Appendix

2009

Electric
Integrated Resource Plan

Appendix A – Technical Advisory Committee Meeting Presentations

AVISTA®

August 31, 2009

2009 Integrated Resource Plan

Technical Advisory Committee Meeting No. 1 Agenda
May 14, 2008

	Topic	Time	Staff
1.	Introduction	10:30	Vermillion
2.	Load & Resource Balance Update	10:35	Gall
3.	Climate Change Update	11:15	Lyons
4.	Lunch	12:15	
	Special Guest - Steve Silkworth- update on renewable acquisitions		
5.	Loss of Load Probability Analysis	1:15	Gall
6.	2009 IRP Topic Discussions • Work Plan • Analytical Process Changes • Other	2:00	Kalich
7.	Adjourn	3:30	

Load and Resource Balance Forecast

James Gall

2007 IRP L&R Review

- Capacity & Energy short beginning 2011
- Load is expected to grow at 2.3% over the next 10 years, and 2.0% over the next twenty years
- Lancaster will be added to the utility's portfolio beginning in 2010, pushing our deficit out to 2015 for capacity and 2017 for energy

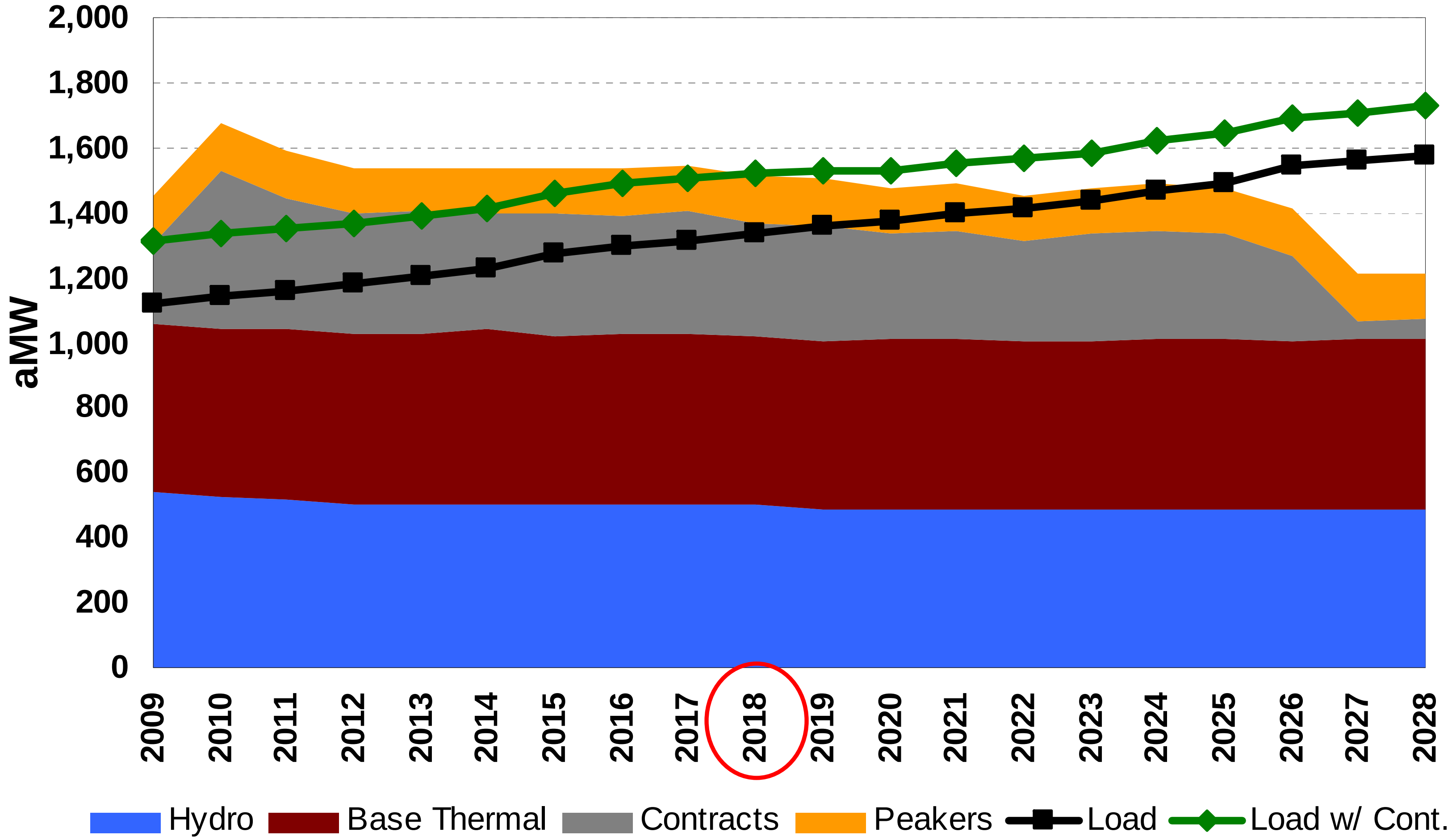
AVISTA

Current L&R

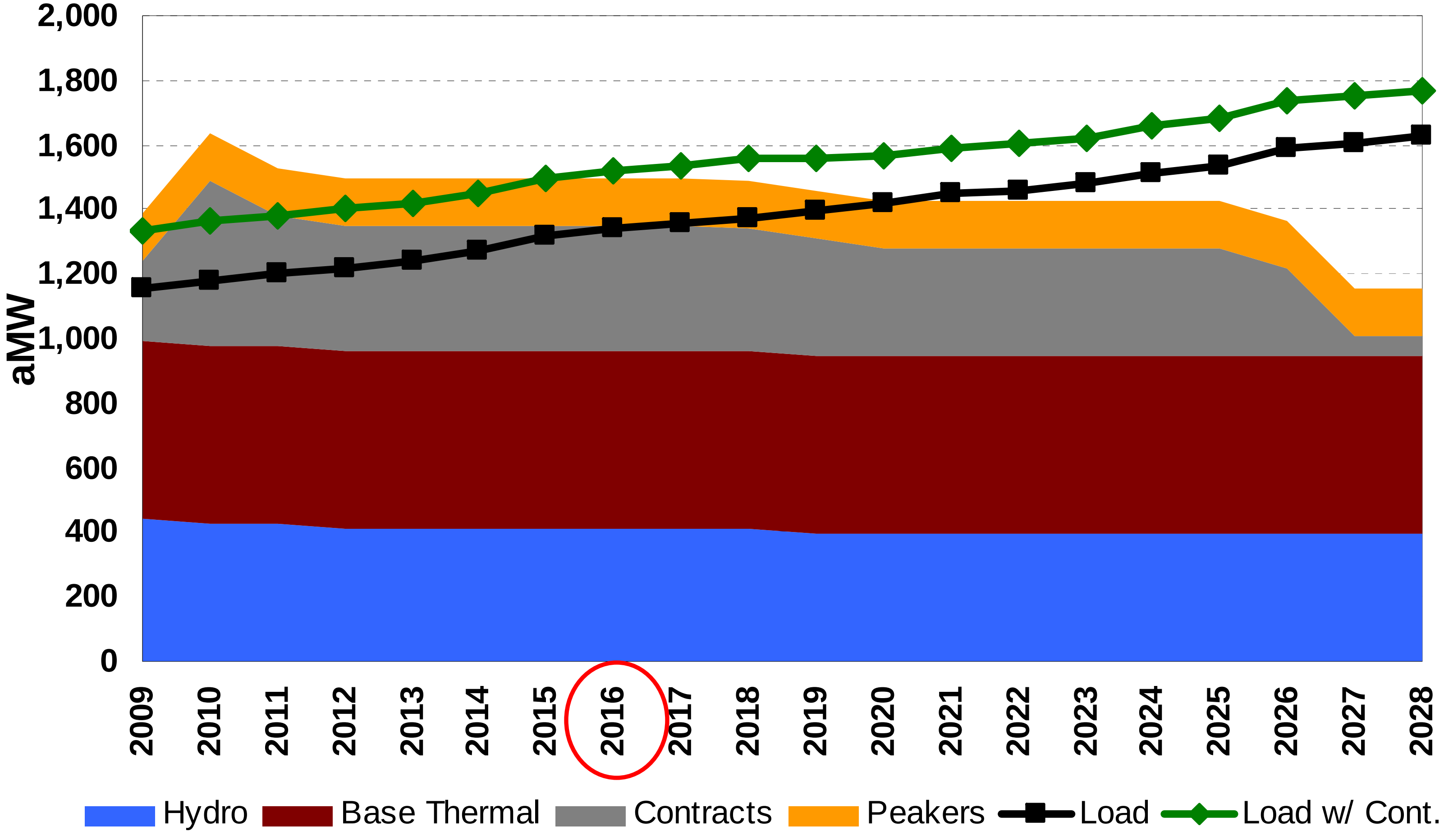
What's Changed:

- **Lancaster**- 270 MW CCCT in Rathdrum, ID will be available Jan 1, 2010
- **Load**- 10 year growth rate 1.9%, 20 year growth rate 1.8% for Peak and Energy. The 2010 forecast is 52 aMW lower than previous forecast or 4.4% lower, due to slow down in growth and implementation of conservation programs.
- **Hydro**- Uses 2006/07 Northwest Power Pool Headwater benefits study, mean energy is used versus median energy [-8 aMW]
- **Misc**- Updates to contracts, most from WNP-3 expected availability [+22 aMW]

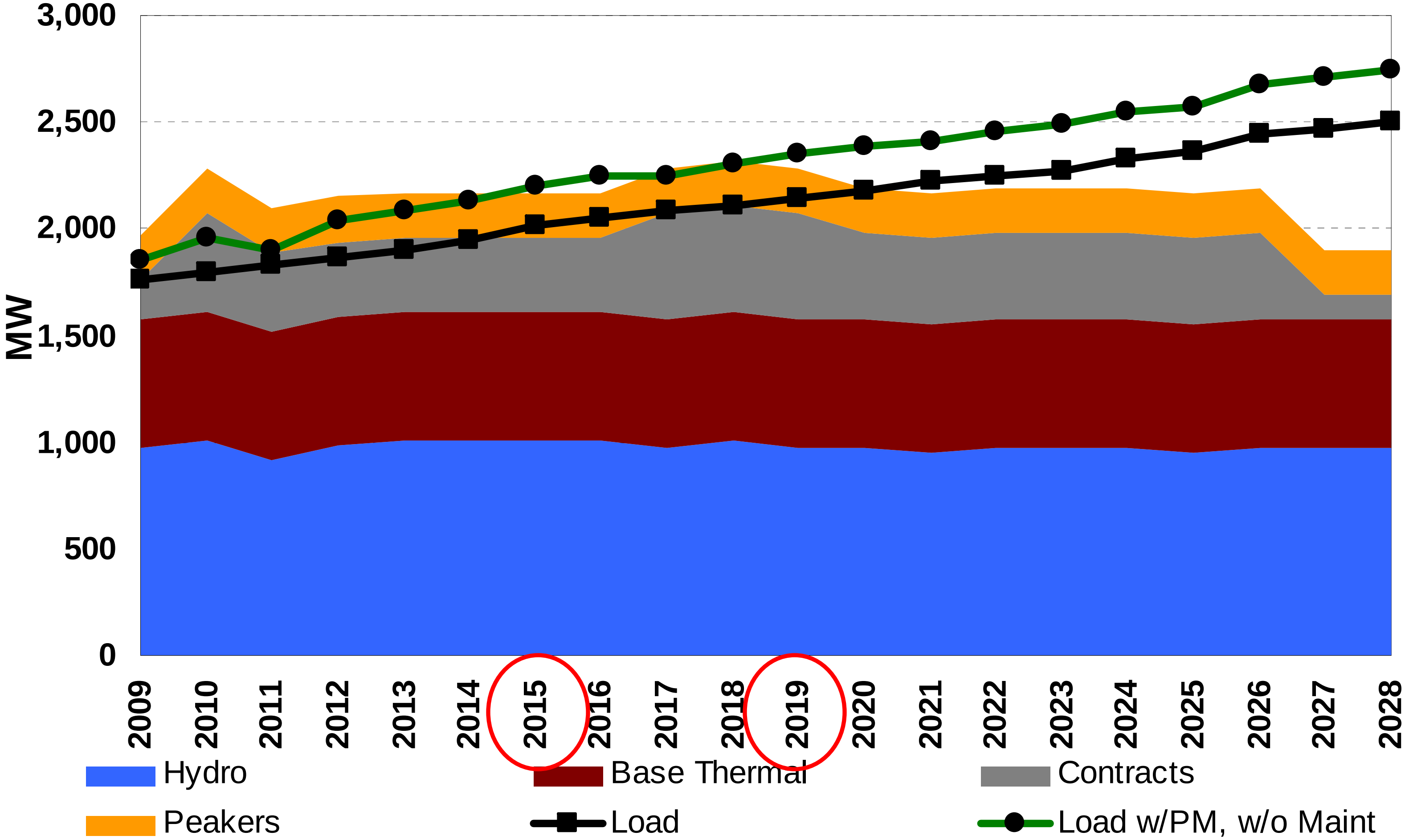
Annual Average Energy Position



Annual Average Energy Position (exclude Q2)



Annual Position at System Peak



Washington State RPS (aMW)

	On-line Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Native Load (Excludes Potlatch)		1,012	1,034	1,053	1,074	1,094	1,121	1,153	1,177	1,194	1,211	1,233	1,253
WA State Load		659	674	686	700	713	730	751	767	778	789	803	816
Load 10% Change of Exceedance		28	29	29	30	30	31	32	33	33	34	34	35
Planning RPS Load		687	702	715	729	743	761	783	799	811	822	837	851
RPS %		0%	0%	0%	3%	3%	3%	3%	9%	9%	9%	9%	15%
Required Renewable Energy		**0.0**	**0.0**	**0.0**	**21.3**	**21.7**	**22.1**	**22.6**	**69.5**	**71.2**	**72.5**	**73.5**	**124.5**
Current Qualifying Resources													
Stateline	1999	7.6	7.6	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long Lake 3	1999	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Little Falls 4	2001	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cabinet 2	2004	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Cabinet 3	2001	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Cabinet 4	2007	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Apprentice Credits		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Hydro 10% Chance of Exceedance		(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)	(4.1)
Total Qualifying Resources		***16.1***	***16.1***	***16.1***	***8.5***	***8.5***	***8.5***	***8.5***	***8.5***	***8.5***	***8.5***	***8.5***	***8.5***
Net Requirement Need (Completed)		**0.0**	**0.0**	**0.0**	**12.8**	**13.2**	**13.6**	**14.1**	**61.0**	**62.7**	**64.0**	**65.0**	**116.0**
Budgeted Hydro Upgrades													
Noxon 1	2009	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Noxon 2	2010	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Noxon 3	2011	0.0	0.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Noxon 4	2012	0.0	0.0	0.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Little Falls 1	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6
Little Falls 2	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6
Apprentice Credits		0.5	0.7	0.9	1.2	1.2	1.2	1.3	1.4	1.4	1.4	1.4	1.4
Hydro 10% Chance of Exceedance		(1.0)	(1.4)	(1.9)	(2.4)	(2.4)	(2.4)	(2.6)	(2.8)	(2.8)	(2.8)	(2.8)	(2.8)
Total Budgeted Hydro Upgrades		***1.8***	***2.6***	***3.6***	***4.5***	***4.5***	***4.5***	***5.1***	***5.6***	***5.6***	***5.6***	***5.6***	***5.6***
Net Requirement Need (Budgeted)		**0.0**	**0.0**	**0.0**	**8.2**	**8.6**	**9.1**	**9.0**	**55.3**	**57.1**	**58.3**	**59.4**	**110.4**

Climate Change Update

John Lyons, Ph.D.

Climate Change Update

- Federal GHG legislation – Overview of Lieberman-Warner Bill
- EPA Analysis of Lieberman-Warner
- EIA Analysis of Lieberman-Warner
- Washington Greenhouse Gas Legislation
- Regional Greenhouse Gas Initiative

Lieberman-Warner Climate Security Act of 2007

- Covers emissions of 10,000 mtco2 or greater
- GHG Emissions Reduction Goals:

2012 – 2005 levels (5,775 mmtco2)

2020 – 15% below 2005 levels (4,924 mmtco2)

2030 – 35% below 2005 levels (3,860 mmtco2)

2040 – 50% below 2005 levels (2,796 mmtco2)

2050 – 70% below 2005 levels (1,732 mmtco2)

2007 total U.S. GHG emissions were about 6,000 mmtco2

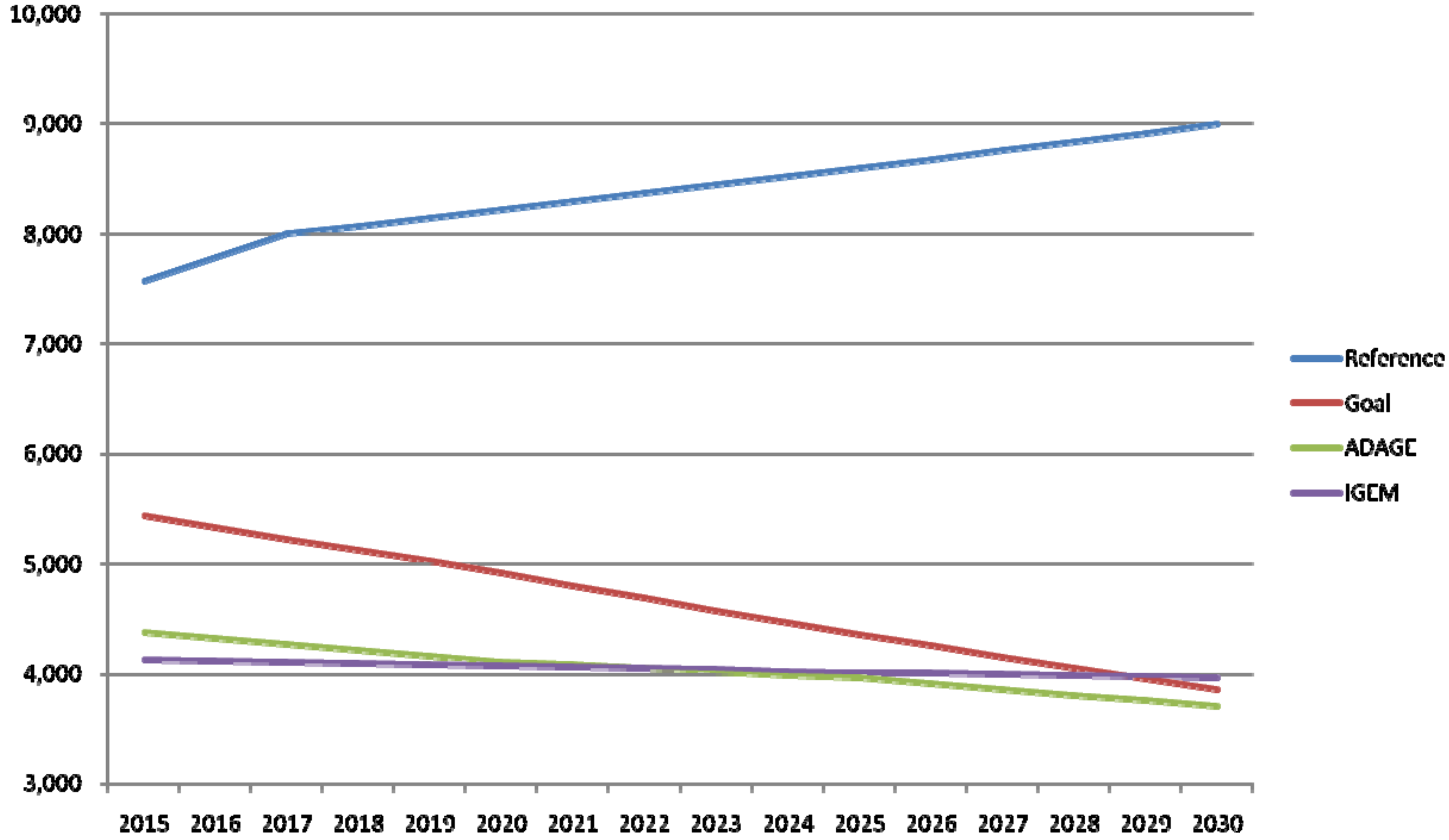
Lieberman-Warner Climate Security Act of 2007

- 73.5% of allowances distributed for free in 2012 to 14 different groups, free allocations decrease over time
- Allows unlimited banking and trading of allowance
- Borrowing is from EPA is allowed with interest for up to 15% of obligations
- 30% of reductions can be offsets (15% domestic and 15% international)
- Establishes a Carbon Market Efficiency Board to monitor and intervene in the carbon market

EPA Analysis of Lieberman-Warner

- Reference Case
- S. 2191 Scenario
- S. 2191 Scenario with Low International Actions
- S. 2191 Scenario Allowing Unlimited Offsets
- S. 2191 Scenario with No Offsets
- S. 2191 Constrained Nuclear and Biomass
- S. 2191 Constrained Nuclear, Biomass, and CCS
- S. 2191 Constrained Nuclear, Biomass, and CCS + Beyond Kyoto + Natural Gas Cartel
- Alternative Reference Scenario
- S. 2191 Alternative Reference Scenario

U.S. Carbon Footprint Projections 2015 – 2030



Federal Spending of Auctioned Credits

	ADAGE		IGEM	
Category	**2015**	**2030**	**2015**	**2030**
Administration of S. 2191 (assumed to be 1% of auction revenues)	1.6	2.3	2.2	3.2
Zero or Low-Carbon Energy Technologies Deployment	7.8	23.7	10.9	32.7
Advanced Coal and Sequestration Technologies Program	6.1	18.5	8.5	25.6
Fuel from Cellulosic Biomass Program	1.5	4.4	2.0	6.1
Advanced Technology Vehicles Manufacturing Program	2.9	8.9	4.1	12.3
Sustainable Energy Program	6.1	18.5	8.5	25.6
Energy Consumers	8.5	25.6	11.7	35.4
Climate Change Worker Training Program	2.4	7.1	3.3	9.8
Adaptation for Natural Resources in the U.S. and Territories	8.5	25.6	11.7	35.4
International Climate Change Adaptation and National Security Program	2.4	7.1	3.3	9.8
Emergency Firefighting Program	1.2	1.2	1.2	1.2
Energy Independence Acceleration Fund	0.9	2.8	1.3	3.9
Total	**49.9**	**145.7**	**68.7**	**201.0**

ADAGE (Applied Dynamic Analysis of the Global Economy - Ross 2007)

IGEM (Intertemporal General Equilibrium Model - Jorgenson 2007)

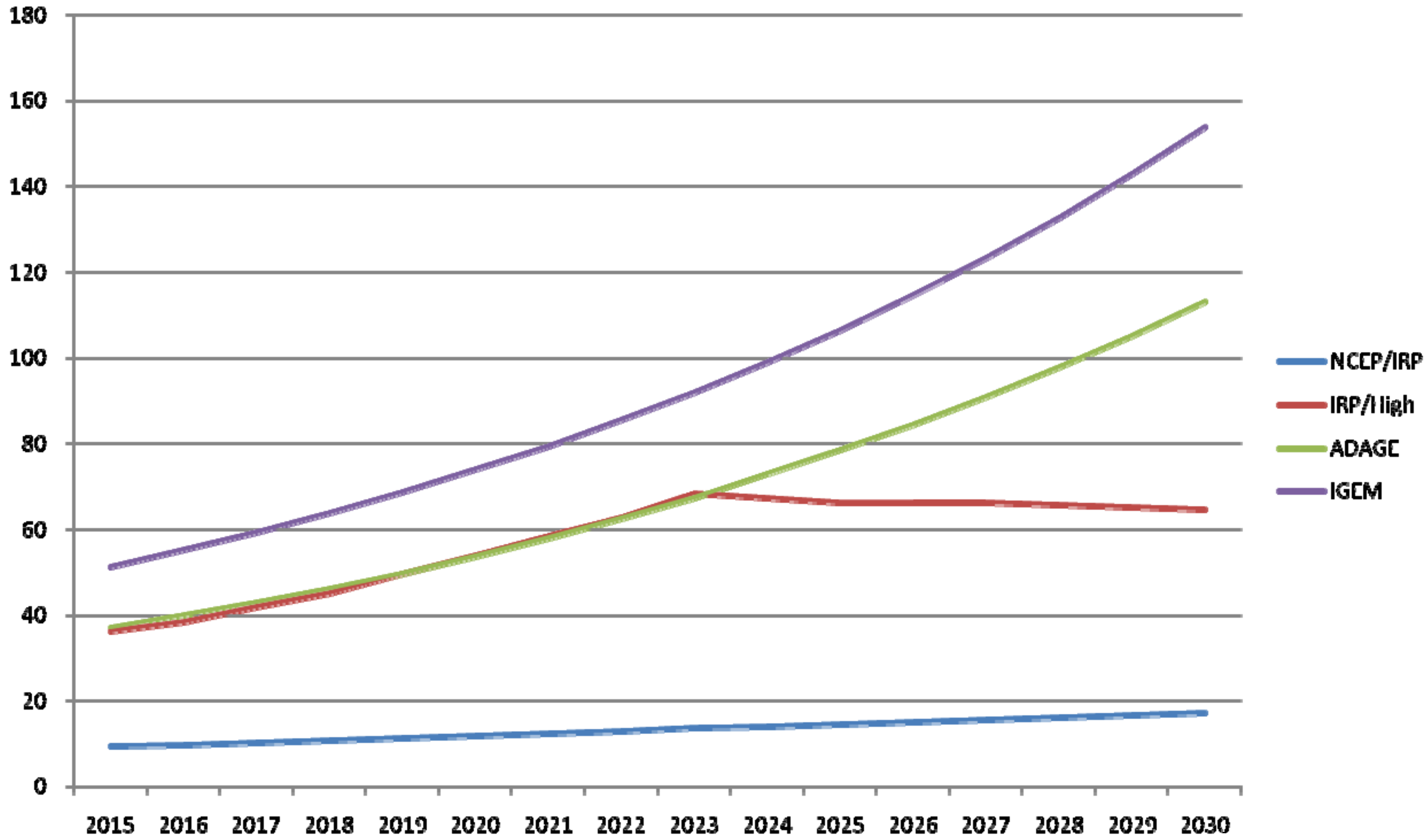
Value of Auctioned & Allocated Allowances

	ADAGE		IGEM	
Category	**2015**	**2030**	**2015**	**2030**
Subtitile A - Auctions (pre-spent by Feds)	47.0	147.0	64.0	201.0
Subtitle B - Early Action	3.0	0.0	4.0	0.0
Subtitle C - States	18.0	26.0	24.0	35.0
Subtitle D - Electricity Consumers	14.0	21.0	20.0	29.0
Subtitle E - Natural Gas Consumers	3.0	5.0	4.0	6.0
Subtitle F - Bonus Allowances for CCS	6.0	9.0	9.0	13.0
Subtitle G - Domestic Ag/Forestry	8.0	12.0	11.0	16.0
Subtitle H - International Forest Protection	4.0	6.0	5.0	8.0
Subtitle I - Transition Assistance	54.0	6.0	74.0	9.0
Subtitle J - Landfill / Coal Mine CH4 Allowance Set - Asides	2.0	2.0	2.0	3.0
Total	**159.0**	**234.0**	**217.0**	**320.0**
net of customer "refunds"	142.0	208.0	193.0	285.0
customer refund %	11%	11%	11%	11%

ADAGE (Applied Dynamic Analysis of the Global Economy - Ross 2007)

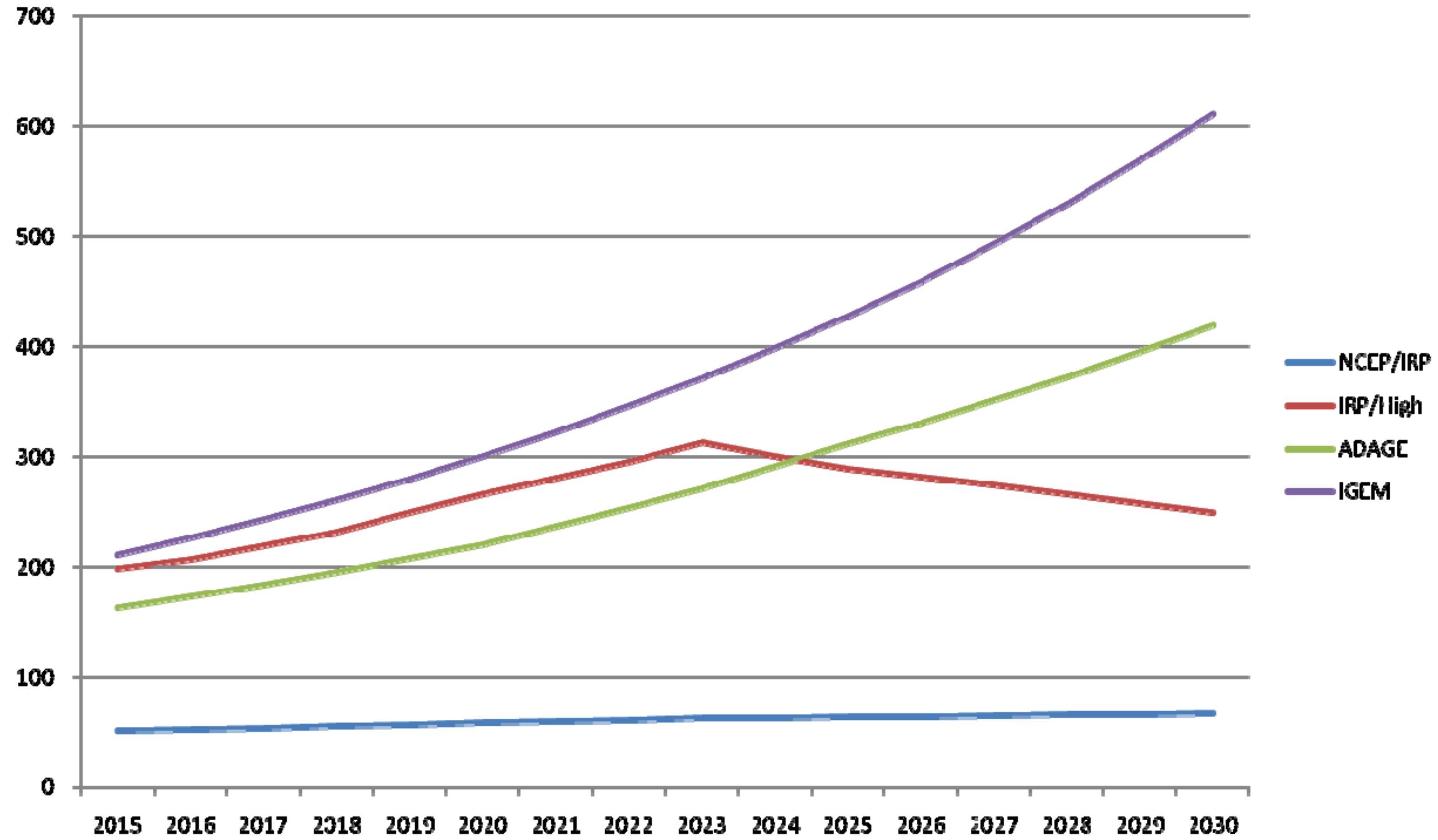
IGEM (Intertemporal General Equilibrium Model - Jorgenson 2007)

EPA Analysis of U.S. Carbon Emission Cost
($/Metric Ton)



AVISTA

EPA Analysis Total U.S. Carbon Emission Cost
($billions)



AVISTA

EIA Analysis of Lieberman-Warner

- Analysis included 7 cases
- Reference Case
- S. 2191 Core
- No International Offsets Case
- S. 2191 High Cost (CCS, Nuclear and biomass costs 50% higher than in the base case)
- S. 2191 Limited Alternatives
- S. 2191 Limited Alternatives / No International Offsets
- S. 1766 Update (Low Carbon Economy Act of 2007)

EIA Analysis Results

- As expected, impacts directly related to the availability and cost of low-carbon technologies such as CCS and nuclear, as well as the availability of international offsets
- Results are also dependent upon the assessment of the current high commodity prices being permanent or temporary
- Most reductions before 2030 are electricity-related
- GDP reductions in the S. 2191 cases
  - 2020: 0.3% to 0.9%
  - 2030: 0.3% to 0.8%
  - Higher manufacturing impacts

EIA Analysis Results

- Significant increases in new capacity because of early retirement of coal plants through 2030
- There are limited opportunities in the electric power industry after 2030 because the most GHG-intensive plants will have been retired, but population growth will require new generation
- Delivered coal prices increase 405% to 804% in 2030 (2006$)
- Natural gas prices increase 34% to 107% in 2030 (2006$)
- Retail gasoline prices increase $0.41 to $1.01 in 2030

Washington State GHG legislation

Washington state has three different laws that directly impact GHG emissions and electric resource planning:

- Washington Energy Independence Act (I-937): 15% of new generation must be renewable by 2020
- SB 6001: Limits new base load generation to 1,100 pounds of CO_2 per MWh
- HB 2815: Sets GHG reductions goals for the state as part of the Western Climate Initiative

AVISTA

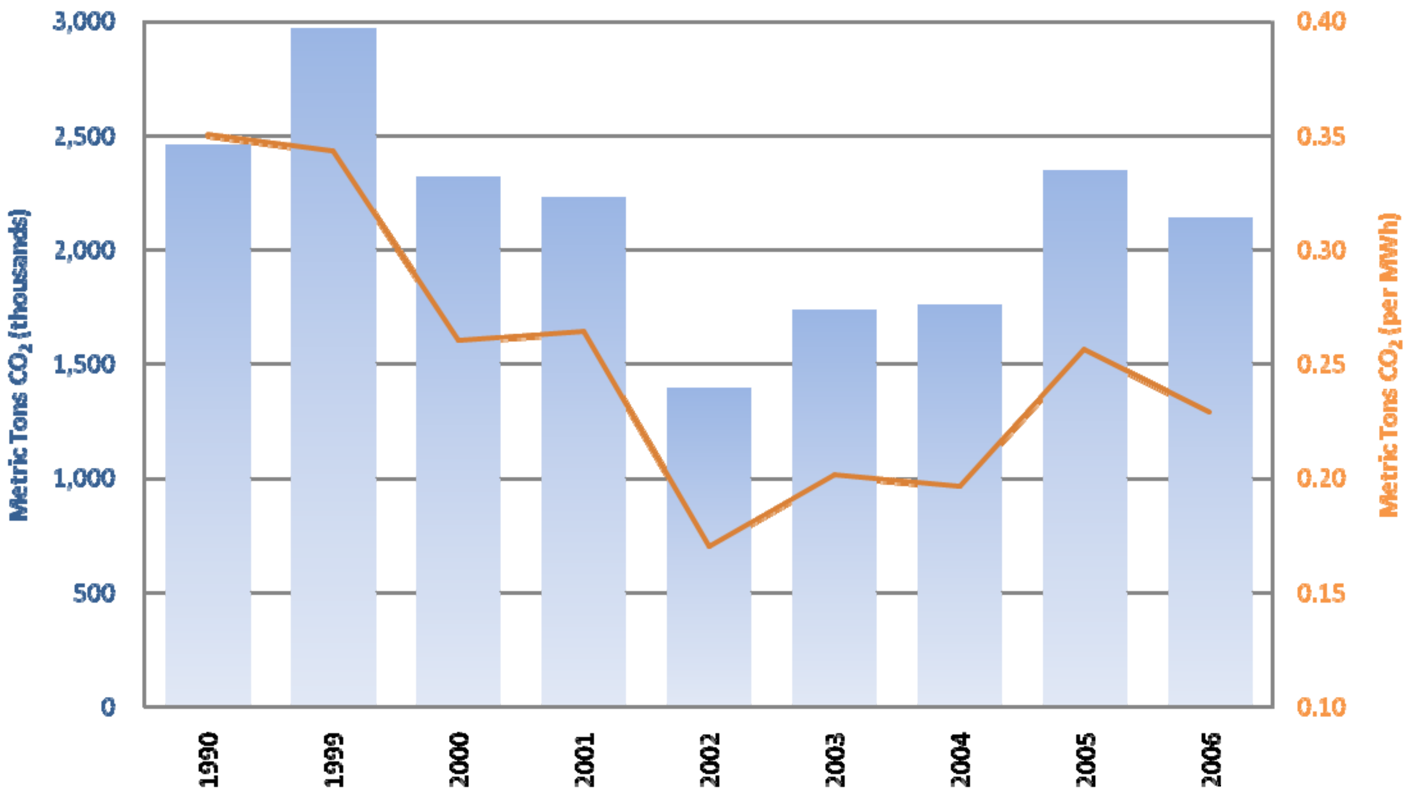
Washington HB 2815

Goals are set to meet Washington's share of the Western Climate Initiative

- 2020 – Below 1990 levels
- 2035 – 25% below 1990 levels
- 2050 – 50% below 1990 levels

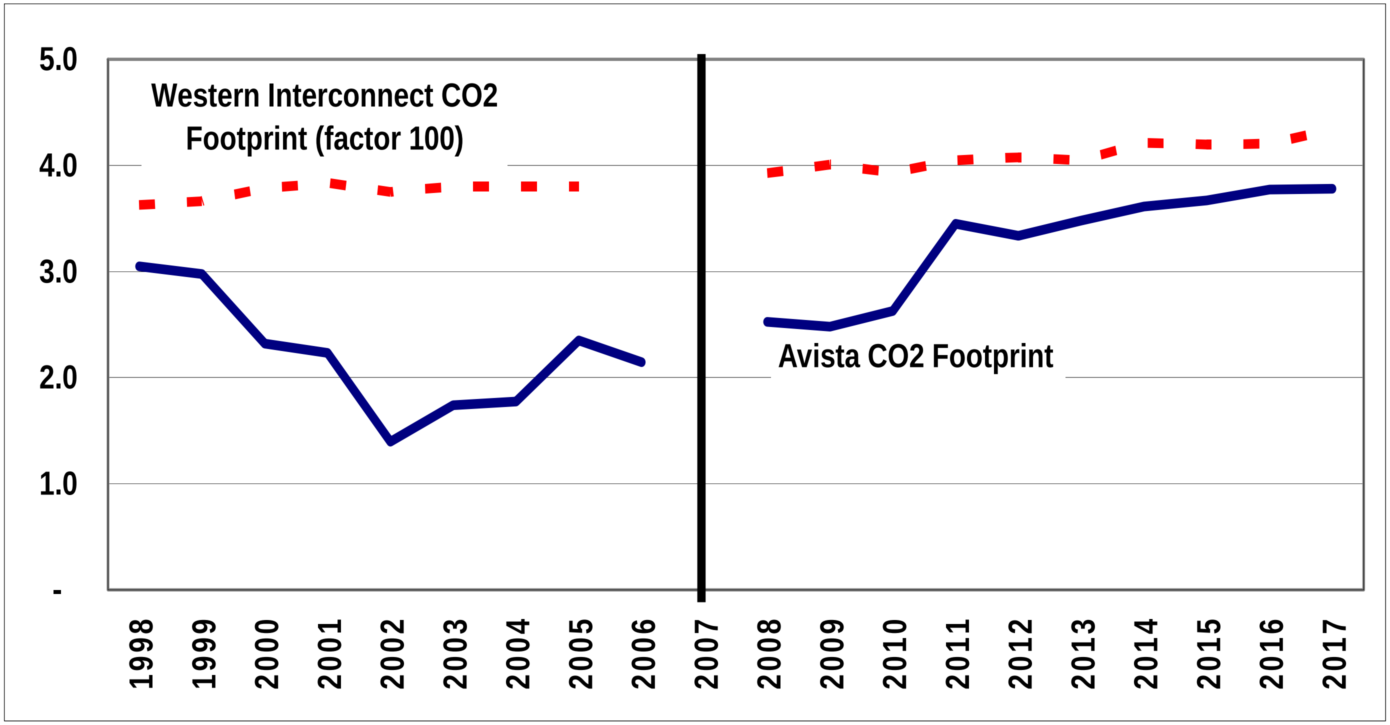
- May 2008: Guidelines are expected to be released by Department of Ecology

Avista Generation Carbon Footprint
(WRI-WBCSD Protocols, Selected Years 1990-2006)



AVISTA

Avista/WI Generation Carbon Footprint
(millions of tons)



AVISTA

Regional Greenhouse Gas Initiative (RGGI)

- Begins January 1, 2009
- Memorandum of understanding signed in 2005 and includes 10 northeastern states
- Caps CO_2 emissions from all power plants greater than 25 MW
- Emissions capped at 121 million short tons per year from 2009 through 2014
- 2015 – 2019 emissions cap reduced by 10%
- 25% of allowances must be strategic or customer oriented in nature
- Some offsets allowed – amount tied to allowance price
- Quarterly auctions beginning in September 2008 with most states having 100% auctions

Loss of Load Probability

James Gall

What is Loss of Load Probability?

A measure of the probability that a system demand will exceed capacity during a given period; often expressed as the estimated number of days over a long period, frequently 10 years or the life of the system.

- *U.S. Department of Energy*

Our study is measured as # of draws where there was a loss of load, for example 1 in 20 draws, is 5%.

LOLP Model Overview

What is it?

- Estimates the probability that not all of load will be served in a given simulation
- Uses available capacity for a given week in January and August
- Simulates major random events, such as wind, hydro, load, and forced outages
- Used to validate planning margin in IRP forecast period

What it is <u>not</u>?

- Energy dispatch model
- Financial costs are not considered
- No estimates for localized transmission/distribution outages
- Does not take into account natural disaster/terrorism related outages

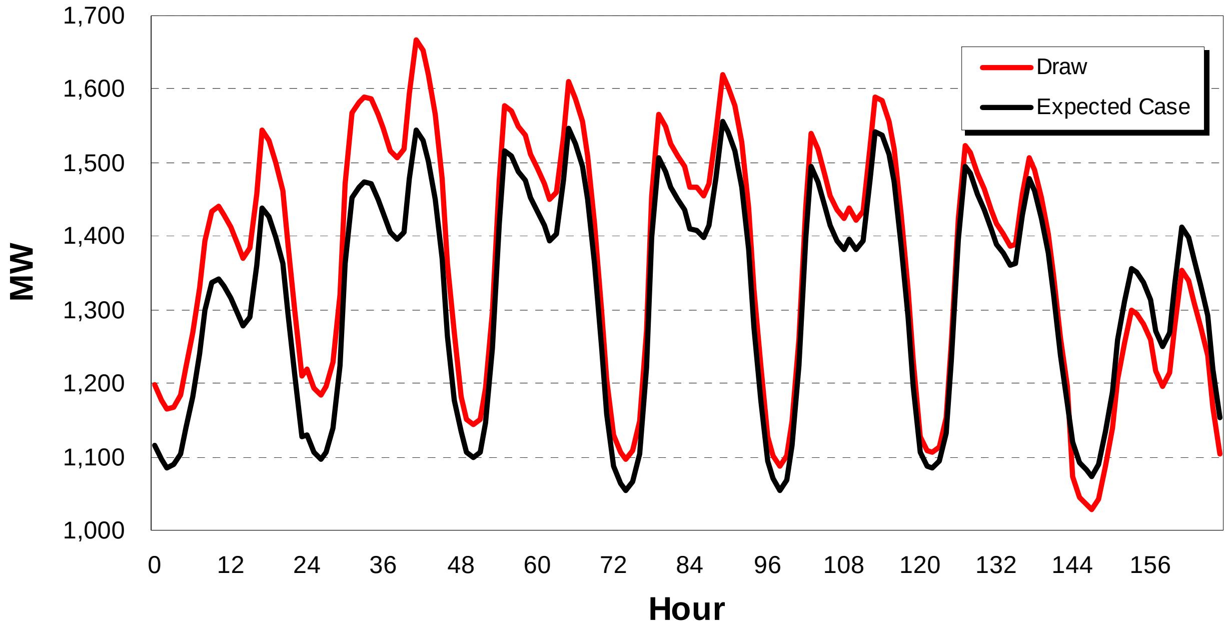
How It Works

Runs for 168 continuous hours (7 days) in January & August

1) Load is estimated (-)
2) Available capacity from thermal resources (+)
3) Run of river hydro (+)
4) Wind shape calculated (+)
5) Contracts are netted (+/-)
6) Available storage hydro is shaped to high load hours (+) [LP]
7) Market energy purchased up to an assumed limit (+) [LP]
8) Federal hydro release from upstream storage (+) [LP]
9) If load is not served in one or more hours, loss of load occurs

Load

- Uses actual 2007 hourly load shapes for January and August
- Each day an amount of energy is drawn,
  - Correlated to previous day to simulate cold and hot snaps,
  - Based on historic weekly energy shape, and
  - Normal distributions are assumed

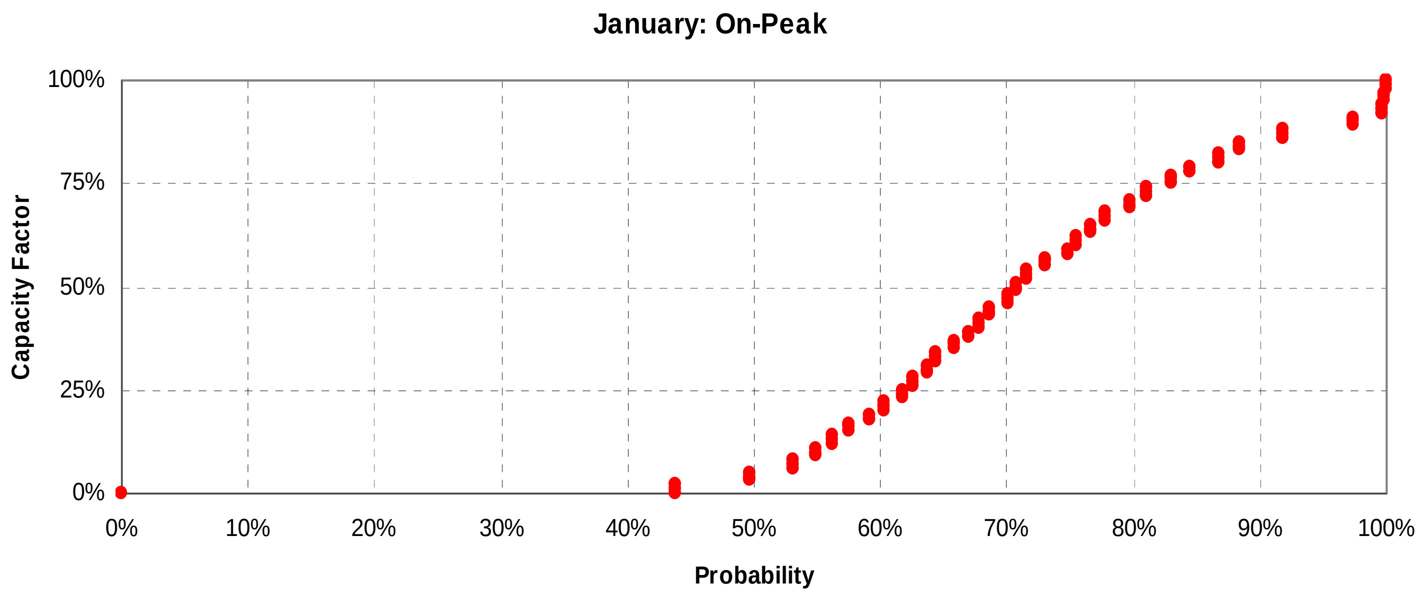


Hydro

- Available energy is a random draw from 70 year historical record from the Northwest Power Pool
- Run-of-River projects use this energy shaped to historical flow
- Storage projects use a Linear Program (LP) to move hydro energy to more valuable hours subject to storage constraints and minimum and maximum capacity.
- Plants can spill energy, and draft reservoirs to minimum level
- Scenarios can be studied with/without federal hydro release from upstream storage to prevent load loss

Wind

- Hourly shape based on expected mean energy and frequency distribution for on/off peak hours by month
- Hour to hour correlation
- Future enhancement will have projects correlated



Forced Outages

- For each plant:
  - *Forced Outage Rate (FOR)*
  - *Mean Time To Repair (MTTR)*
  - *Ramp Rate*
- For each hour a unit has a probability of an outage, calculated as:

  Outage Probability = FOR x 8760 / MTTR / 52

  e.g. 0.10 x 8760 / 24 / 52 = 70% chance of outage in the week or 0.42% in a given hour

- If an outage is drawn, another probability is calculated if the unit is to return to service, calculated as:

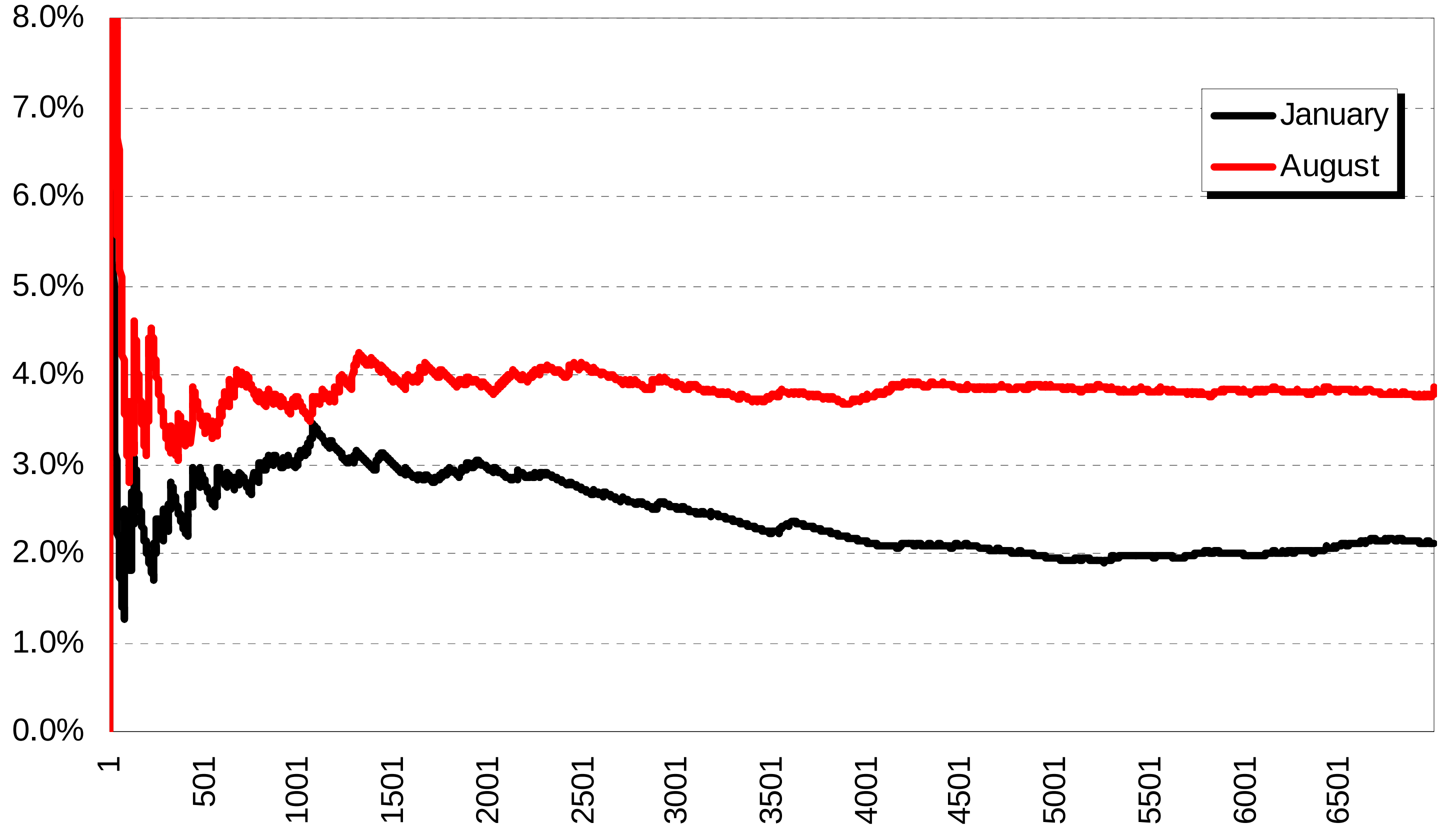
  Return to Service if: Rnd# > 1 / MTTR, than "on", otherwise "off"

- If a unit has a ramp rate, such as 10 hours, the units available generation will increase linearly over 10 hours until it reaches maximum capability

2009 Results- Base Case

	January	August
Loss of Load	2.1%	3.8%
Market Reliance	47.6%	55.6%
Peak Load	2,023	2,005
Average Peak Load	1,656	1,492
Average Load	1,319	1,081
Available Market (MW)	300	300
Federal Hydro	0	0

How Many Iterations Do You Need?



