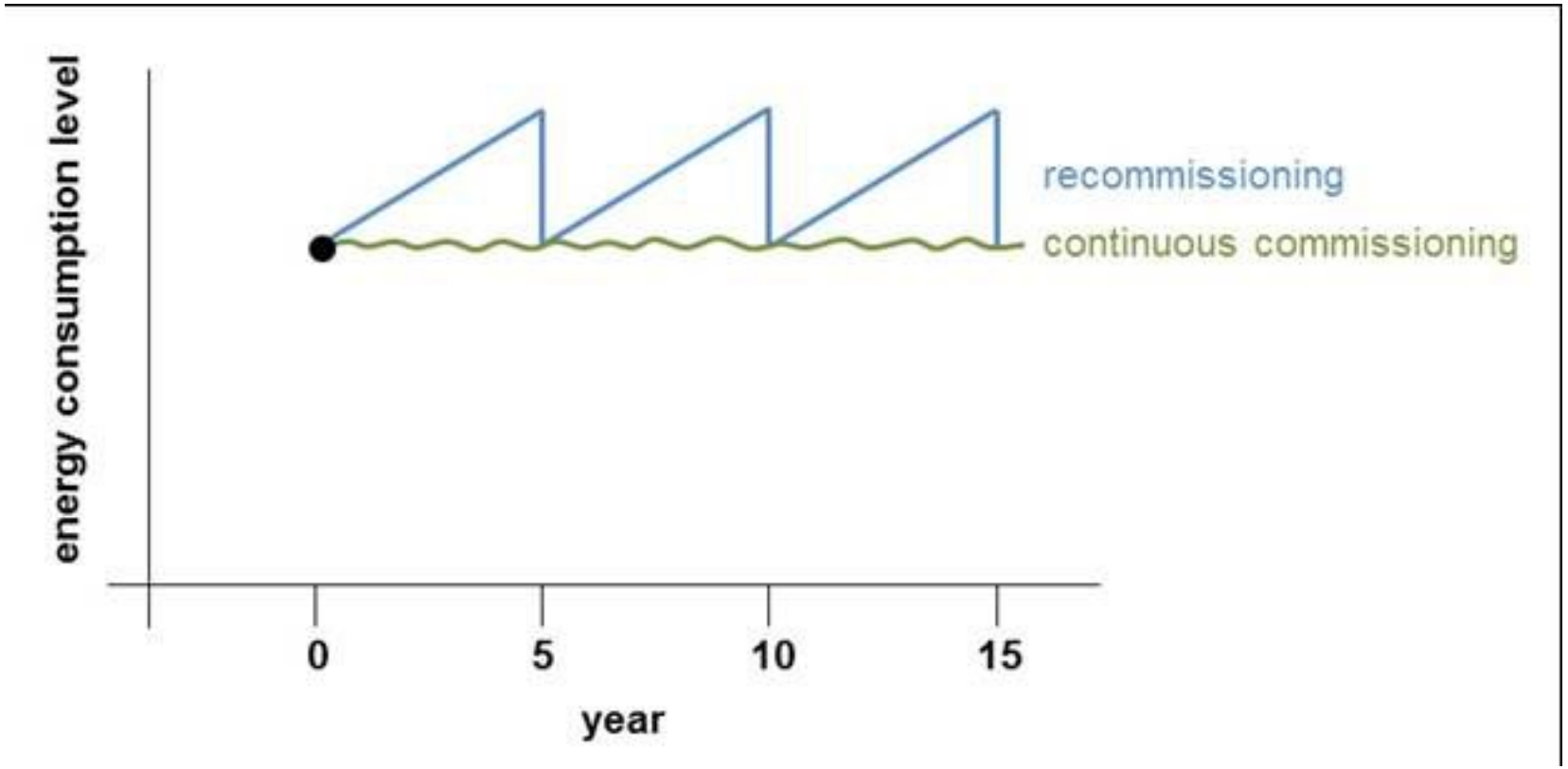
Energy Management

- AKA
  - Strategic Energy Management (SEM)
  - Retro-commissioning
  - Track and tune
  - Resource Conservation Manager (RCM)