2009 Results- Scenario 1, Less Market Opportunity
200 MW (on-peak), 300 MW (off-peak)

	January	August
Loss of Load	7.4%	12.1%
Market Reliance	47.3%	56.1%
Peak Load	2,053	1,841
Average Peak Load	1,656	1,494
Average Load	1,319	1,081
Available Market (MW)	200	200
Federal Hydro	0	0

2009 Results- Scenario 2, Increase Market Opportunity
400 MW of Market

	January	August
Loss of Load	0.4%	0.9%
Market Reliance	47.3%	56.1%
Peak Load	2,026	1,762
Average Peak Load	1,656	1,494
Average Load	1,319	1,081
Available Market (MW)	400	400
Federal Hydro	0	0

2020 Results- Scenario 3, Potential Future

	January	August
Loss of Load	3.3%	0.8%
Market Reliance	41.7%	19.6%
Peak Load	2,494	2,279
Average Peak Load	2,048	1,849
Average Load	1,631	1,338
Available Market (MW)	300	300
Federal Hydro	0	0

Adds: Lancaster (270 MW), Reardan (50 MW), CCCT (200 MW), Wind (200 MW)

2020 Results- Scenario 4, All Wind Future

	January	August
Loss of Load	9.8%	3.2%
Market Reliance	73.5%	51.8%
Peak Load	2,515	2,198
Average Peak Load	2,048	1,848
Average Load	1,629	1,138
Available Market (MW)	300	300
Federal Hydro	0	0

Adds: Lancaster (270 MW), Reardan (50 MW), CCCT (0 MW), Wind (400 MW)

2020 Results- Scenario 5, Flat Wind Future

	January	August
Loss of Load	6.0%	1.8%
Market Reliance	65.7%	39.0%
Peak Load	2,662	2,238
Average Peak Load	2,047	1,851
Average Load	1,630	1,339
Available Market (MW)	300	300
Federal Hydro	0	0

Adds: Lancaster (270 MW), Reardan (50 MW), CCCT (0 MW), Wind (400 MW)

2009 Results- Scenario 6, 5% LOLP Case

	January	August
Loss of Load	4.9%	5.1%
Market Reliance	47.5%	54.8%
Peak Load	1,992	1,780
Average Peak Load	1,657	1,493
Average Load	1,319	1,080
Available Market (MW)	235	270
Federal Hydro	0	0

What it takes to stay at 5% LOLP for 2009 if remove 100MW of market availability

- Remove 100MW of Market: 15.1%/15.9%
- Add 100MW of CCCT: 5.0%/5.4%
- Add 300MW of Wind: 7.9%/11.1%
- Add 600MW of Wind: 6.0%/8.3%

2009 Results- Scenario 7, Federal Hydro 16 hrs

	January	August
Loss of Load	0.1%	0.0%
Market Reliance	47.6%	55.8%
Peak Load	2,025	1,785
Average Peak Load	1,657	1,493
Average Load	1,320	1,080
Available Market (MW)	300	300
Federal Hydro	16 hrs	16 hrs

2009 IRP Topic Discussions

Clint Kalich

Work Plan – Proposed TAC Meeting Schedule

May 14, 2008 – Kickoff Meeting

August 2008 – TBD

October 2008 – TBD

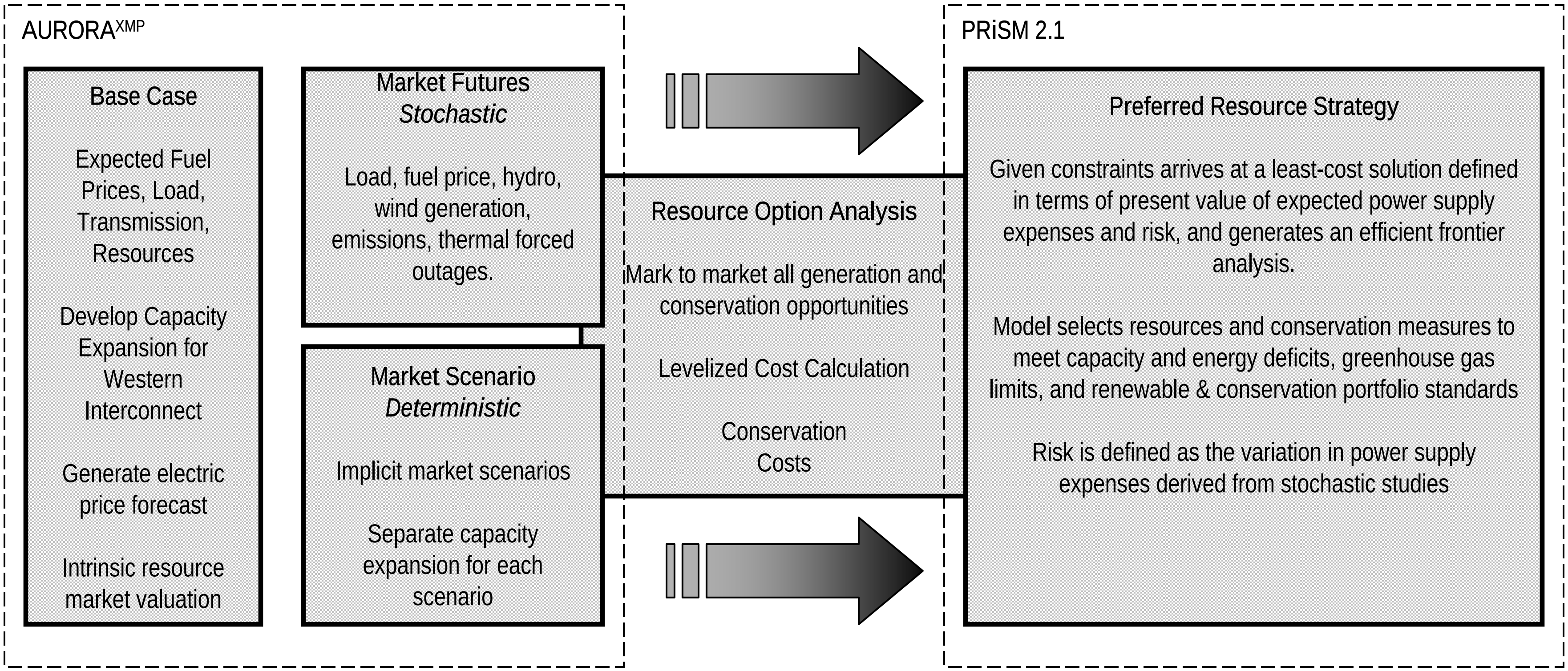
January 2009 – Review of final modeling and assumptions

March 2009 – Review of scenarios and futures, resource, and transmission costs

April 2009 – Review of final PRS

June 2009 – Review of report

Work Plan – Flow Diagram



Work Plan – Timeline on IRP Development

Preferred Resource Strategy	
Identify Regional resource options for electric market price forecast	8/15/2008
Identify Avista's resource options	8/31/2008
Develop PRiSM 2.1 model & implement	9/15/2008
Update AURORA^{xmp} database for electric market price forecast	9/30/2008
Select natural gas price forecast	10/10/2008
Finalize deterministic Base Case	10/17/2008
Create datasets/statistics variables for risk studies	10/31/2008
Base case risk study complete	11/30/2008
Develop Efficient Frontier & PRS	1/30/2009
Simulation of risk studies "futures" complete	1/30/2009
Simulate market scenarios in AURORA^{xmp}	2/27/2009
Evaluate resource strategies against market futures & scenarios	3/20/2009
Present to TAC preliminary study and PRS	3/31/2009

Work Plan – Timeline on IRP Development

Writing Tasks

File 2009 Integrated Resource Planning Work Plan	8/30/2008
Prepare Report and Appendix Outline	9/15/2008
Prepare text drafts	4/15/2009
Prepare charts and tables	4/15/2009
Internal draft released	5/1/2009
External draft released	6/15/2009
Final editing and printing	8/1/2009
Report distribution	8/30/2009

Analytical Process Changes

DSM Fully Integrated Into PRiSM

- Valuation, risk, selection

PRiSM Improvements

- “Lumpiness” added
- Portfolio carbon limits
- Additional resource options
- Plant retirement
- New efficient frontier method (balancing risk and cost)
- End effects more accurately modeled
- Added AFUDC
- Market and green tag purchases risk

Resource dispatch & valuation

- Evaluating options to AURORA (e.g., LP Model)

Planning Futures/Scenarios

- More carbon looks
- Solar cost collapse
- Sustained high gas prices
- Lots of nuclear (government support/promotion)
- 25% RPS nationwide
- Back to the Future
  - Determine cost of renewable energy & carbon legislation
- Other Ideas from TAC??

2009 Integrated Resource Plan

Technical Advisory Committee Meeting No. 2 Agenda

August 27, 2008

	Topic	Time	Staff
1.	Introduction	10:30	Vermillion
2.	Risk Assumptions/PRiSM	10:35	Gall
3.	Resource Assumptions	11:30	Lyons
4.	Lunch	12:15	
5.	Scenarios and Futures	1:15	Lyons
6.	Demand Side Management	2:00	Powell
7.	Adjourn	3:30	

Stochastic Analysis & Resource Portfolio Selection Modeling

James Gall

Presentation Overview

Risk

- Discuss methods and risk assumptions, expected (mean) values will be discussed at later TAC meetings
- Variable correlations are difficult to quantify, recommendations are placeholders until better information is available or the TAC agrees the assumption is acceptable for modeling purposes
- Risk analysis is modeled in AURORA- impacts electric markets prices and the cost of new resource options
- Feedback and suggestions are needed

PRiSM

- Overview of the model and enhancements
- Feedback and suggestions are welcome

AVISTA

Stochastic Analysis Methods & Assumptions

Long-Term Correlation Matrix

	Gas Prices	CO_2 Prices	NO_X Prices	SO_2 Prices	New Coal Prices	Hog Fuel Prices	Load Growth
Gas Prices	1.00						
CO_2 Prices	0.50	1.00					
NO_X Prices		0.75	1.00				
SO_2 Prices		0.75	1.00	1.00			
New Coal Prices		-0.25	-0.25	-0.25	1.00		
Hog Fuel Prices		0.50				1.00	
Load Growth	-0.25	-0.25					1.00

Carbon Dioxide Credit Prices (CO_2, GHG)

- Similar method to 2007 IRP
- For each iteration, a potential carbon cost scenario is selected, based on a weighting of 10 EPA studies.
- After the scenario is selected, the cost is treated as an expected value and a lognormal distribution is applied to each year.
- Further, natural gas and other market price drivers are correlated to the CO_2 prices
- The intent of this method is model the unknown nature of climate change legislation, it potential for year-to-year price volatility, and its affect on other major market price drivers.

AVISTA

Carbon Dioxide Credit Prices (nominal)

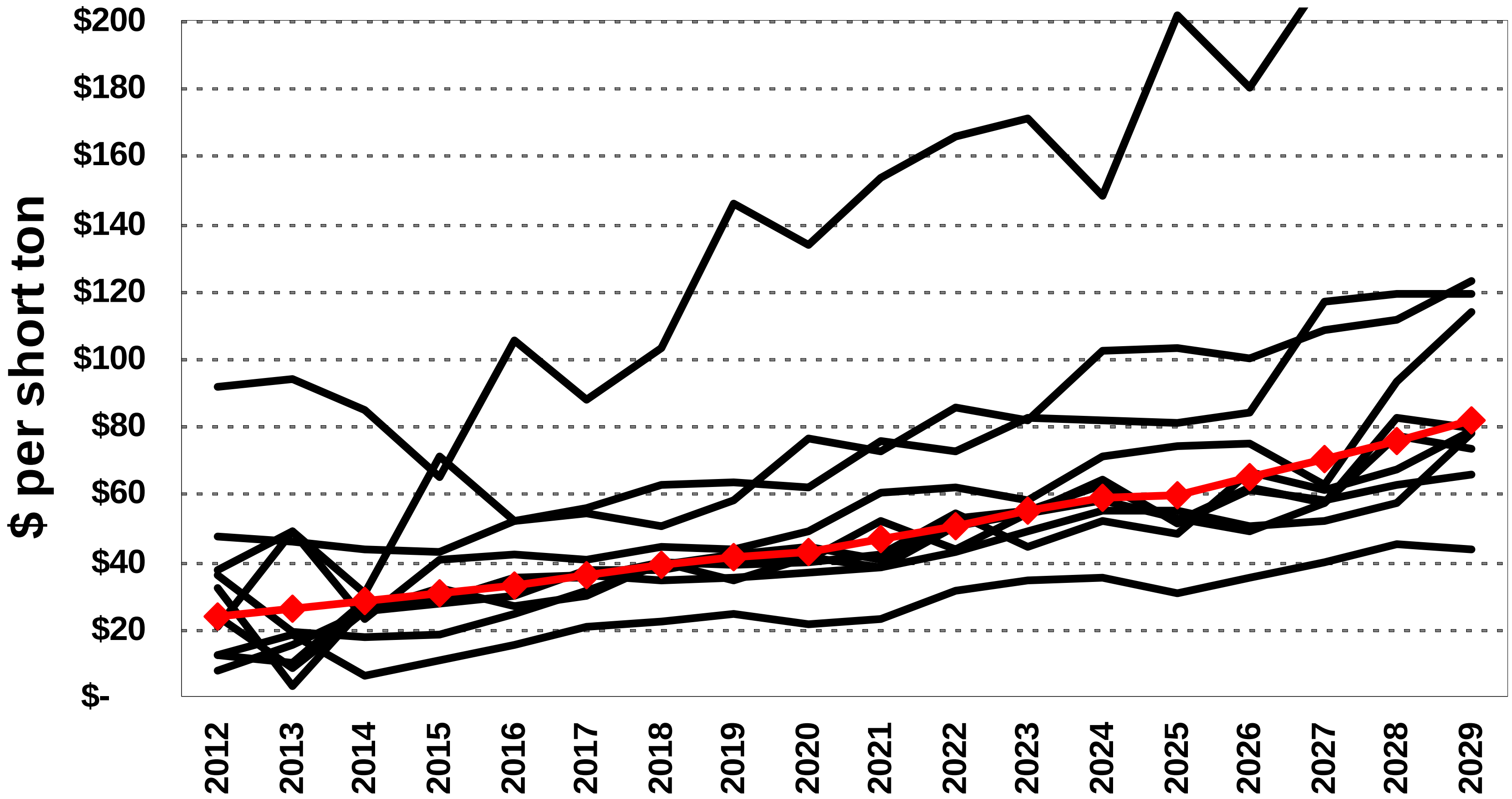
%	Nominal $/ Short Ton	2010	2011	2012	2016	2020	2025	2029
10%	EPA S. 2191 ADAGE	-	-	28.60	39.08	50.89	72.40	94.74
3%	EPA S. 2191 IGEM	-	-	40.50	53.13	70.15	98.04	122.32
15%	EPA S. 2191 ADAGE - Low Intl Action	-	-	26.20	36.53	48.14	66.36	88.25
10%	EPA S. 2191 IGEM Unlimited Offsets	-	-	8.70	16.09	20.63	28.66	47.69
2%	EPA S. 2191 IGEM with No Offsets	-	-	80.80	100.39	134.79	190.04	221.27
3%	EPA S. 2191 ADAGE Scenario 6	-	-	39.70	51.85	67.39	95.02	119.07
2%	EPA S. 2191 ADAGE Scenario 7	-	-	57.20	72.29	94.90	132.73	159.63
35%	EPA S. 2191 Alt. Ref. ADAGE	-	-	21.00	30.14	38.51	54.30	75.27
5%	EPA S. 2191 Alt. Ref. IGEM	-	-	35.00	46.75	61.89	85.97	109.34
15%	EPA S. 1766 ADAGE	-	-	10.20	17.37	20.63	28.66	47.69
100%	**Expected Value**	**-**	**-**	**23.46**	**33.09**	**42.76**	**59.91**	**81.31**

Carbon Dioxide Credit Prices (Cont.)

- Randomly draws price strips for each AURORA iteration
- Each year has lognormal distribution (draw is the mean), market become less volatile over time as market matures
    - 2012-2014 prices use 50% sigma
    - 2015-2016 prices use 25% sigma
    - 2017-2029 prices use 10% sigma

AVISTA

CO_2 Price Trends (10 Simulations)

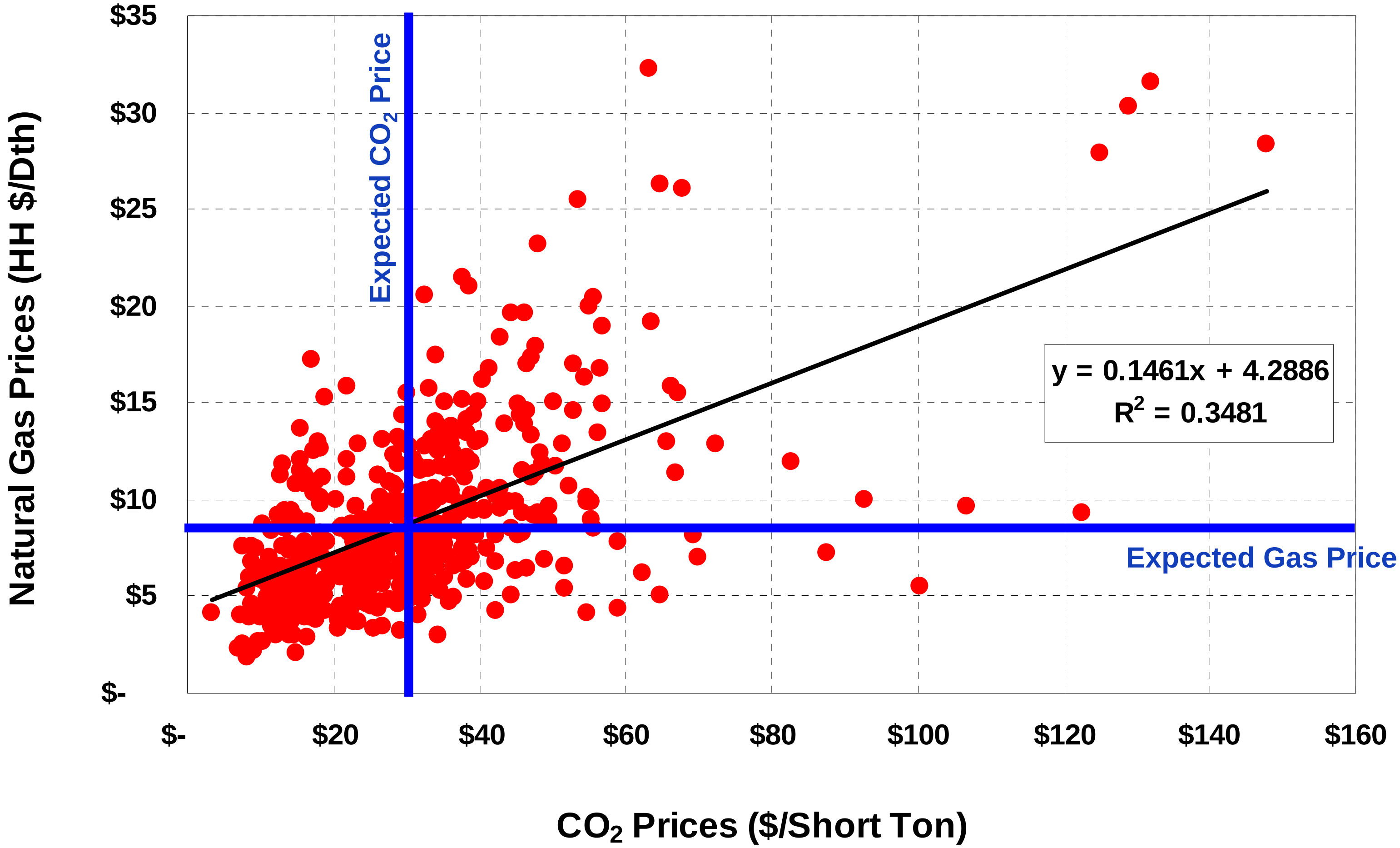


Natural Gas Prices

- Lognormal distribution
- Correlated to CO_2 credit prices (50% as placeholder),
  - *Wood Mackenzie will help identify this assumption by studies that model gas prices by changes in gas demand from CO_2 legislation*
- Assumes 35% sigma before CO_2 volatility is applied, than ~58-70%
- Monthly prices may be correlated to load in the winter
- No direct annual serial correlation
- Load growth is negatively correlated at 25%

Modeled Natural Gas & CO_2 Price Relationship

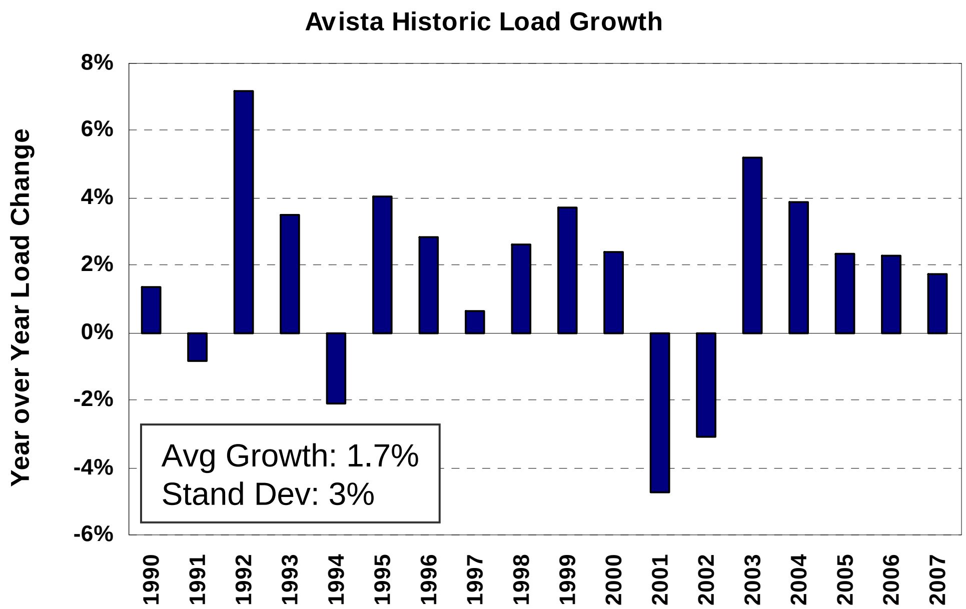
Year 2015, Correlation 59%, 500 draws

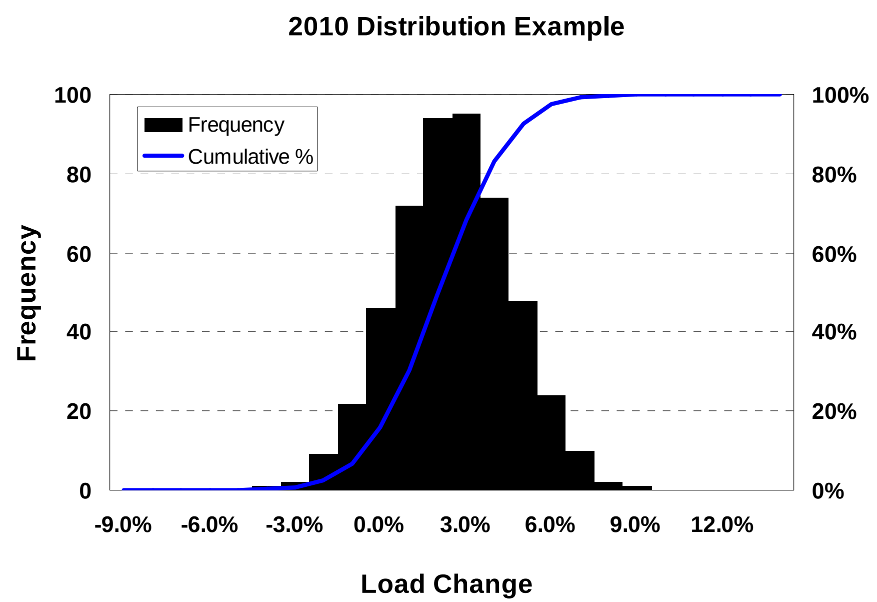


Load Growth

- Normal distribution
- Standard deviation is equal to expected value, represents potential volatility due economic activity *(perhaps too volatile)*
- Energy load growth negatively correlated to gas (-25%), CO_2 (-25%),
- Peak load variance modeled as weather variance
- Western Interconnect regional correlation between zones, similar to the 2007 IRP
- Potential correlation between natural gas prices in winter

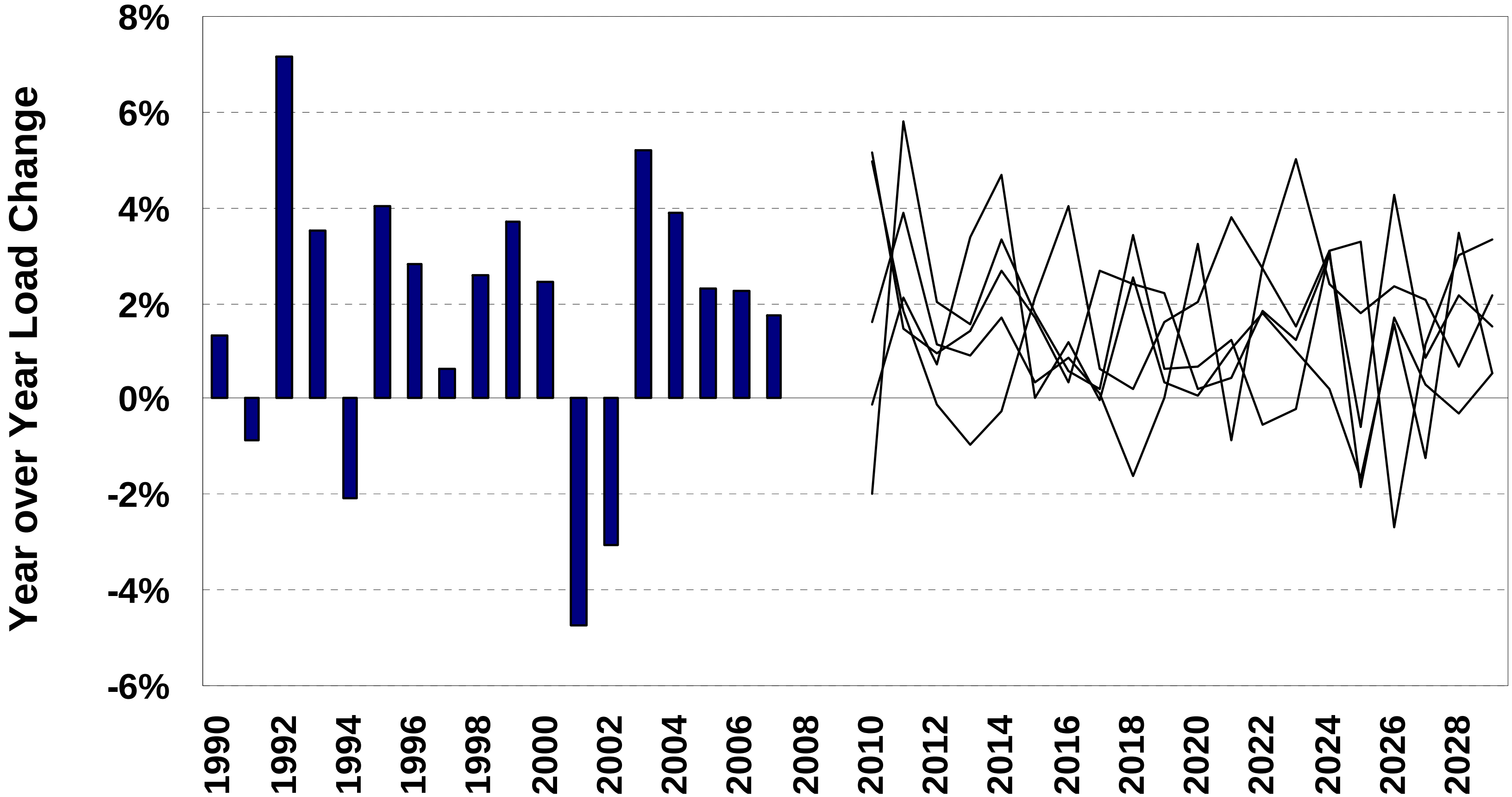
Avista Load Growth Example





AVISTA

Load Growth Example (Forecast- 5 draws)



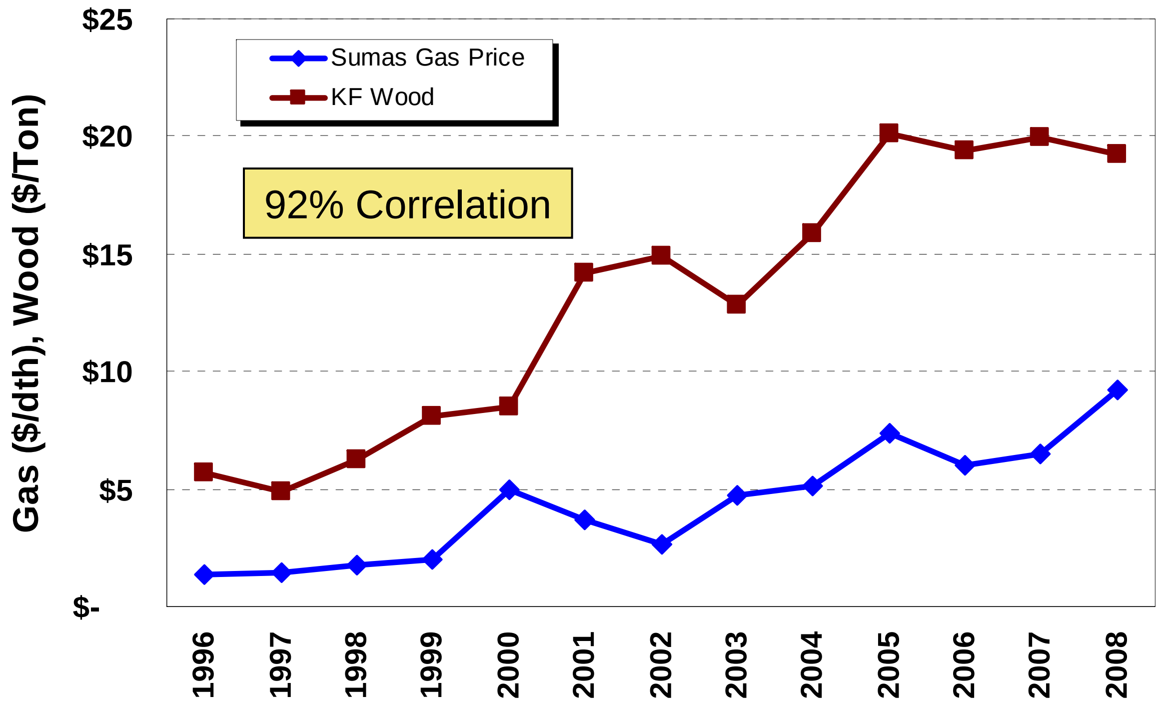
AVISTA

Hog Fuel (Wood Waste) Prices

- Normal distribution
- Standard deviation: 10% of expected value
- Positively correlated CO_2 (50%) prices,
  - *A higher CO_2 price could add demand to Wood Prices to offset CO_2*
- Potential correlation to load growth, but more likely correlated to on economic growth, while loads tend to have additional drivers
- What about correlating to natural gas prices

AVISTA

Kettle Falls Prices Compared to Sumas Gas Prices



A multiple regression including inflation & natural gas prices were tested to see if inflation was actually the cause for the correlation.

The results indicated that Sumas gas prices was not a significant predictor of wood prices. **Therefore natural gas will not be correlated to wood prices for this IRP.**

Mine Mouth Coal Price

- Normal distribution
- Standard deviation: 10% of expected value
- Negatively correlated to CO_2 (-25%), and other emissions (-25%)
  - *As policy changes decreasing domestic coal demand, prices could potentially lower as coal mines remain open for international demand*
- Basis for short and long-haul coal prices for new coal options- *this should not affect market prices to any extent*
- No change to existing coal prices for existing plants

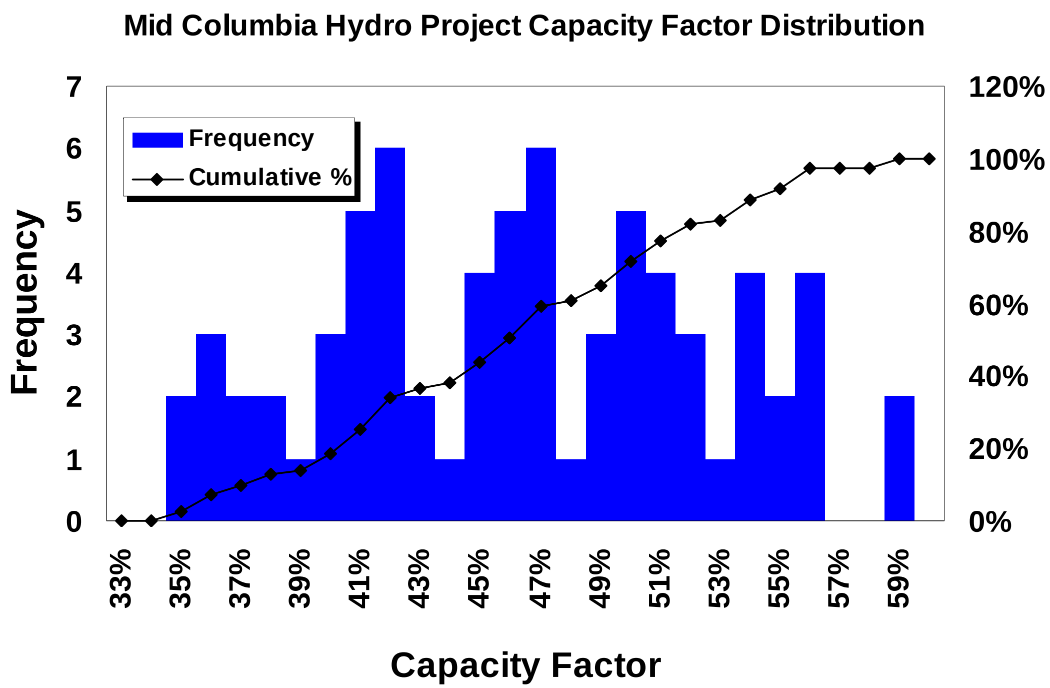
AVISTA

NO_X and SO_2 Credit Prices

- Lognormal distribution
- Standard Deviation: 10% of expected values
- Expected values will be based on July 2008 Wood-Mackenzie study
- Positively correlated to CO_2 prices (75%)
  - *Stricter CO_2 policy will likely lead to stricter air emissions policy and additional gas fired generation- requiring the needs for credits*
- Negatively correlated to new coal prices (-25%)
- No mercury prices will be modeled in this IRP, rather controls will be assumed to be installed on required plants.

Hydro

- Each year of each iteration will randomly draw of historical 70 year history (1929-1998)
- No historical evidence of normality



AVISTA

Wind

- Generic wind for existing projects will use fixed shape with distribution of energy- this is only used for market analysis.
- For potential Avista wind resources, each hour will be randomly drawn based on its probability of occurrence in a given month and time of day with correlation to previous hour.
  - Statistics are available for potential projects on the Columbia River, Reardan, and Montana.
- Similar method was used in the 2007 IRP.
- Potential correlation to winter hydro conditions and will be evaluated

Forced Outages

- Use AURORA logic for random forced outages
- Only Coal, Nuclear, and CCCT plants will be modeled with F/O logic
- Mean Repair Times:
  - Nuclear: 84 hours
  - Coal: 72 hours
  - CCCT: 24 hours

PRiSM

Preferred Resource Strategy Model

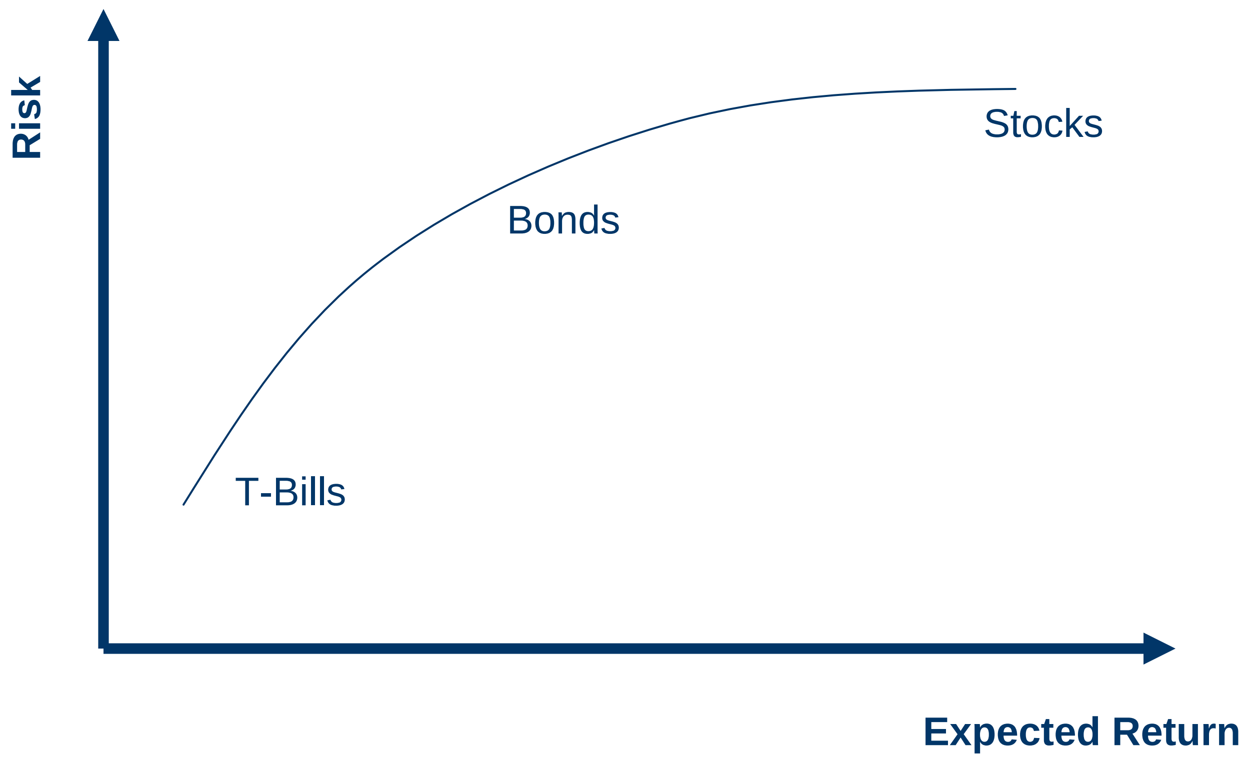
Overview & Enhancements

What is PRiSM?

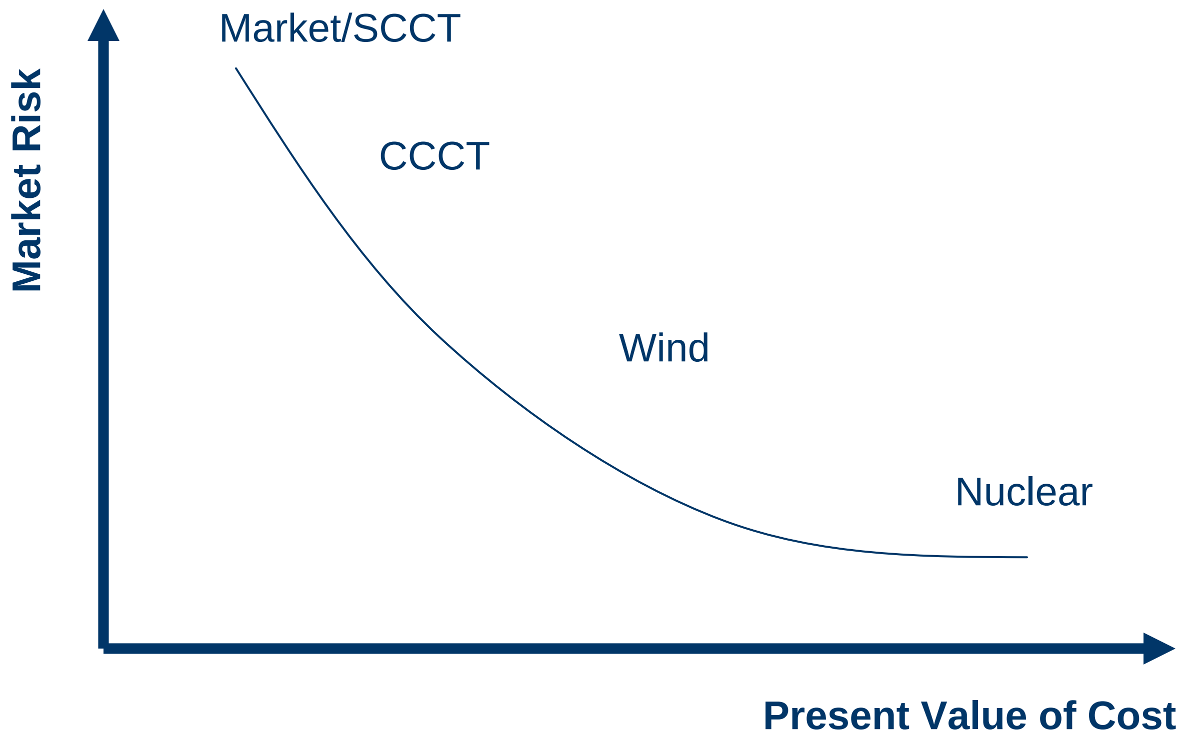
- Preferred Resource Strategy Model
  - *Selects resource & conservation opportunities on an optimal cost and risk basis using a linear program (What's Best!)*
  - *What's Best is a linear programming tool added to MS Excel*
- Objective function is to either select resource strategies to meet our energy/capacity/market/RPS/CO_2 requirements on a least cost or least risk basis
- Cost is measured by the present value of incremental fuel & O&M expenses and new capital investment
- Risk is measured by the variation in fuel & variable O&M expenses in years 2019 & 2029 (possible PV of 20 years)

AVISTA

Efficient Frontier- Introduction



Efficient Frontier- Introduction



New Enhancements

- Conservation measures are selected in model rather than an input (only measures that are between $xx/MWh & $xxx/MWh)
- Resources are now added in increments rather than any amount
- Use more precise method to estimate frontier curve
- Meets both summer & winter capacity requirements
- Ability to retire resources
- Ability to account for greenhouse gas caps
- More accurate ability to take into account post IRP time period

AVISTA

2009 IRP Resource Assumptions

John Lyons

Supply Side Resource Data Sources

- Resource lists developed internally
  - Trade journals
  - Press releases
  - Engineering studies and models (ThermoFlow)
  - Announcements from state commissions
  - International projects
  - Proposals from developers
- Power Council
- Consulting firms/reports: Wood Mackenzie, Goldman Sachs, Black & Veatch
- State and federal resource studies
- These data sources are used to develop generic resource types

Resource Differences from 2007 IRP

- Fewer types of coal resources are included – only ultra critical and IGCC plants are being modeled
- Alberta oil sands are not included as a resource option
- Solar and hydro are being included as resource options for the preferred resource strategy
- Adding more specifics for the Other Renewable Resources category – geothermal, biomass, and solar resources are being modeled separately

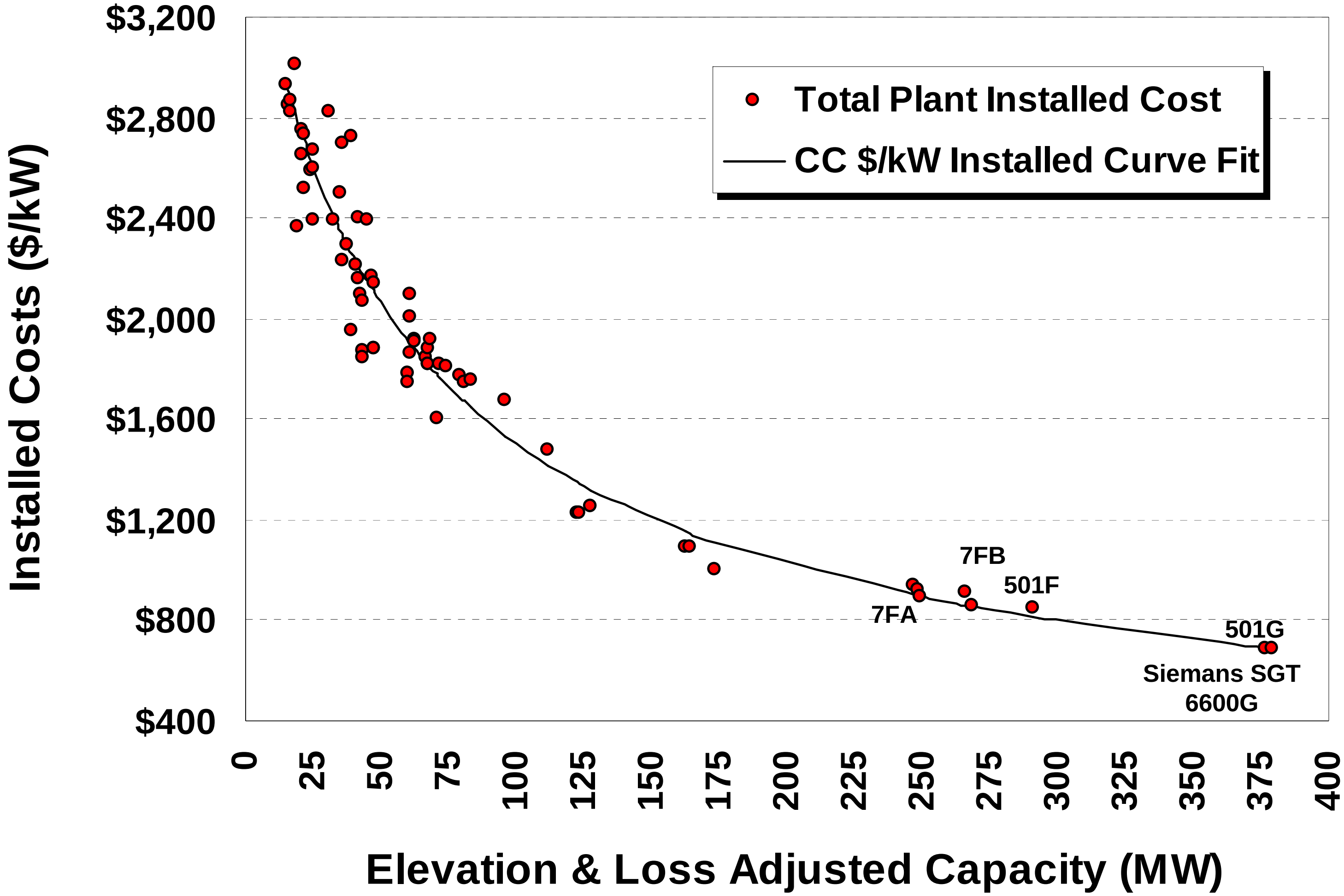
Non-Renewable Supply Side Resources

- Natural Gas Combined Cycle (CCCT)
  - 2 x 1 and 1 x 1 with duct burner water cooled (1x1 for PRS)
  - 2 x 1 and 1 x 1 with duct burner air cooled
  - 600 MW with sequestration
- Natural Gas-Fired Simple Cycle – Aero, Frame, and Hybrid
- Small co-generation (< 5 MW)
- Pipeline co-generation
- Coal – ultra critical, IGCC, and IGCC with sequestration
- Nuclear