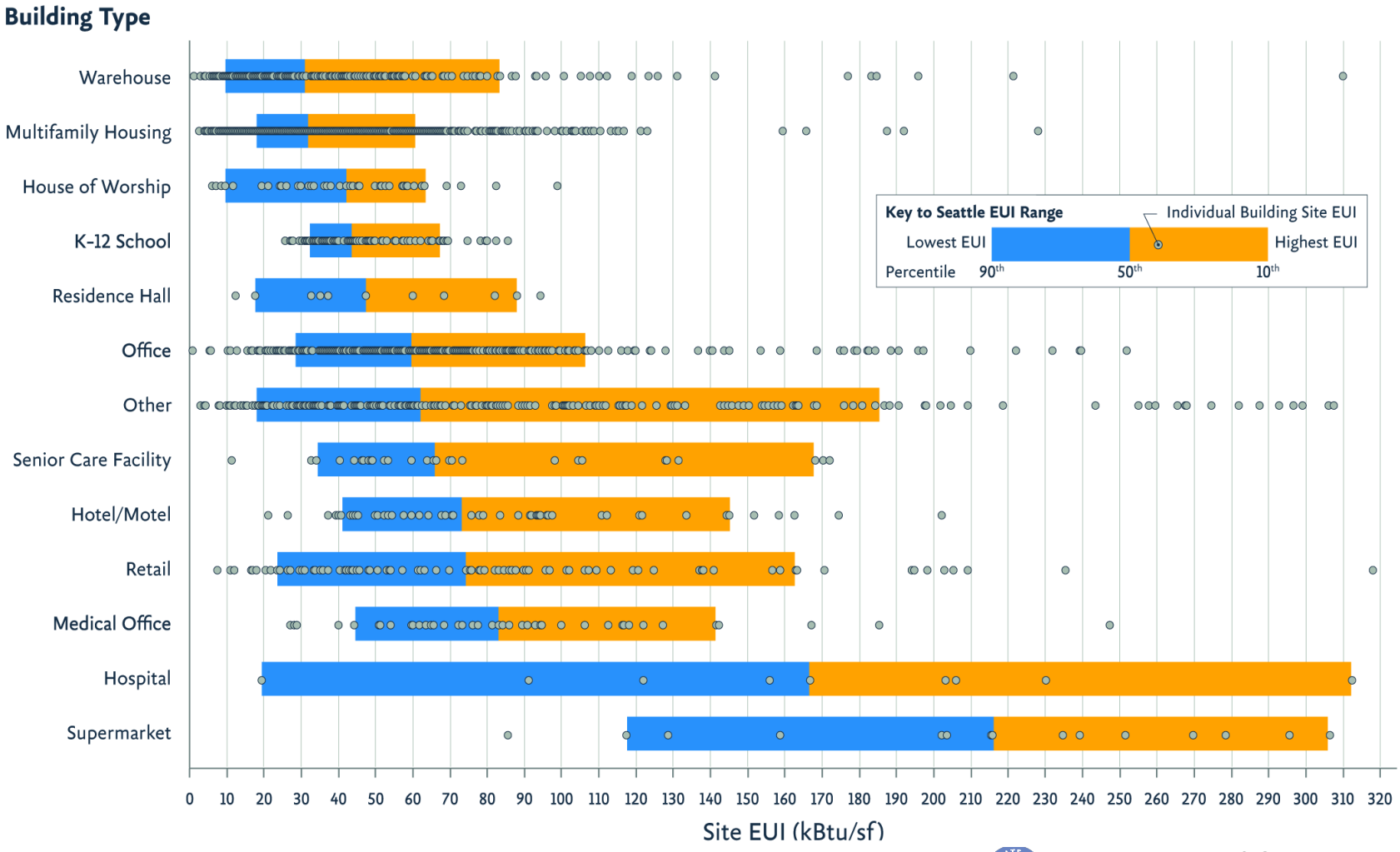
  - Take advantage of utility staff and programs – you already paid for it.
  - Get ready for “pay for performance” incentives

Building or Process Energy Trends



Navigant

Benchmarking



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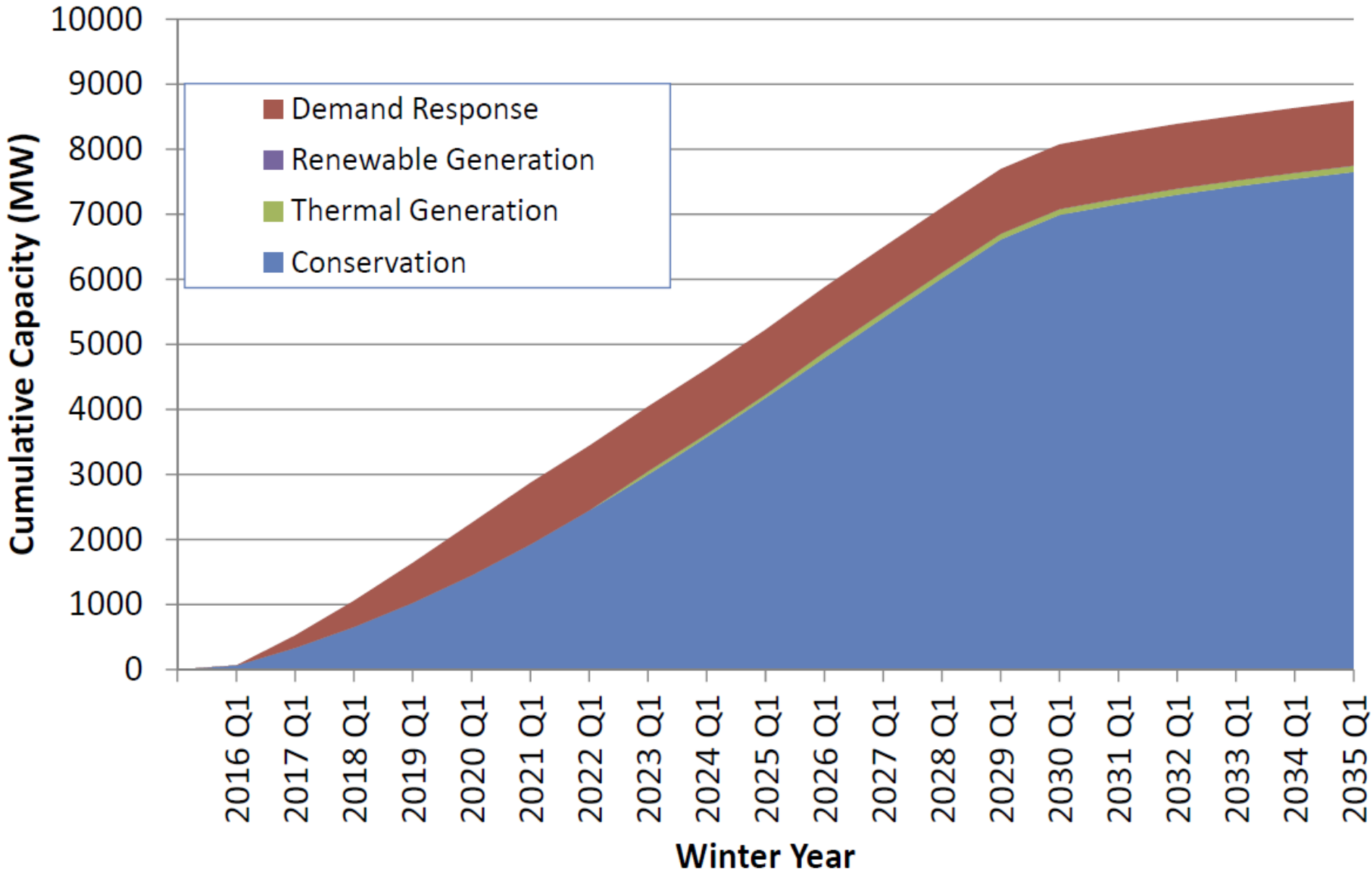
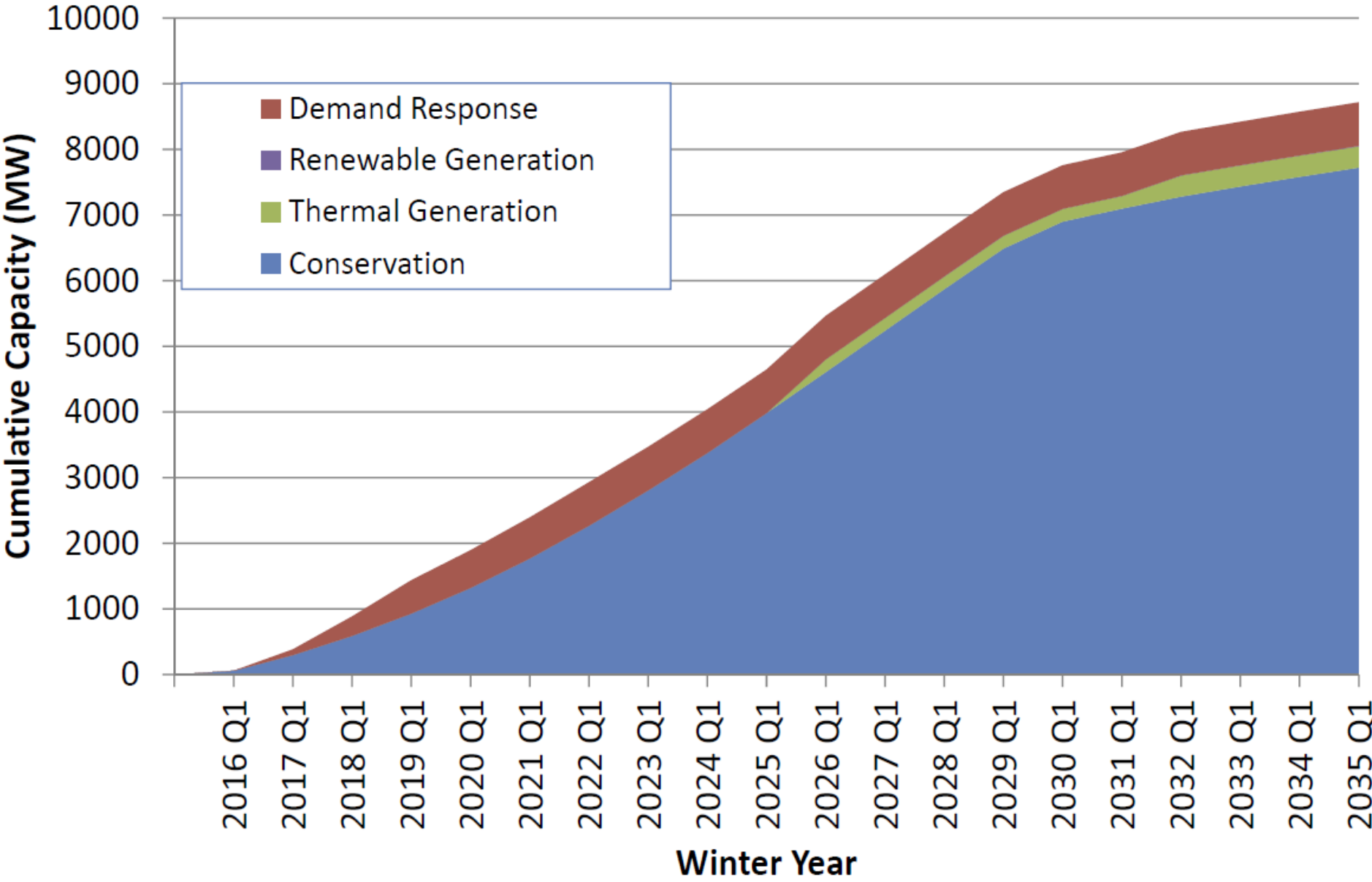
What's your yardstick?