AVISTA

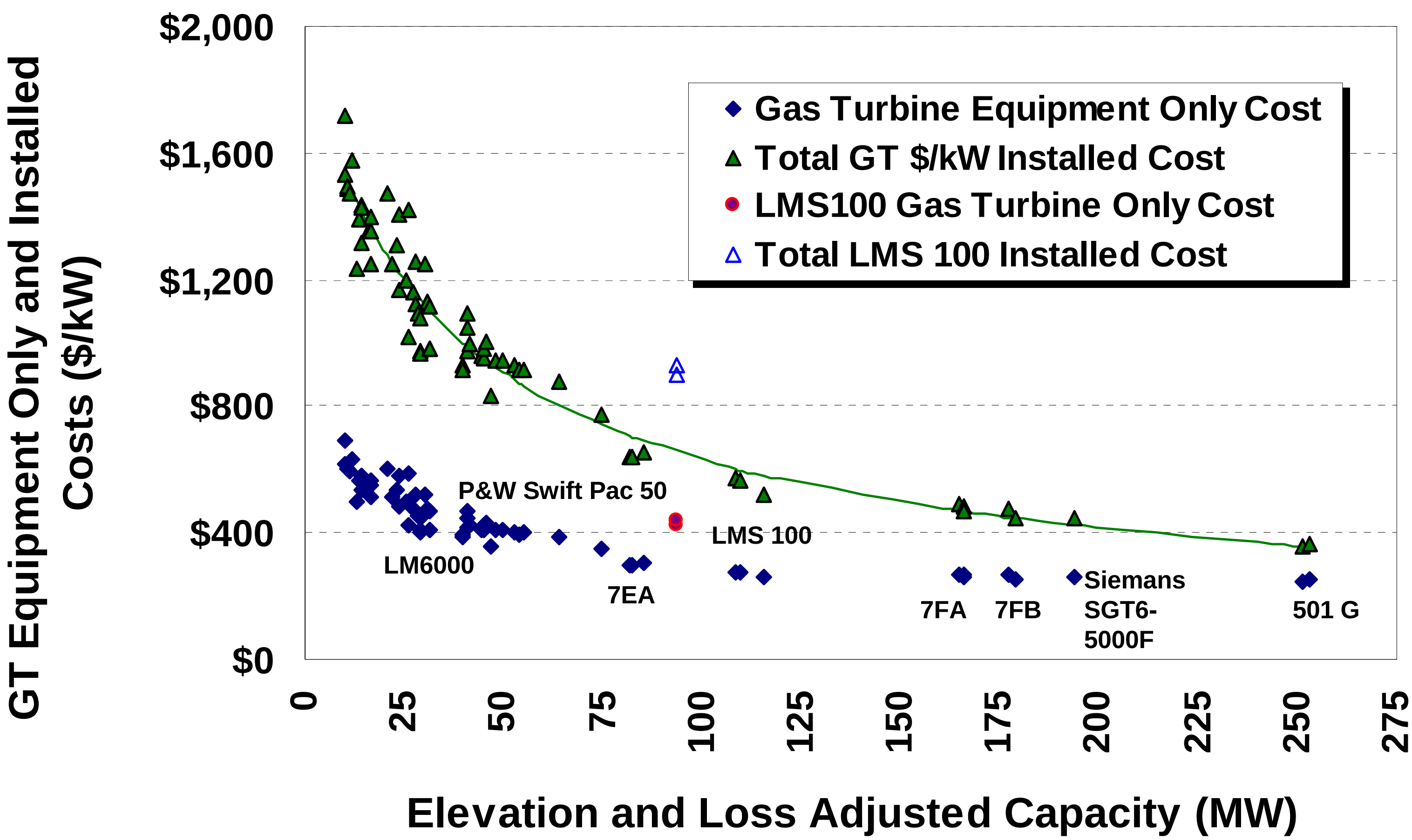
2008 Combined Cycle Total Installed Cost Estimate

2,000 Feet Elevation



2008 Simple Cycle Total Installed Cost Estimate

2,000 Feet Elevation



Renewable Supply Side Resources

- Geothermal
- Wind – 100 MW, < 5 MW, and offshore
- CCCT Wood Boiler
- Wood Gasification Conversion
- Open Loop Biomass – landfill gas, wood, waste, etc.
- Closed Loop Biomass
- Solar Photovoltaic
- Solar Thermal
- Roof Top Solar
- Tidal Power
- Hydrokinetics
- Run of River Hydro
- Pumped Storage

Avista Resource Upgrades

- Little Falls Unit #1 – 4 Upgrades
- Post Falls Unit #6 Upgrade
- Upper Falls Upgrade
- Long Lake new unit and new powerhouse
- Cabinet Gorge #5
- Scheduled upgrades and acquisitions are included in the L&R
  - Noxon Rapids Units #1 – 4 scheduled for 2009 – 2012
  - Lancaster Generation Facility – 2010
  - Reardan – preliminarily scheduled for 2011

Avista 2009 IRP Resource Assumptions

Draft as of 8/27/08
2009 Dollars

Resource (not locational specific)	First Year Available	Availability (MW)	Capital Cost-Exclude AFUDC (2009$/kW)	Transmission Interconnect ($/kW)	Construction (Yrs)	Fixed O&M ($/kW/Yr)	Net HHV Heat Rate(s) (Btu/kWh)	Variable Costs ($/MWh)	Gas Transport ($/Dth/Mn)	Fuel Charge (%)	Winter Capacity Credit (%)	Summer Capacity Credit (%)	Availability (%)	Forced Outage (%)	Annual Avg Maintenance (days)	Min Dispatch (%)	Start up Cost ($/MW/Start)	Start up Fuel (Dth/MW/Start)	Ramp Rate (%/hr)	CO2 (lbs/mmbtu)	SO2 (lbs/mmbtu	NOX (lbs/mmbtu)	Federal Incentives	Sources/Notes
CCCT (2x1) w/ duct burner (wet)	2011	N/A			3		6,750/ 8,500	3.29	0.27	1.0	105	95	90.1	5	18	55	35	6.6	20	117	0.0006	0.02	No	
CCCT (2x1) w/ duct burner (dry)	2011	N/A			3		6,900/ 8,700	3.29	0.27	1.0	105	95	90.1	5	18	55	35	6.6	20	117	0.0006	0.02	No	
CCCT (1x1) w/ duct burner (wet)	2011	N/A	900		3	11.0	6,750/ 8,500	3.29	0.27	1.0	105	95	90.1	5	18	55	35	6.6	20	117	0.0006	0.02	No	O&M: '08 CS2 Budget (LTSA/Major Maint is in VOM calculation), emissions based on CS2, Eng. Est.
CCCT (1x1) w/ duct burner (dry)	2011	N/A	928		3	11.0	6,900/ 8,700	3.29	0.27	1.0	105	95	90.1	5	18	55	35	6.6	20	117	0.0006	0.02	No	Capital Cost Est from Thermoflex and HR based on
CCCT (600MW, w/ Seq)	2025	N/A							0.27	1.0	105	95	90.1	5	18					11.7	0	0	No	
Small Co-Gen (<5MW)	2011	15	2,000		1.5	5.0	5,700	5.00	0.27	1.0	105	95	92.3	5	10	n/a	n/a	n/a	n/a	117	0.0006	0.02	No	
Pipeline Co-Gen	2010								n/a	n/a						n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	
Frame SCCT	2010	N/A	480		1.5		10,200	5.00	0	3.4	105	95	92.3	5	10		15	3.7	100	117	0.0006	0.02	No	Thermoflex, NPCC
Hybrid SCCT (LMS 100)	2010	N/A	900		1.5		8,400	5.00	0	3.4	105	95	92.3	5	10				100	117	0.0006	0.02	No	Thermoflex, NPCC
Wind (100MW)	2010	500	2,400		2	50.0	n/a	3.00	n/a	n/a	TBD	TBD	28-33	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FULL PTC- 10 Yrs (end 2011)	Recent press, O&M from Uwe's latest O & M Presentation
Wind (<5MW)	2010	10	3,000		2		n/a	3.00	n/a	n/a	TBD	TBD	20.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FULL PTC- 10 Yrs (end 2011)	
Wind (Offshore)	2018	100	5,000			95.0	n/a		n/a	n/a	TBD	TBD	45.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FULL PTC- 10 Yrs (end 2011)	PSE Assumption from Wind Developer
Coal (Ultra Critical)	2019	N/A	3,000		8	38.0	8,825	1.30	n/a	n/a	100	100	89.2	7	14	50	n/a	n/a	8	205	0.12	0.07	No	Black & Veatch (O&M), VOM Goldman Sachs, maint based on Colstrip
Coal (IGCC)	2022	N/A	3,600		8	41.0	8,130	4.00	n/a	n/a	105	95	89.2	7	14	75	n/a	n/a	4	205	0.03	0.15	No	Black & Veatch (O&M), VOM Goldman Sachs, assumes extra gasifier
Coal (IGCC w/ Seq)	2025	N/A	5,040		8	50.0	9,595	4.40	n/a	n/a	100	100	88.3	7	17	75	n/a	n/a	4	20.5	0.003	0.015	No	Escalated rates from IGCC based on NPCC for O&M, capital 40% higher than IGCC
Geothermal	2012		4,250		3	75.0		5.00	n/a	n/a	110	90	93.4	5	6	n/a	n/a	n/a	n/a	10	n/a	n/a	FULL PTC- 5 Yrs (End 2011)	Capital Costs per Avg of Kitz & Public Renewable Partners, O&M per GS Study
CCCT Wood Boiler	2012	20	2,500		3	121.0	10,500	6.00	n/a	n/a	100	100	90.1	5	18	0	n/a	n/a	n/a	202	0.025	0.17	HALF PTC- 5 Yrs (End 2011)	Emissions data per Kettle Falls & TD analysis
Wood Gasification Conv. for CCCT DB		25							n/a	n/a			100.0				n/a	n/a	n/a	202			HALF PTC- 5 Yrs (End 2011)	
Wood Gasification Conversion (KFCT)		7							n/a	n/a			100.0				n/a	n/a	n/a	202			HALF PTC- 5 Yrs (End 2011)	
Biomass Open Loop (landfill,wood,waste,etc)	2011		5,000		2				n/a	n/a	100	100	92.3	5	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 5 Yrs (End 2011)	Black & Veatch (Capital)
Biomass Closed Loop	2017				2				n/a	n/a	100	100	92.3	5	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FULL PTC- 10 Yrs (end 2011)	
Solar Photovoltaic	2010	50	7,500		1	32.0	n/a	0.00	n/a	n/a		100	20.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	30% ITC (End 2011)	Black & Veatch (Capital), O&M per Goldman Sachs Study
Solar Thermal	2010	50	4,200		3	65.0	n/a	0.00	n/a	n/a		100	30.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	30% ITC (End 2011)	Black & Veatch (Capital) O&M per Goldman Sachs Study
Roof Top Solar	2010	50	8,000		0.5	30.0	n/a	0.00	n/a	n/a		100	15.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	30% ITC (End 2011)	Kyocera Website, O&M per Goldman Sachs Study
Nuclear	2022	500	5,500		10	97.0	10,400	0.55	n/a	n/a	100	100	87.1	8	18		n/a	n/a		n/a	n/a	n/a	FULL PTC- 10 Yrs (end 2011)	Reports/Huron Consulting (Capex), Black & Veatch (O&M)
Tidal Power	2018	2	10,000		1.5	1000.0	n/a	0.00	n/a	n/a	0	0	30.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FULL PTC- 10 Yrs (end 2011)	Tidal Power Conference and CC fabricated based on range from conference
Little Falls 1 Upgrade	2014	1.0	2,600		2	0.0	n/a	0.00	n/a	n/a	100	100	61.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Little Falls 2 Upgrade	2015	1.0	1,800		2	0.0	n/a	0.00	n/a	n/a	100	100	61.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Little Falls 3 Upgrade	2016	1.0	3,200		2	0.0	n/a	0.00	n/a	n/a	100	100	61.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Little Falls 4 Upgrade	2017	1.0	1,300		2	0.0	n/a	0.00	n/a	n/a	100	100	61.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Post Falls 6 Upgrade	2018	0.2	5,000		2	0.0	n/a	0.00	n/a	n/a	100	100	50.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Upper Falls Upgrade	2019	2.0	3,500		3	0.0	n/a	0.00	n/a	n/a	100	100	90.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Long Lake 5 Addition	2020	24.0	2,167		5	1.0	n/a	0.00	n/a	n/a	100	100	30.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Long Lake 2nd Powerhouse	2020	60.0	2,000		6	2.0	n/a	0.00	n/a	n/a	100	100	2.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Cabinet Gorge Unit 5	2016	60.0	1,417		5	2.0	n/a	0.00	n/a	n/a	100	100	12.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Pumped Storage	2020	25	5,000		8	5.0	n/a	Off-Peak Market	n/a	n/a	100	100	50.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	Avista Engineering Preliminary Estimate
Hydrokinetics	2014	5	4,000		3	3.0	n/a	0.00	n/a	n/a			75.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate
Run of River Hydro	2020	N/A	4,500		5	2.0	n/a	0.00	n/a	n/a	100	100	30.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	HALF PTC- 10 Yrs (end 2011)	Avista Engineering Preliminary Estimate

Scenarios and Futures

John Lyons

Uses of Scenarios and Futures

Provide details about impacts and size of impacts of different assumptions

- Avista's current load and resource portfolio
- Preferred Resource Strategy
- Wholesale electric market
- Different resource options

Market Scenarios

- Starts with the Base Case assuming expected conditions
  - Hydro
  - Load
  - Gas prices
  - Wind
  - Emissions prices
  - Forced outages
- Scenarios study the effects of fundamental changes to a driving force in the forecast
- Scenarios have quicker solution times and provide more understandable results due to the limited change in variables
- Used to test portfolio sensitivities

Market Futures

- A future is a stochastic or random study using Monte Carlo style analysis for risk quantification
- Multiple iterations provide a shape and boundaries to potential costs
- Avista's modeling process looks 21 years into the future with several hundred draws of hydro, load, wind, fuel prices, emissions costs, and thermal forced outage values
- Futures can quantitatively assess market risk
- Use a large amount of computational power for each future
- Results are sometimes difficult to understand because of the sheer number of variables

2009 IRP Market Futures

- **Base Case:** uses expected hydro, wind, load, fuel costs, and emissions costs
- **Unconstrained Carbon:** quantifies CO_2 emissions costs
- **High CO_2 Costs:** higher expected value of CO_2 emissions costs
- **Volatile Fuel:** increase natural gas price volatility

2009 IRP Market Scenarios

- **High and Low Gas Prices:** 50% higher and 50% lower prices
- **CO_2 and Natural Gas:** different levels of linkage between CO_2 and natural gas prices
- **High and Low Load Growth**
- **Electric Car:** high penetration of electric cars
- **Constant Gas Growth:** No downward trend in near term gas prices
- **Unconstrained Carbon Costs:** zero carbon costs
- **High Carbon Costs:** significantly higher than the Base Case
- **Nuclear:** significant new nuclear in the Western Interconnect
- **Buck-a-Watt Solar:** drastic decrease in photovoltaic solar costs

AVISTA

2009 IRP Portfolio Options

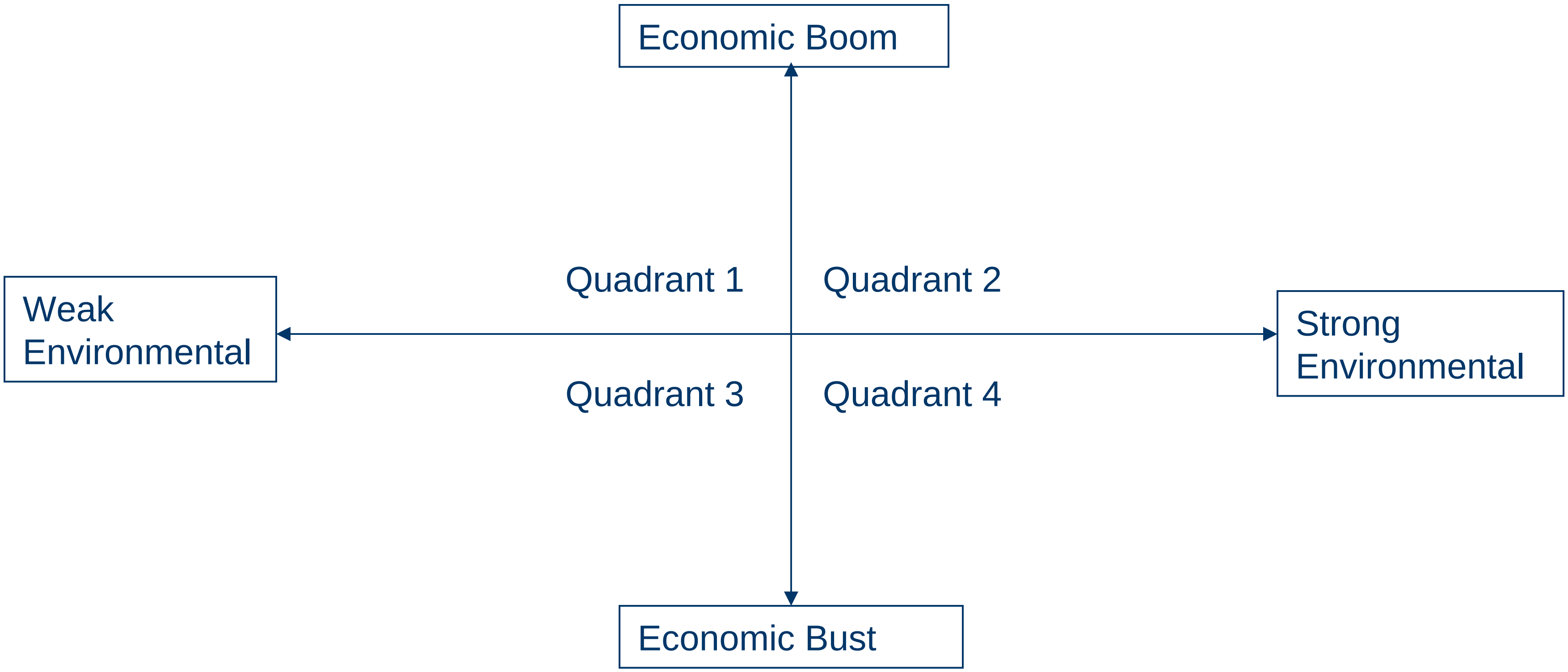
- **Efficient frontier**
- **No Resource Additions –** market reliance
- **All CT –** with and without green tags
- **All CCCT –** with and without green tags
- **Fixed Gas –** with and without
- **All Renewables**
- **Wind and CT**
- **Nuclear –** available in 2020
- **Coal –** available in 2018
- **2007 IRP**
- **Others?**

New Scenario Approach

- Previous slides show Avista's past approach to scenarios and futures
- This approach is difficult to use to adjust our resource strategy
- Moving towards a smaller number of scenarios, where each scenario represents a fundamentally different future with its own assumptions
- Scenario matrix with the economy and environmental concerns

1. **Base Case –** center of the matrix
2. **Quadrant 1 –** Economic Boom and Weak Environmental
3. **Quadrant 2 –** Economic Boom and Strong Environmental
4. **Quadrant 3 –** Economic Bust and Weak Environmental
5. **Quadrant 4 –** Economic Bust and Strong Environmental

Scenario Matrix – Environmental Regulation and Economics



AVISTA

Potential Scenario Drivers

- **Economic –** inflation, load, commodities, and market developments
- **Environmental –** carbon costs, RPS, and competition for renewables
- **Political –** structure of carbon market
- **Social –** views of environmental issues and response of customers to rate pressure
- **Technological –** help or hindrance, new technologies, and electric cars
- **Organizational –** business as usual, new ways of doing things

Demand-Side Management in the 2009 Electric IRP

Jon Powell

DSM / IRP Objectives

Opportunity to perform a comprehensive overview of electric resource opportunities and strategy on a level playing field

DSM Challenges in the IRP

- IRP results must be actionable to be meaningful
- The IRP must provide the basis for continual evaluation of DSM opportunities between IRP cycles
- “Normal” technical challenges of assessing DSM resources within the IRP

How Avista Addresses Challenges

- The biennial high-level IRP process is augmented with an annual detailed DSM business plan

- Our tariffs are reasonably flexible in the short-term; even more flexible in the long-term

- The IRP avoided cost stream forms the basis for intra-IRP DSM resource analysis and cost-effectiveness

AVISTA

Annual DSM Business Plan

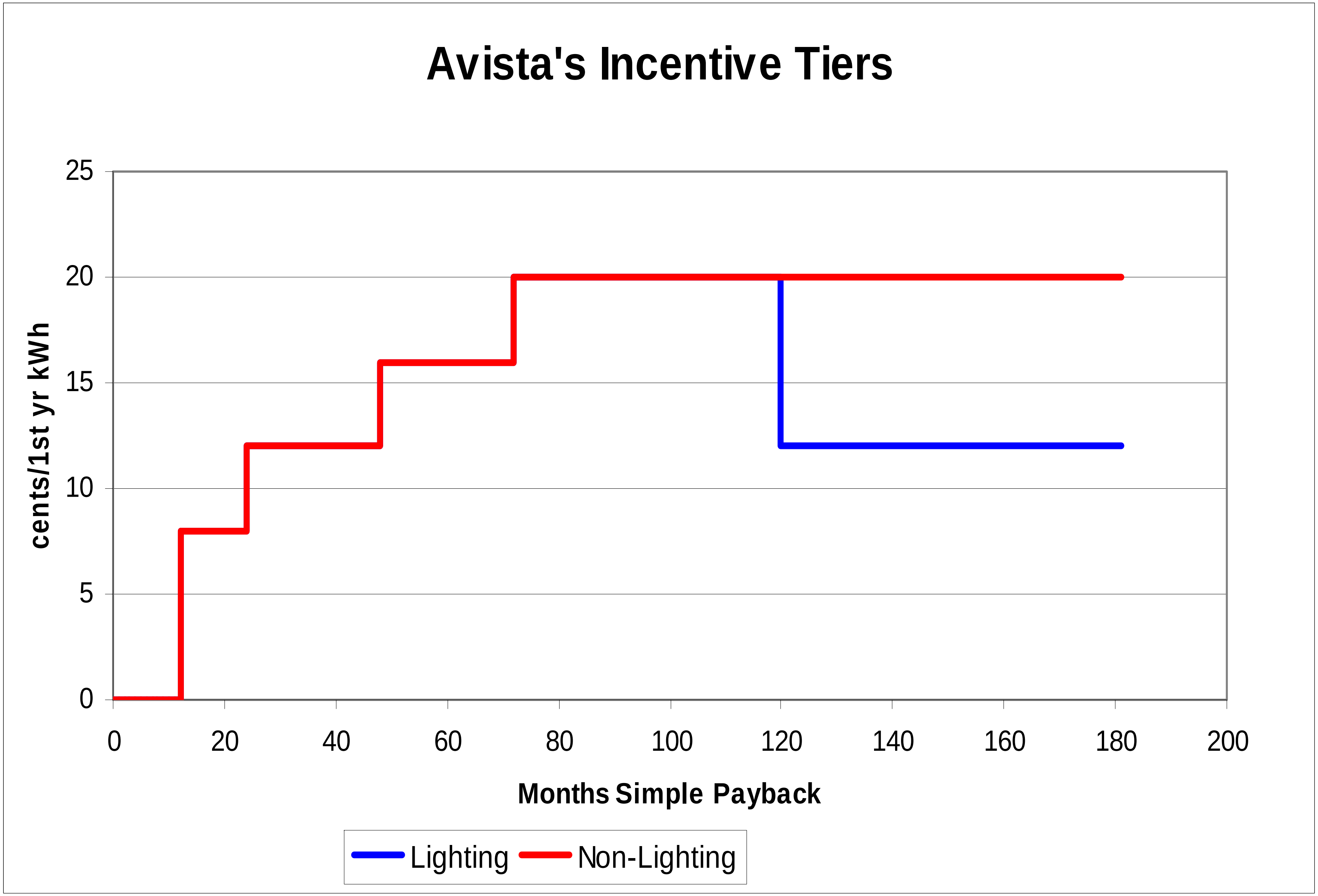
- Establishes a corporate budget
- Allows for the detailed review of DSM opportunities
- Considers the packaging of measures
- Establishes a high-level program plan for promising measures:
  - Infrastructure requirements (labor and non-labor)
  - Outreach requirements (brochures, paid and free media, etc)
  - Establishes critical trade allies relationships (including potential regional cooperative efforts)
- Program trigger points are established
- Plan for the M&E necessary for program management and external reporting
- Calculate prospective cost-effectiveness (program and portfolio)

AVISTA

DSM Tariffs and Operations

- Tariffs can, and have, changed to meet resource acquisition needs
- DSM operations governed by Schedule 90 and funded by Schedule 91
- Tariffs allow for the inclusion of any measure into the DSM portfolio
- Four basic portfolio's within Avista's DSM operations

1. Non-Residential – mix of "site-specific" and prescriptive programs
2. Residential – exclusively prescriptive programs
3. Residential Limited Income – any measure cooperating with CAP agencies
4. Regional – NEEA's market transformation portfolio


Avista's Incentive Tiers
25
20
15
10
5
0
cents/1st yr kWh
0
20
40
60
80
100
120
140
160
180
200
Months Simple Payback
Lighting
Non-Lighting

Electric Avoided Costs

- Price is an efficient means of signaling resource scarcity
- Avoided cost composed of:
  - Commodity avoided cost ($/kWh)
  - Distribution losses ($/kWh)
  - Carbon cost ($/kWh)
  - Value of risk reduction ($/kWh)
  - Generation capacity ($/kW)
  - T&D capacity ($/kW)

Demand-Side Management in the 2009 Electric IRP

Lori Hermanson

Integration of DSM into the 2009 IRP

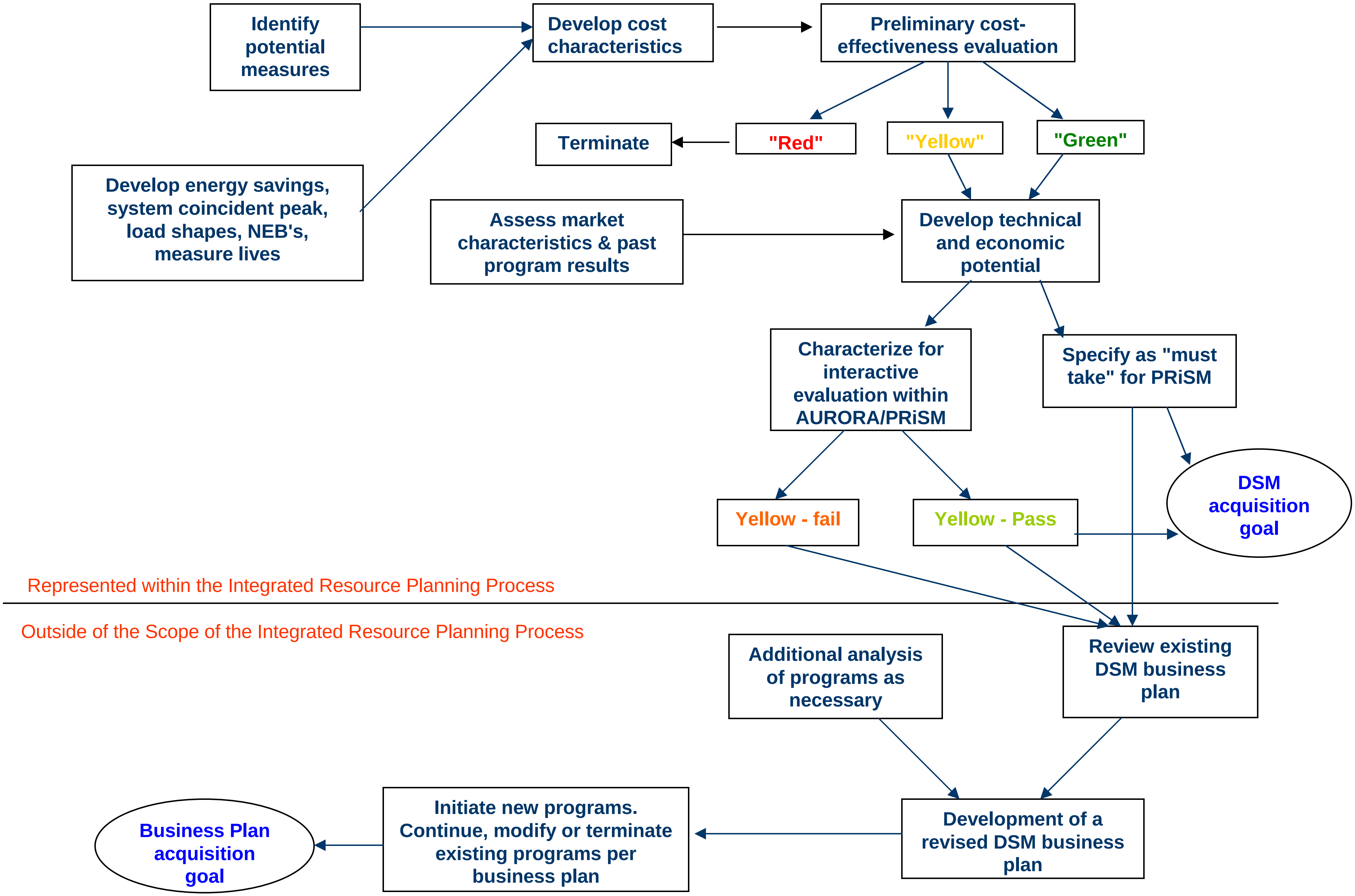
Interactive process that meets regulatory requirements and produces results for the business planning process.

- Identify commercially available non-residential technologies and applications
  - "Acceptance" or "rejection" within the IRP will not remove any technology or application from potentially being included in our non-residential portfolio
  - Almost 2,500 measures being evaluated for the 2009 IRP
- Re-evaluate existing residential measures and evaluate the inclusion of additional measures
  - May change the menu of qualifying residential measures.
  - Nearly 800 measures being evaluated for 2009

Integration of DSM into the 2009 IRP

- Inclusion of Limited Income and Non-Residential Site Specific programs are done by modifying the historical baseline
  - Not necessarily limited to modifying baseline for price elasticity and load growth
- Improvements in estimating Site Specific programs
  - Identified the largest portion of Site Specific programs and are trying to make them more generic in nature
  - Can process more Non-Residential programs through the entire IRP process as opposed to modifying a historical base

AVISTA


Identify potential measures
Develop cost characteristics
Preliminary cost-effectiveness evaluation
Terminate
"Red"
"Yellow"
"Green"
Develop energy savings, system coincident peak, load shapes, NEB's, measure lives
Assess market characteristics & past program results
Develop technical and economic potential
Characterize for interactive evaluation within AURORA/PRiSM
Specify as "must take" for PRiSM
DSM acquisition goal
Yellow - fail
Yellow - Pass
Represented within the Integrated Resource Planning Process
Outside of the Scope of the Integrated Resource Planning Process
Additional analysis of programs as necessary
Review existing DSM business plan
Business Plan acquisition goal
Initiate new programs. Continue, modify or terminate existing programs per business plan
Development of a revised DSM business plan

Categories of Savings and Benefits

- Obtain savings, system coincident peak savings, incremental customer cost, non-energy benefits and life of each measure
  - Used to calculate a levelized sub-TRC cost
  - Sorted based on results into “reds,” “yellows” and “greens”
  - Band of “yellow” energy only measures to be tested in AURORA is projected to be $70-150/MWh
  - PRiSM automatically selects “greens”
  - Remainder of need is selected from passing “yellows”
  - Establishes the 2009 DSM acquisition goal

Integration of DSM into the 2009 IRP

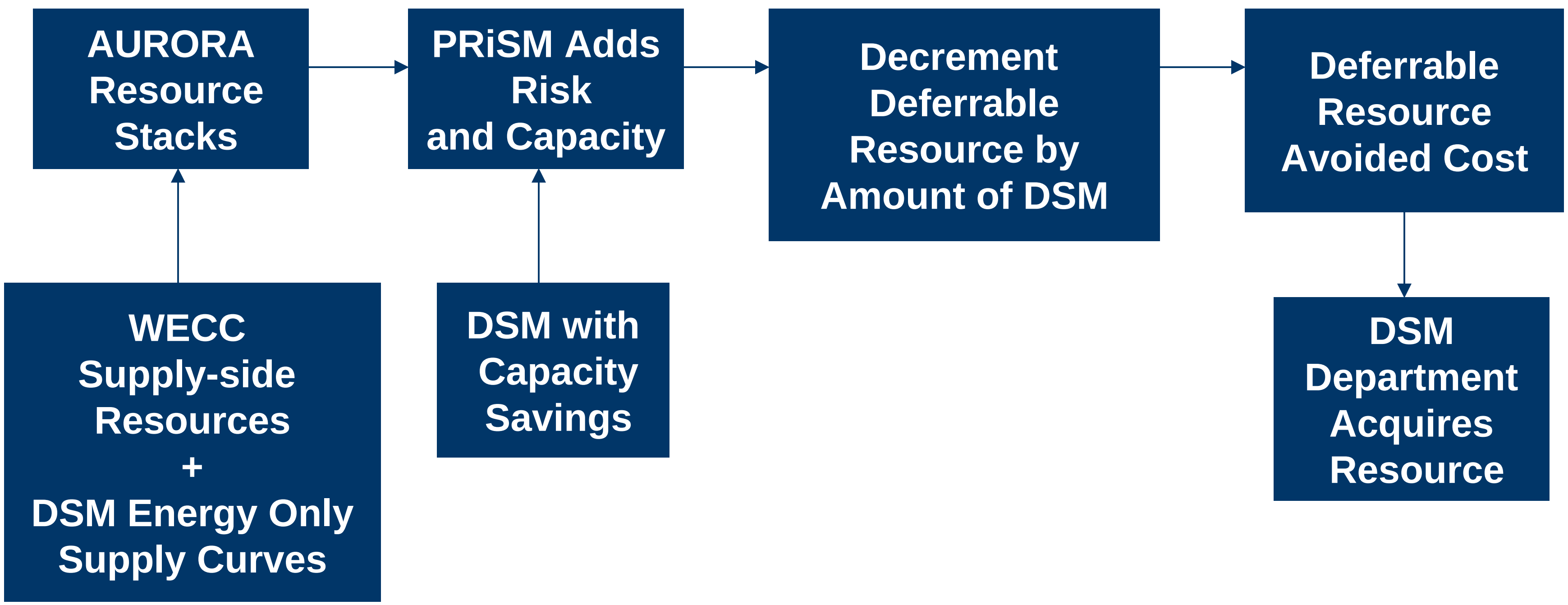
- Last year was the first focus on deferring summer space cooling-driven load
  - Load profiles were assigned to each measure
  - Measures categorized by impact to cooling load
    - Zero impact – measures received no additional value regardless of their load profile
    - Non-Drivers – measures unrelated to space cooling but contribute to system load during a cooling-driven peak receive a capacity value based upon the average demand of their specific load profile during peak periods

Space Cooling

- Drivers – measures that drive a space cooling peak received a capacity valuation based upon the maximum hourly demand for that load profile
- Improving method of addressing the space cooling driven peak
  - Using the Council's system coincident peak estimates
  - Measures with capacity savings will be tested in PRiSM against the avoided costs inclusive of risk and capacity
  - PRiSM will select measures and they will be incorporated into the final DSM acquisition goal

Incorporating DSM in the 2009 IRP

Integration by Price Signal



What Works – What Doesn't

- DSM is acquired in small annual amounts relative to the overall load requirement
  - "Snowballing" effect over time
- Historically Avista's DSM has been non-dispatchable
  - Demand Response pilot
  - When enough data is available, modifications to this existing process may need to be made to accommodate demand response technologies and applications
- Allows continuous modification and testing of new opportunities between IRPs in a consistent manner

Avista's 2009 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 3 Agenda

October 22, 2008

	Topic	**Time**	**Staff**
1.	Introduction	10:30	Vermillion
2.	Load Forecast	10:35	Barcus
3.	Lunch	11:45	
4.	Natural Gas Price Forecast	12:30	Rahn
5.	Electric Price Forecast	1:30	Gall
6.	Legislative Update	2:30	Sprague
7.	Adjourn	3:30	

F2009 Sales and Load Forecast

July 21, 2008 Operations Council Meeting

Randy Barcus

Edited for 2009 Electric Integrated Resource Plan

Third Technical Advisory Committee Meeting

October 22, 2008

Summary of Results

Electricity Sales Forecast

- 2009 Forecast 9,138 million kWh
- 2009 in F2008 9,134 million kWh
- 5 Year Growth Rate 2009-2014 +1.8%
- 10 Year Growth Rate 2009-2019 +1.7%
- 20 Year Growth Rate 2009-2029 +1.7%
- Last Year 20 Yr. GR 2009-2029 +1.8%

Natural Gas Firm Sales Forecast

- 2009 Firm Forecast 338.5 million therms
- 2009 in F2008 352.0 million therms
- 5 Year Growth Rate 2009-2014
  - Washington -0.2%
  - Idaho +1.0%
  - Oregon +0.8%
  - System +0.3%
- 10 Year GR System +0.9%
- 20 Year GR System +1.3%
- 20 Year Customer GR +2.5%

Significant Assumptions

Economy—slower growth in near term, returns to trend

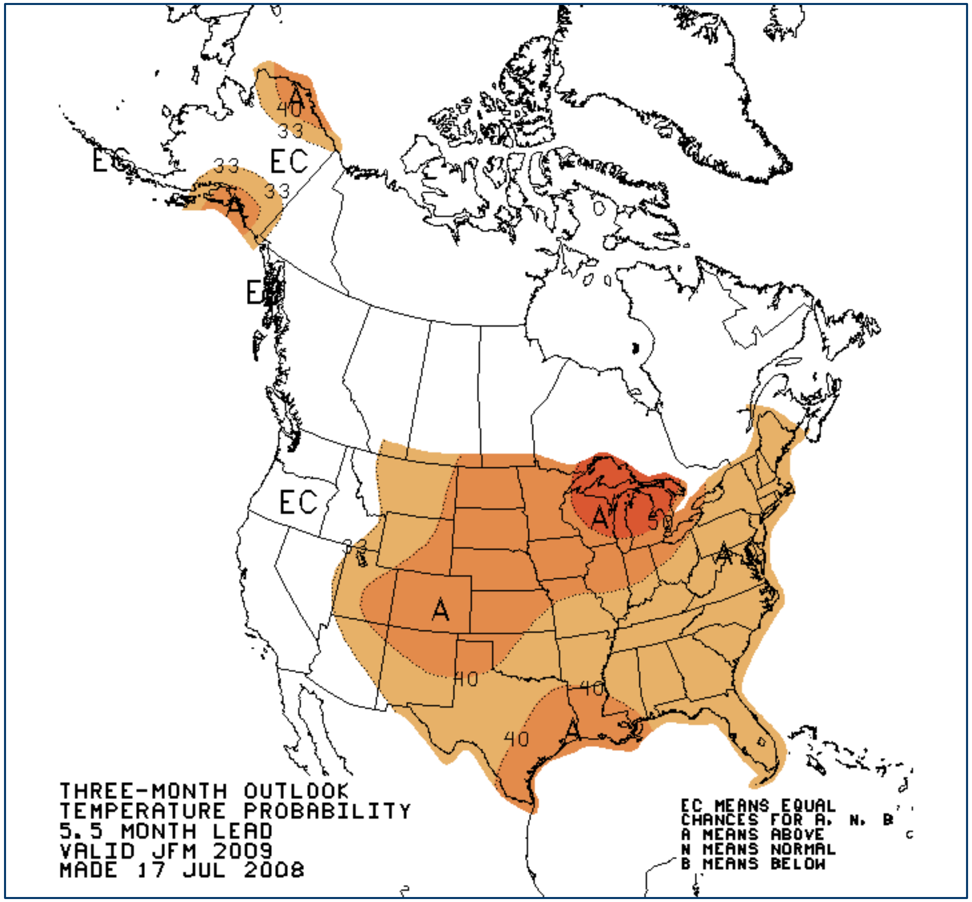
- Tight credit, housing bubble, but strong commodity prices for agriculture and metals
- Regional economy returns to long term trend in 2012

Avista Retail Prices

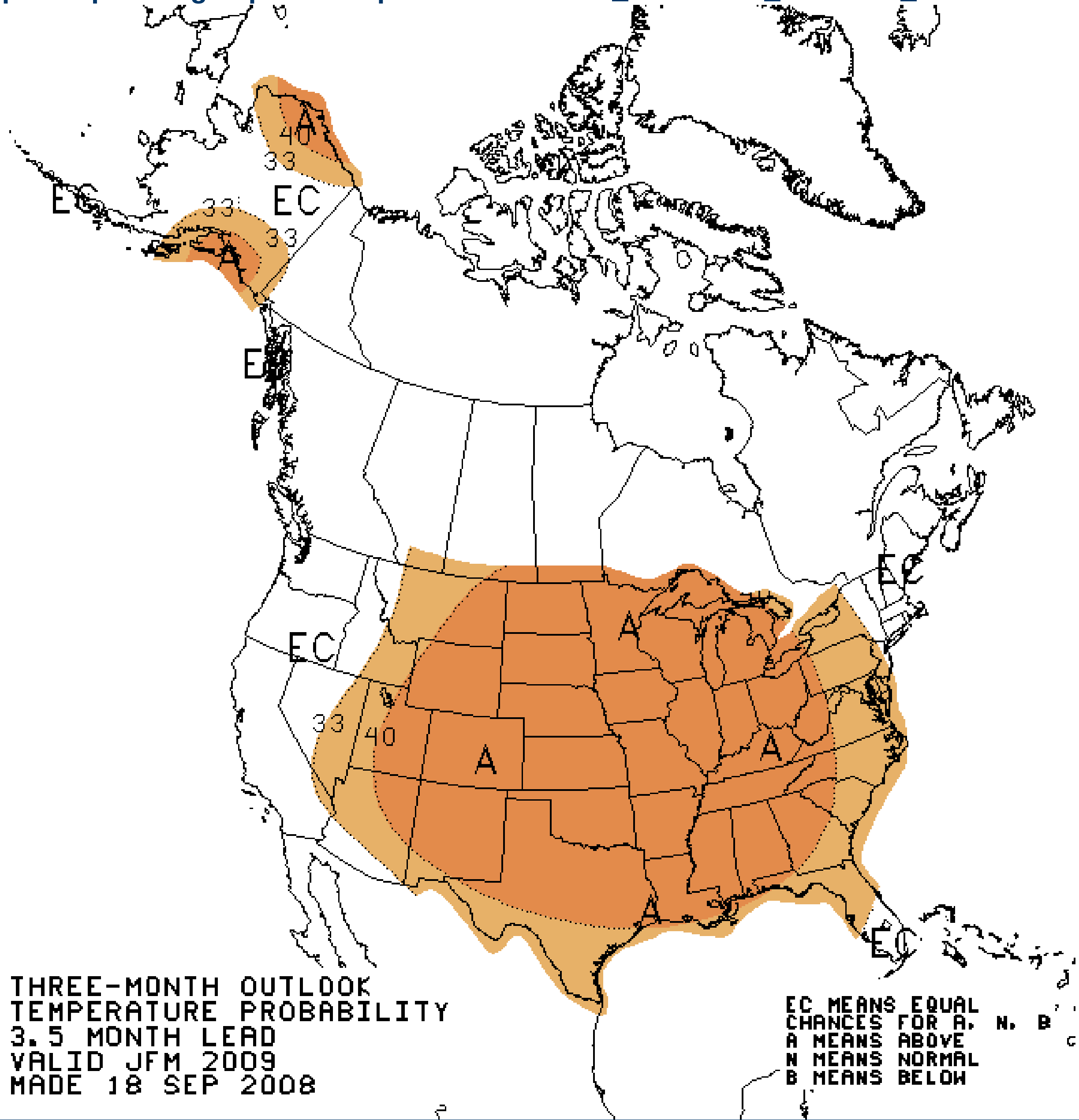
- Electric prices increase 10% in 2009 and thereafter until 2015, and at inflation plus real income growth thereafter
- Natural gas prices increase 20% in 2009 and 10% thereafter until 2015, and at inflation plus real income growth thereafter
- Carbon taxes are included in the 2012-2015 price increases

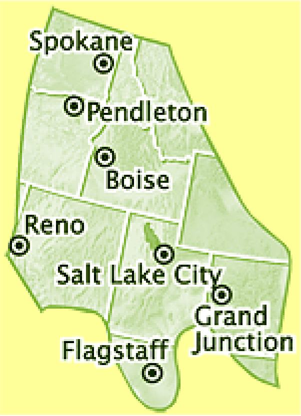
Global Warming Degree Days

- 2009 Heating and Cooling at NOAA Normal (1971-2000 avg.)
- 2010-2019 ramps to trend, 2020-2029 on trend



http://www.cpc.ncep.noaa.gov/products/predictions//multi_season/13_seasonal_outlooks/color/churchill.php





Intermountain
Annual Weather Summary
November 2008 to October 2009

Winter will be much colder and drier than normal, on average, with snowfall above normal in the north and below normal in the south. The coldest temperatures will occur in late December; early, mid-, and late January; and early February. The snowiest periods will be in mid-November, early and mid-December, mid- and late January, and late February.

April and May will be cooler than normal, with slightly above-normal precipitation.

Summer will be cooler than normal, with slightly above-normal rainfall. The hottest periods will be in mid- and late June and early and mid- to late July.

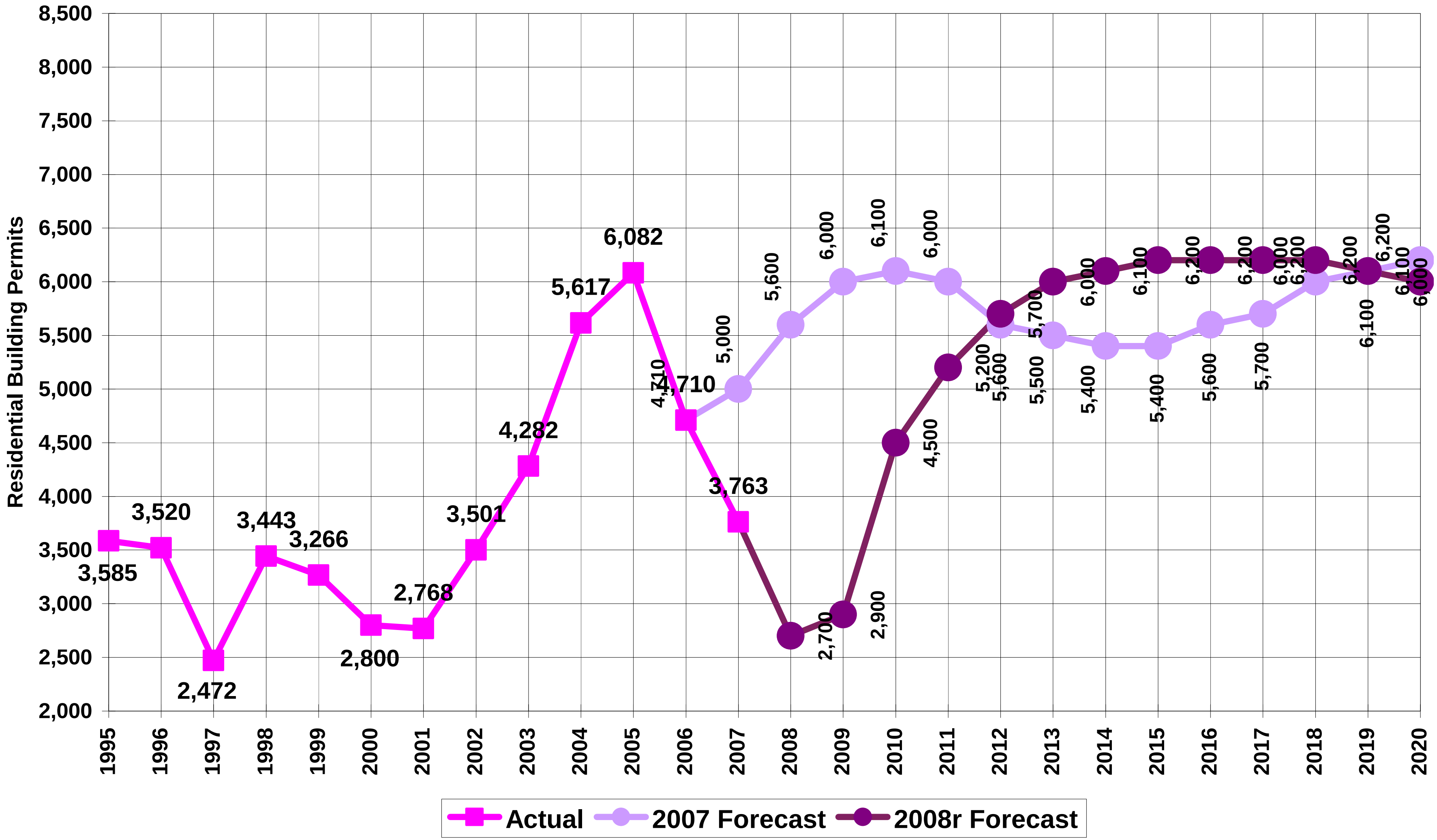
September and October will be warmer and drier than normal.

http://www.almanac.com/weatherforecast/us/13

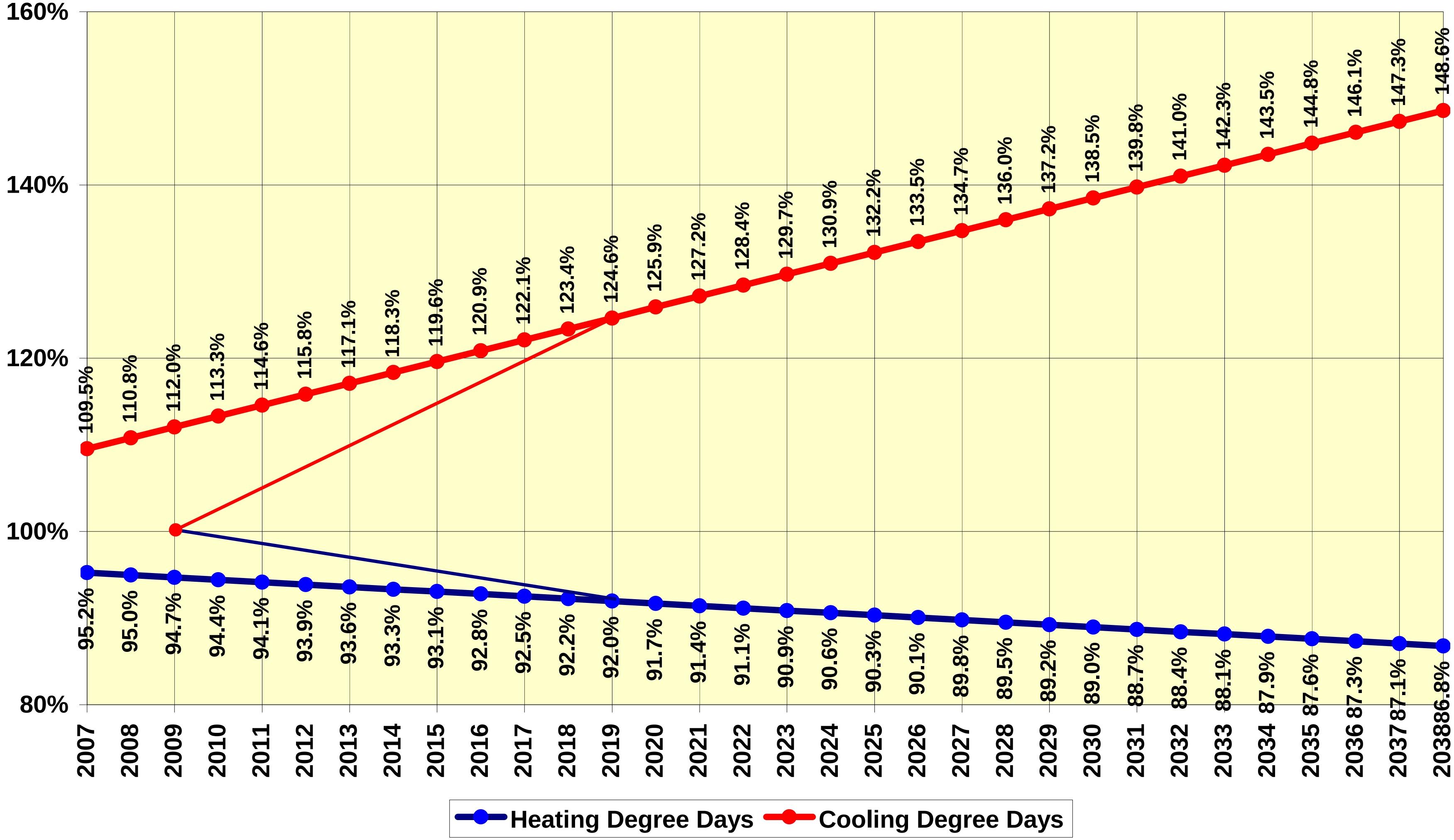
Other Assumptions

- **DSM and Conservation—included in forecast at new levels**
- **Multi-Family Natural Gas—assuming successful penetration**
- **Inland Empire Paper—12 average MW added load in 2010**
- **Mining Loads—continued high silver prices lead to modest growth**
- **Lumber Loads—low levels through 2009, some bounce in 2010**
- **Plug-In Hybrid Cars—included in forecast**
- **Other implicit assumptions**
  - Housing mix 40% single family, 30% condo/townhome, 30% multifamily rental
  - Average new construction size is 30% larger than present average
  - Growing plug loads (largely digital TV's) offset Energy Star savings
  - The Energy Independence and Security Act of 2007 contains provisions that significantly impact electricity use, particularly residential lighting usage, over the next 5 to 10 years. The key lighting-related provisions that related to energy forecasters are:
    - Incandescent Light Bulb Standard. Requires roughly 25 percent greater efficiency for light bulbs, phased in from 2012 through 2014. This effectively bans the sale of most current incandescent light bulbs. The initial targets will be met by advanced incandescent lamps, which the major manufacturers are just introducing to the market, using halogen capsules with infrared reflective coatings. The longer-term targets will likely be met by compact fluorescent lamps and other advanced technologies, such as light emitting diodes and very advanced incandescent lamps now in development.
    - Lighting Efficiency Standard. Requires a minimum 45 lumens/watt efficiency standard for general service lamps by 2020.
    - Federal Building Lighting Standard. Requires that all lighting in Federal buildings use Energy Star products.
  - The Energy Information Administration's 2008 Annual Energy Outlook (AEO) forecast provides insight into the impact that these provisions will have on residential lighting use. The 2008 Residential AEO forecast projects that lighting's share of total residential electricity usage will drop from 14.4% in 2011, the year before the incandescent light bulb standard takes place, to 10.7% in 2016. Over this five year period, lighting's share of electricity usage is projected to drop by approximately 25%.
  - The long-run effect of the lighting standards on residential electricity usage is to decrease residential lighting share of usage to 8.3% by 2030, a reduction of over 40% from its 2011 level of 14.4%.

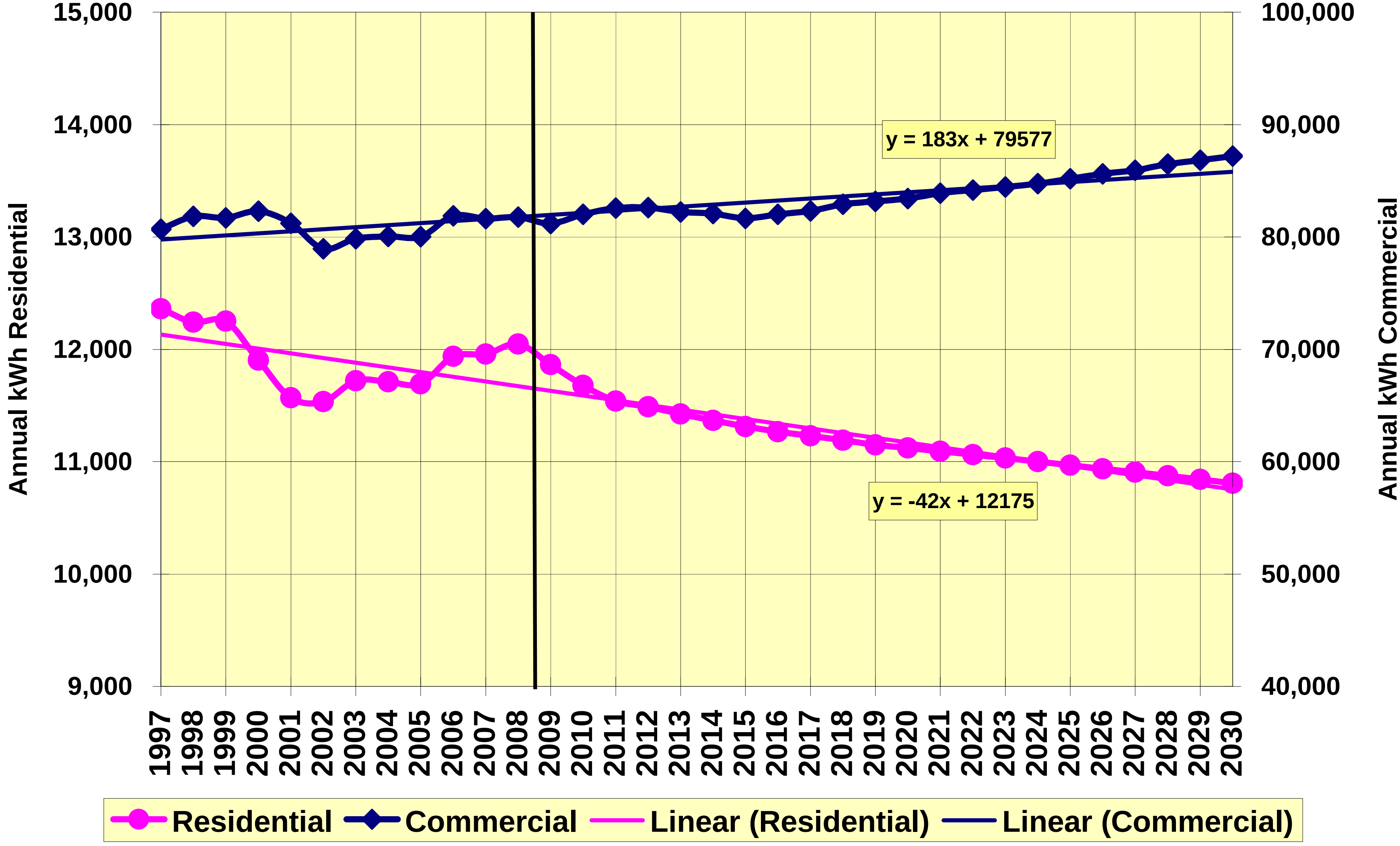
2008 Forecast Residential New Construction
Kootenai & Spokane County Combined



Spokane NWS Global Warming Degree Day Trends 2007-2038



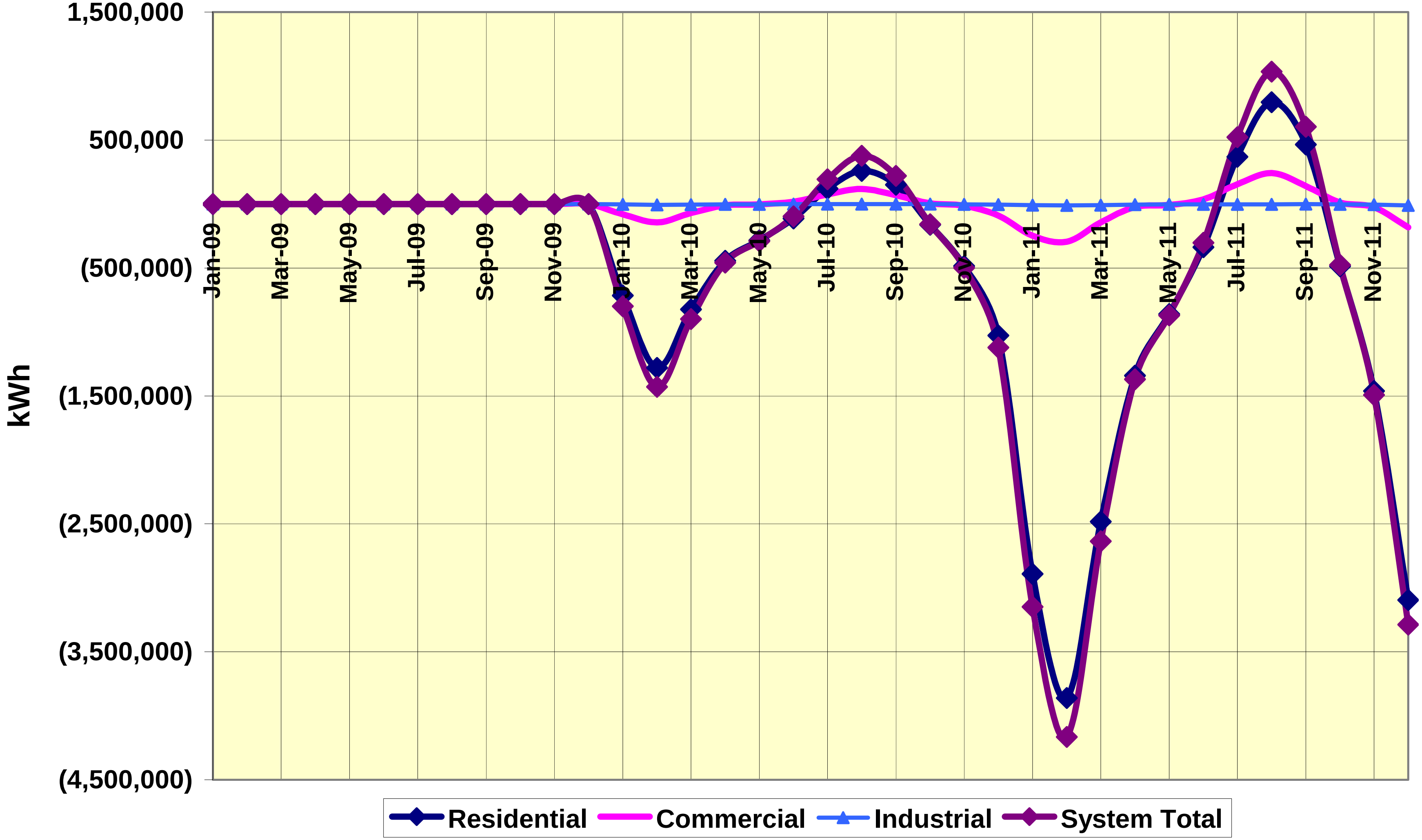
Electric Average Use per Average Customer

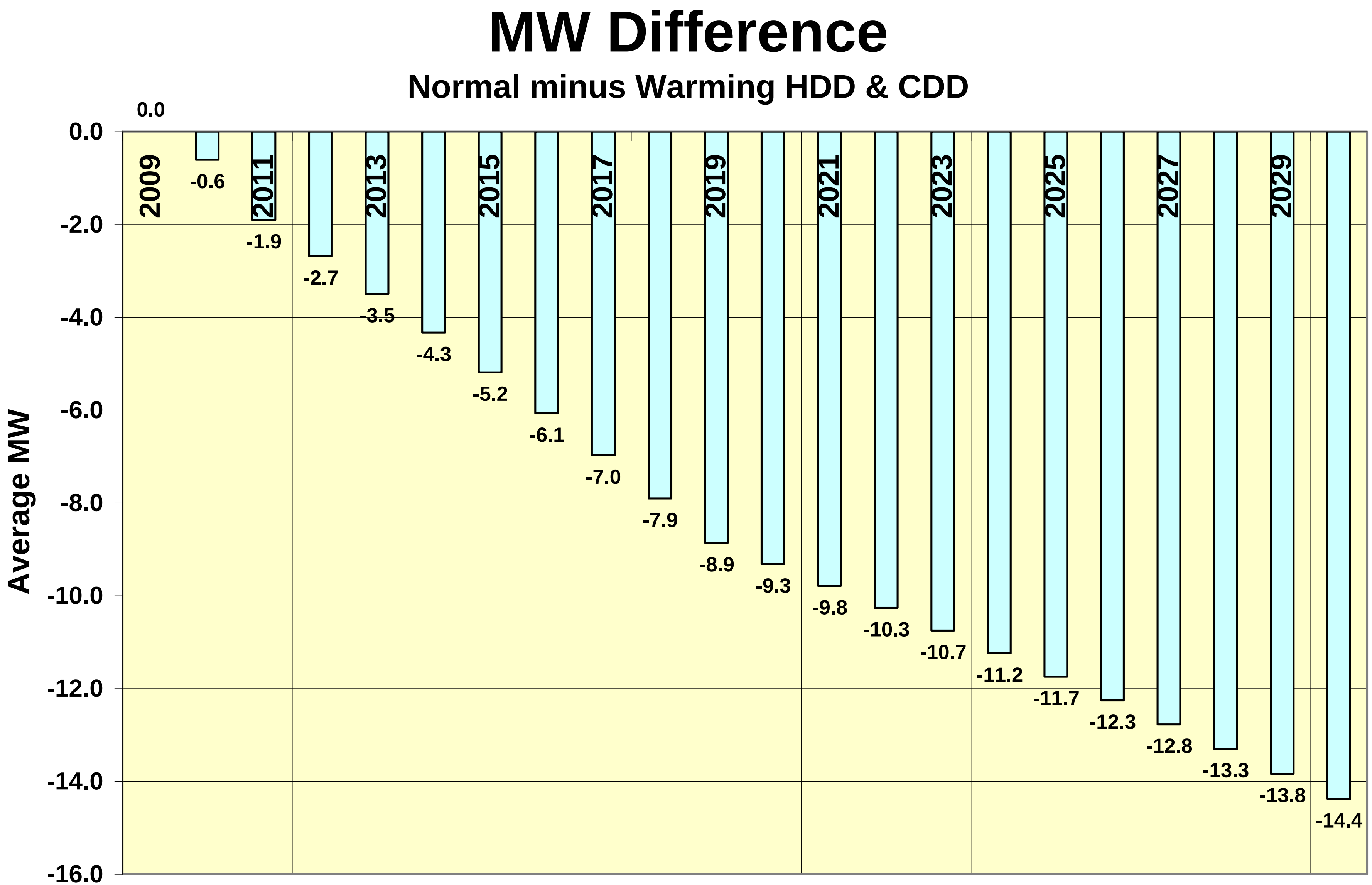


AVISTA

Global Warming Impact

Normal minus Warming HDD and CDD

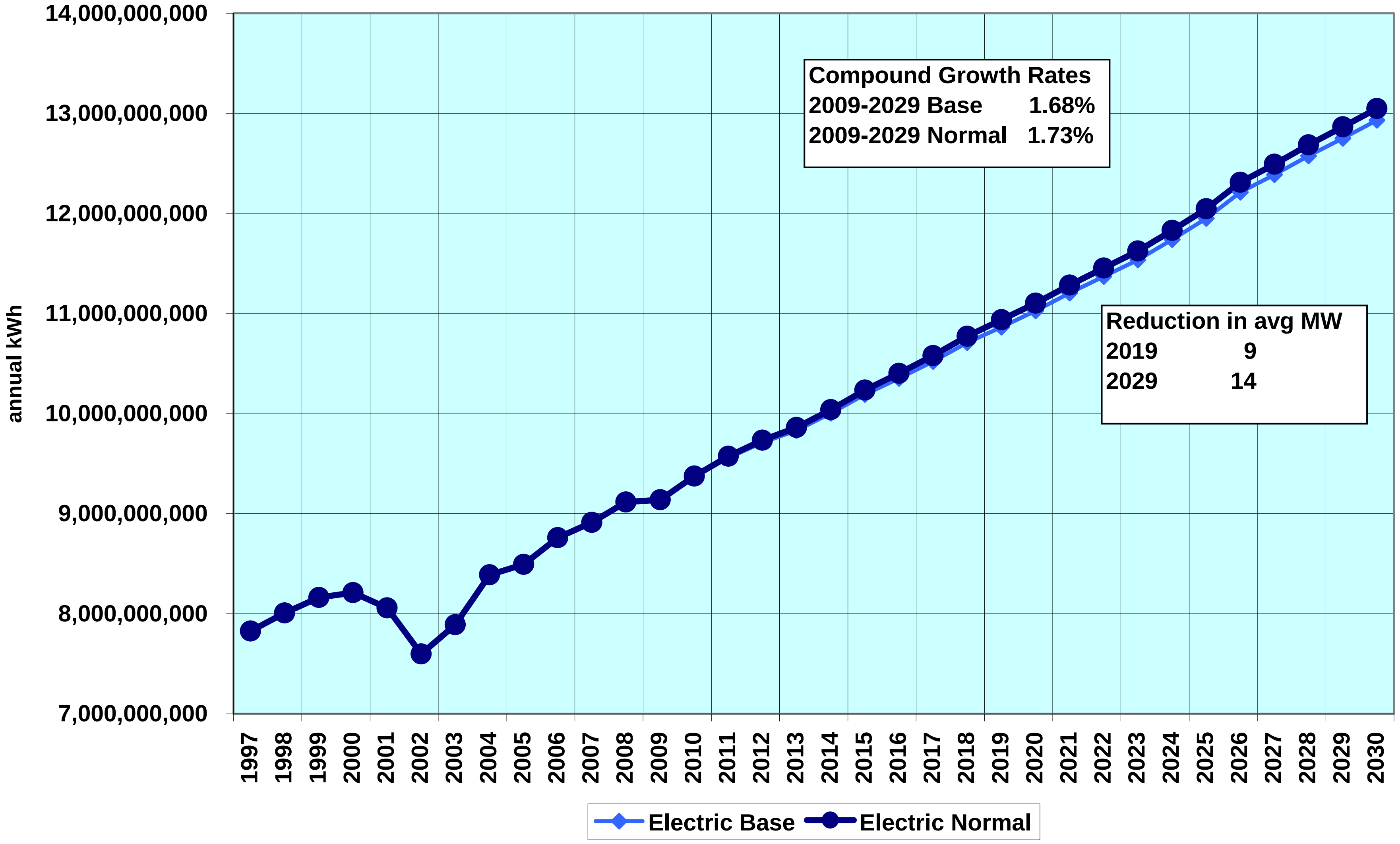




MW Difference
Normal minus Warming HDD & CDD
Average MW
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
0.0
-0.6
-1.9
-2.7
-3.5
-4.3
-5.2
-6.1
-7.0
-7.9
-8.9
-9.3
-9.8
-10.3
-10.7
-11.2
-11.7
-12.3
-12.8
-13.3
-13.8
-14.4

AVISTA

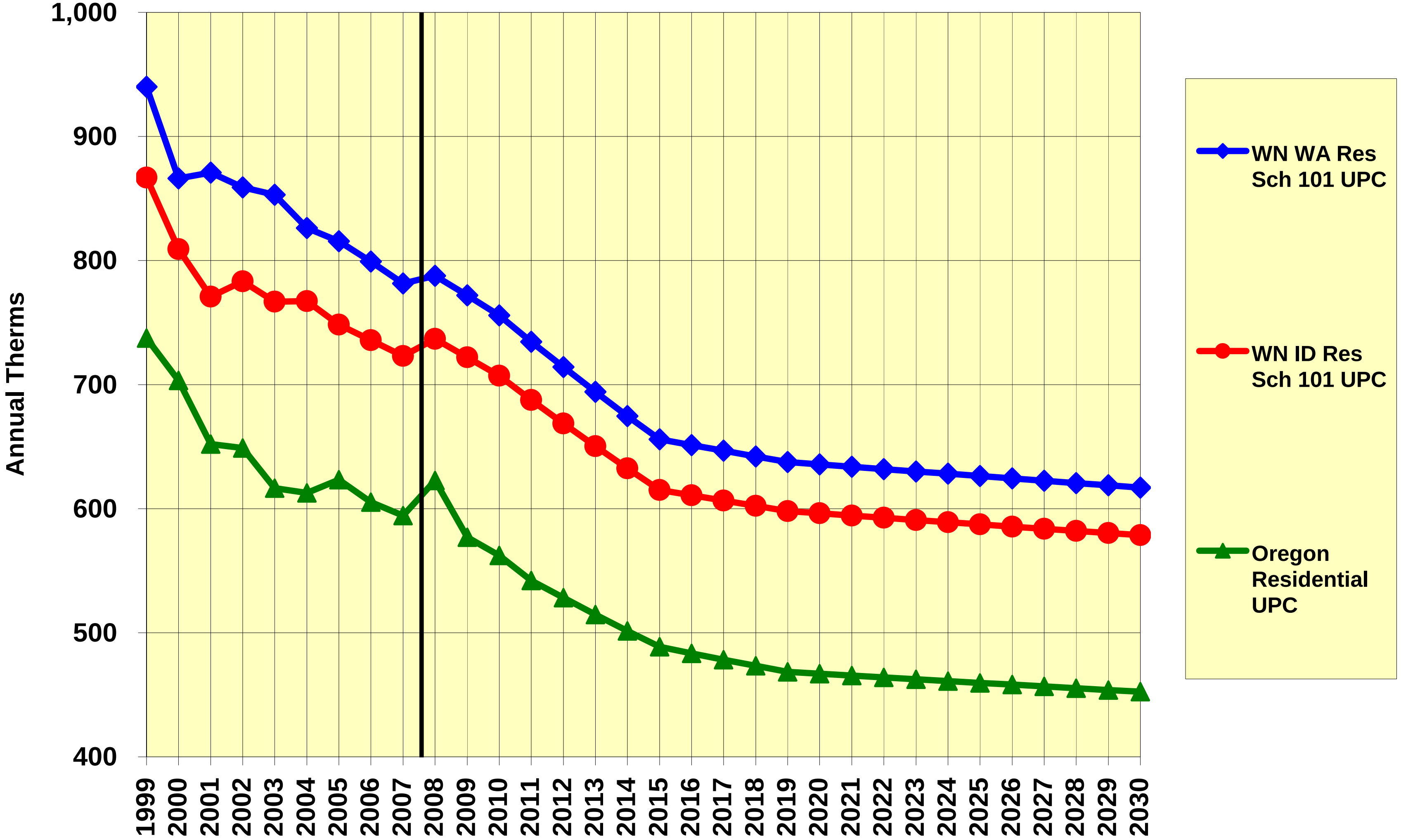
Electric Sales Forecast Base w/ GW vs. Normal Weather



AVISTA

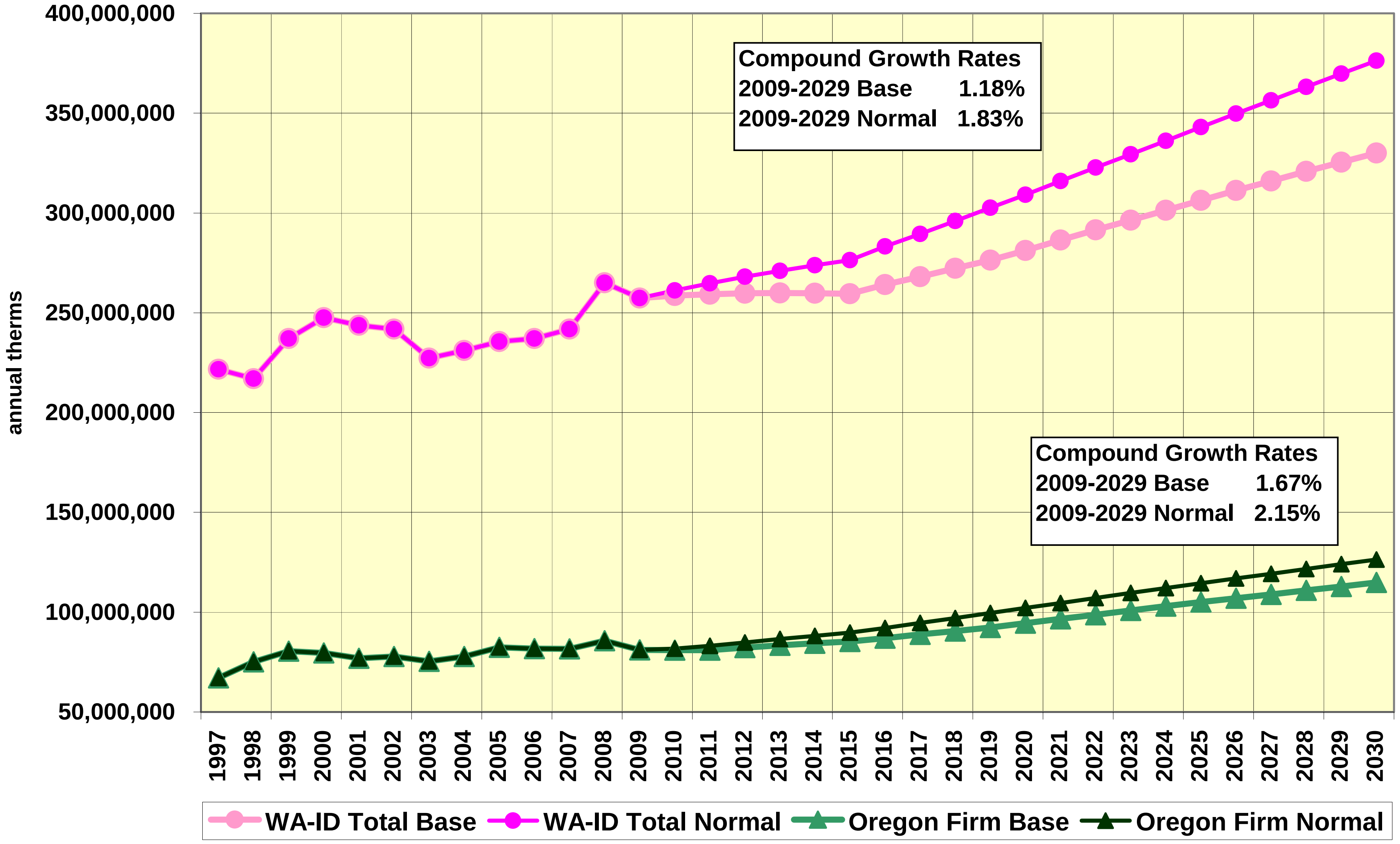
Avista Residential by Schedule

Therm Use Per Customer



AVISTA

WA-ID & Oregon Natural Gas Base w/GW vs. Normal Weather



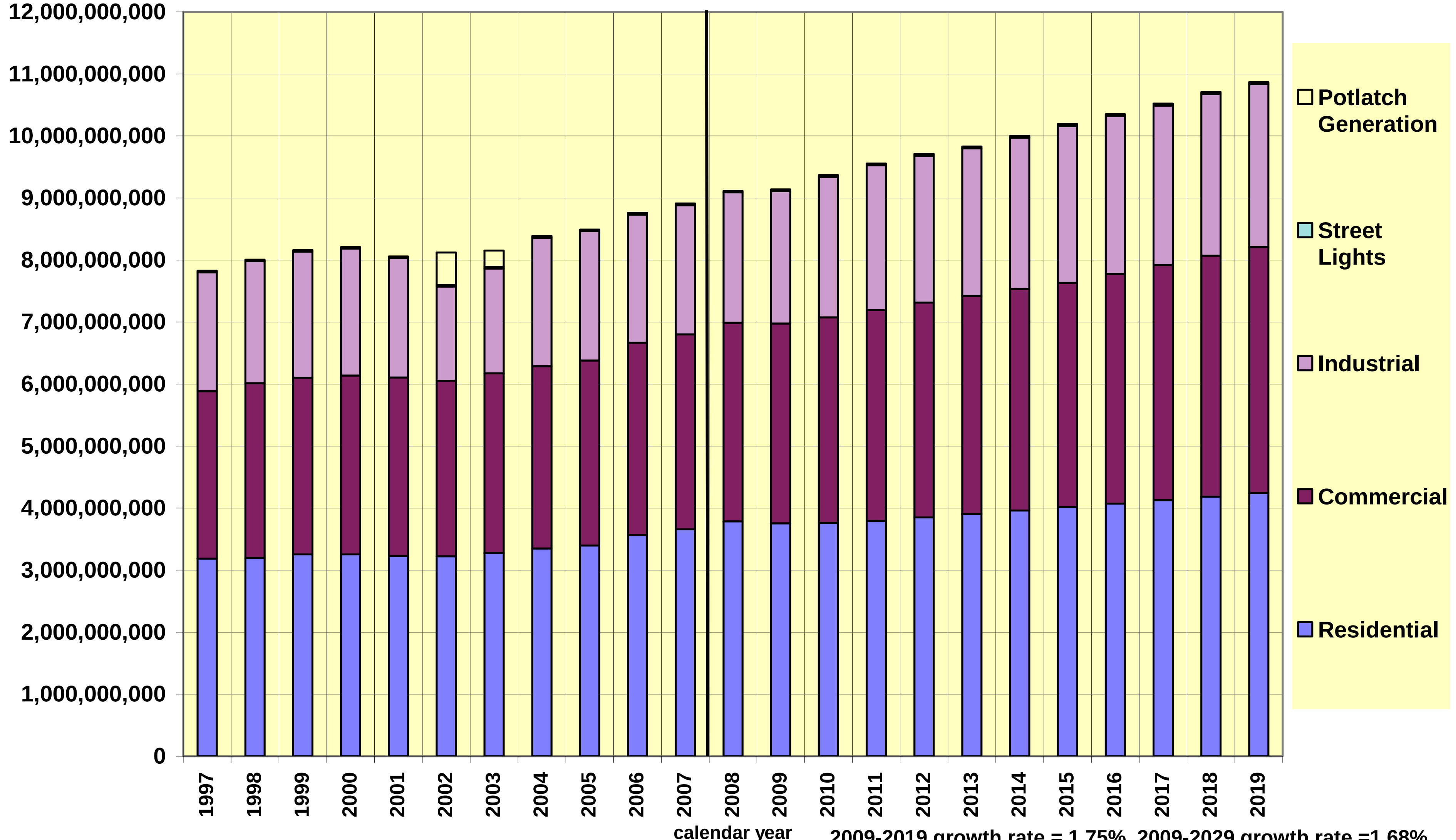
AVISTA

Avista Electric Service Area Plug-In Hybrid Car Sales Forecast

	Market Share	Hybrid Vehicles Served	Incremental Sales of Hybrid Vehicles	kWh Energy Consumption	Average MW	Base Case Residential Sales Forecast	Cumulative Percent Boost to Residential	Residential Sales with Hybrid Vehicles
2010	3.5%	1,000	1,000	2,500,000	0.3	3,761,638,997	0.1%	3,764,138,997
2011	6.0%	2,000	1,000	5,000,000	0.6	3,788,118,462	0.1%	3,793,118,462
2012	8.5%	3,500	1,500	8,750,000	1.0	3,842,900,187	0.2%	3,851,650,187
2013	11.0%	5,500	2,000	13,750,000	1.6	3,893,034,524	0.4%	3,906,784,524
2014	14.0%	8,000	2,500	20,000,000	2.3	3,941,757,508	0.5%	3,961,757,508
2015	18.0%	11,000	3,000	27,500,000	3.1	3,988,061,420	0.7%	4,015,561,420
2016	24.0%	15,000	4,000	37,500,000	4.3	4,034,409,825	0.9%	4,071,909,825
2017	26.0%	20,000	5,000	50,000,000	5.7	4,079,468,146	1.2%	4,129,468,146
2018	26.0%	25,000	5,000	62,500,000	7.1	4,123,323,408	1.5%	4,185,823,408
2019	26.0%	30,000	5,000	75,000,000	8.6	4,167,601,524	1.8%	4,242,601,524
2020	26.0%	35,000	5,000	87,500,000	10.0	4,215,588,573	2.1%	4,303,088,573
2021	26.0%	40,000	5,000	100,000,000	11.4	4,261,378,267	2.3%	4,361,378,267
2022	26.0%	45,000	5,000	112,500,000	12.8	4,306,622,849	2.6%	4,419,122,849
2023	26.0%	50,000	5,000	125,000,000	14.3	4,351,888,063	2.9%	4,476,888,063
2024	26.0%	55,000	5,000	137,500,000	15.7	4,396,064,205	3.1%	4,533,564,205
2025	26.0%	60,000	5,000	150,000,000	17.1	4,439,711,711	3.4%	4,589,711,711
2026	26.0%	65,000	5,000	162,500,000	18.6	4,481,771,729	3.6%	4,644,271,729
2027	26.0%	70,000	5,000	175,000,000	20.0	4,523,907,789	3.9%	4,698,907,789
2028	26.0%	75,000	5,000	187,500,000	21.4	4,564,967,067	4.1%	4,752,467,067
2029	26.0%	80,000	5,000	200,000,000	22.8	4,605,531,184	4.3%	4,805,531,184
2030	26.0%	85,000	5,000	212,500,000	24.3	4,645,605,390	4.6%	4,858,105,390
2,500 kWh per car		80% WA	20% ID		2010-2030 CGR	1.06%		1.28%

AVISTA

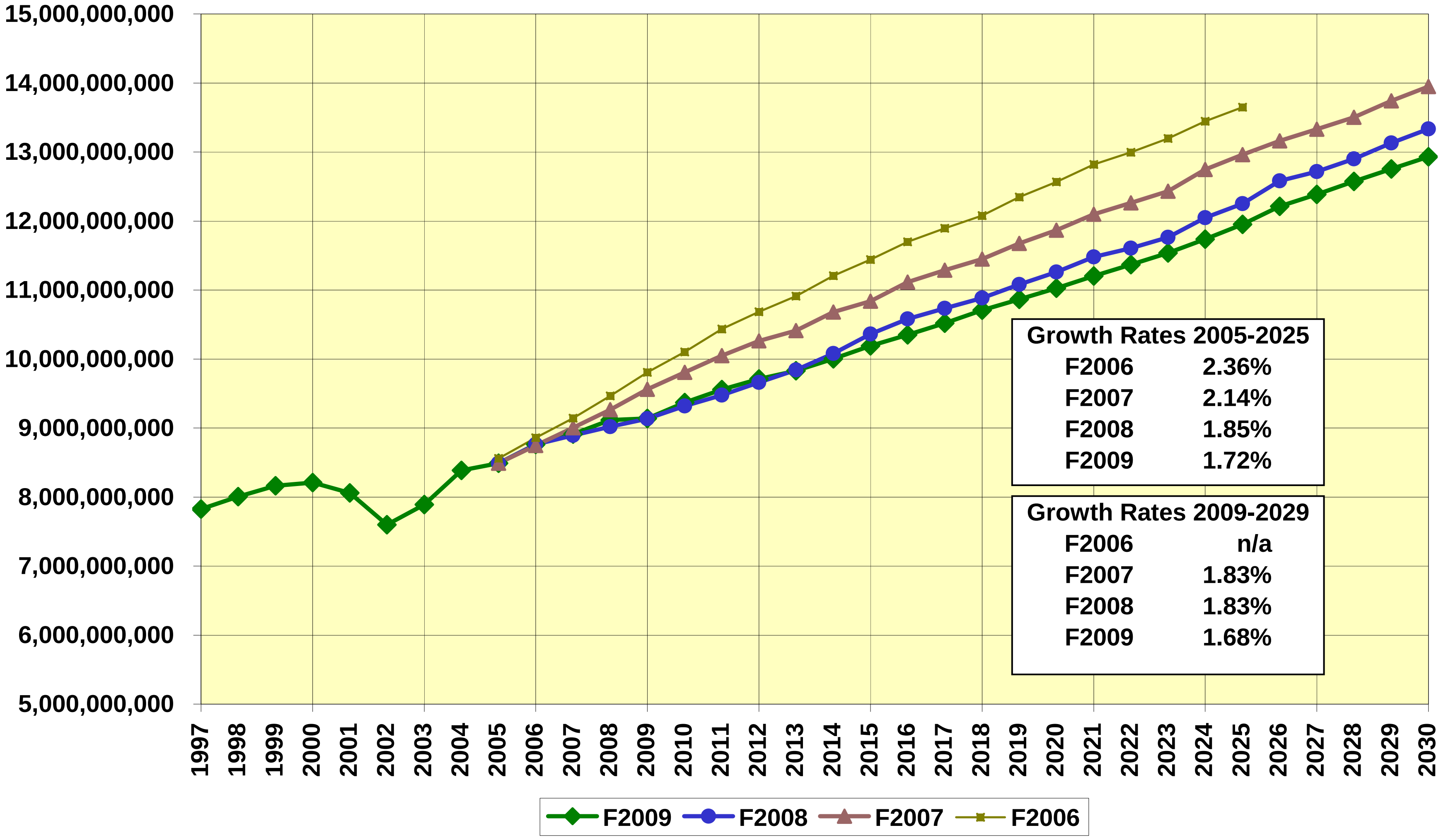
2009 ELECTRIC RETAIL SALES FORECAST



2009-2019 growth rate = 1.75%, 2009-2029 growth rate =1.68%

Load Growth Comparisons

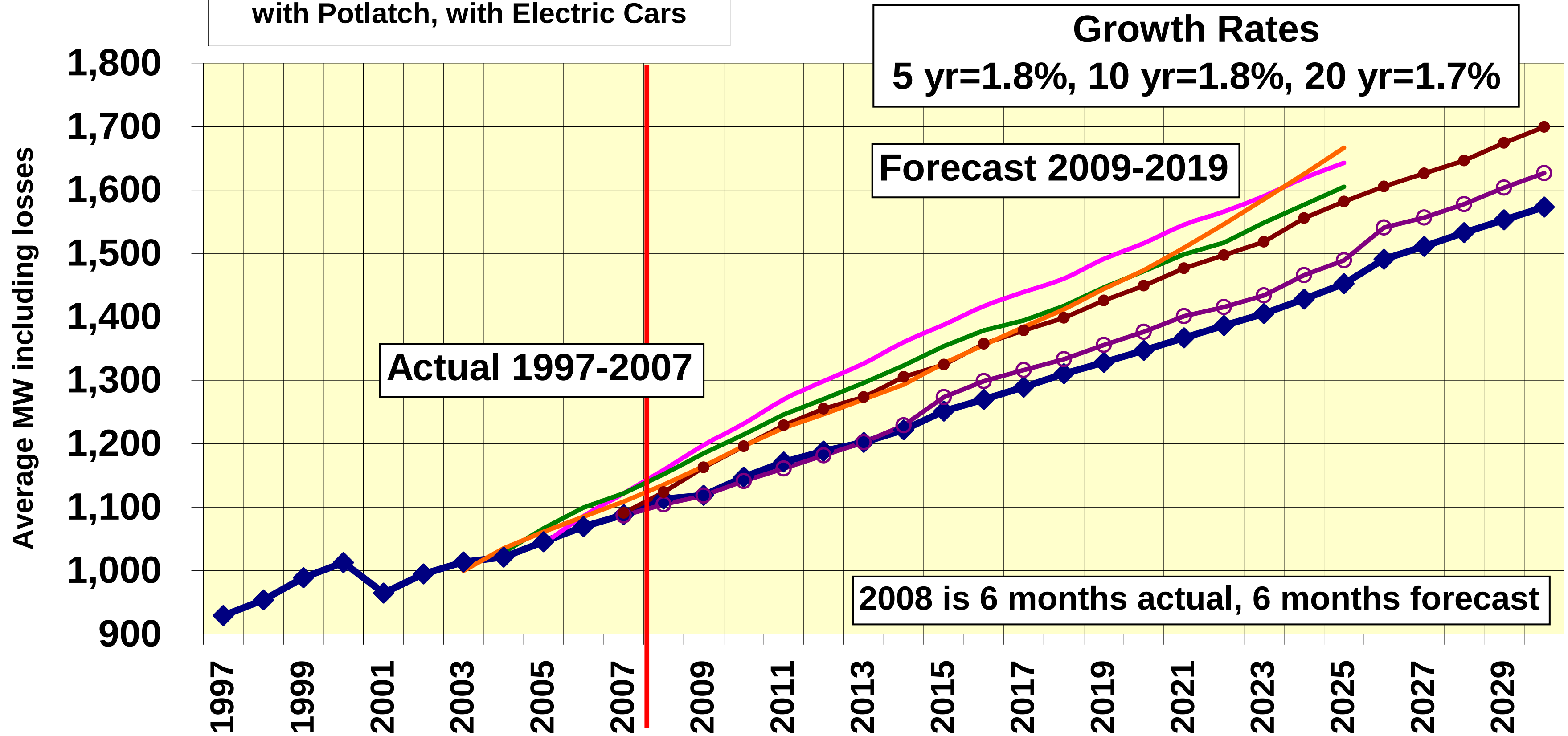
(plug-in hybrid car consumption is included)



AVISTA

Net Native Load

with Potlatch, with Electric Cars



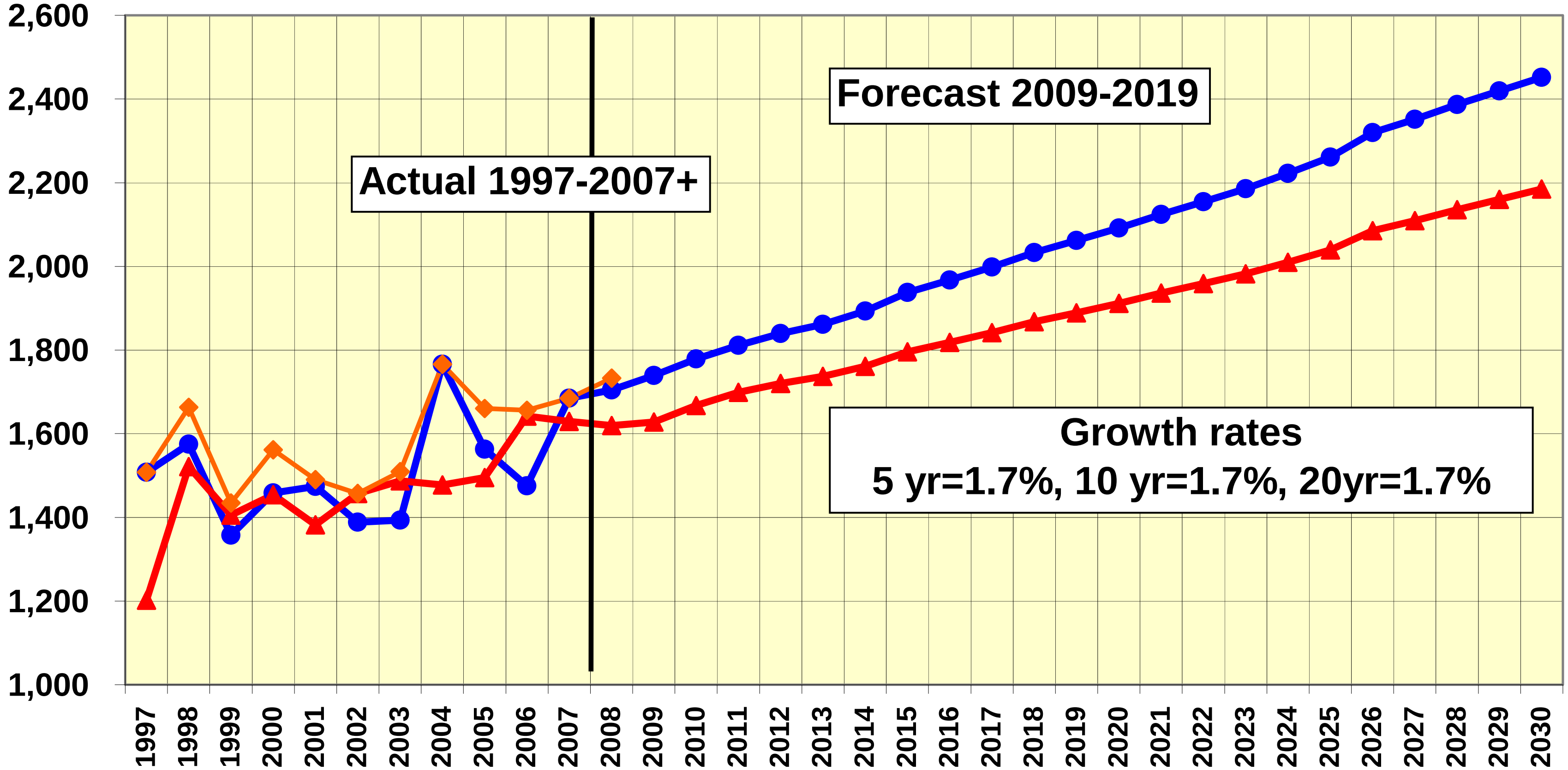
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
F2009	929	954	989	1,013	965	995	1,013	1,021	1,046	1,069	1,088	1,113	1,119	1,148	1,171	1,188	1,202
F2008											1,087	1,104	1,118	1,141	1,161	1,182	1,202
F2007IRP											1,091	1,124	1,163	1,196	1,229	1,255	1,274
F2006									1,043	1,086	1,122	1,159	1,198	1,232	1,270	1,299	1,327
F2005								1,029	1,067	1,099	1,122	1,152	1,185	1,215	1,246	1,270	1,296
F2004							1,000	1,035	1,061	1,085	1,109	1,135	1,164	1,196	1,225	1,247	1,270

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
F2009	1,222	1,252	1,270	1,289	1,311	1,329	1,347	1,367	1,386	1,405	1,428	1,452	1,491	1,511	1,533	1,553	1,573
F2008	1,229	1,274	1,299	1,316	1,333	1,356	1,376	1,401	1,416	1,434	1,466	1,489	1,541	1,556	1,577	1,604	1,627
F2007IRP	1,306	1,325	1,358	1,379	1,399	1,426	1,449	1,477	1,497	1,518	1,556	1,582	1,606	1,626	1,646	1,674	1,699
F2006	1,360	1,388	1,417	1,440	1,461	1,491	1,516	1,545	1,566	1,590	1,619	1,643					
F2005	1,323	1,354	1,379	1,395	1,417	1,447	1,472	1,499	1,517	1,549	1,577	1,605					
F2004	1,293	1,327	1,356	1,384	1,412	1,444	1,474	1,509	1,546	1,585	1,625	1,667					

F2009 F2008 F2007IRP F2006 F2005 F2004

Calendar Year, January & July Peak Demands

Megawatts



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Jan	1,508	1,575	1,357	1,458	1,474	1,388	1,393	1,766	1,563	1,475	1,685	1,705	1,739	1,779	1,812	1,839	1,862
Jul	1,202	1,521	1,405	1,454	1,382	1,457	1,487	1,477	1,495	1,642	1,629	1,619	1,628	1,667	1,699	1,720	1,737
Calendar	1,508	1,663	1,434	1,561	1,490	1,457	1,509	1,766	1,660	1,656	1,685	1,733					

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Jan	1,893	1,937	1,967	1,998	2,033	2,062	2,091	2,124	2,154	2,185	2,222	2,261	2,320	2,352	2,387	2,419	2,452
Jul	1,761	1,796	1,818	1,842	1,867	1,889	1,912	1,936	1,959	1,982	2,010	2,039	2,085	2,109	2,135	2,160	2,185
Calendar																	