- Commercial Office – Energy/SF, Energy Star Score
- Wastewater – Energy / MGD
- Food processing – Energy / lb of potatoes
- Plastic extrusion – Energy / lb of raw materials
- Data Center – Power Usage Effectiveness (PUE)

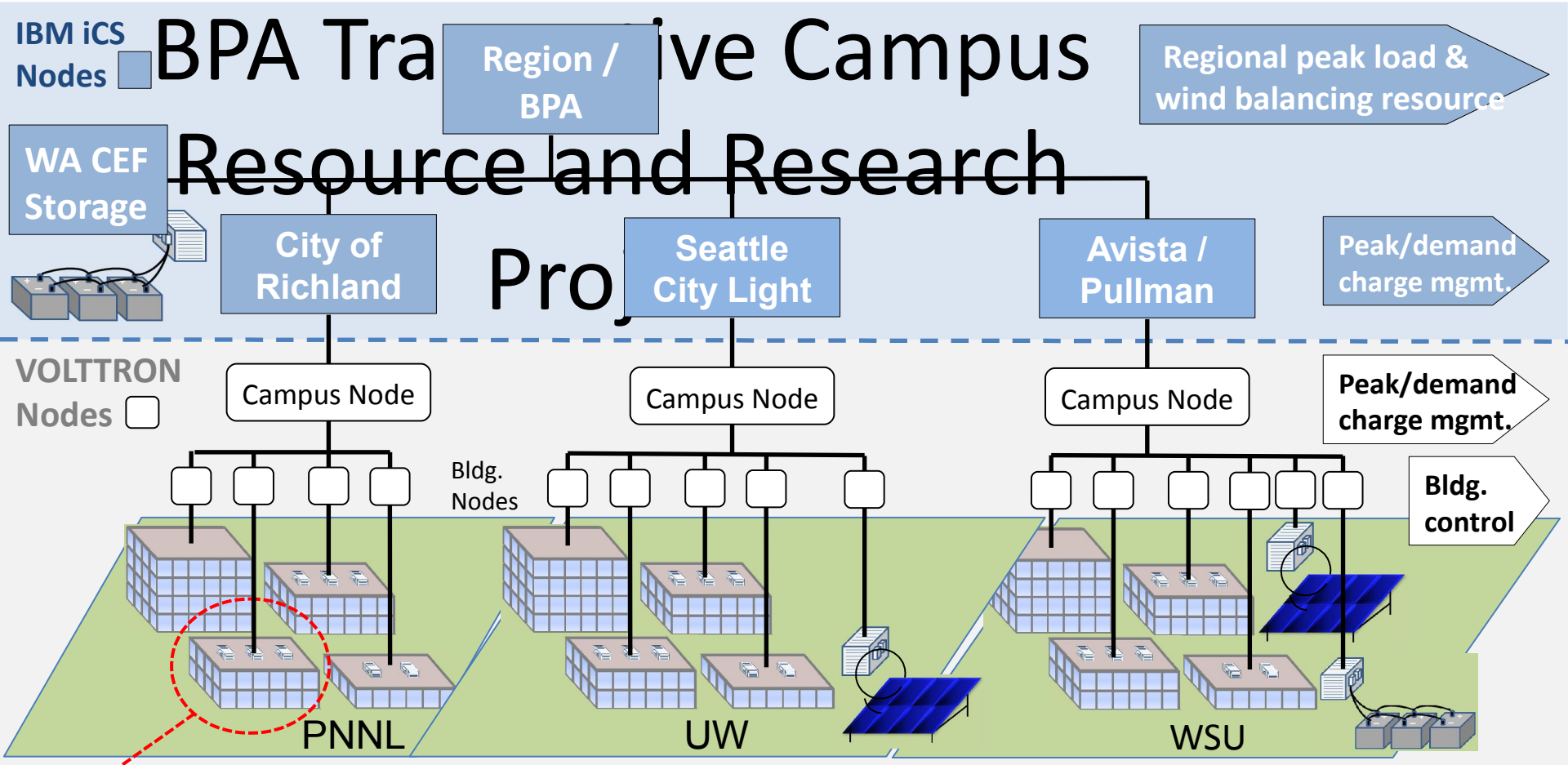
Winter Peaking Capacity of New Resources - Least Risk Strategy Scenario 1B



Winter Peaking Capacity of New Resources - Least Risk Strategy Scenario 2C



Transactive Network DOE / BPA Transactive Campus Resource and Research Project



- Multi-campus network operations
- Transactive campus/bldg. responsive applications
- Transactive / advanced bldg. controls testbed (SEL bldg.)
- Energy efficiency applications, leveraging transactive network
- Smart inverter integration w/ Seattle City Light's distribution
- Curricula development
- Microgrids as a resilience resource/smart city w/ Avista
- Solar PV & CEF battery in WSU microgrid ops
- Curricula development