Peak Load Planning

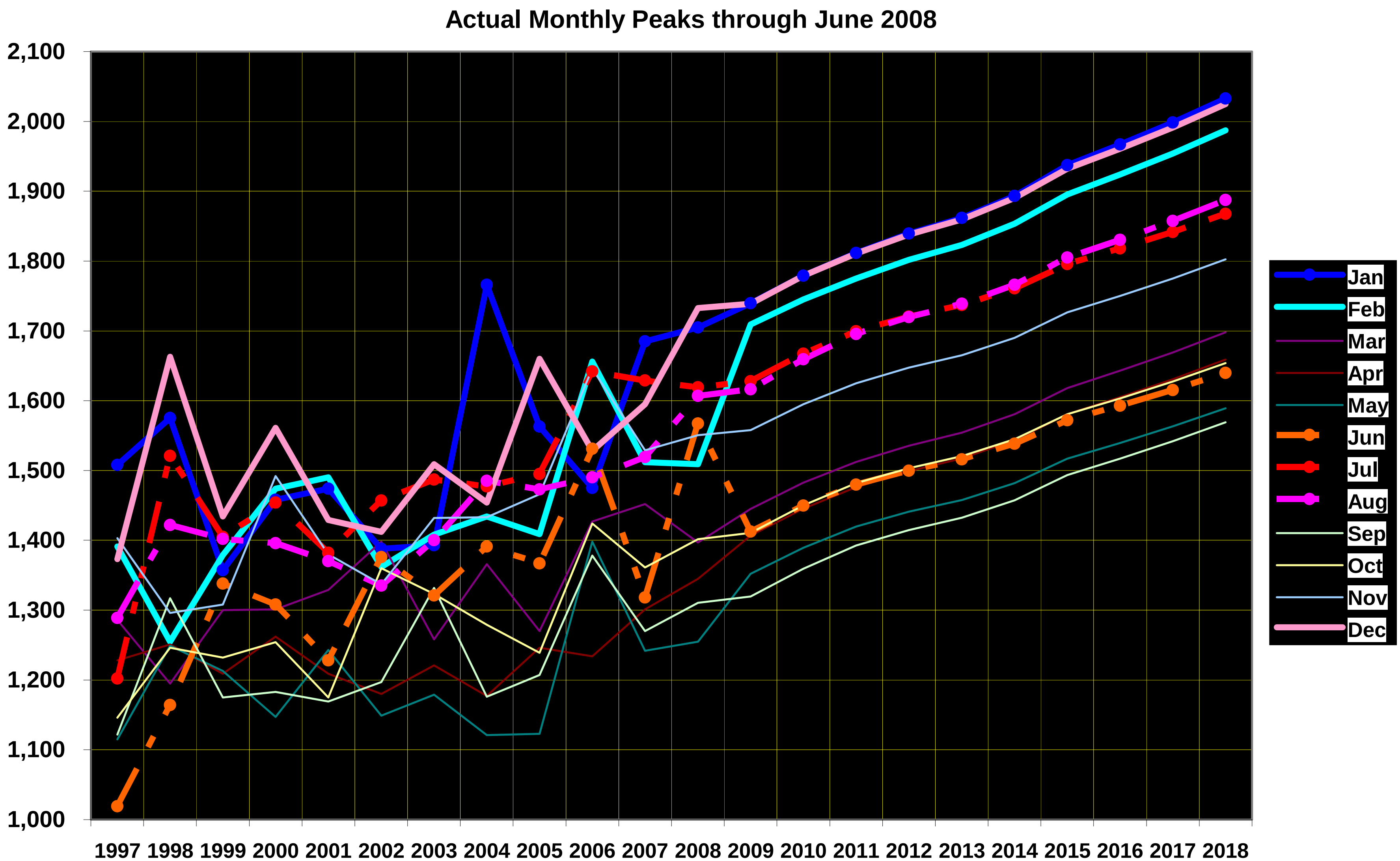
•Winter based on average coldest day

Data from 1890 to 2007			Temp	HDD
Average Coldest Day (December & January)			11.7	53.3
Standard Deviation		10.2		
5% chance of exceedance	1.645	16.779	-5.1	70.1
1% chance of exceedance	2.330	23.766	-12.1	77.1
0.25% chance of exceedance	2.814	28.7	-17.0	82.0

•Summer based on average hottest day

Data from 1890 to 2007			Temp	CDD
Average Hottest Day (July & August)			80.0	15.0
Standard Deviation		3.405		
5% chance of exceedance	1.645	5.601	85.6	20.6
1% chance of exceedance	2.330	7.933	87.9	22.9
0.16% chance of exceedance	2.950	10.0	90.0	25.0

Peak Demand Trends



AVISTA

Questions & Answers

Natural Gas Price Forecast

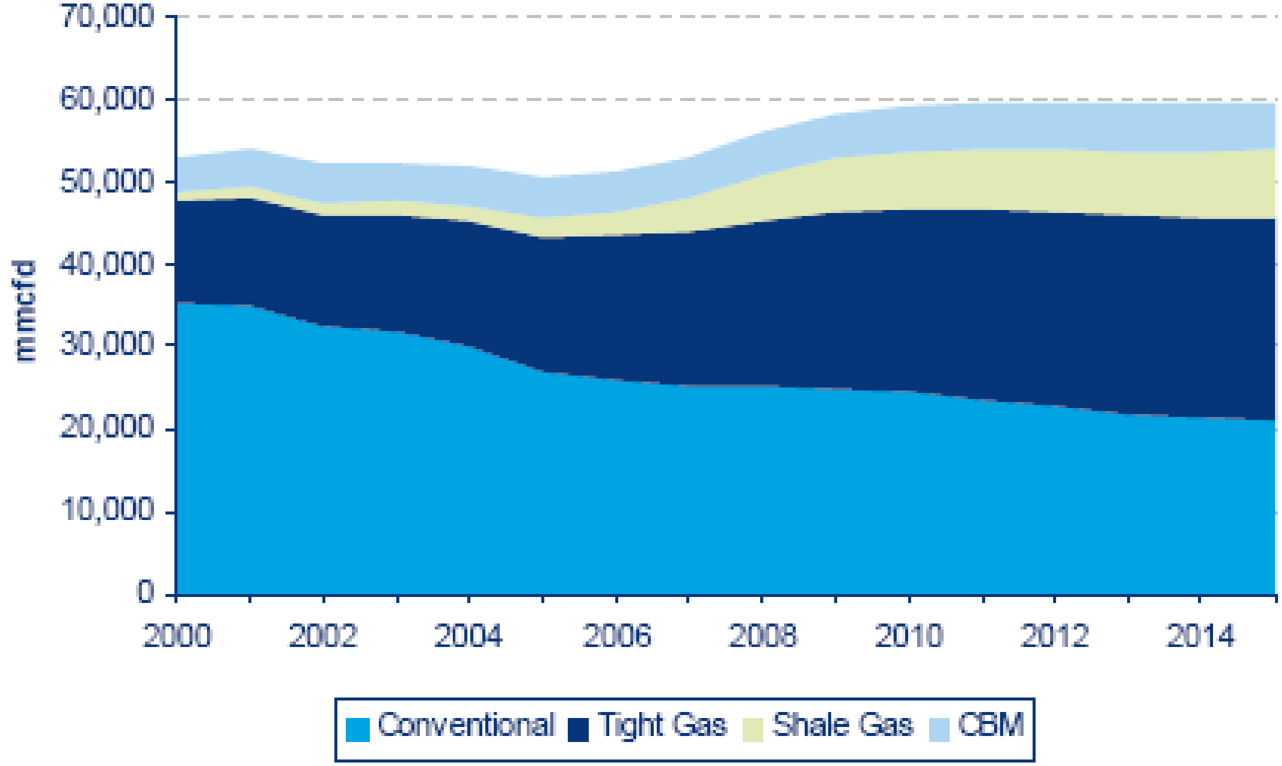
Greg Rahn, Manager Natural Gas Planning
James Gall, Senior Power Supply Analyst

2009 Electric Integrated Resource Plan

Third Technical Advisory Committee Meeting

October 22, 2008

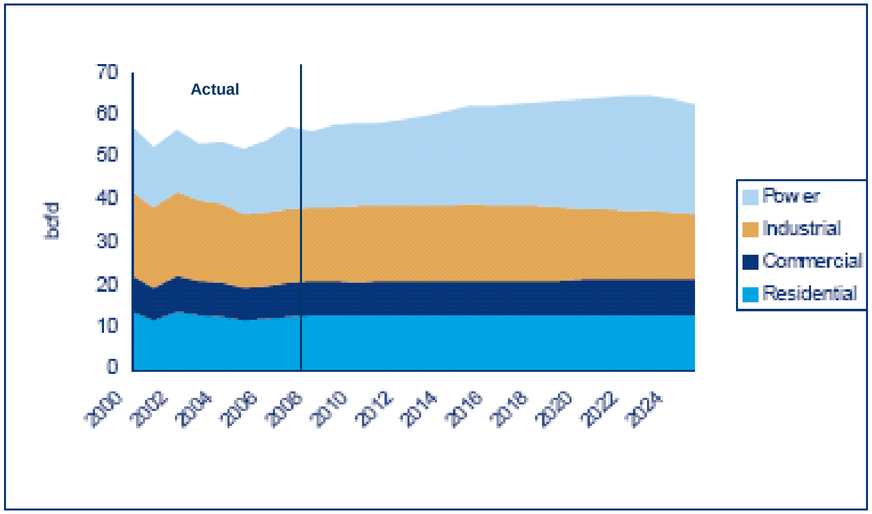
US Supply Growth Forecast through 2015



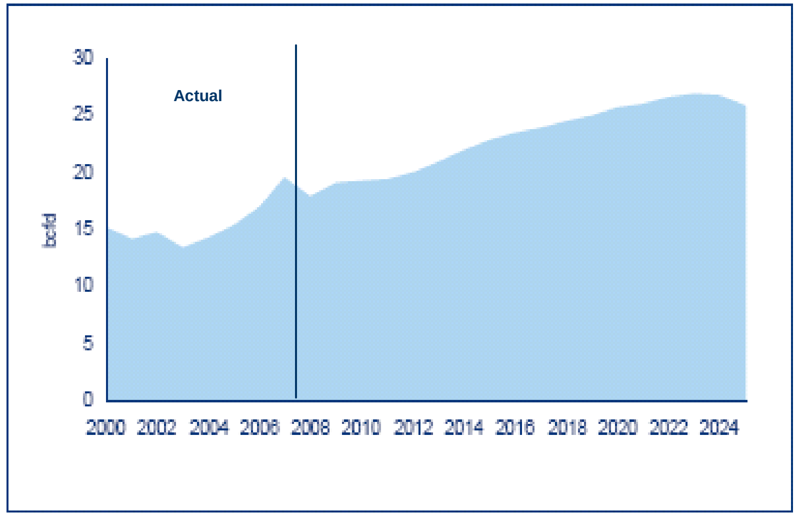
Source: Wood Mackenzie

Generation Forecasted to Lead National Demand for Natural Gas

US Demand by Sector



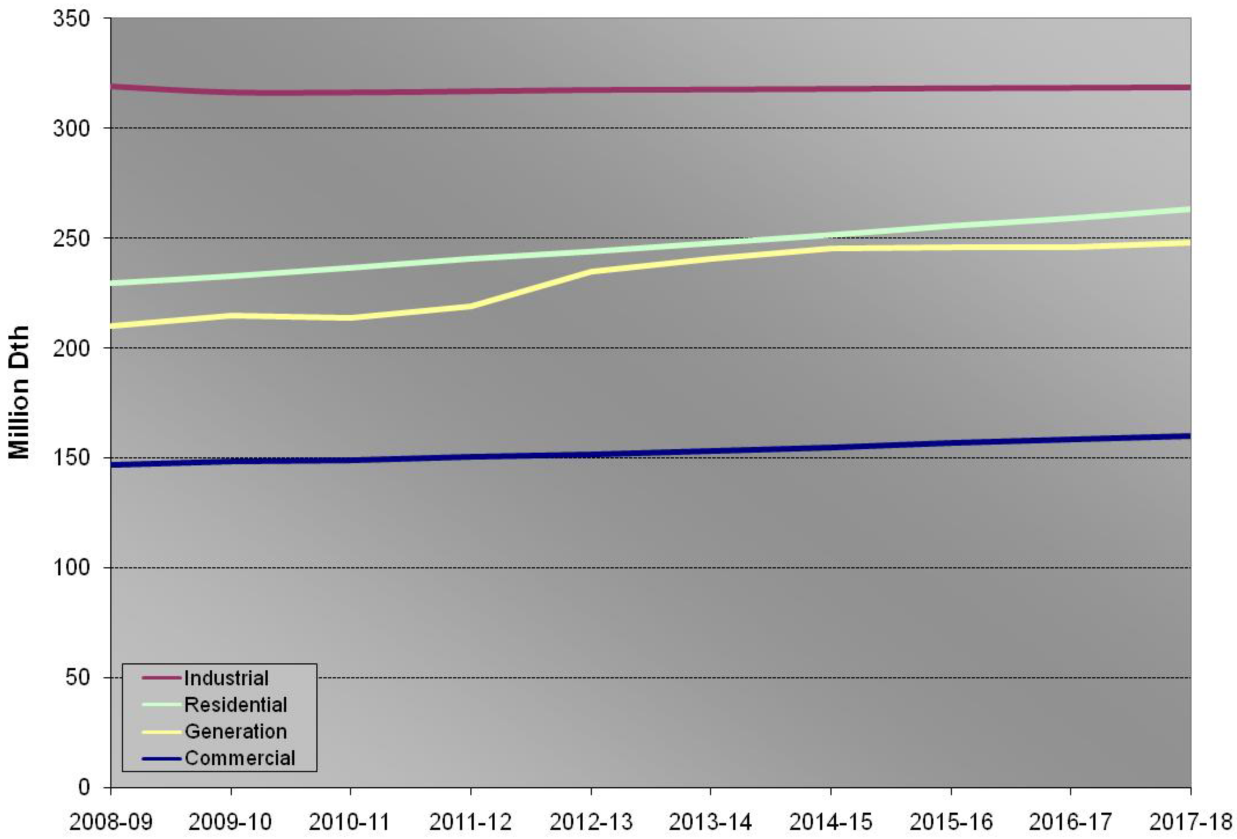
Power Sector Demand



Source: Wood Mackenzie

AVISTA

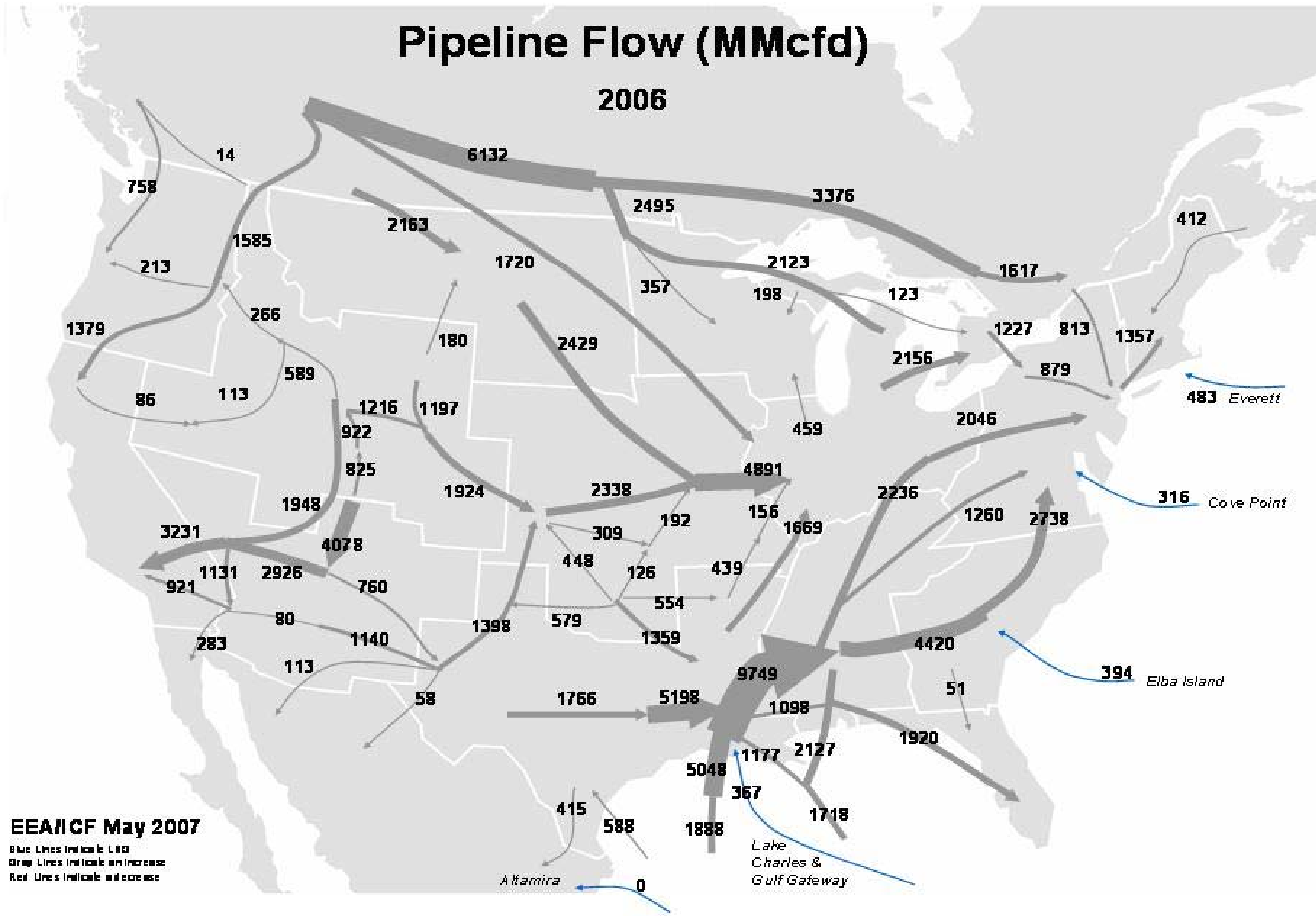
Regional Natural Gas Demand Forecast



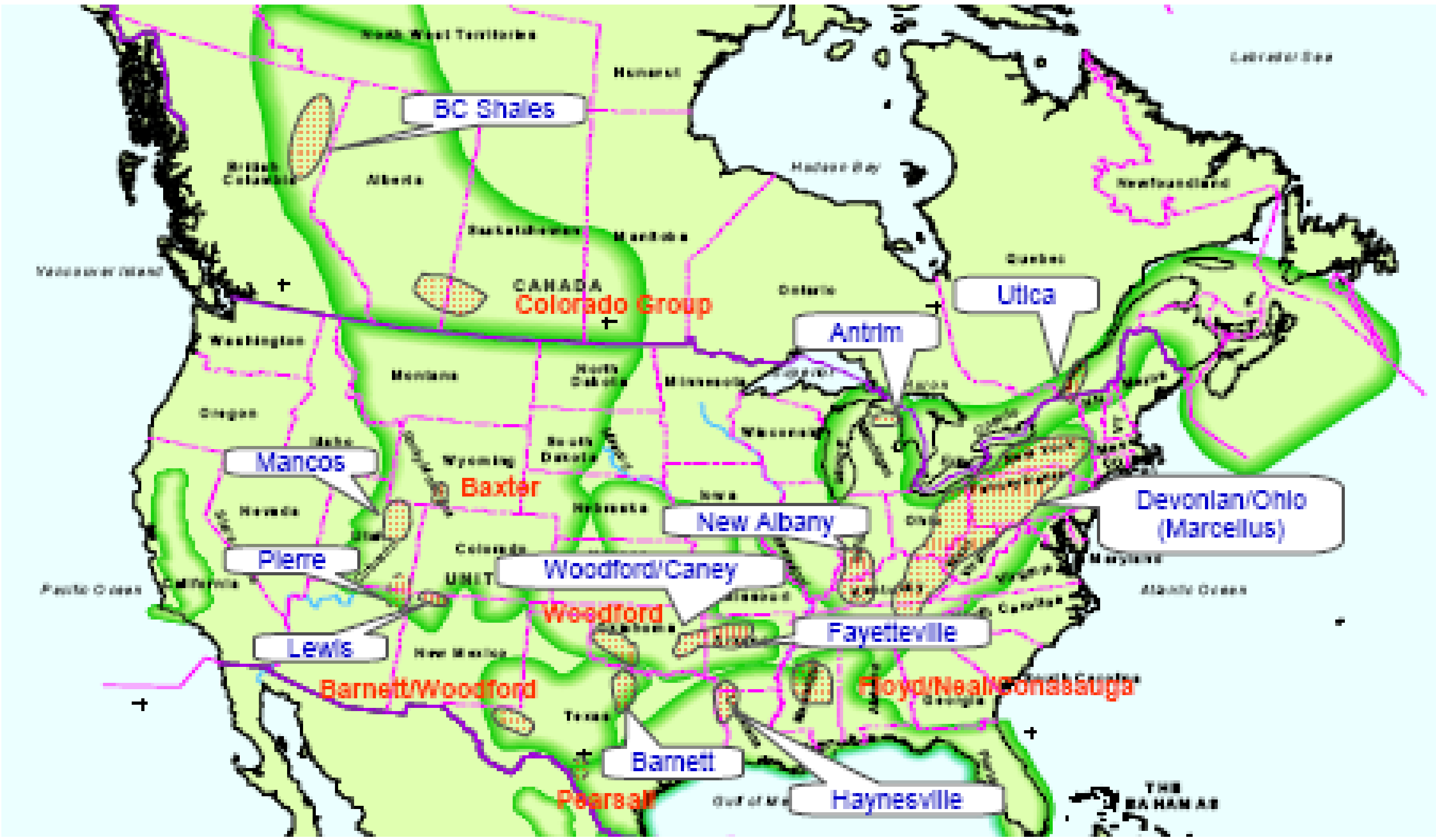
Source: Northwest Gas Association

AVISTA

Interstate Pipeline Flow

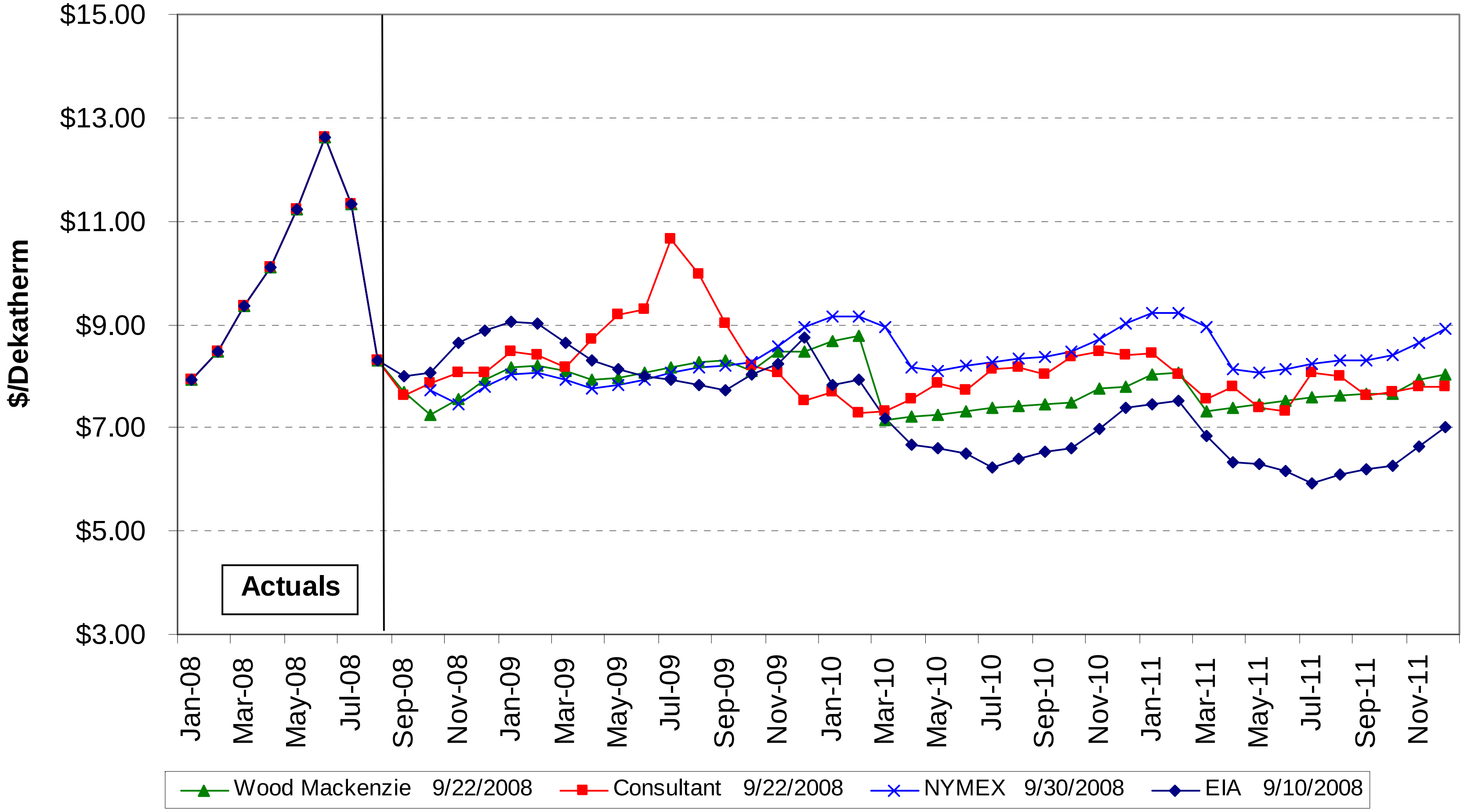


Shale Gas Plays



Source: Wood Mackenzie

Henry Hub Short Term Price Forecasts

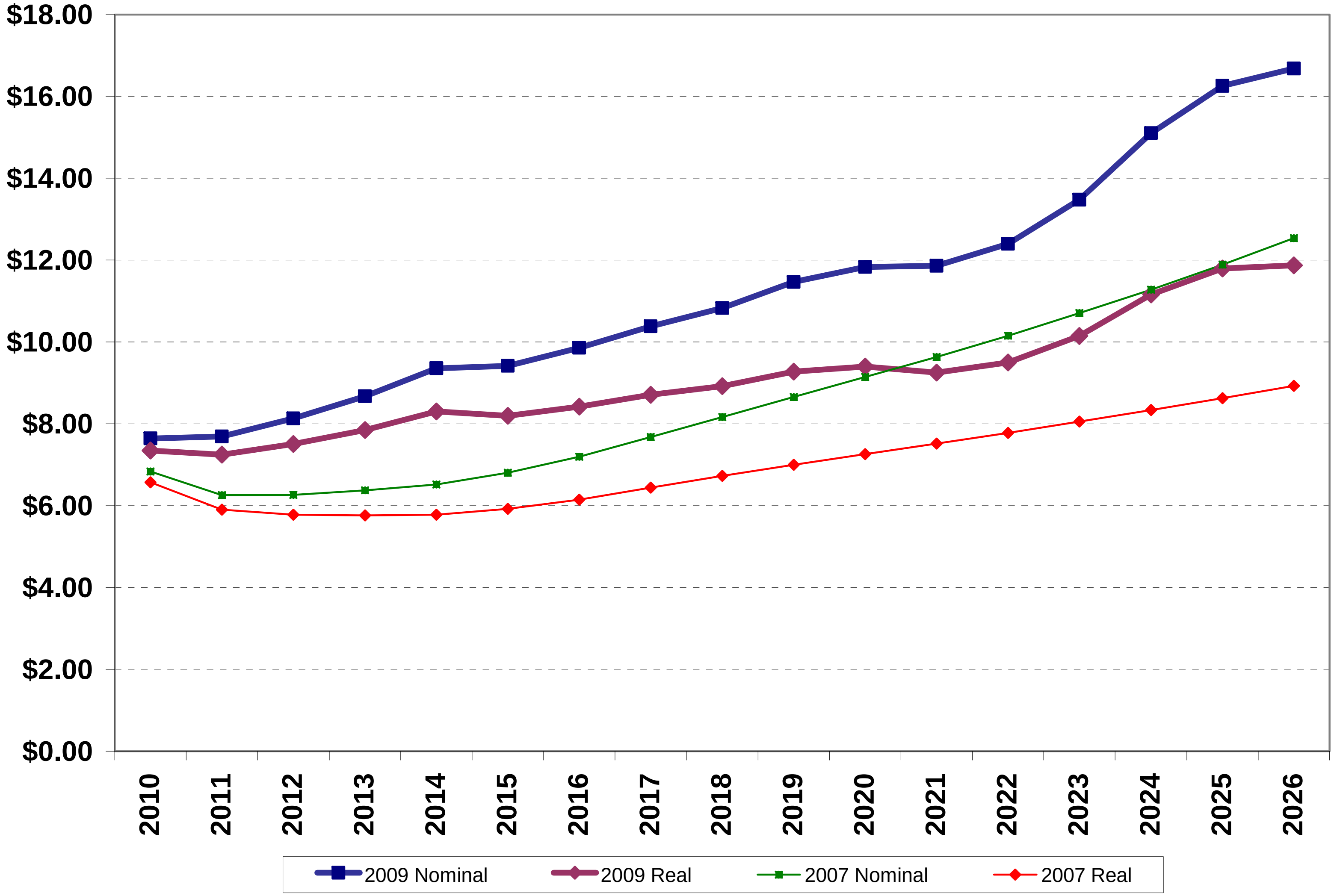


Forecast Assumptions

	2009	2015	2020
US Economic Growth (% GDP)	2.55%	2.84%	2.73%
US Gas Demand (bcf/d)	64.85	68.44	70.67
EG Demand (bcf\d)	19.33	22.88	26.41
WTI Oil Price (2008$)	$ 72.25	$ 60.40	$ 68.17
US Gas Prod. (bcf\d)	56.82	57.36	55.21
LNG Imports (bcf\d)	1.28	8.40	12.20
Alaska Pipeline			2021

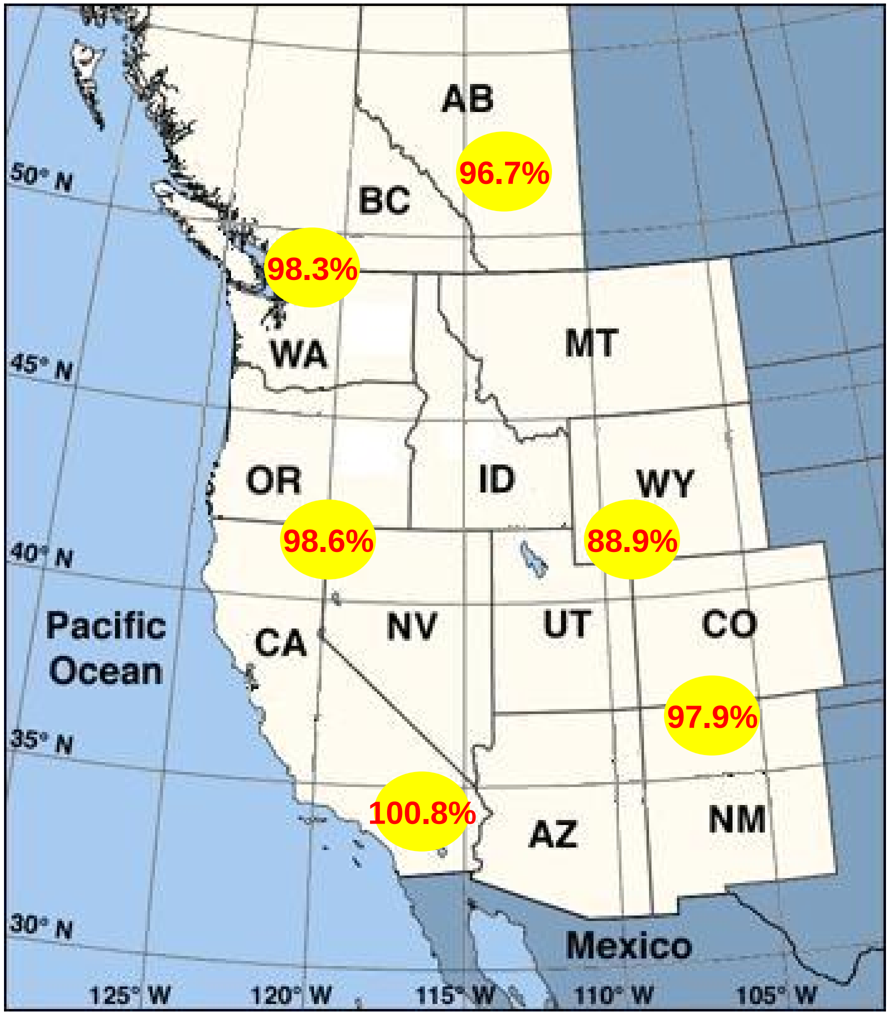
Source: Wood Mackenzie

Annual Gas Price Forecast (Henry Hub)



AVISTA

Basin Differentials as a % of Henry Hub*



Location	%
Henry Hub	100.0%
AECO	96.7%
Sumas	98.3%
Malin	98.6%
Opal	88.9%
San Juan	97.9%
So Cal	100.8%

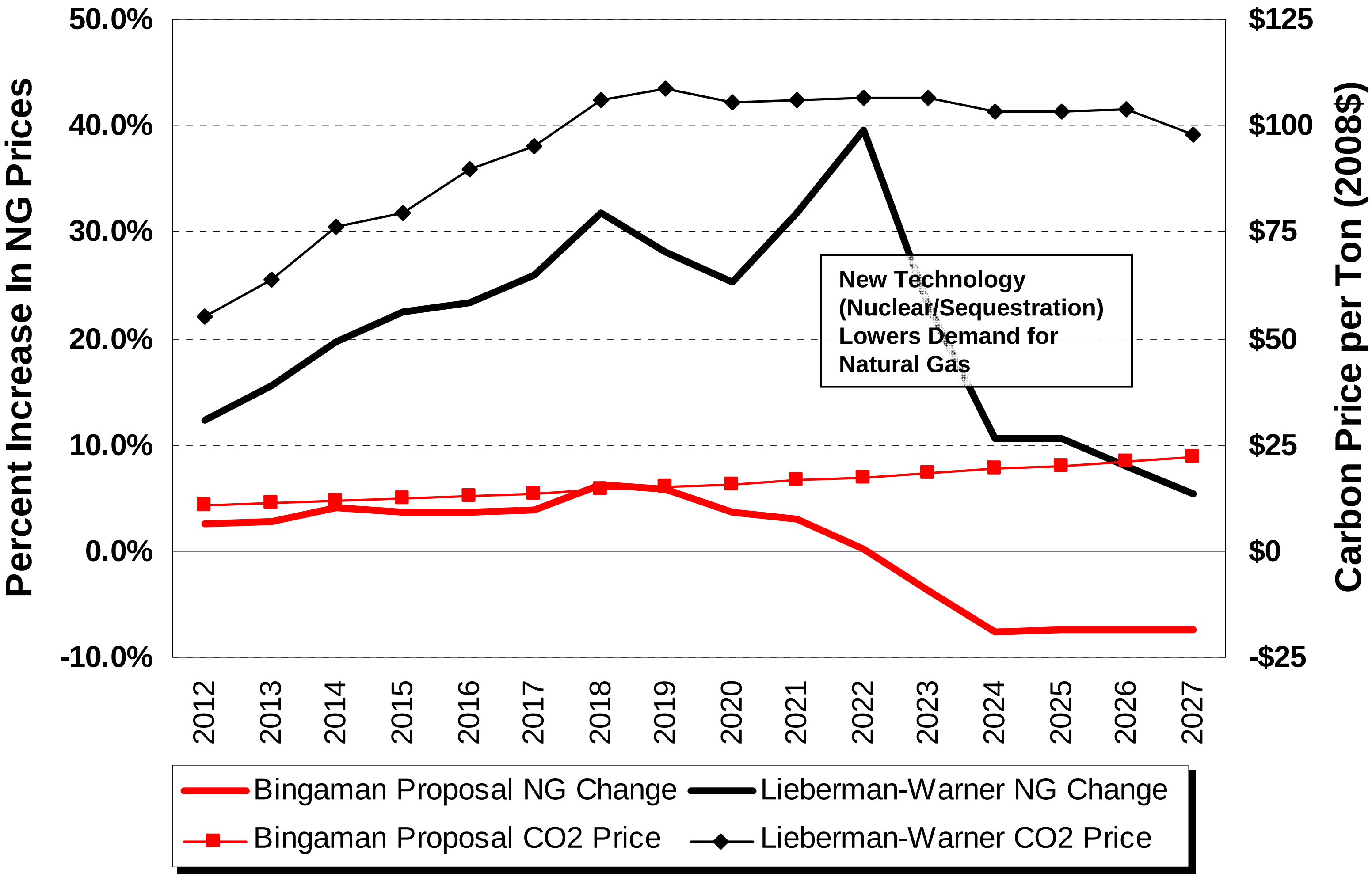
* Based on forecasted 20 year levelized nominal prices

Monthly Gas Shape*

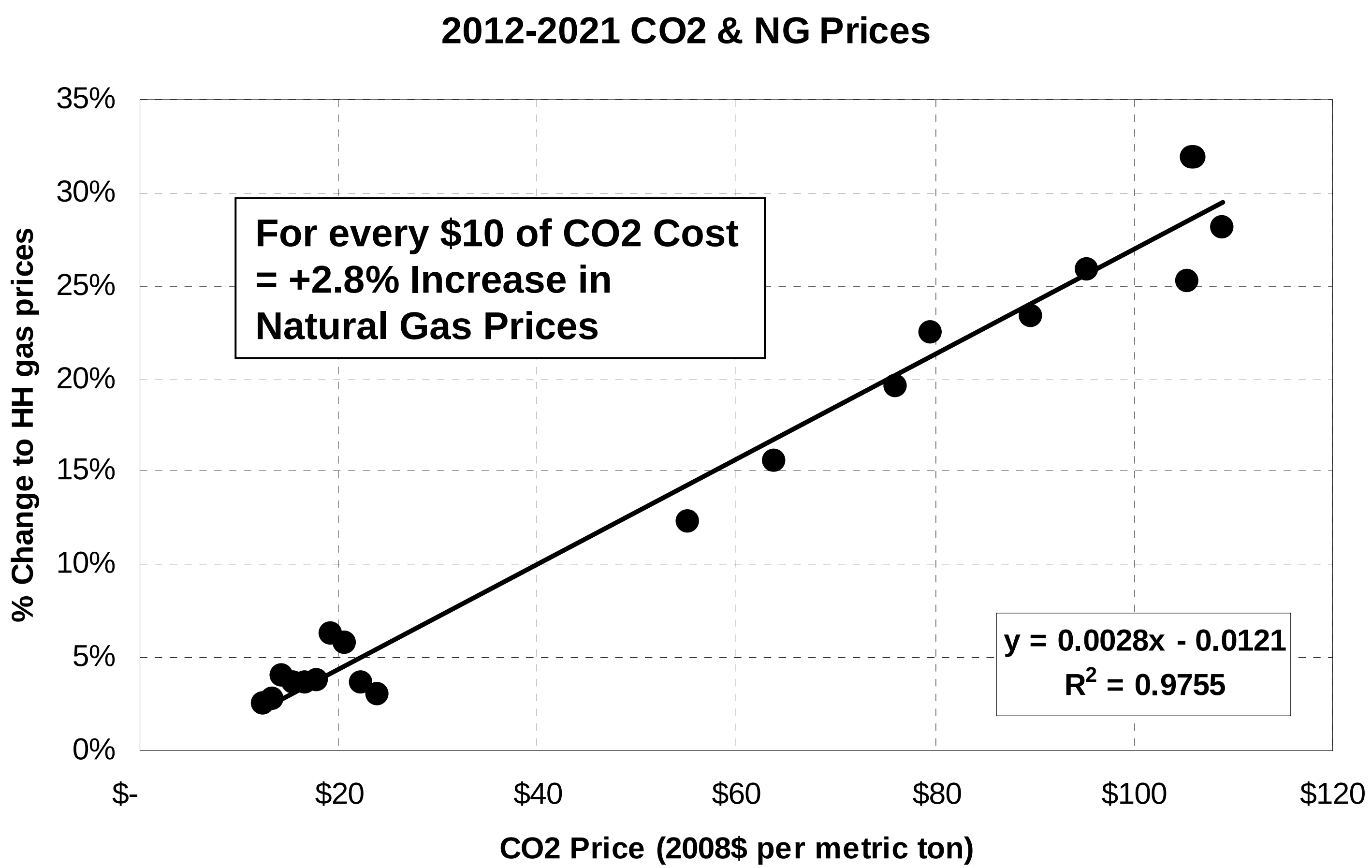
Month	% of Annual	Month	% of Annual
Jan	103%	Jul	98%
Feb	104%	Aug	99%
Mar	97%	Sep	99%
Apr	96%	Oct	100%
May	97%	Nov	104%
Jun	98%	Dec	105%

* Based on 5 year average of monthly differentials to annual average (AECO)

Wood Mackenzie Green House Gas Scenarios



Carbon Cost & LT Natural Gas Prices Relationship



Carbon Impact to Natural Gas Conclusion

- Carbon Legislation will increase natural gas demand and price.
- To meet a national 1990 Carbon Emissions levels; gas prices could be 30% higher than without Carbon Legislation, unless new technology (Nuclear or Carbon Sequestration) is available in high supply.
- ’09 IRP will use the discussed relationship to develop the Base Case natural gas price forecast, until 2025 (first year sequestration is available to the market), post 2025 prices differentials will flatten.
- Increases to natural gas prices will allow existing coal resources to compete with natural gas at higher Carbon cost levels (see Price Forecast Presentation)

Levelized Natural Gas Costs ($/Dth)*

Location	Nominal		Real (2008$)	
	WM	w/CO_2	WM	w/CO_2
Henry Hub	$10.94	$11.71	$9.11	$9.75
AECO	$10.58	$11.35	$8.81	$9.45
Sumas	$10.76	$11.53	$8.96	$9.60
Malin	$10.79	$11.56	$8.98	$9.62
Opal	$9.72	$10.49	$8.10	$8.74
San Juan	$10.71	$11.48	$8.92	$9.56
Southern Cal	$11.02	$11.80	$9.18	$9.82

* Levelized 20 Years (2010-2029)

AVISTA

Mid-Columbia Electric Market Forecast

James Gall

2009 Electric Integrated Resource Plan

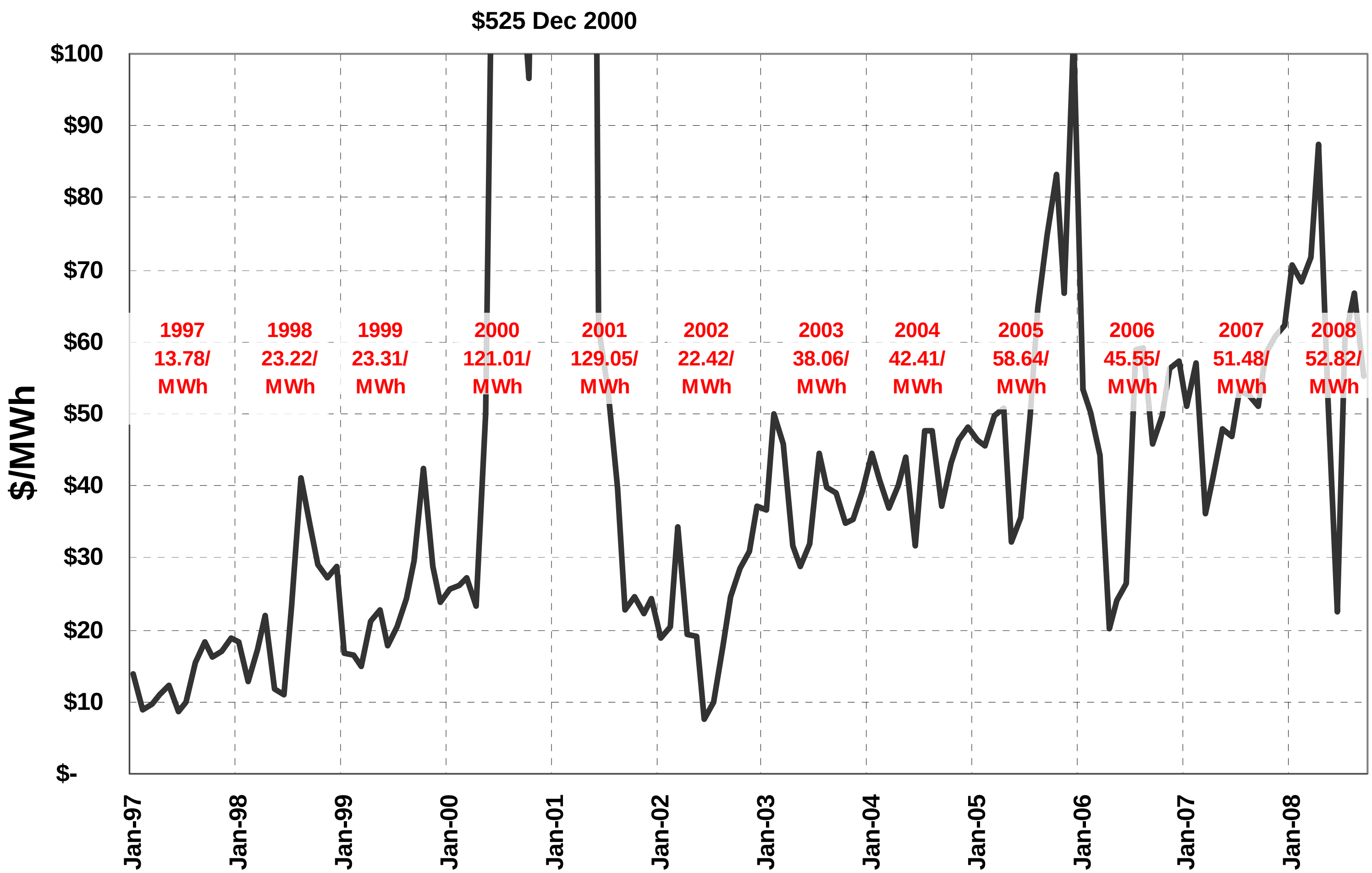
Third Technical Advisory Committee Meeting

October 22, 2008

Why Is This Forecast Relevant?

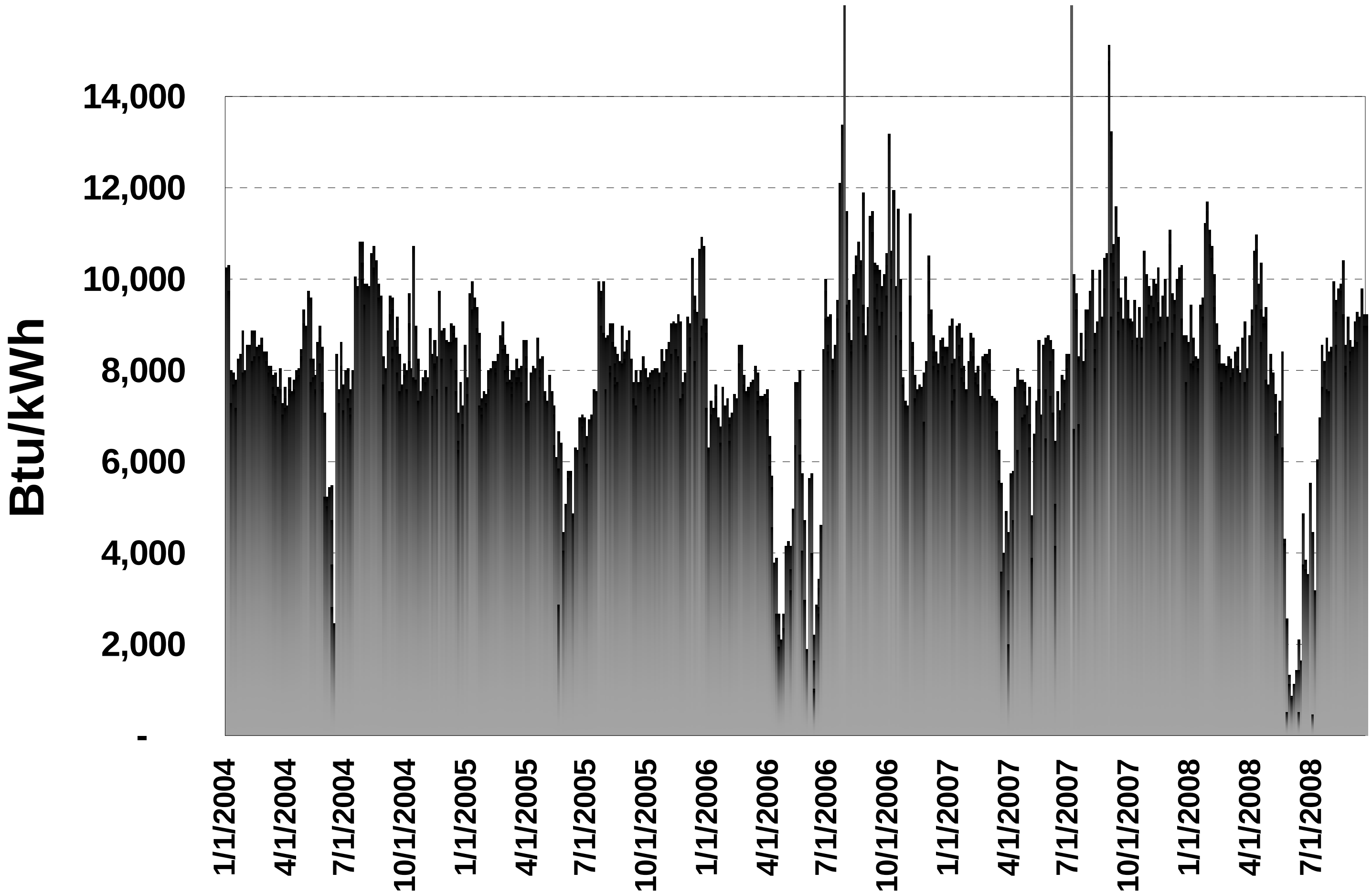
- Used to value future energy costs
- Used to determine resources financial value given different market conditions
- Forecasts when and under what conditions a resource is likely to dispatch
- Test regional market conditions and policies
- Time for changes- recommendations are welcome!

Historical Mid-Columbia Market Prices



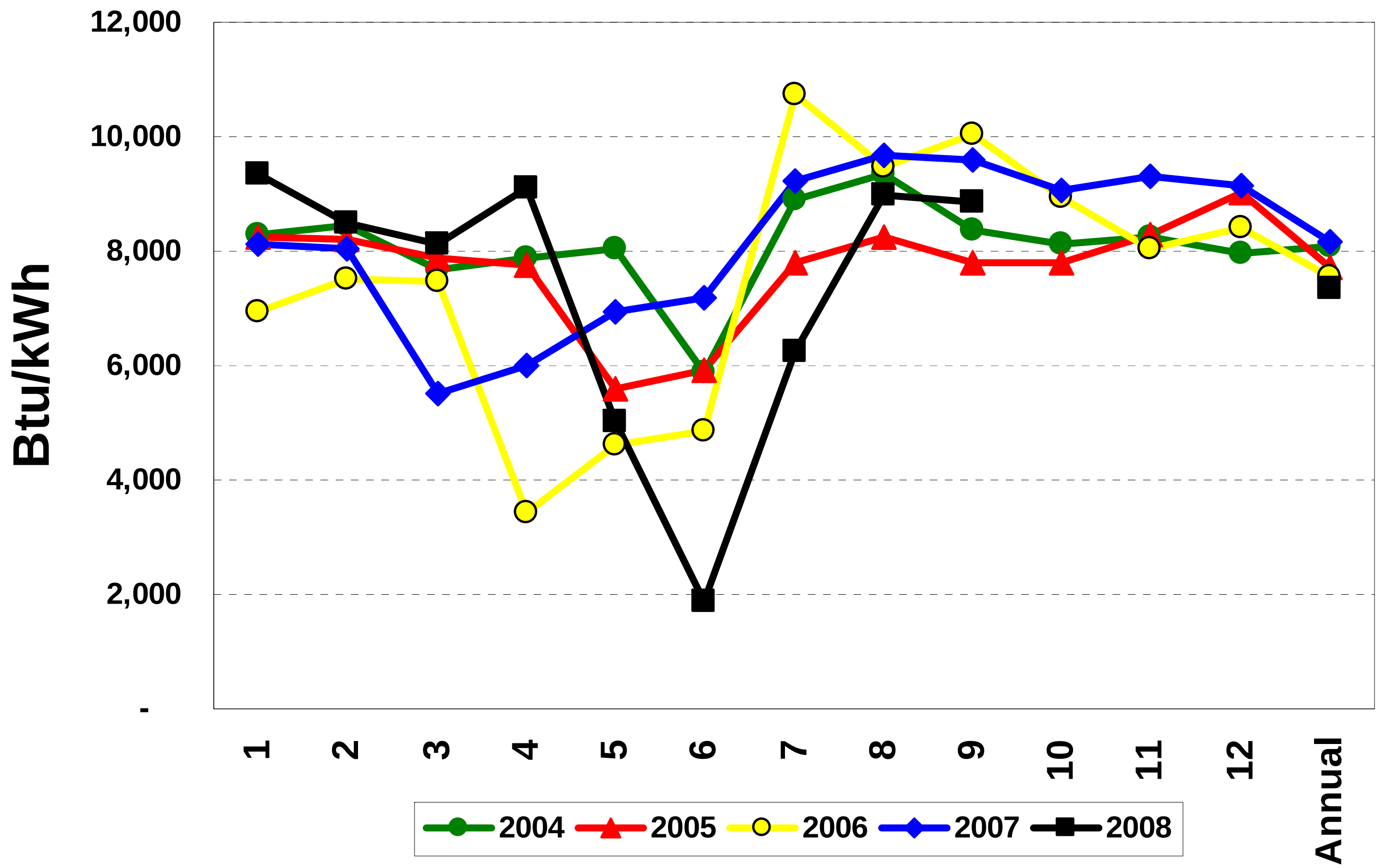
AVISTA

Historical Market Implied Heat Rate



Mid C Daily Firm/Stanfield Prices x 1000

Historical Market Implied Heat Rate

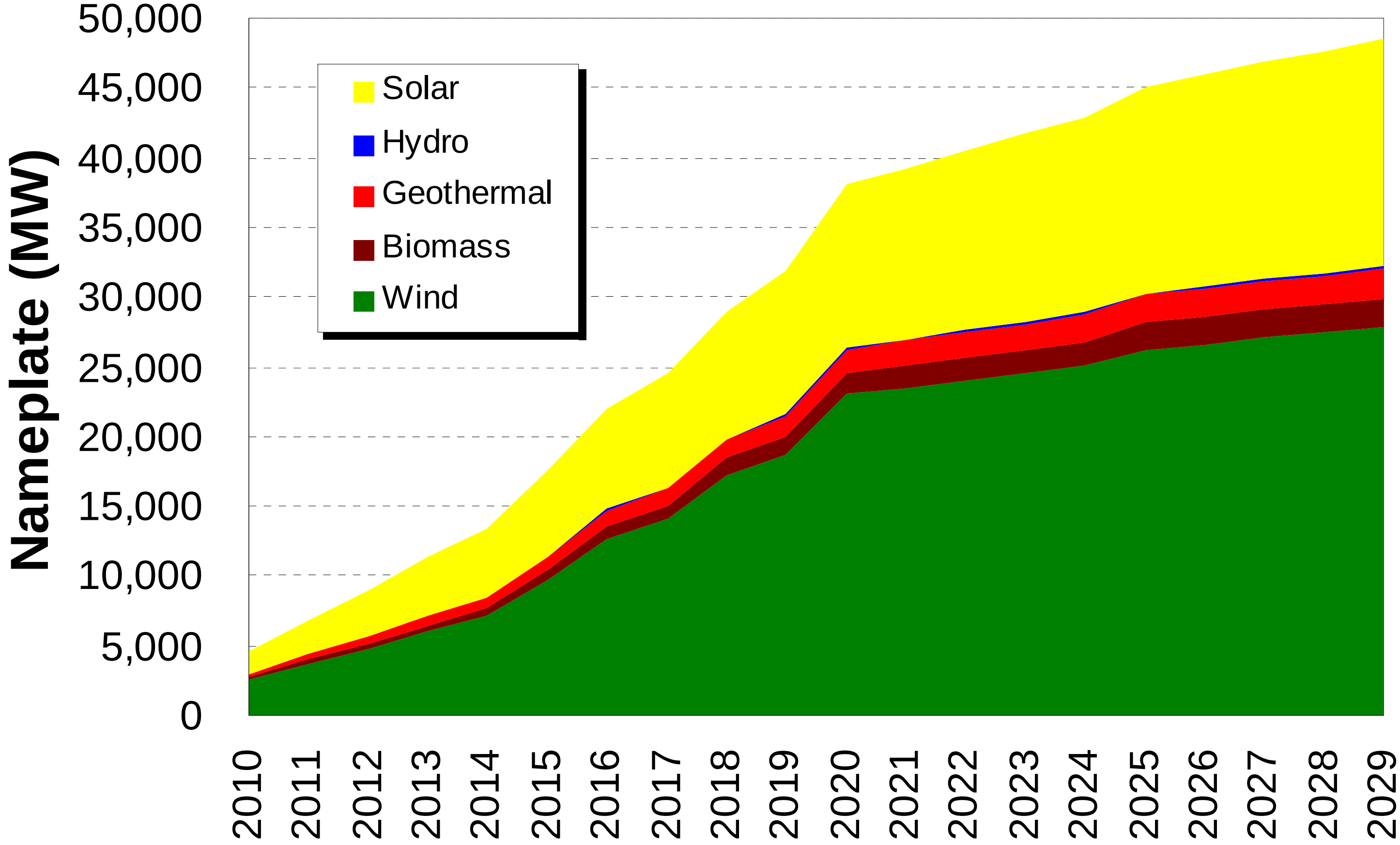


AVISTA

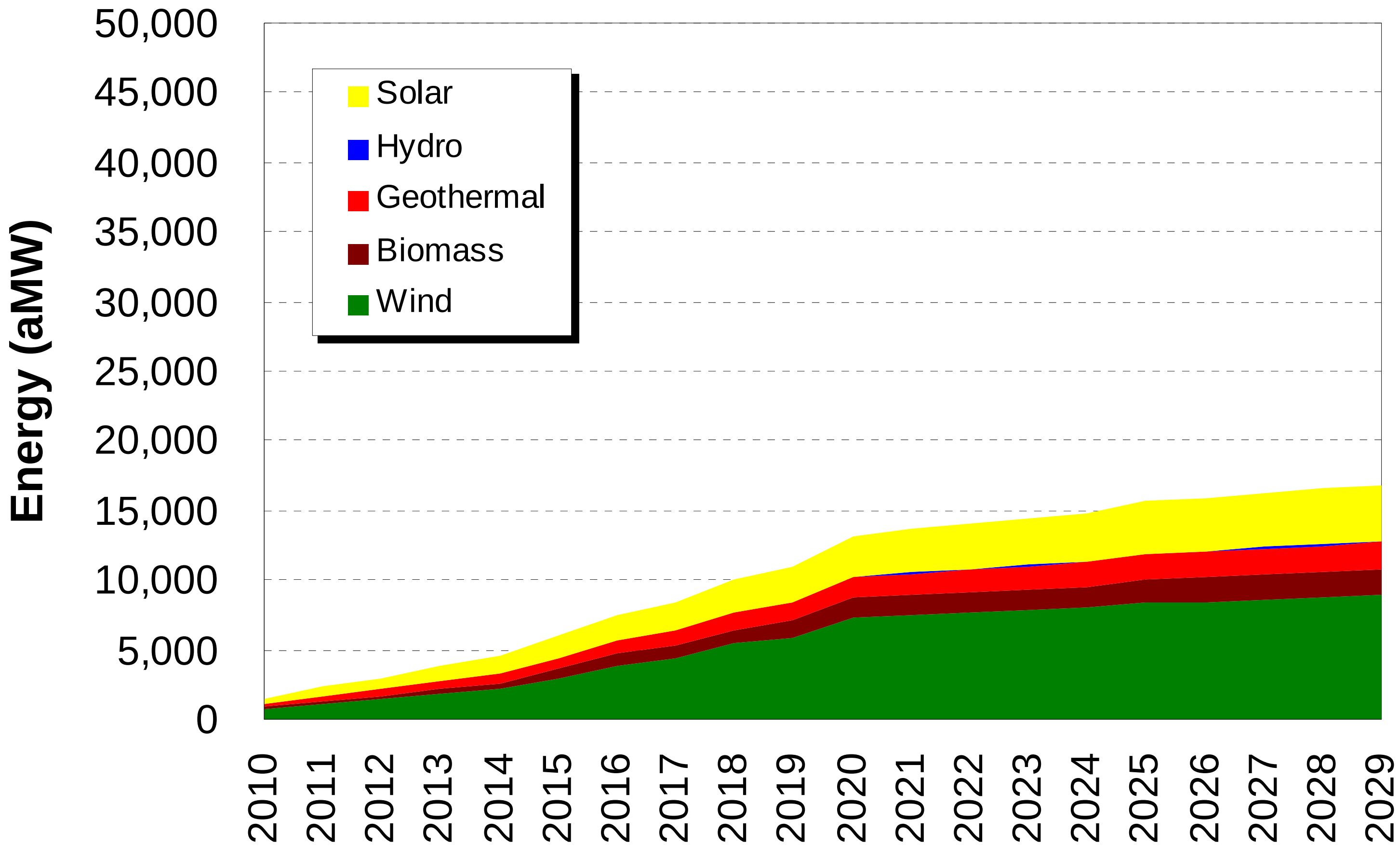
Regional Demand (20 Year AAGR)

- Source: Wood Mackenzie
  - NW- 0.84%
  - DSW- 2.09%
  - CA- 1.61%
  - RM- 1.78%
  - UT- 2.19% (PAC IRP)
- Will evaluate using NPCC after GRAC meeting
- Evaluate NW IRP Forecasts

RPS Assumptions (Nameplate Capacity)



RPS Assumptions (Energy)



AVISTA

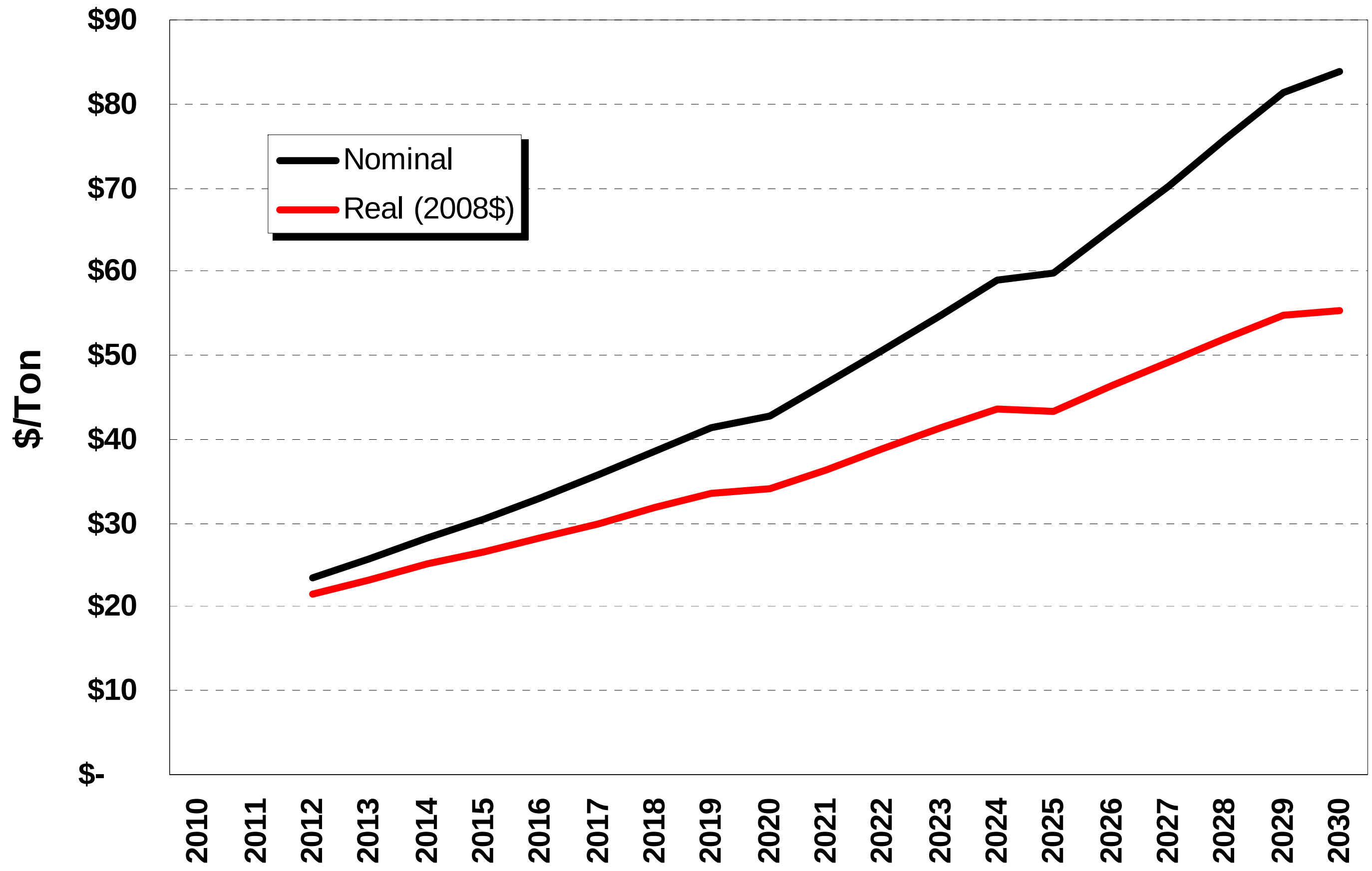
New Transmission Assumptions

Regional Resource Options

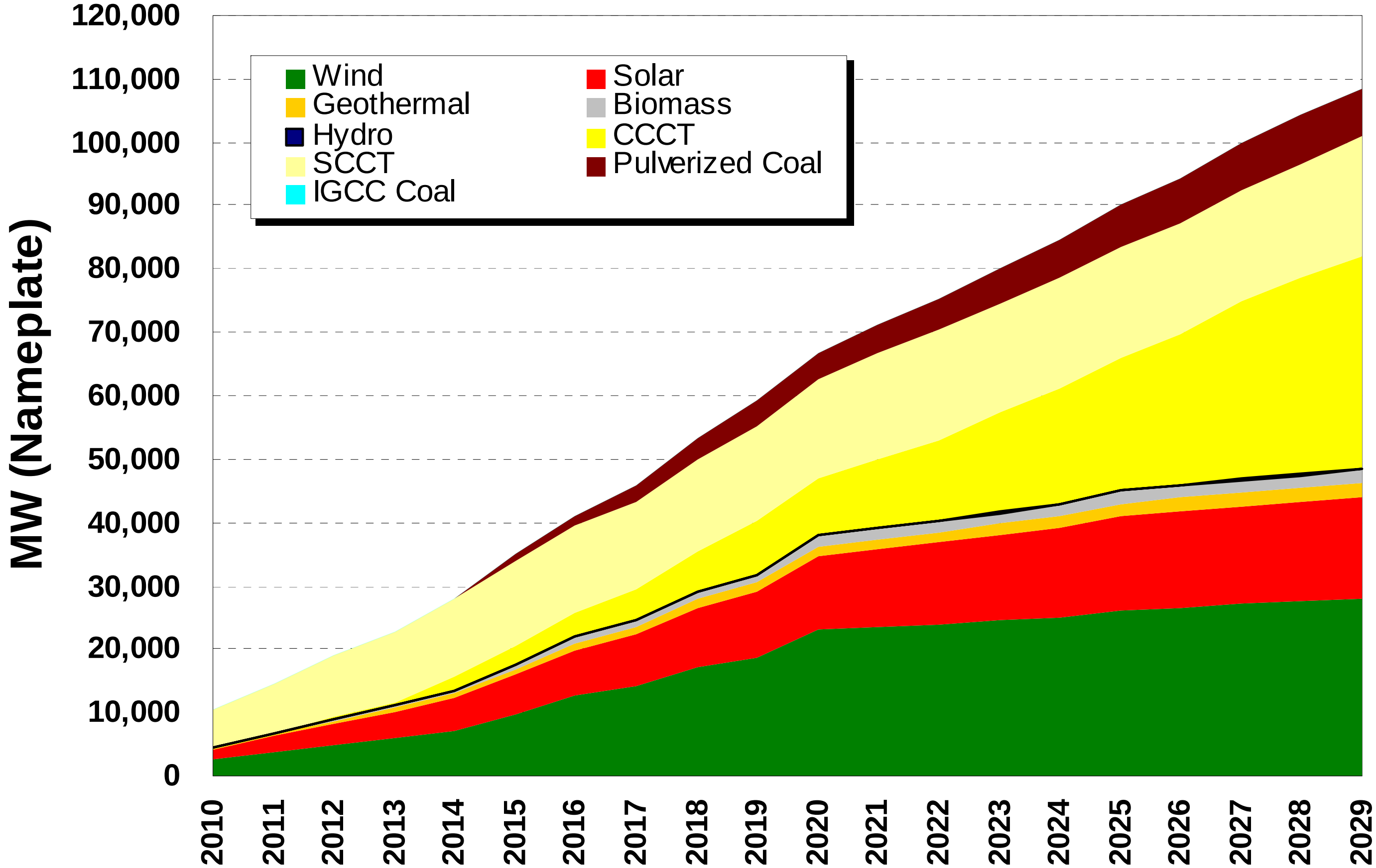
(First Year Available)

- Combined Cycle Combustion Turbine (2011)
- Single Cycle Combustion Turbine (2010)
- Wind (2010)
- Solar (2010)
- Pulverized Coal (2015)
- IGCC Coal (2015)
- IGCC Coal w/ Sequestration (2025)
- Combine Cycle Combustion Turbine w/ Sequestration (2025)
- Nuclear (2022)

Carbon Adder

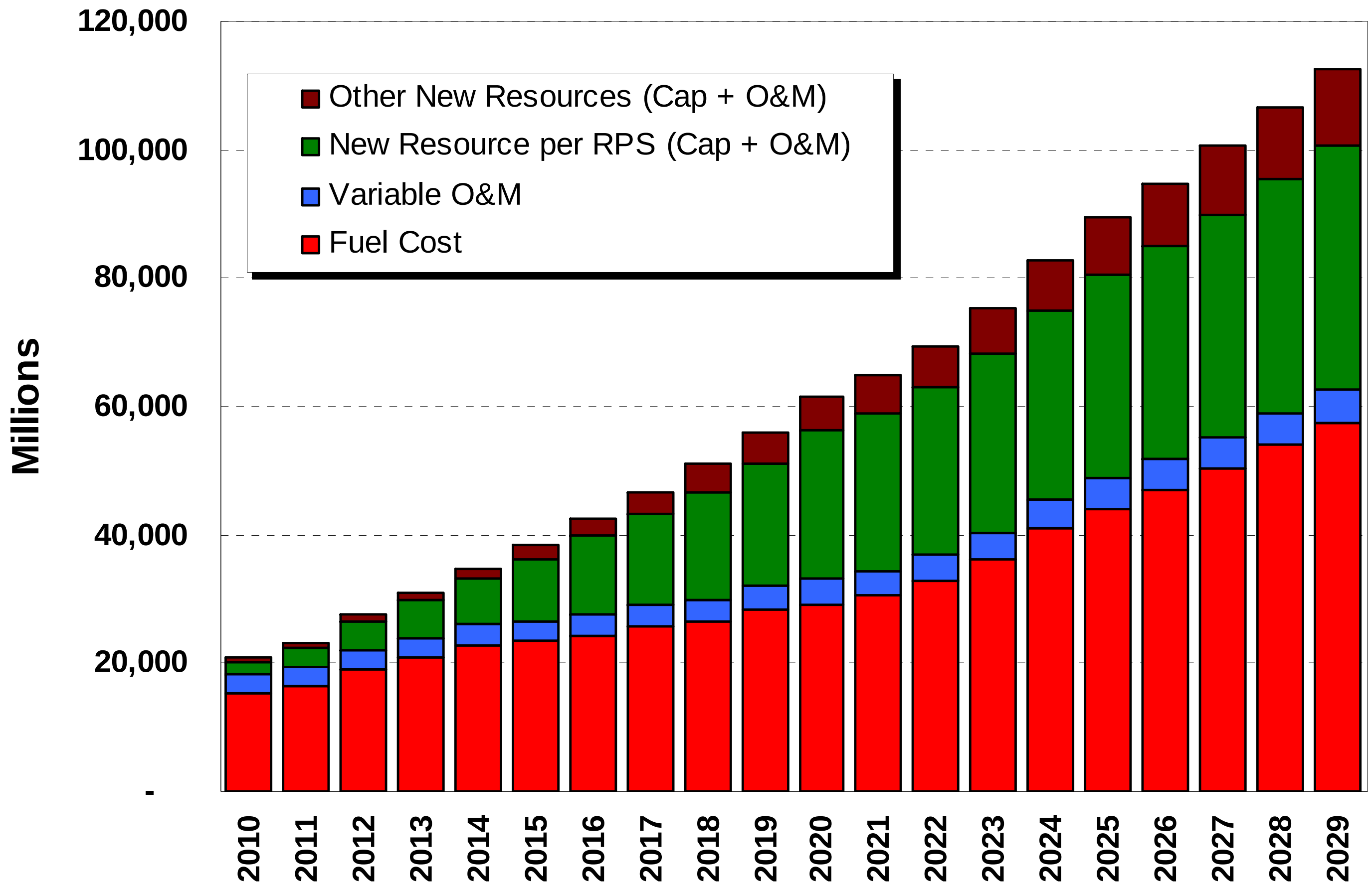


New Resources by Type in the WECC

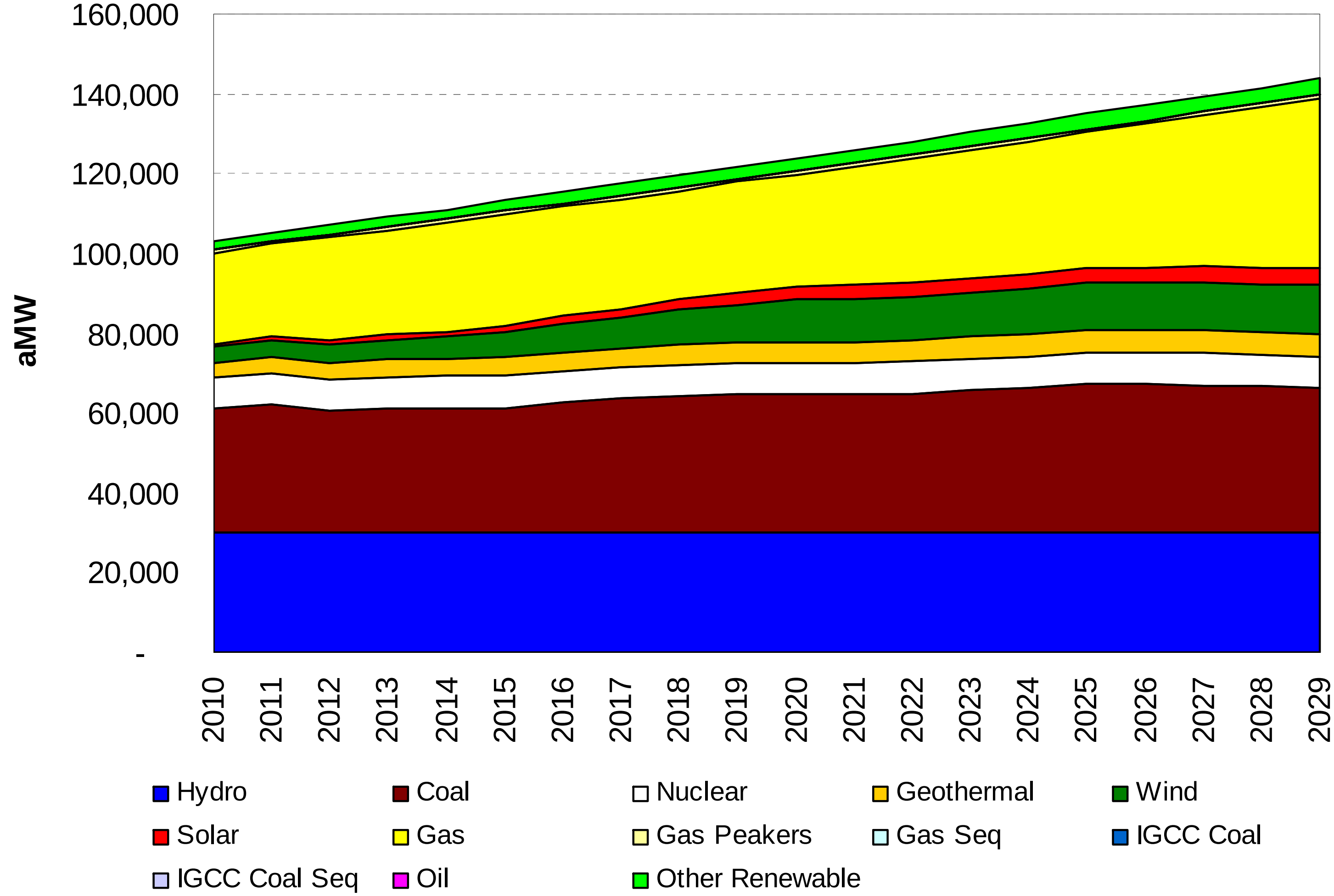


Retired 1,300 MW of High Heat Rate Natural Gas Plants between 2011-2013

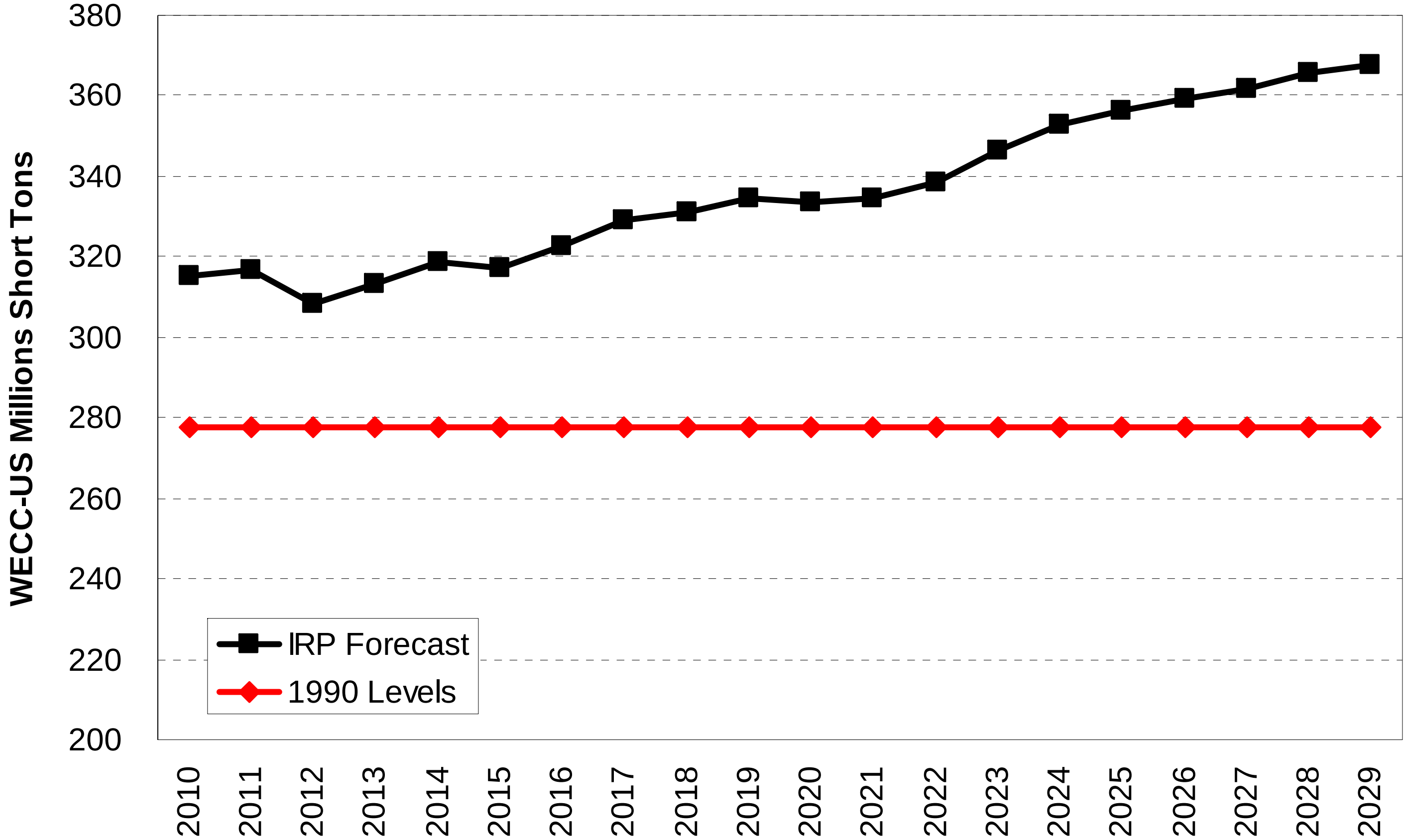
Western Interconnect System Costs
(Nominal - *Excludes Carbon Trading Costs)*



Resource Dispatch Contribution

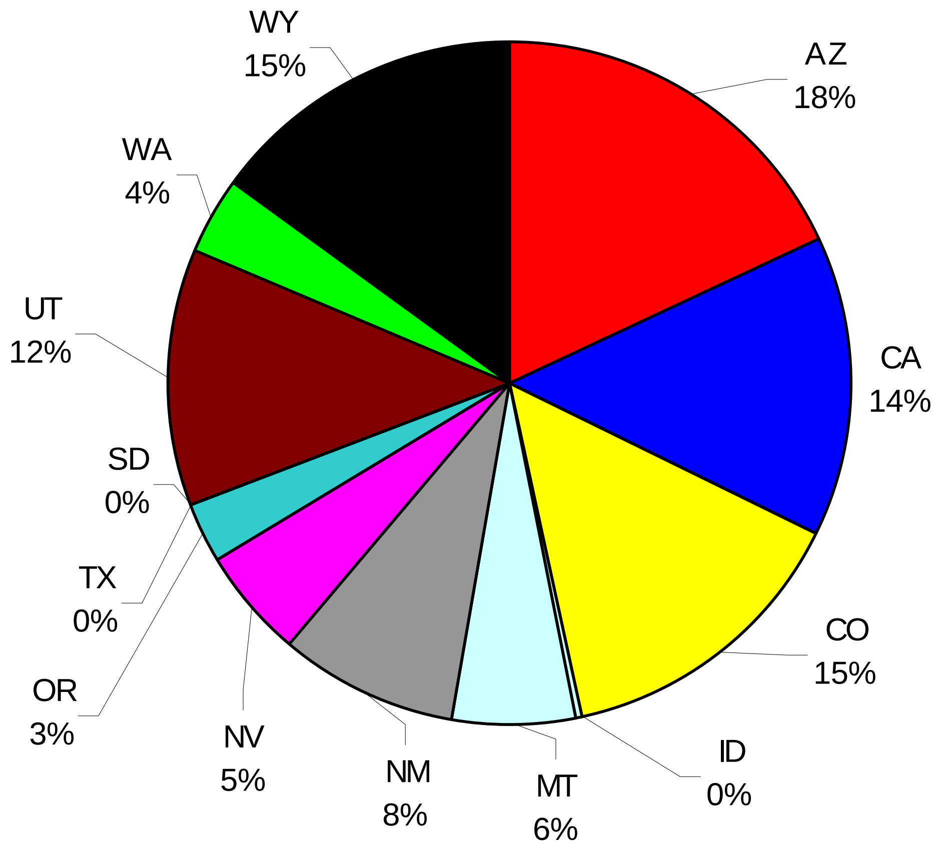


Greenhouse Gas Forecast- US Western Interconnect

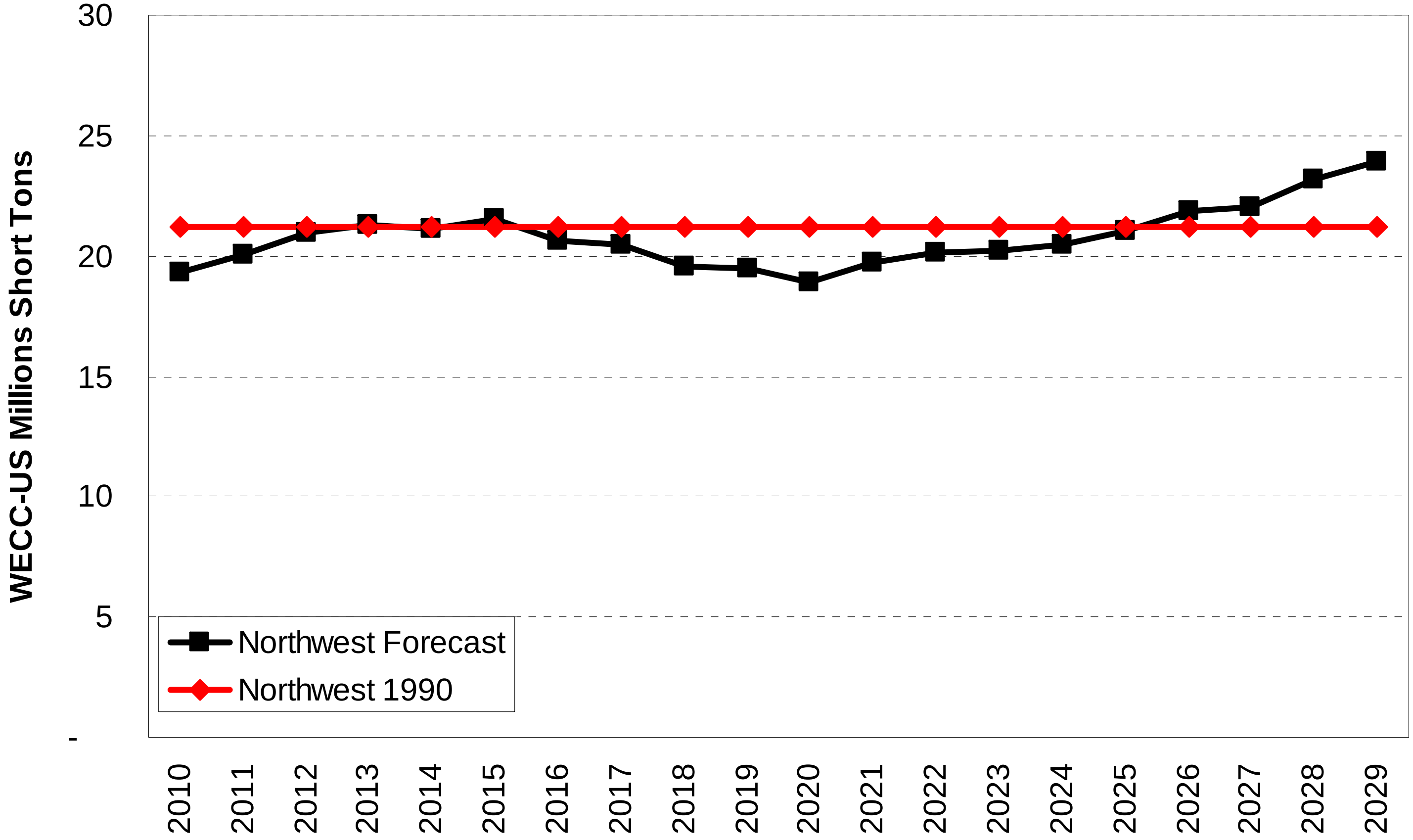


Greenhouse Gas Forecast

U.S. Western Interconnect

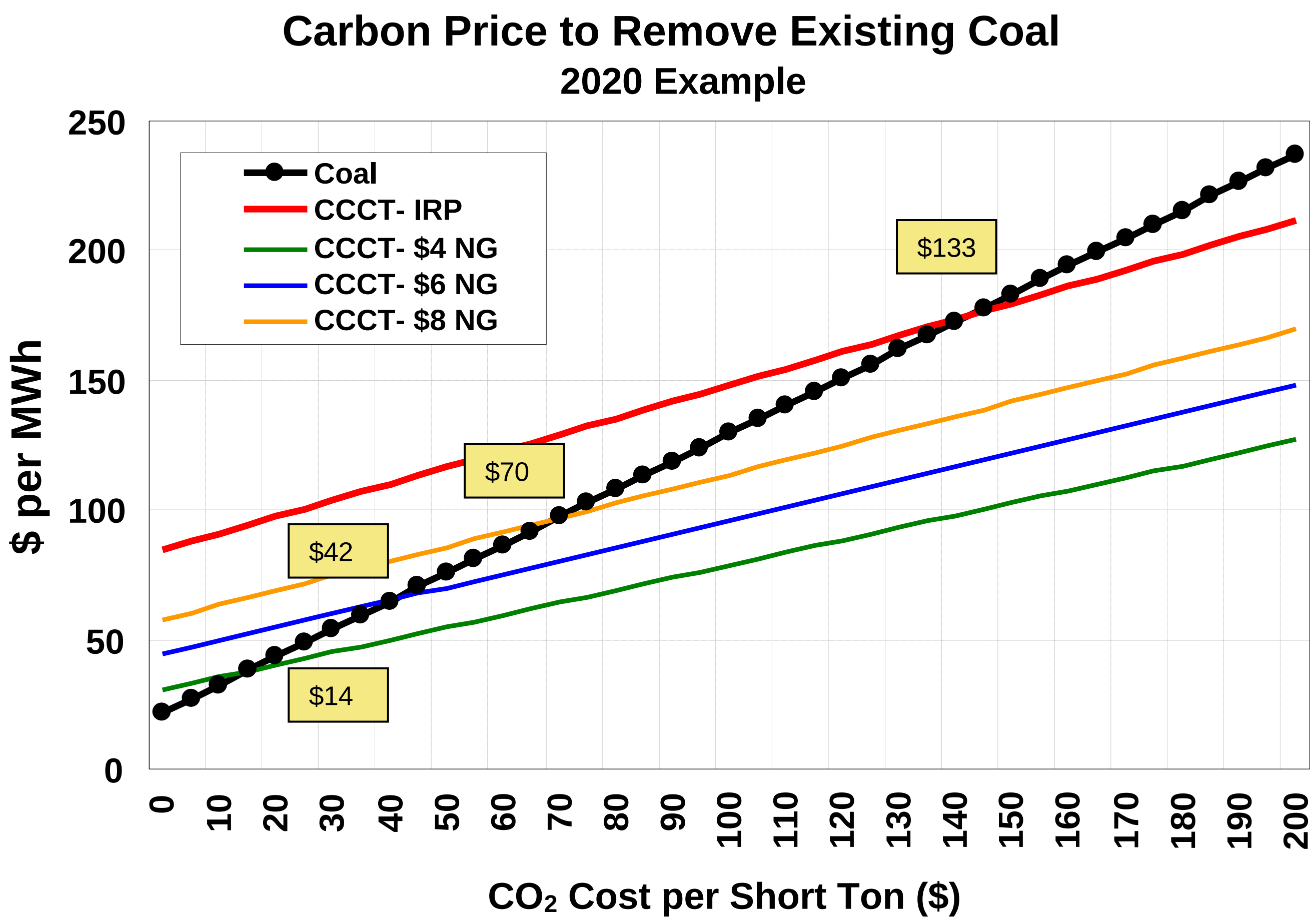


Greenhouse Gas Forecast- WA/OR/ID



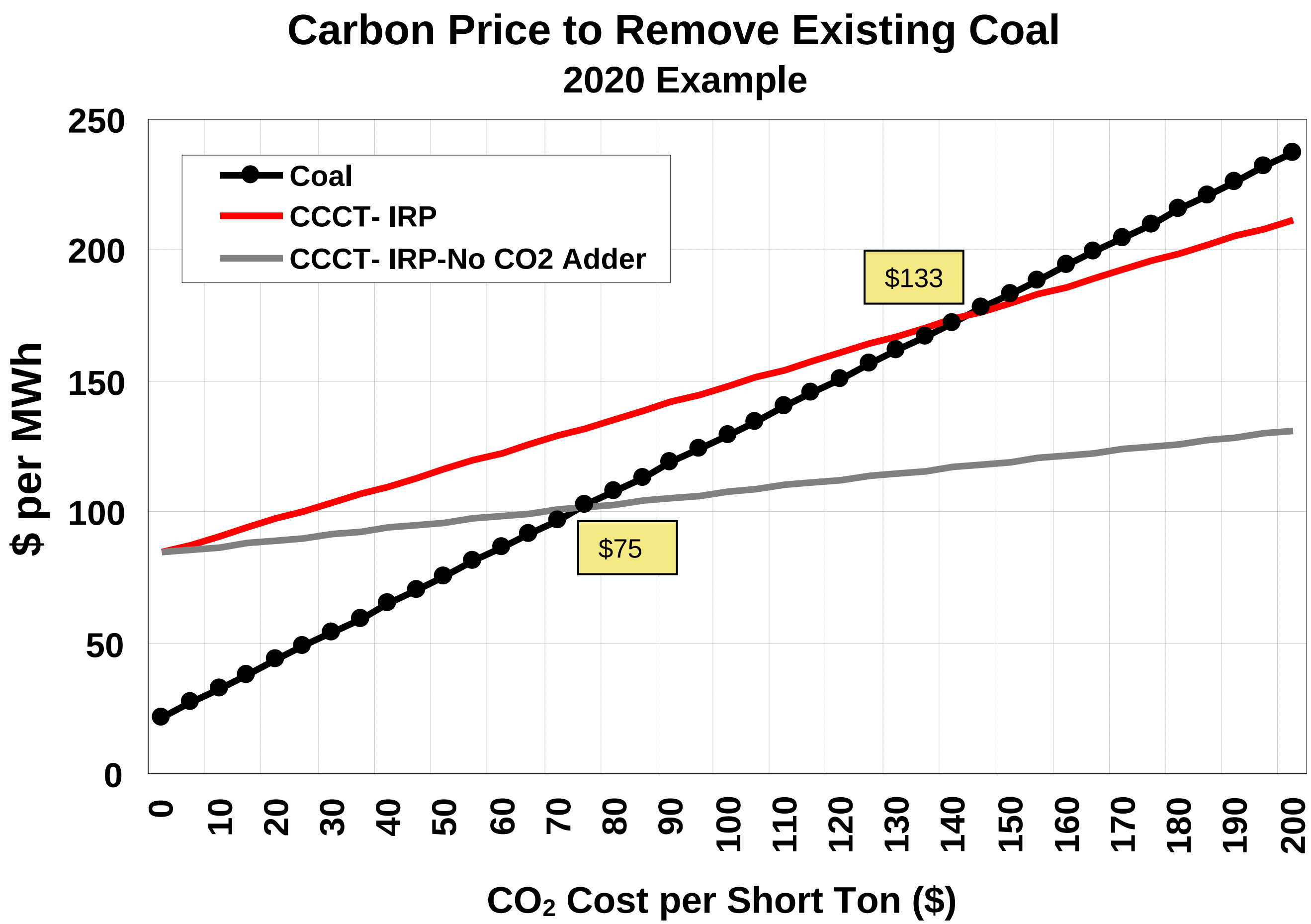
AVISTA

Carbon Adder High Enough, 2020 Example?



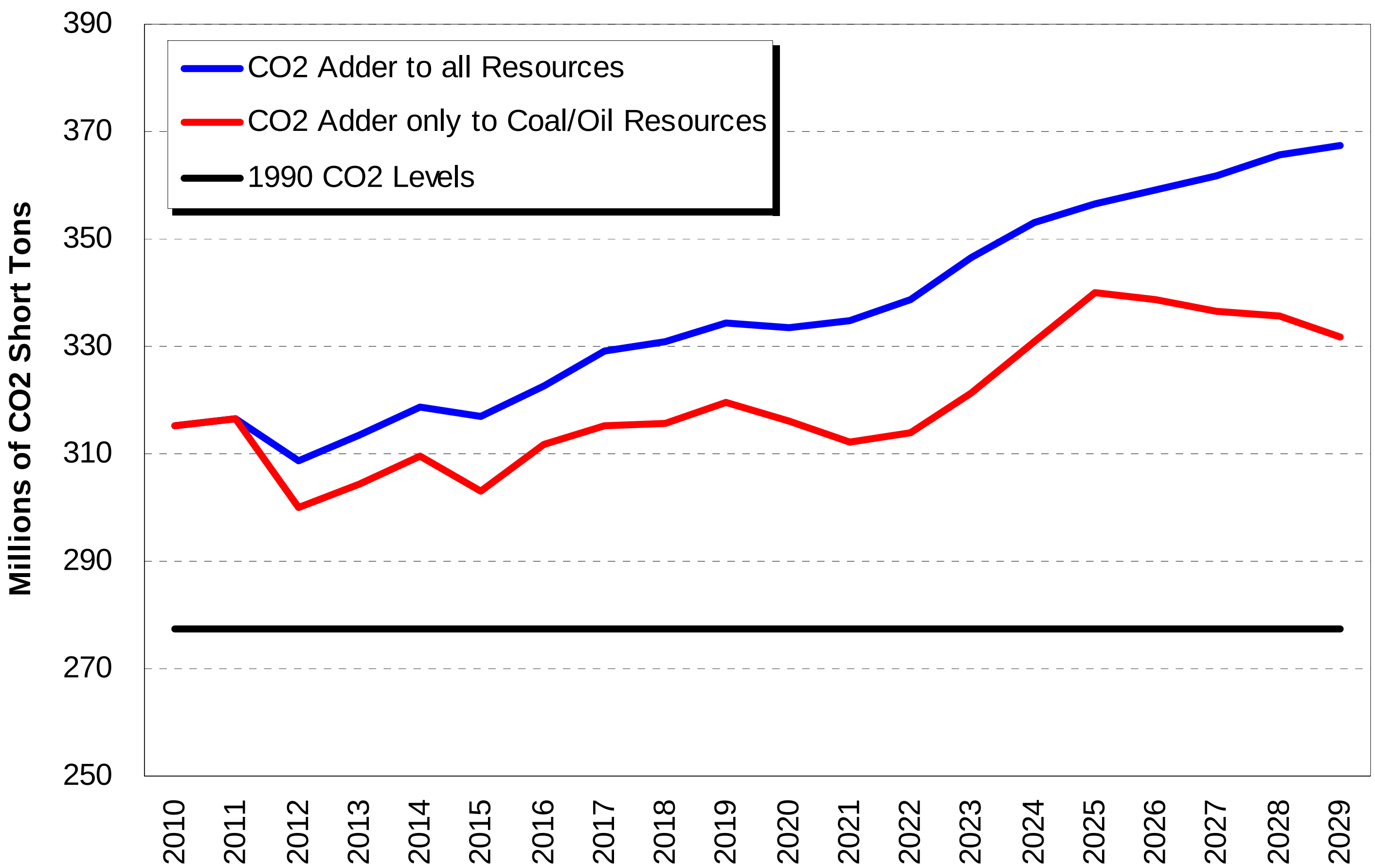
AVISTA

How about a Coal Carbon "adder" Instead

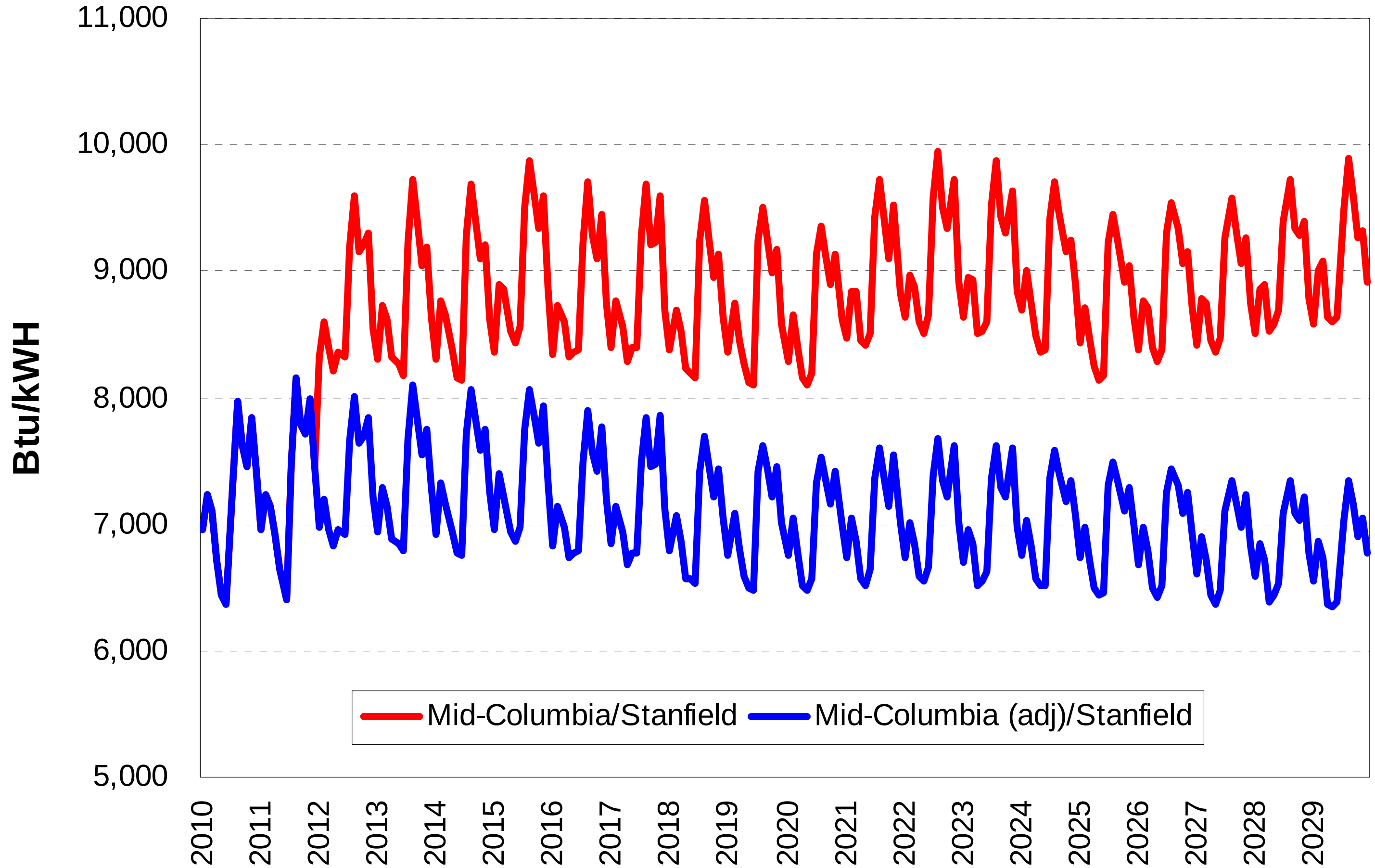


AVISTA

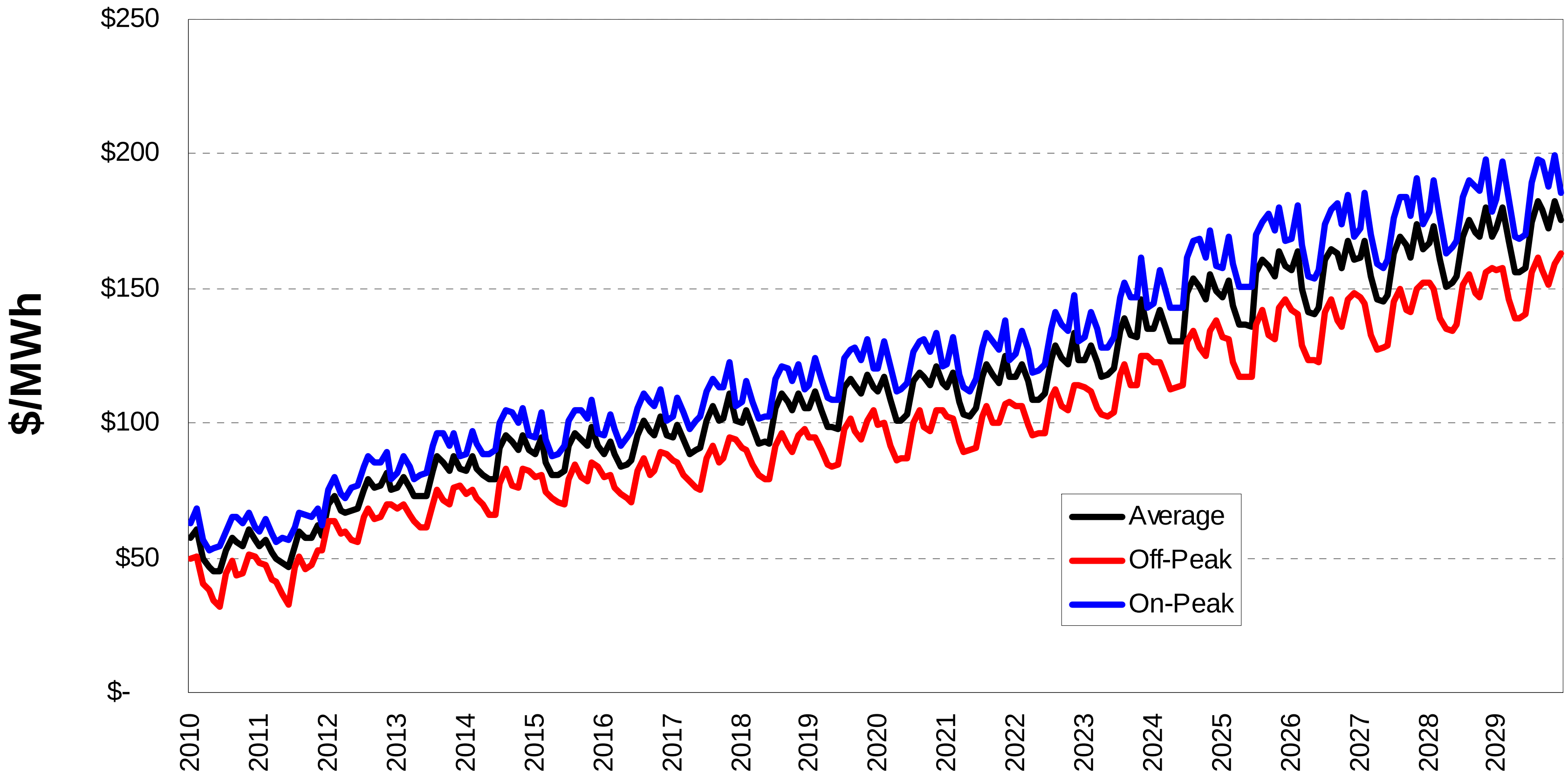
Greenhouse Gas Forecast- US Western Interconnect



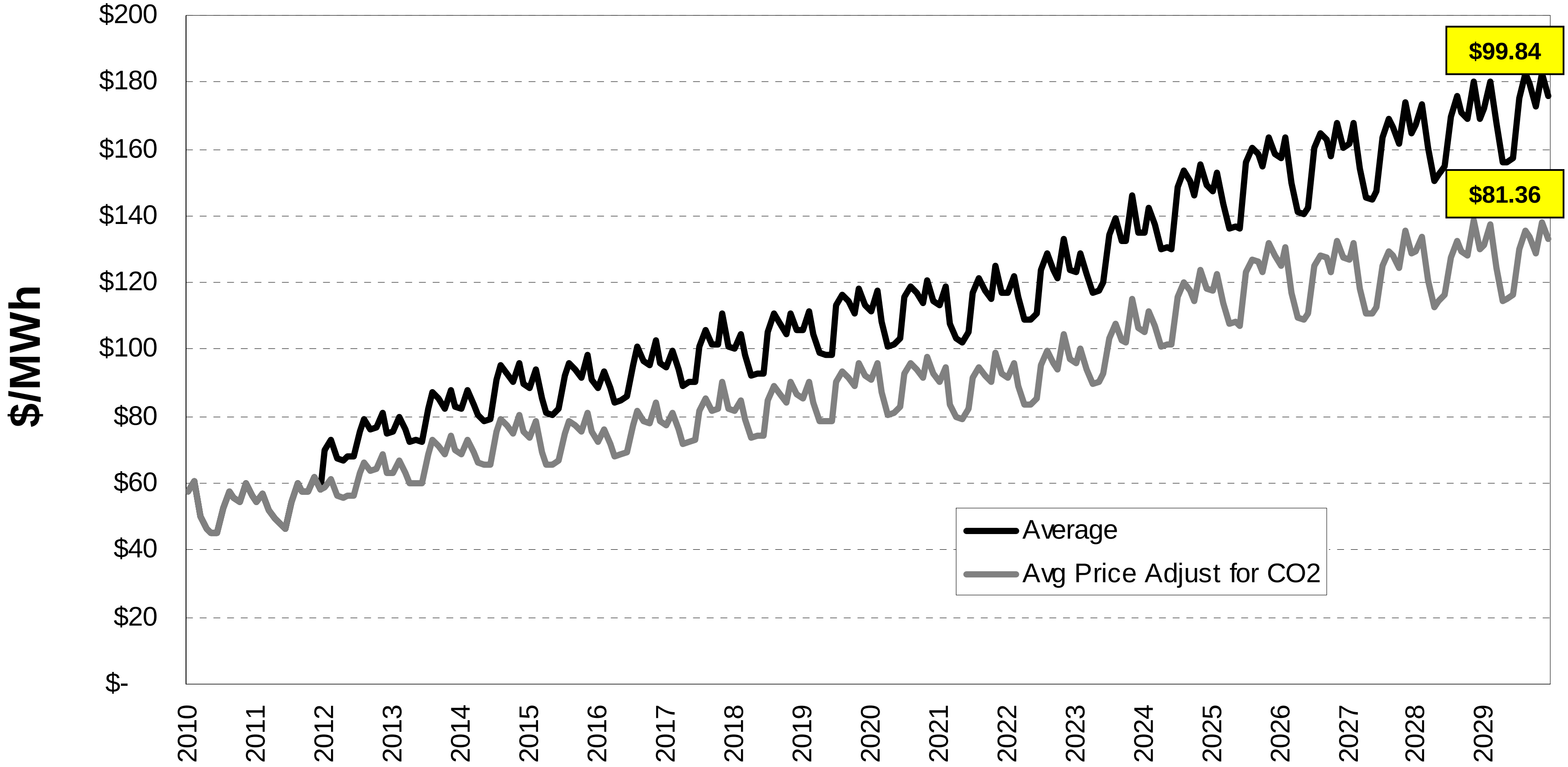
Market Implied Heat Rates
(Mid-C/Stanfield)



Annual On-Off Peak Mid-Columbia Prices



Mid-Columbia Prices would be lower if not for Carbon Costs



AVISTA

Mid-Columbia Levelized Prices ($/MWh)

2010-2029

	Average	On-Peak	Off-Peak
20-Year (Nominal)	99.84	109.77	86.60
20-Year (2008$)	83.15	91.41	72.13

Legislative Update

Collins Sprague

2009 Electric Integrated Resource Plan

Third Technical Advisory Committee Meeting

October 22, 2007

Western Climate Initiative

- Regional cap and trade implementation
- Electricity sector obligations
- Cost containment mechanisms
- Allowances
- Market regulation and enforcement

Feed-In Tariff

- Solar – Renewable Rate Recovery and Control Act
- Anaerobic Digester ($0.12/kWh), landfill gas ($0.08/kWh), and "organic" combined heat and power ($0.09/kWh)
  - Will not qualify for utility compliance with I-937
- Renewable energy credit (public utility tax) for solar expanded to include other technologies
- Wheeling requirement for output from digesters
  - Transmission cost capped at 5%

Energy Efficiency

- Existing, new and renovated buildings
- Update Energy Code to achieve 30% reduction from current edition
- “State Building Efficiency and Carbon Reduction Strategy” – targets for building energy use intensity
- Energy benchmark disclosure requirement at time of structure sale
- Partial public utility credit for non-residential energy performance
- Expansion of Local Improvement Districts to finance energy efficiency and district heating/cooling

Other Topics

- Tax incentives
  - Broad tax incentives for combined heat and power, distributed generation, and water systems
  - Renewable energy tax incentives for large-scale generation

- “Product Stewardship” – collection and recycling of incandescent lighting by manufacturers

- Vegetation Management

- Emissions Performance standard revisions

Avista's 2009 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 4 Agenda

January 28, 2009

	Topic	Time	Staff
1.	Introduction	9:30	Storro
2.	2008 Peak Load Event	9:35	Heath
3.	Natural Gas & Electric Price Update	10:00	Rahn / Gall
4.	Lunch	11:30	
5.	Resource Assumptions	12:30	Lyons
6.	Transmission	1:00	Gibson
7.	Draft Preferred Resource Strategy	2:00	Gall
8.	Adjourn	3:00	

2008 Peak Load Event

Heidi Heath

2009 Electric Integrated Resource Plan

Fourth Technical Advisory Committee Meeting

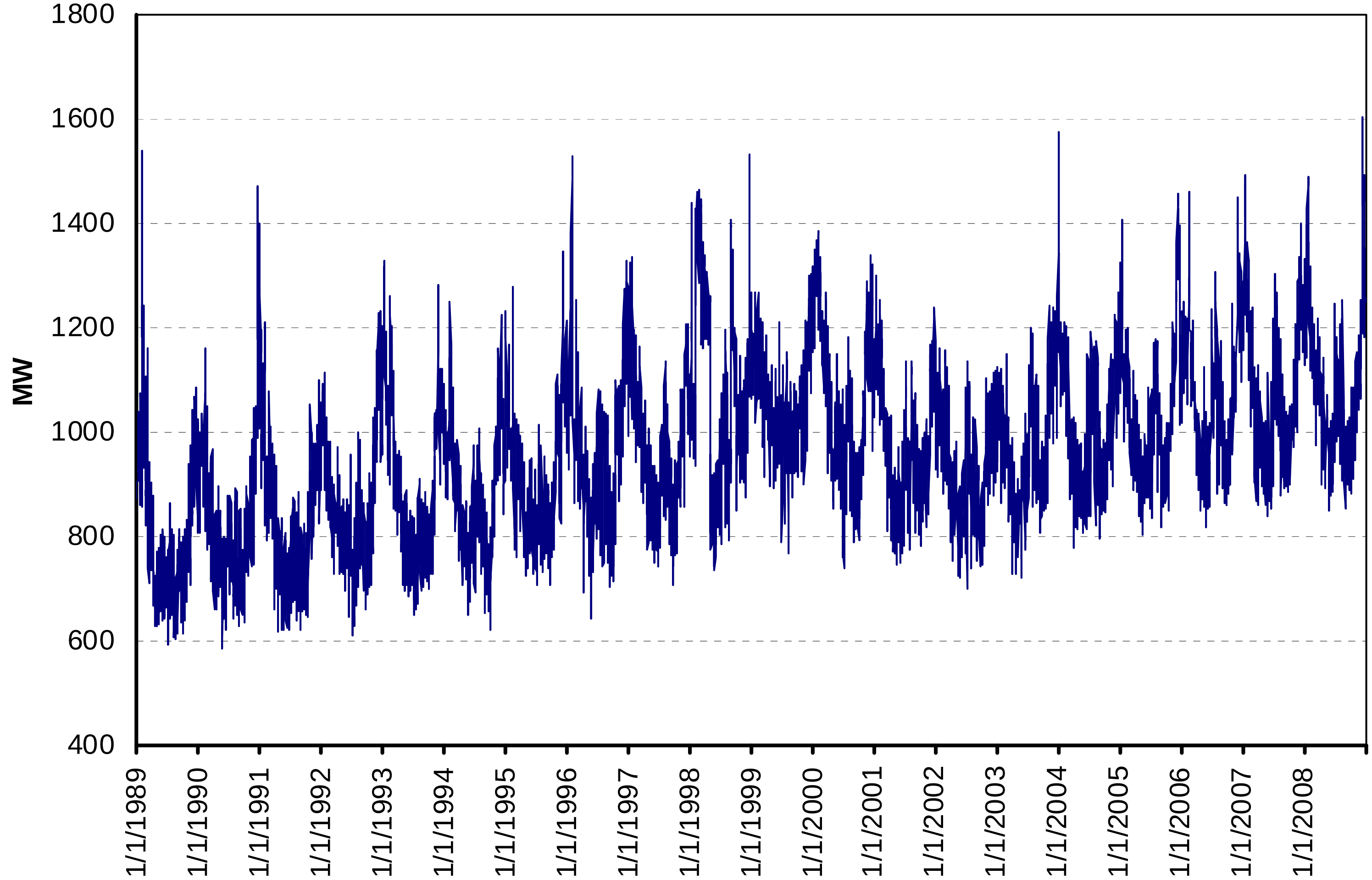
January 28, 2009

Top Ten Highest Hourly Loads

	Date	Load
1	***12/16/2008***	***1821***
2	***12/16/2008***	***1809***
3	***12/16/2008***	***1791***
4	2/1/1996	1796
5	***12/15/2008***	***1781***
6	***12/15/2008***	***1776***
7	2/2/1996	1770
8	1/5/2004	1766
9	***12/16/2008***	***1759***
10	***12/14/2008***	***1752***

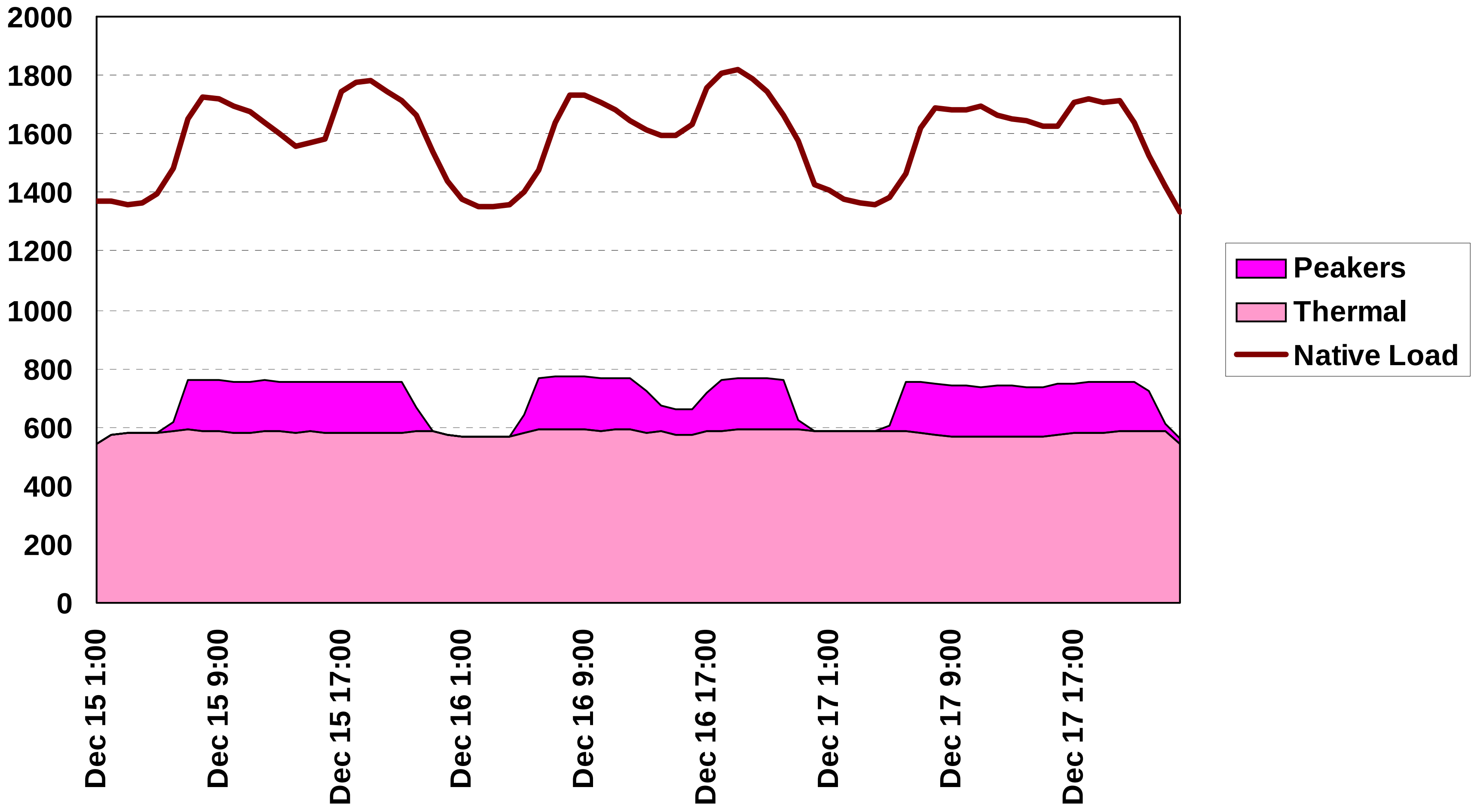
AVISTA

Daily Average Loads
1989-2008



AVISTA

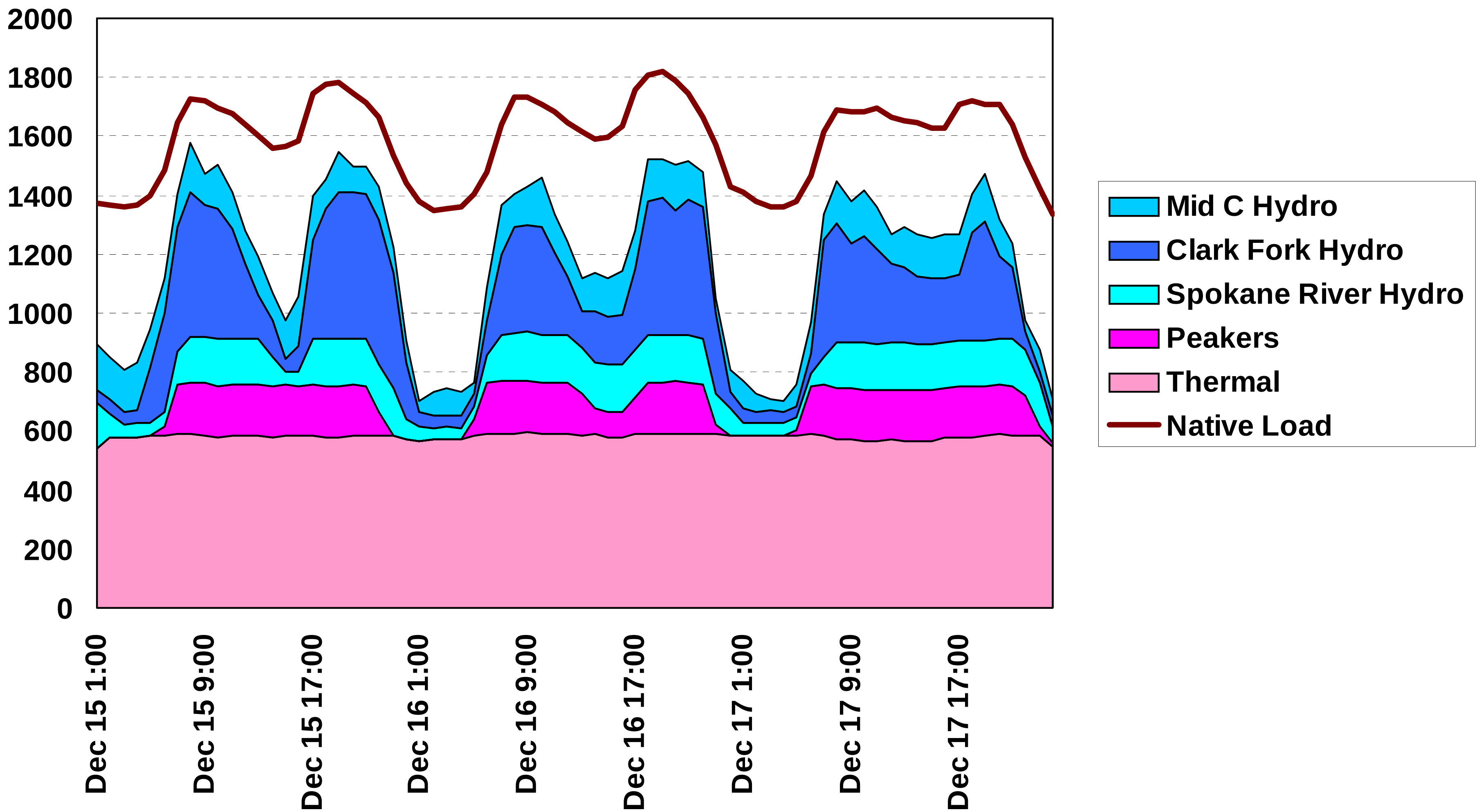
Thermal Generation



4

AVISTA

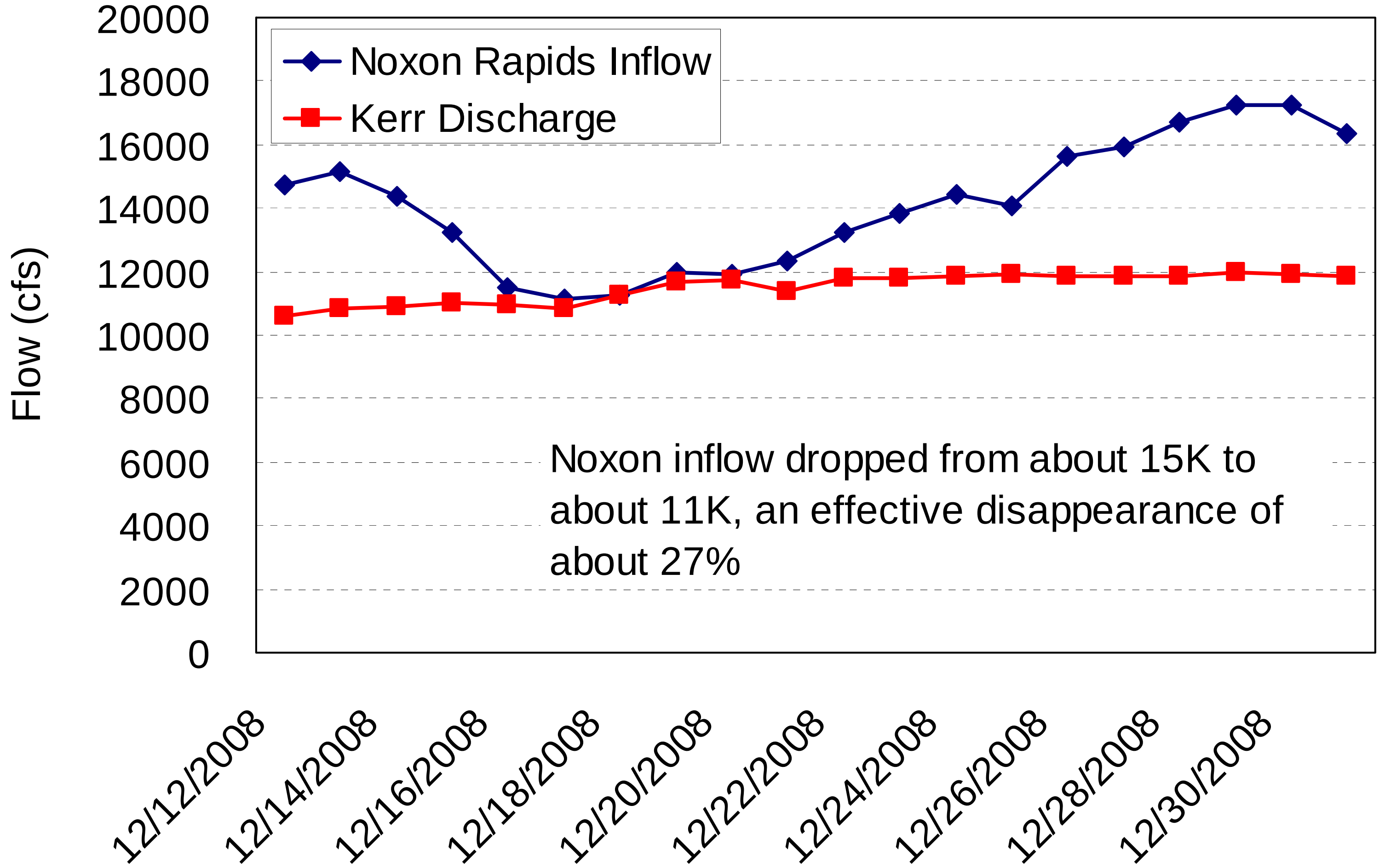
Hydro Generation



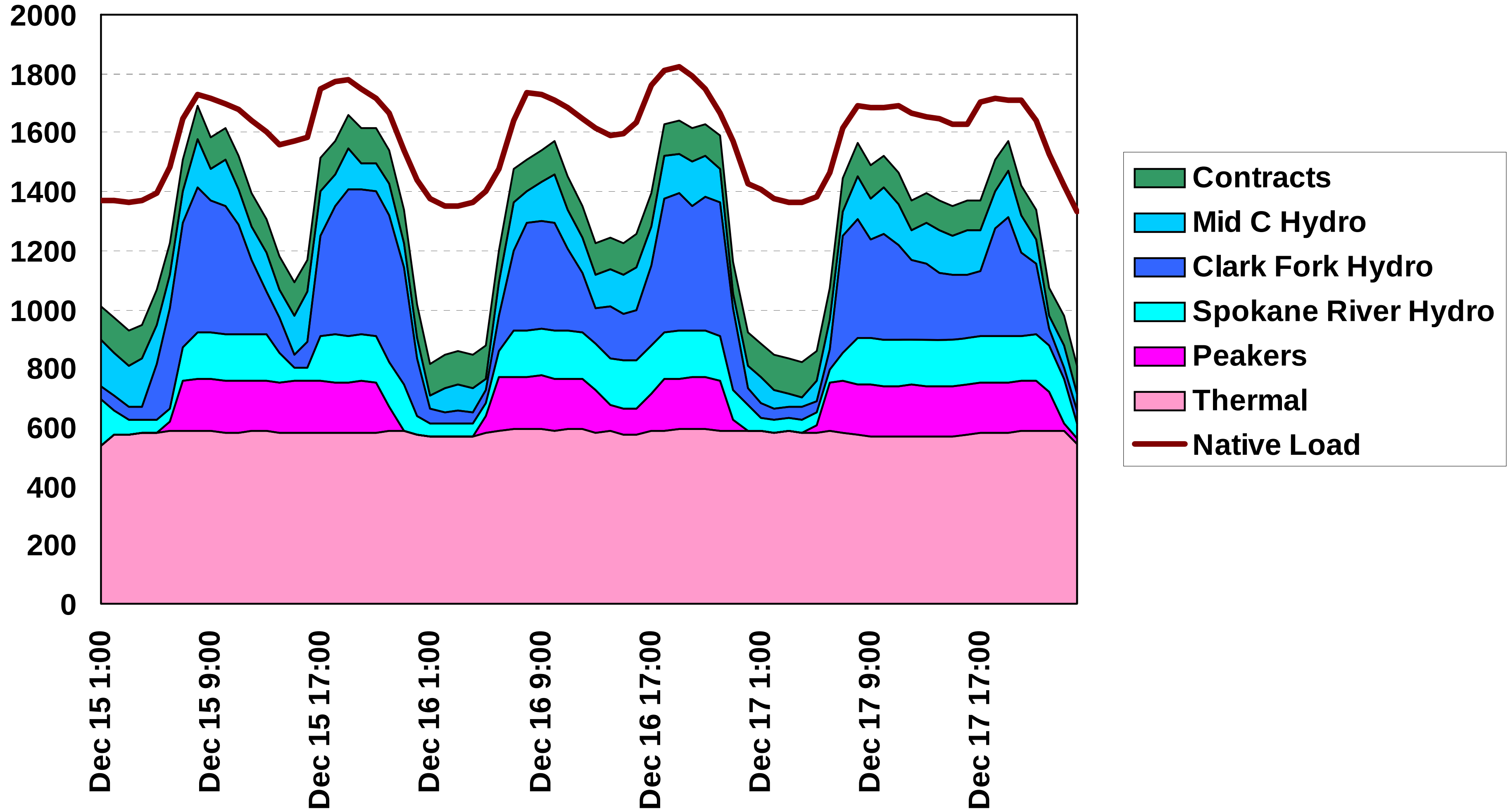
5

AVISTA

River icing was a problem!

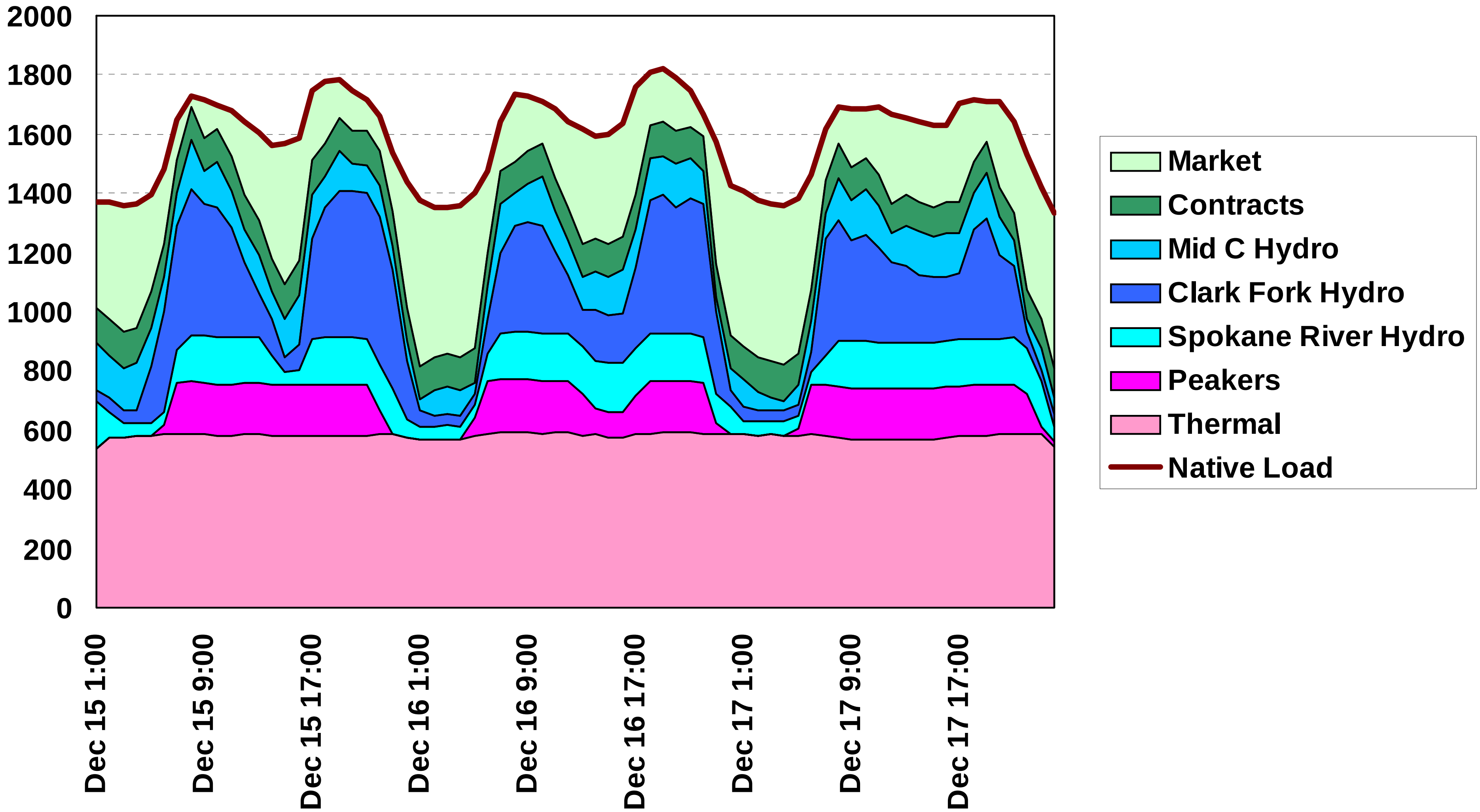


Contracts



AVISTA

Market Purchases



AVISTA

Natural Gas & Electric Price Forecast- Update

Greg Rahn & James Gall

2009 Electric Integrated Resource Plan

Fourth Technical Advisory Committee Meeting

January 28, 2009

Study Changes Since Last TAC

- Wood Mackenzie released its “Carbon Case #3”
  - Mid-range greenhouse gas mitigation scenario
  - Natural gas price impact from greenhouse legislation
  - Demand reductions due to greenhouse gas legislation
- Updated Natural Gas Price Forecast
  - Integrates near term economy
  - Short-term price collapse
  - Credit markets

AVISTA

Natural Gas Price Forecast Update

Supply Increase to Soften Price of Natural Gas

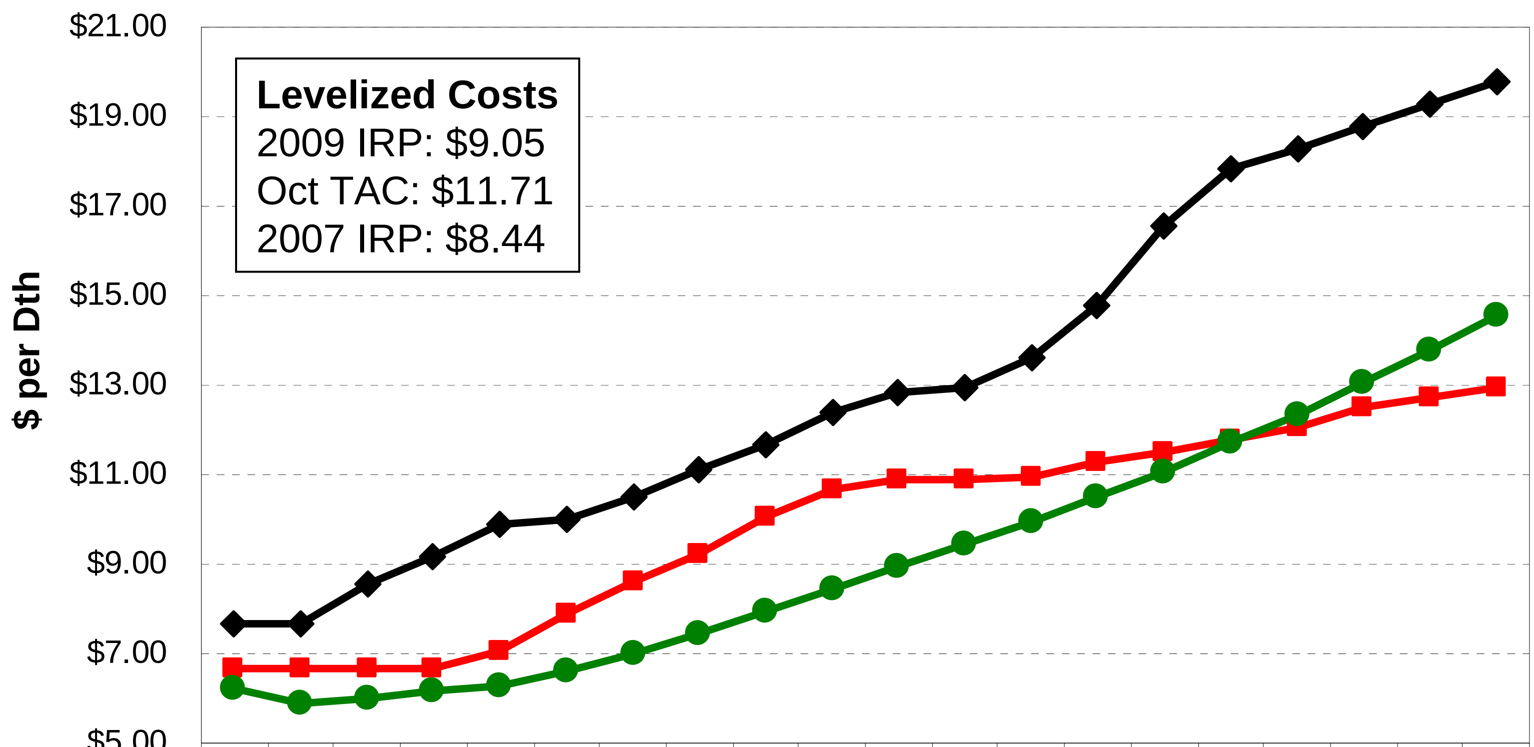
- Edinburgh, Scotland-based energy consultancy Wood Mackenzie said it expects spot prices for natural gas between $5 and $6 per million British thermal units for the next few years, with periods when prices will slip even lower.
- "We are now in a position of significant potential oversupply brought about by the huge success experienced in the development of shale gas plays," says Jen Snyder, head of North American gas research at Wood Mackenzie.

- Russell Gold, The Wall Street Journal

November 25, 2008

Annual Natural Gas Price Comparison

Henry Hub Nominal $

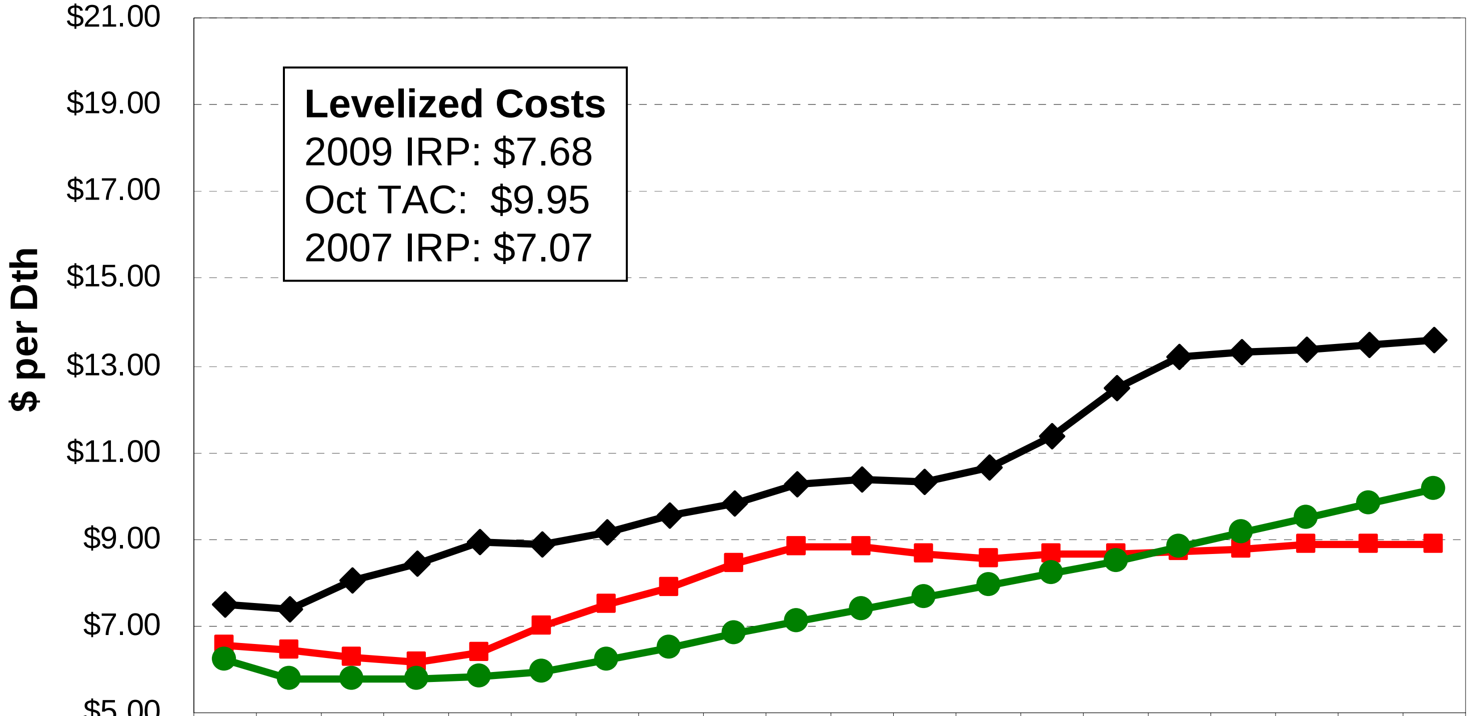


	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
2009 IRP	6.66	6.69	6.69	6.69	7.05	7.87	8.63	9.20	10.05	10.69	10.89	10.86	10.94	11.26	11.50	11.76	12.04	12.49	12.72	12.96
Oct TAC	7.64	7.69	8.53	9.14	9.90	10.00	10.52	11.13	11.67	12.41	12.82	12.94	13.60	14.79	16.57	17.84	18.30	18.77	19.26	19.75
2007 IRP	6.23	5.91	6.00	6.15	6.30	6.59	6.98	7.47	7.95	8.44	8.94	9.43	9.95	10.50	11.08	11.70	12.35	13.04	13.77	14.55

2009 IRP: 2010-2013 Average Price of Consultants, EIA, and Forward Prices

Annual Natural Gas Price Comparison

Henry Hub 2009 $



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
2009 IRP	6.53	6.43	6.29	6.17	6.37	6.98	7.52	7.87	8.44	8.81	8.82	8.64	8.55	8.64	8.66	8.70	8.74	8.90	8.90	8.90
Oct TAC	7.49	7.39	8.03	8.43	8.96	8.88	9.17	9.52	9.80	10.23	10.38	10.29	10.63	11.35	12.48	13.20	13.29	13.37	13.47	13.56
2007 IRP	6.23	5.80	5.77	5.79	5.81	5.96	6.19	6.50	6.80	7.09	7.37	7.63	7.91	8.20	8.50	8.81	9.14	9.47	9.81	10.17

AVISTA

Greenhouse Gas Price Assumptions

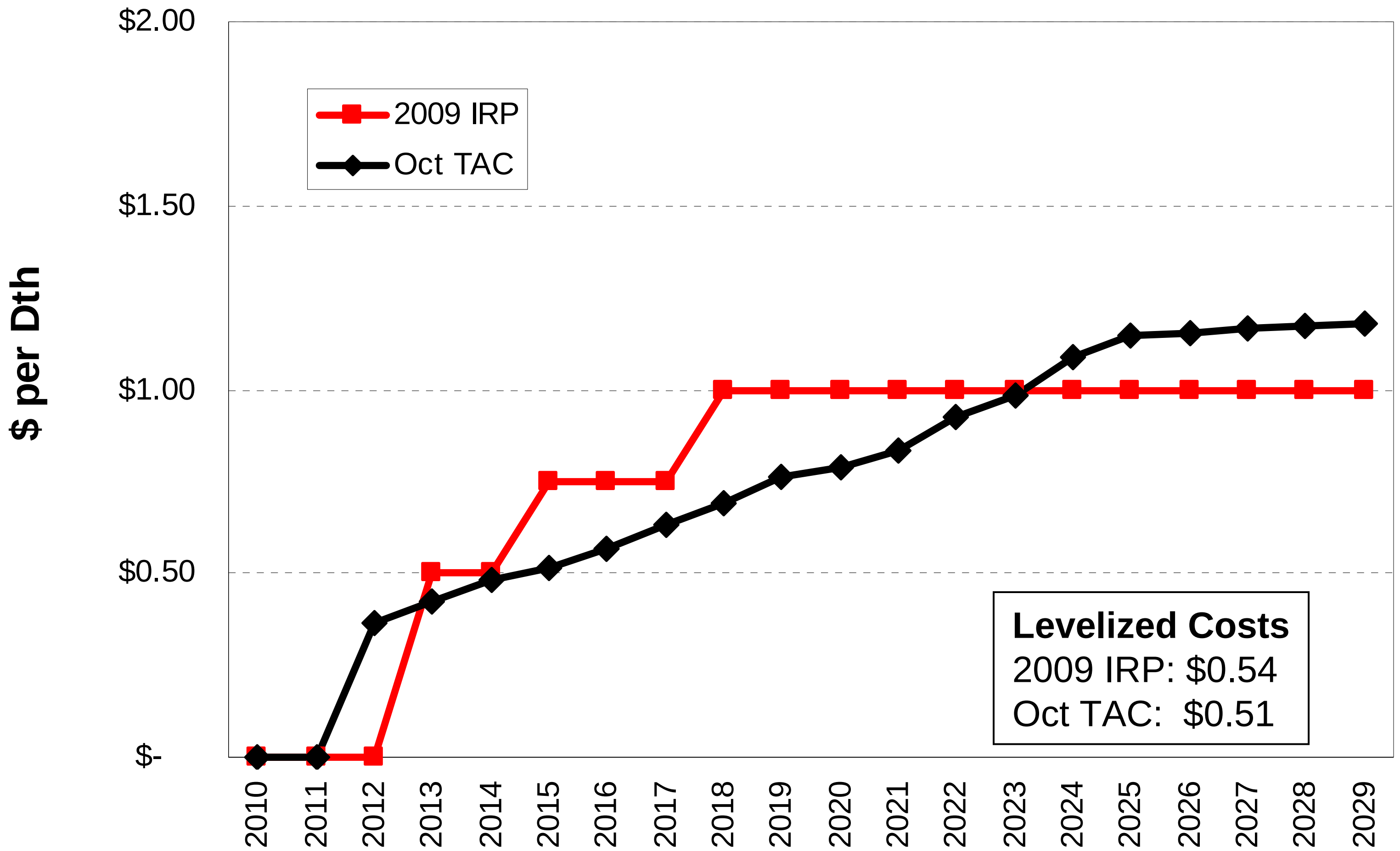
- Based on the most recent 'discussion draft' proposal by Reps. Dingell and Boucher of the House Energy and Commerce Committee
- Wood Mackenzie made assumptions on the key components of the analysis such as caps on carbon prices, the allocation of carbon credits, the use of carbon offsets, and, nuclear and CCS technology availability.
- Wood Mackenzie's proprietary upstream oil, gas, and coal data and analysis are the cost and availability of fuel supplies, particularly to support an assumption to increase reliance on natural gas to meet near term emission reduction requirements.
- Carbon offsets/other industry represent difference between forecasted emissions and legislative goals

Source: Wood Mackenzie Carbon Case 3

AVISTA

Annual GHG Adder to Natural Gas Prices

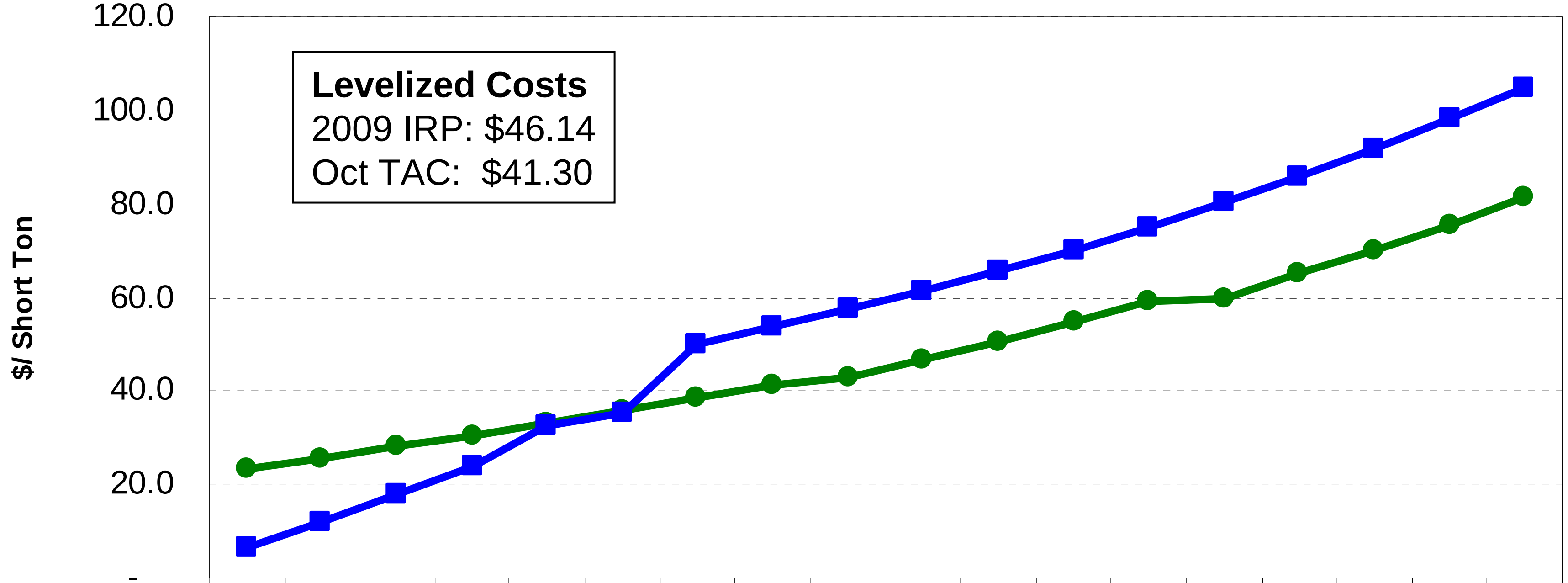
2008 $



AVISTA

Annual GHG Adder per Ton of CO_2

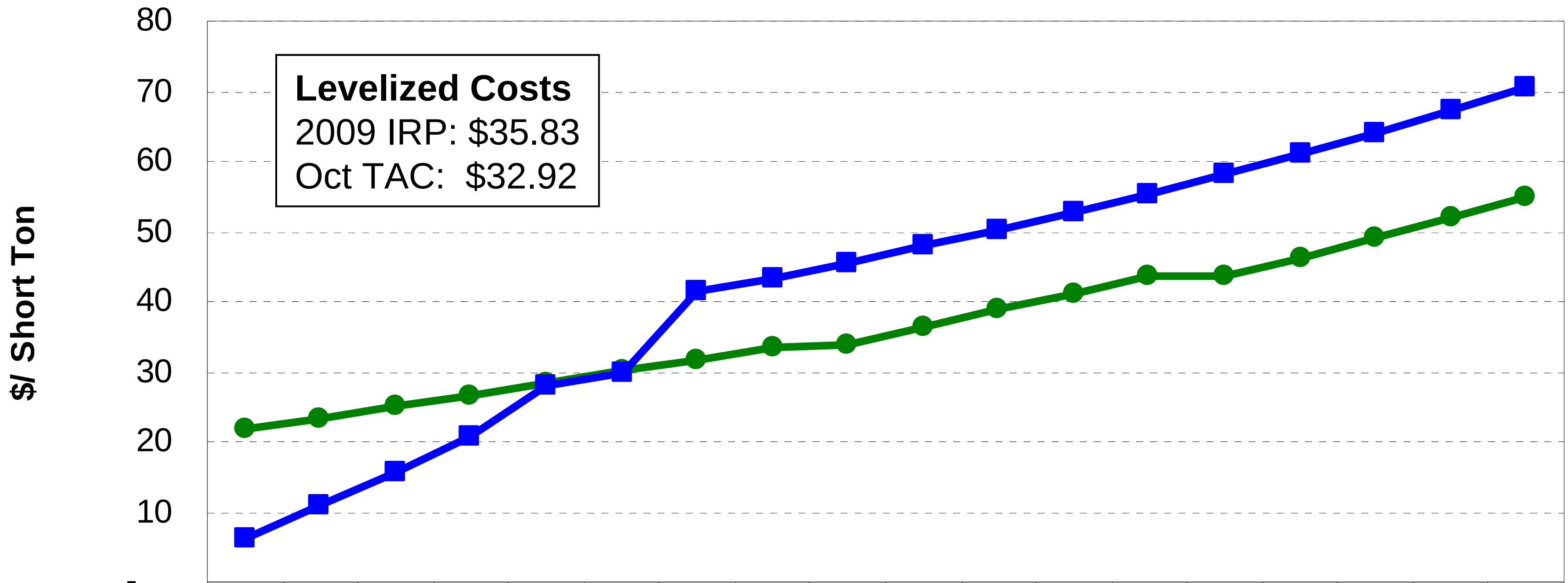
Nominal $



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Oct TAC	23	26	28	30	33	36	39	41	43	47	51	55	59	60	65	70	76	81
2009 IRP	7	12	18	24	33	35	50	54	57	61	66	70	75	80	86	92	98	105

Annual GHG Adder per Ton of CO_2

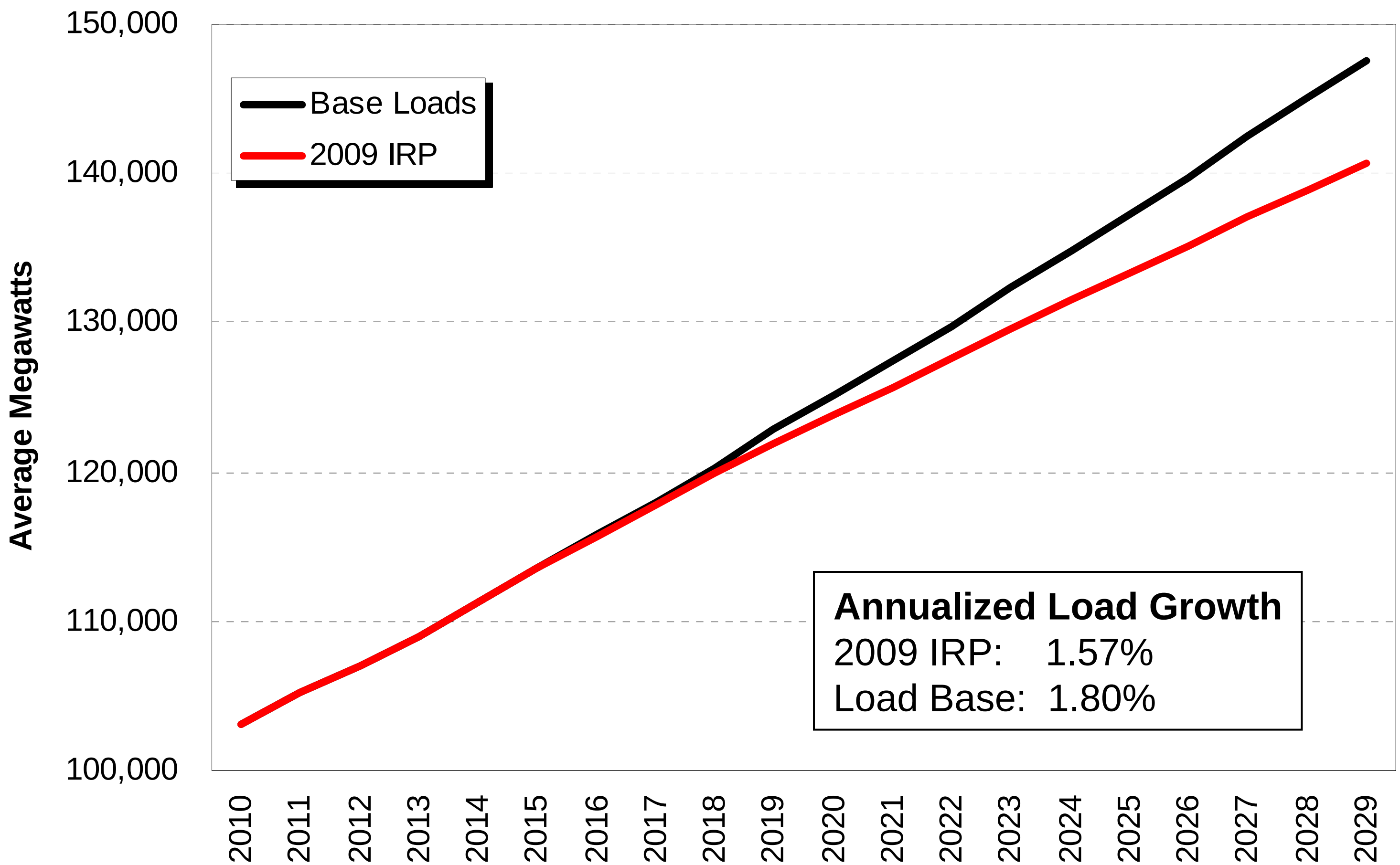
2009 $



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Oct TAC	22	23	25	27	28	30	32	34	34	36	39	41	44	43	46	49	52	55
2009 IRP	6	11	16	21	28	30	41	43	46	48	50	53	55	58	61	64	67	71

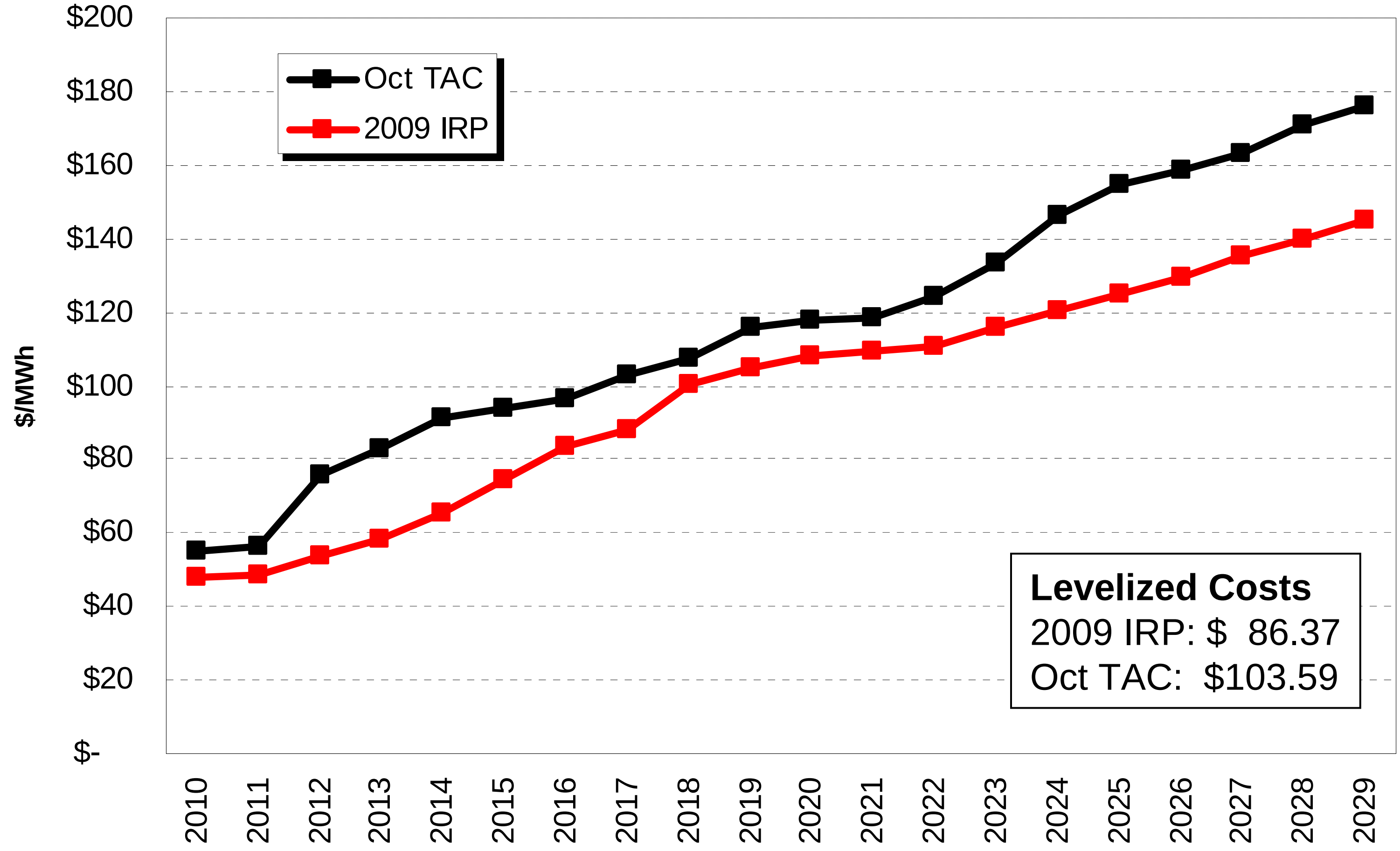
Western Interconnect Load Growth

Change with Greenhouse Gas Legislation



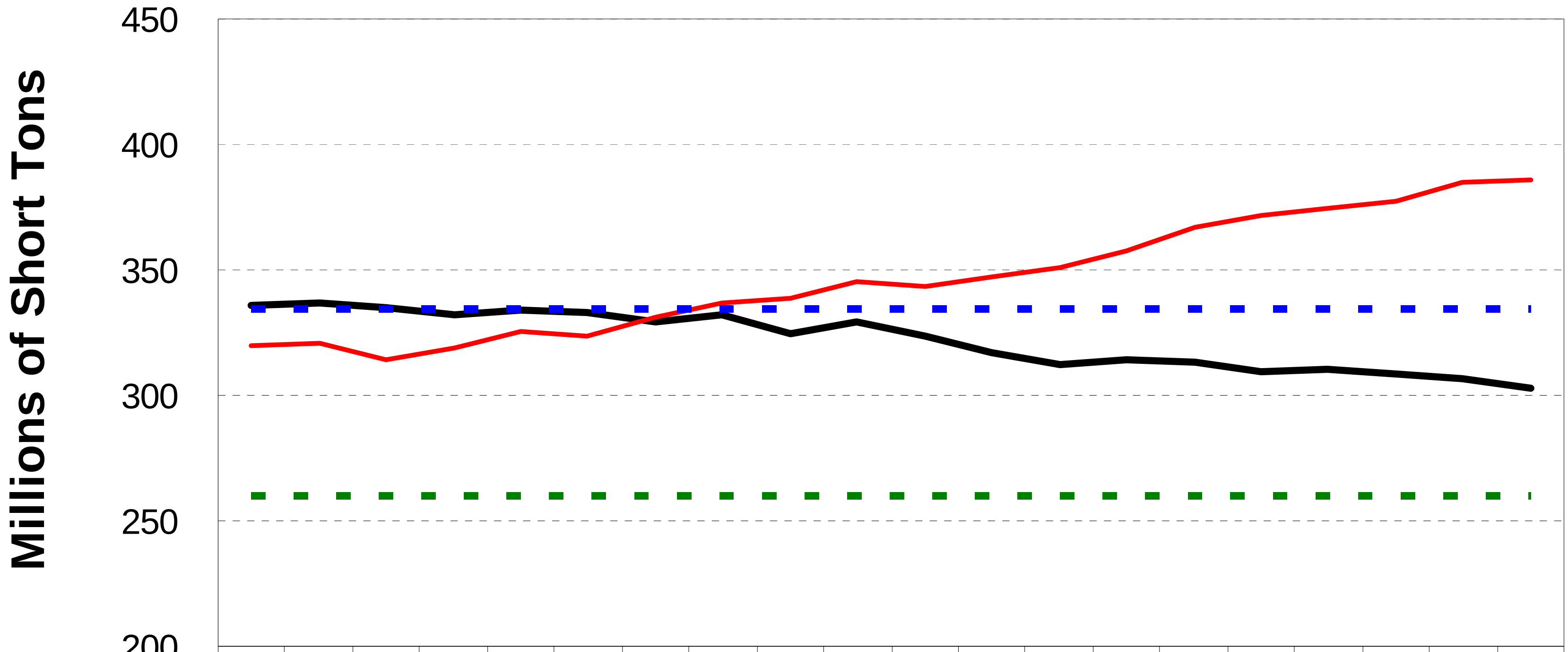
AVISTA

Last TAC Price Forecast vs 2009 IRP



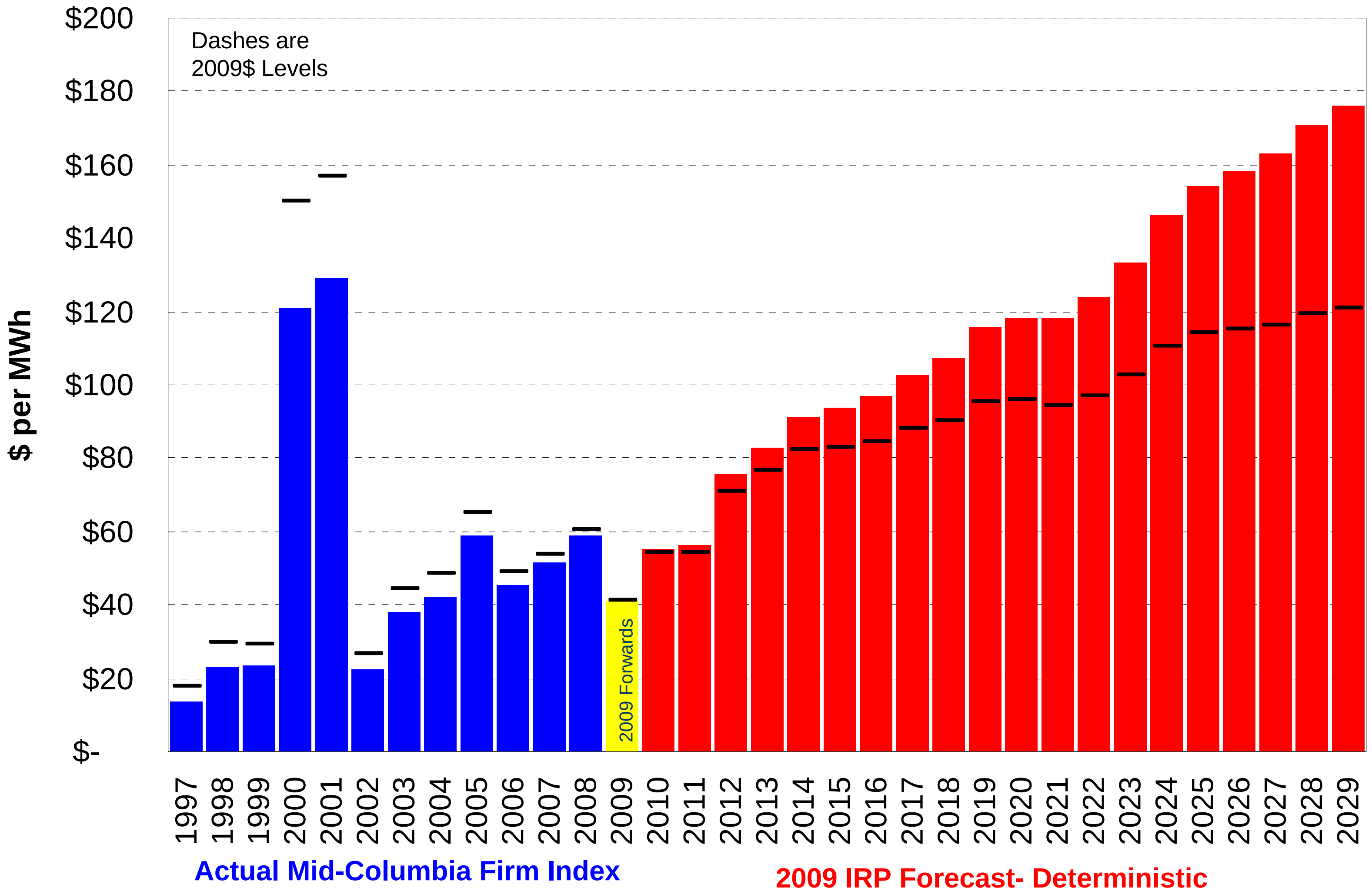
AVISTA

US Western Interconnect Greenhouse Gas Comparison



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
2009 IRP	336	337	335	332	334	333	330	332	325	329	323	317	312	314	314	309	310	309	307	303
Oct TAC	319	321	314	319	325	324	331	337	338	345	343	347	351	357	367	371	375	377	385	385
2005 Levels	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334
1990 Levels	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259

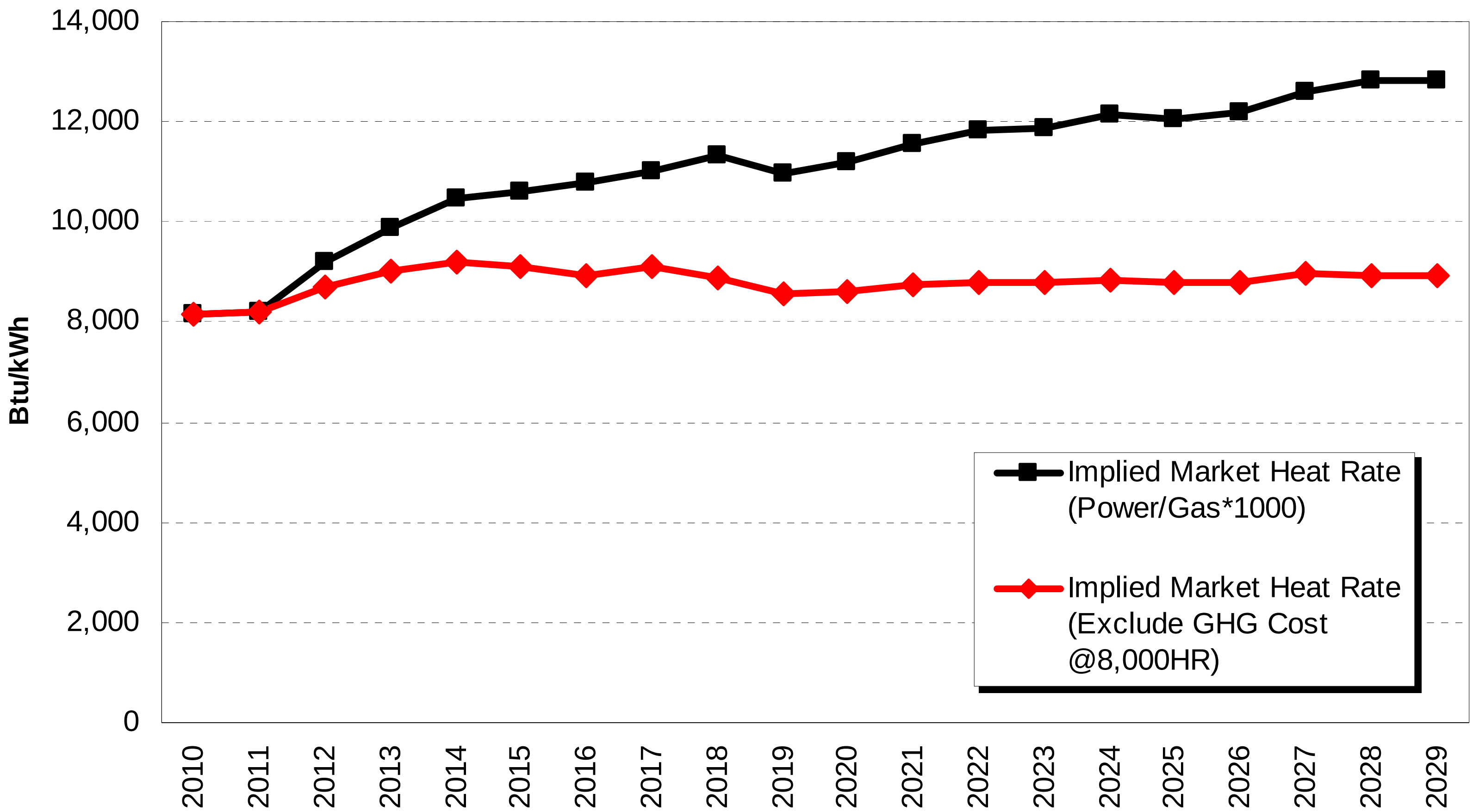
Mid-Columbia Actual & Forecast



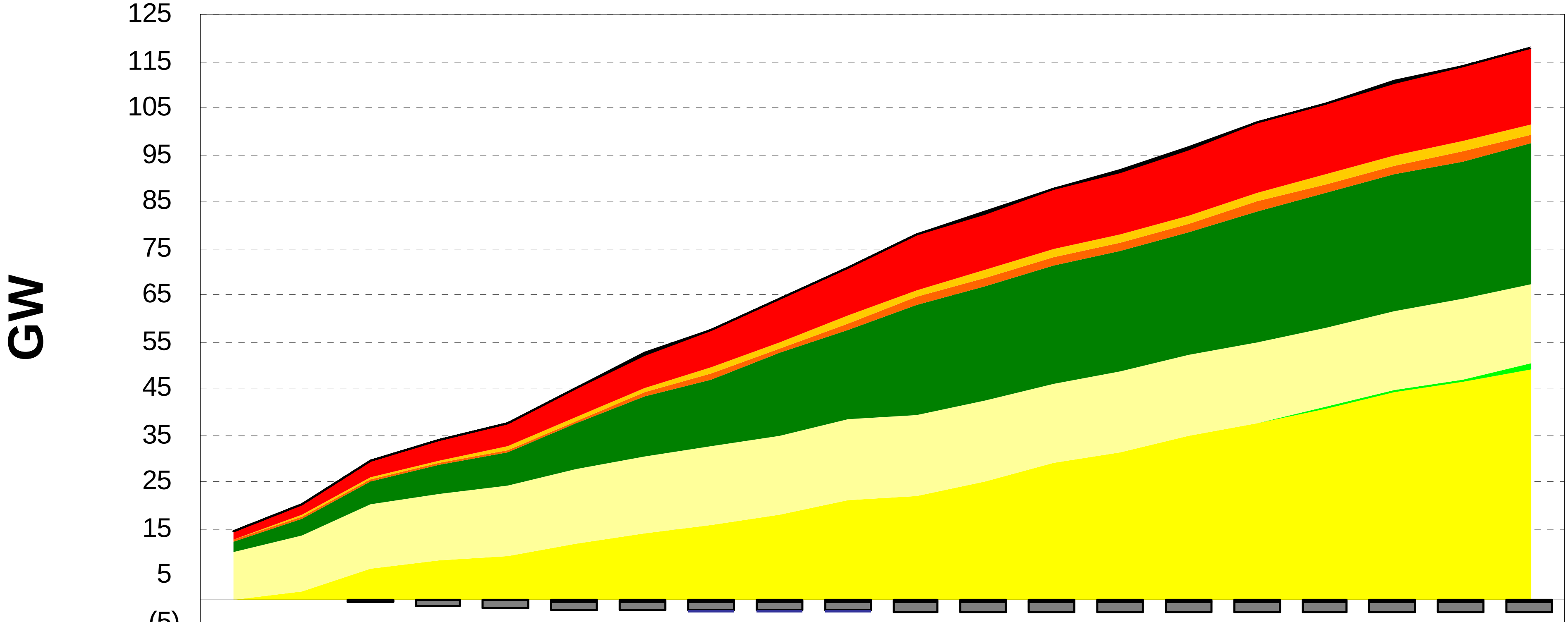
AVISTA

Implied Market Heat Rate

(Mid-Columbia/Stanfield*1000)

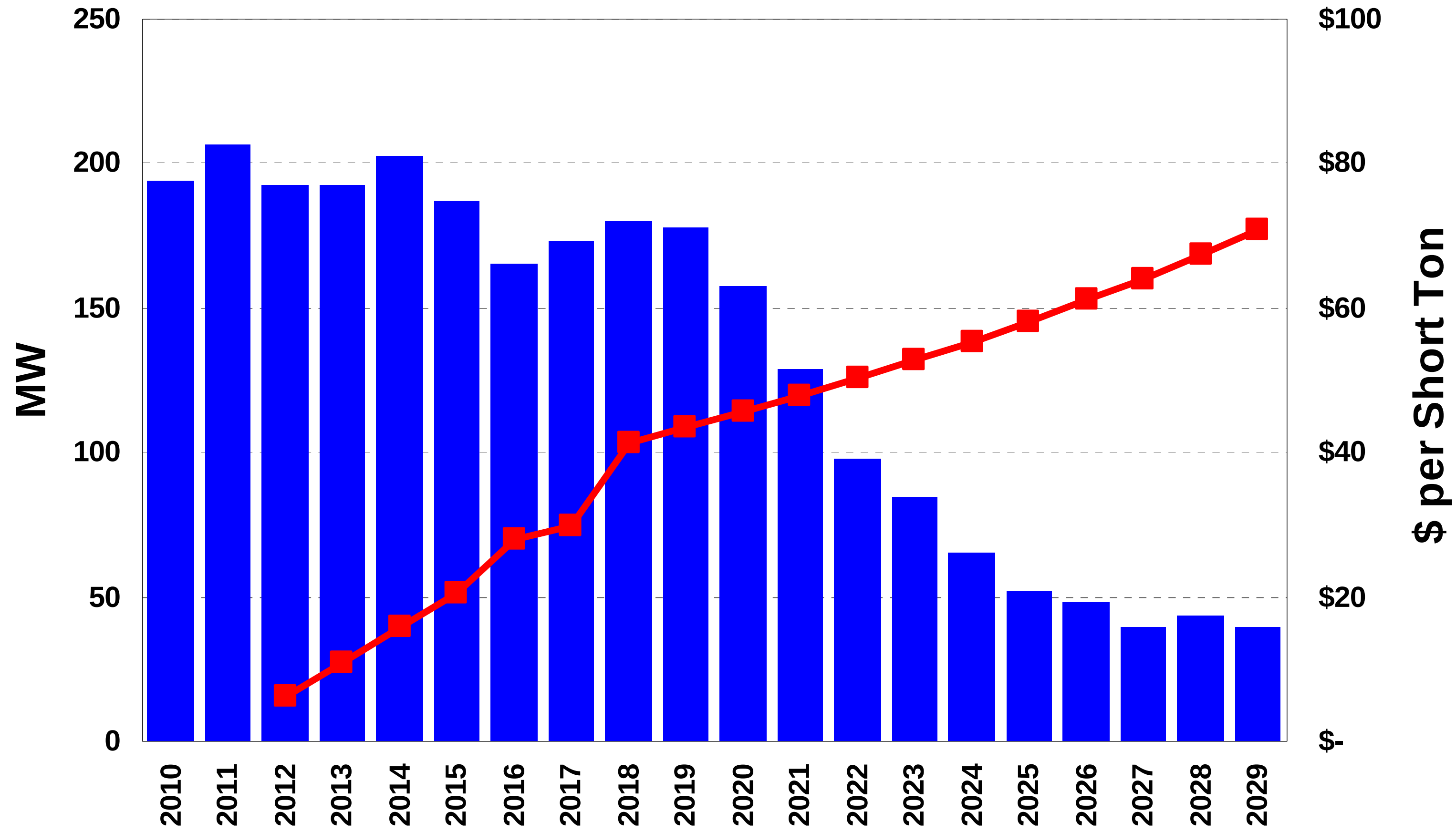


Western Interconnect New Resources



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Hydro	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar	2	3	3	4	5	6	7	8	9	10	12	12	13	13	14	15	15	16	16	16
Geothermal	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Biomass	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Wind	3	4	5	6	7	10	13	15	18	19	24	25	25	26	26	28	29	29	29	30
SCCT	10	12	14	15	15	16	16	17	17	17	17	17	17	17	17	17	17	17	17	17
Coal Seq	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
CCCT	-	2	7	8	9	12	14	16	18	21	22	25	29	32	35	38	41	44	47	49
Oil- retire	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NG- retire	(0)	(0)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Coal- retire	-	-	-	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

Colstrip Generation & CO_2 Legislation



Stochastic Analysis

Stochastic Study CPU Requirements

- 20-year hourly simulations, 250 times (tested as high as 500)
- Uses 25 CPU and 1 data server
- 26.5 GB output database per study
- 6 hours per simulation, 1,500 hours of computing time
- 2.5 days to complete a study

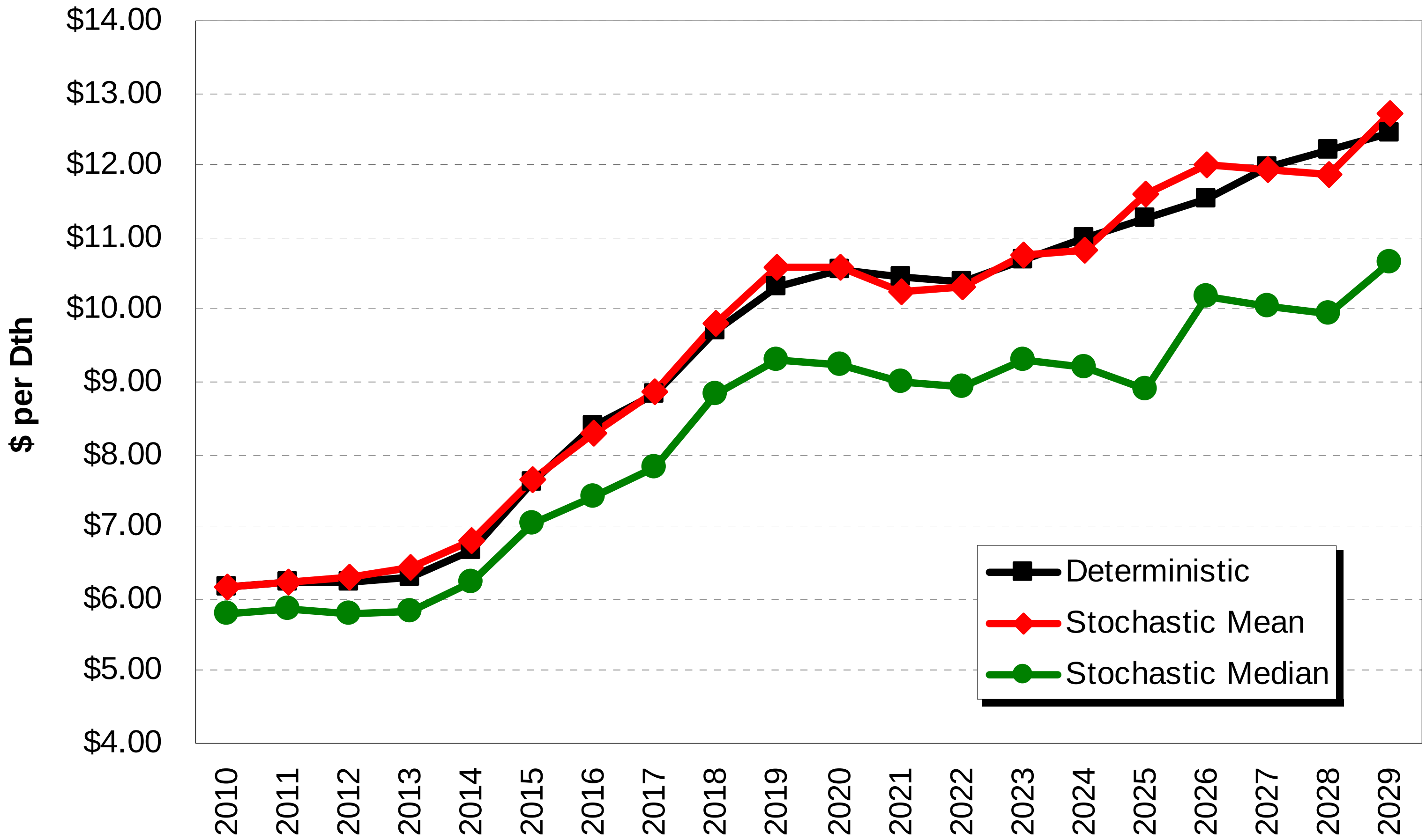
AVISTA

Long-Term Correlation Matrix

	Gas Prices	GHG Prices	NO_X Prices	SO_2 Prices	New Coal Prices	Hog Fuel Prices	Load Growth
Gas Prices	1.00						
GHG Prices	0.50	1.00					
Hg Prices		-0.50	1.00				
NO_X Prices		0.75	1.00	1.00			
SO_2 Prices		0.75	1.00	1.00	1.00		
New Coal Prices		-0.25	-0.25	-0.25	1.00	1.00	
Hog Fuel Prices	0.50	0.50				1.00	1.00

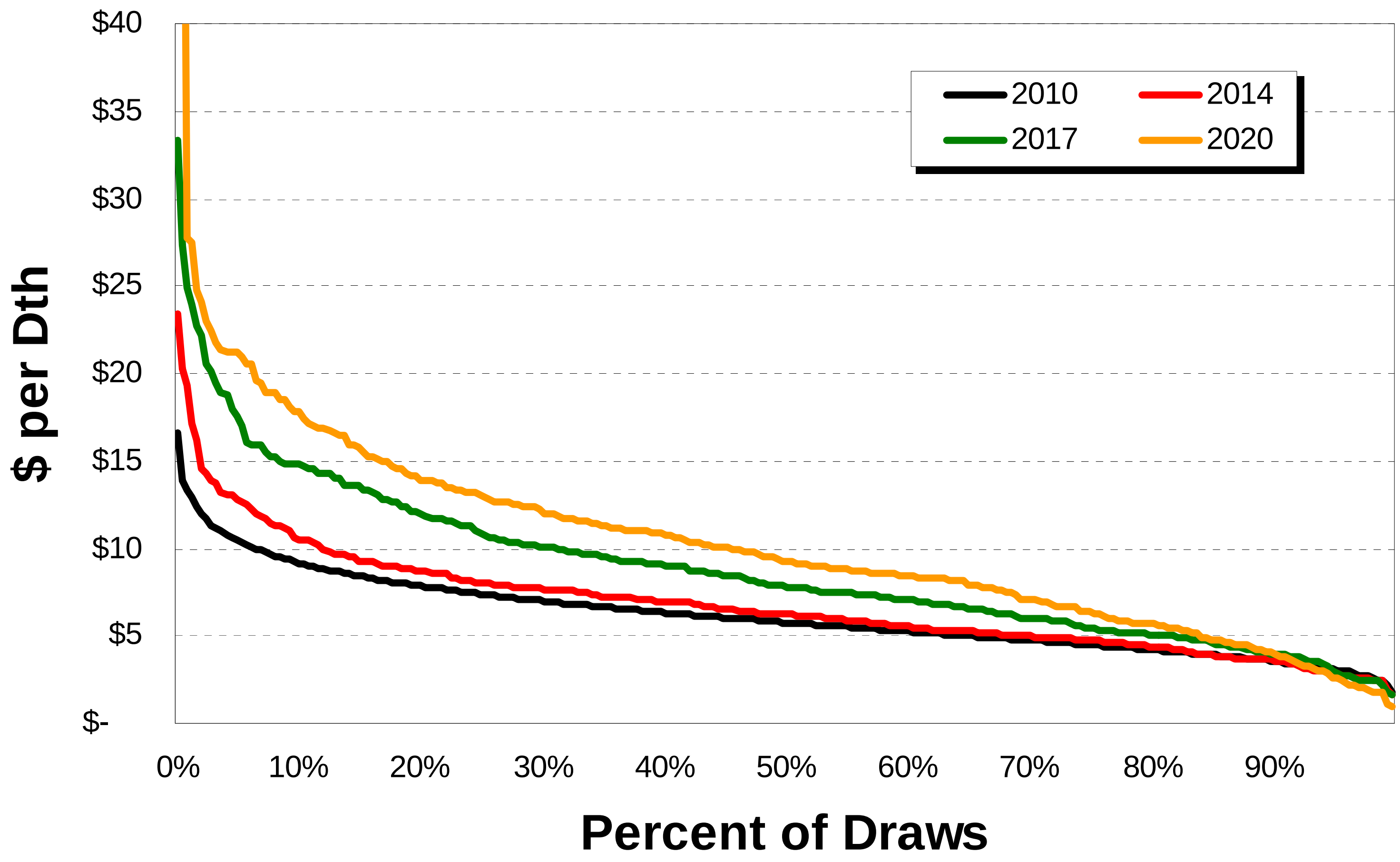
AVISTA

Annual Henry Hub Prices

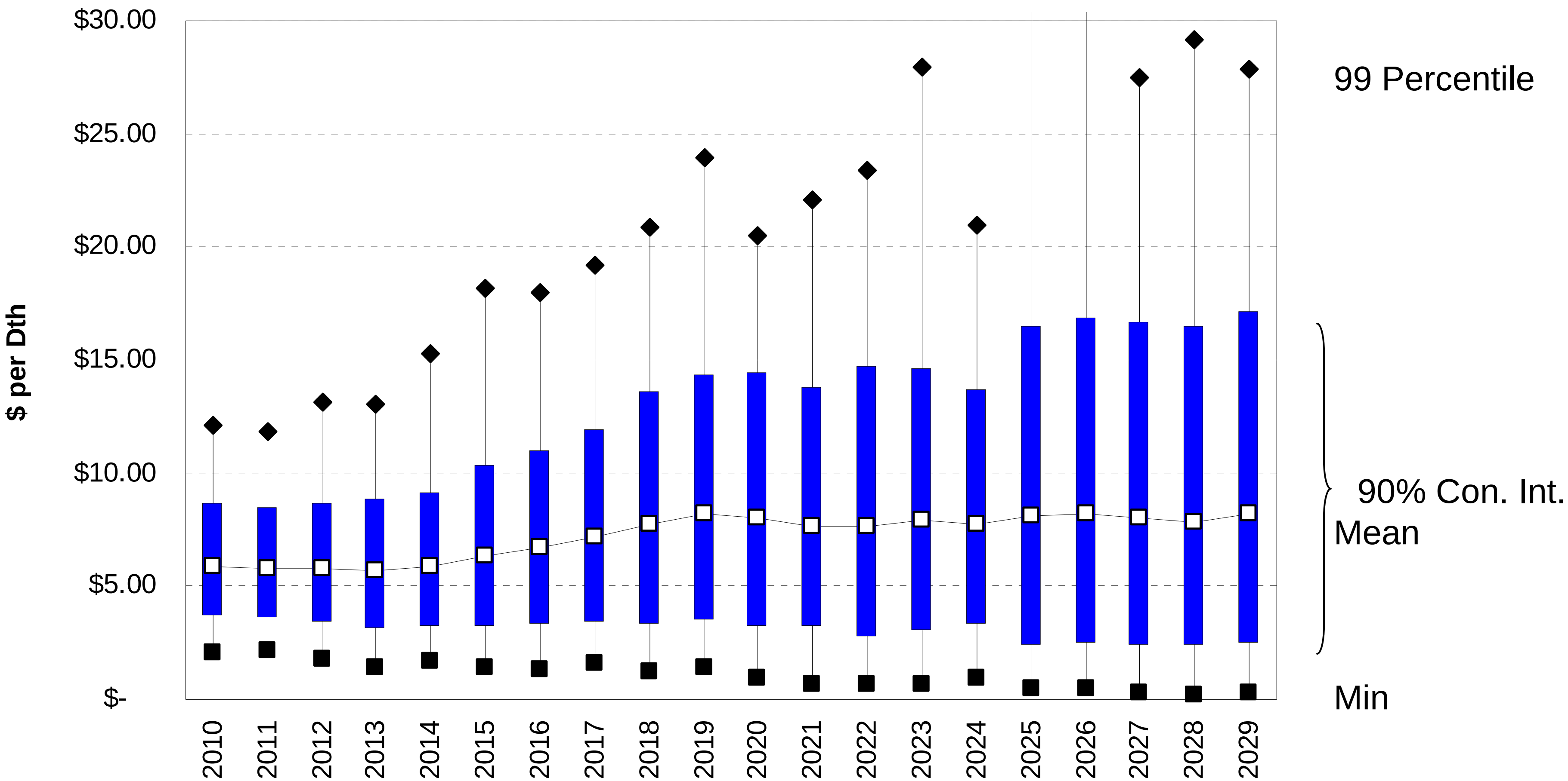


Annual Henry Hub Prices

Select Years

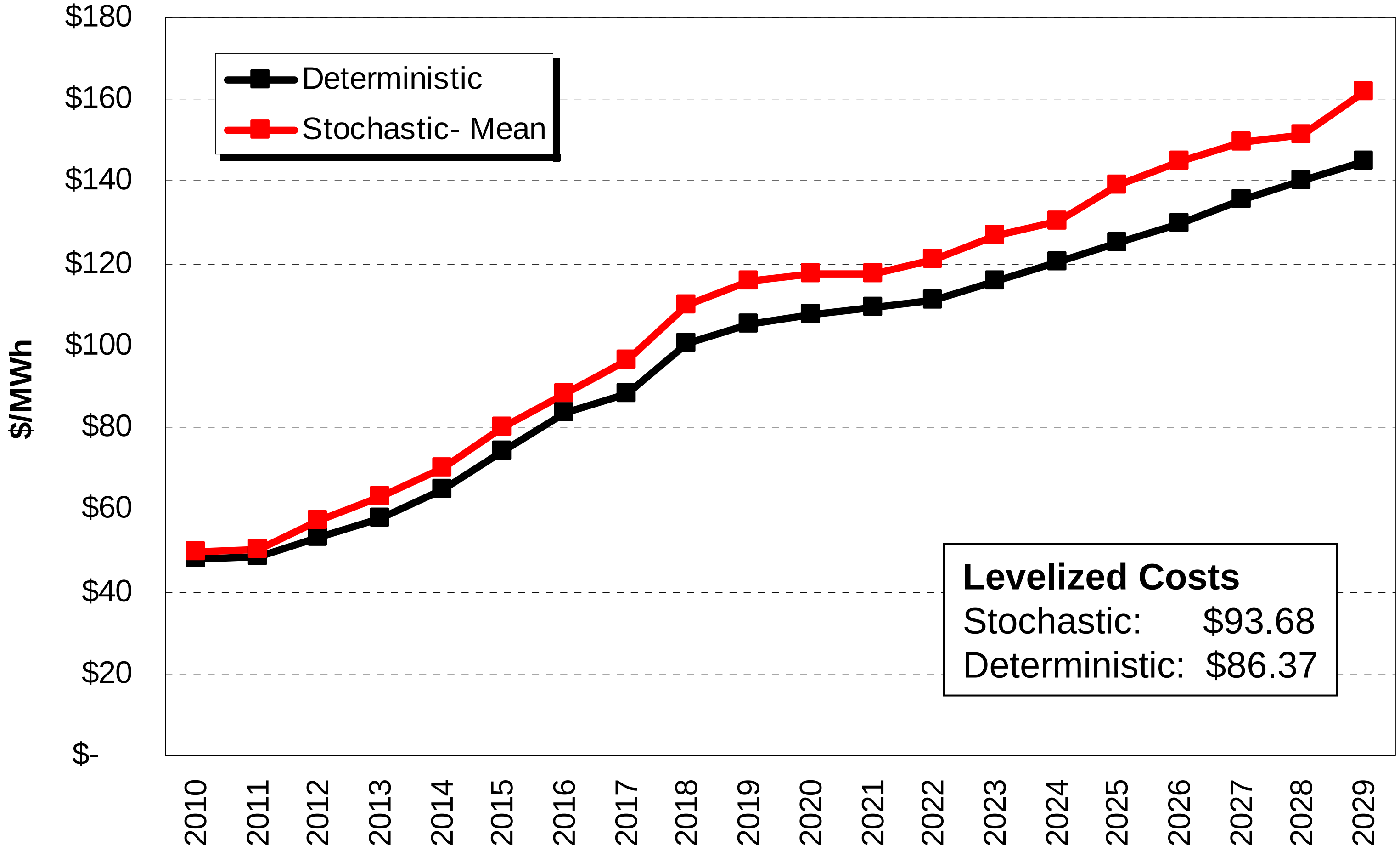


Annual Henry Hub Stochastic Price Ranges



Annual Mid-Columbia Electric Prices

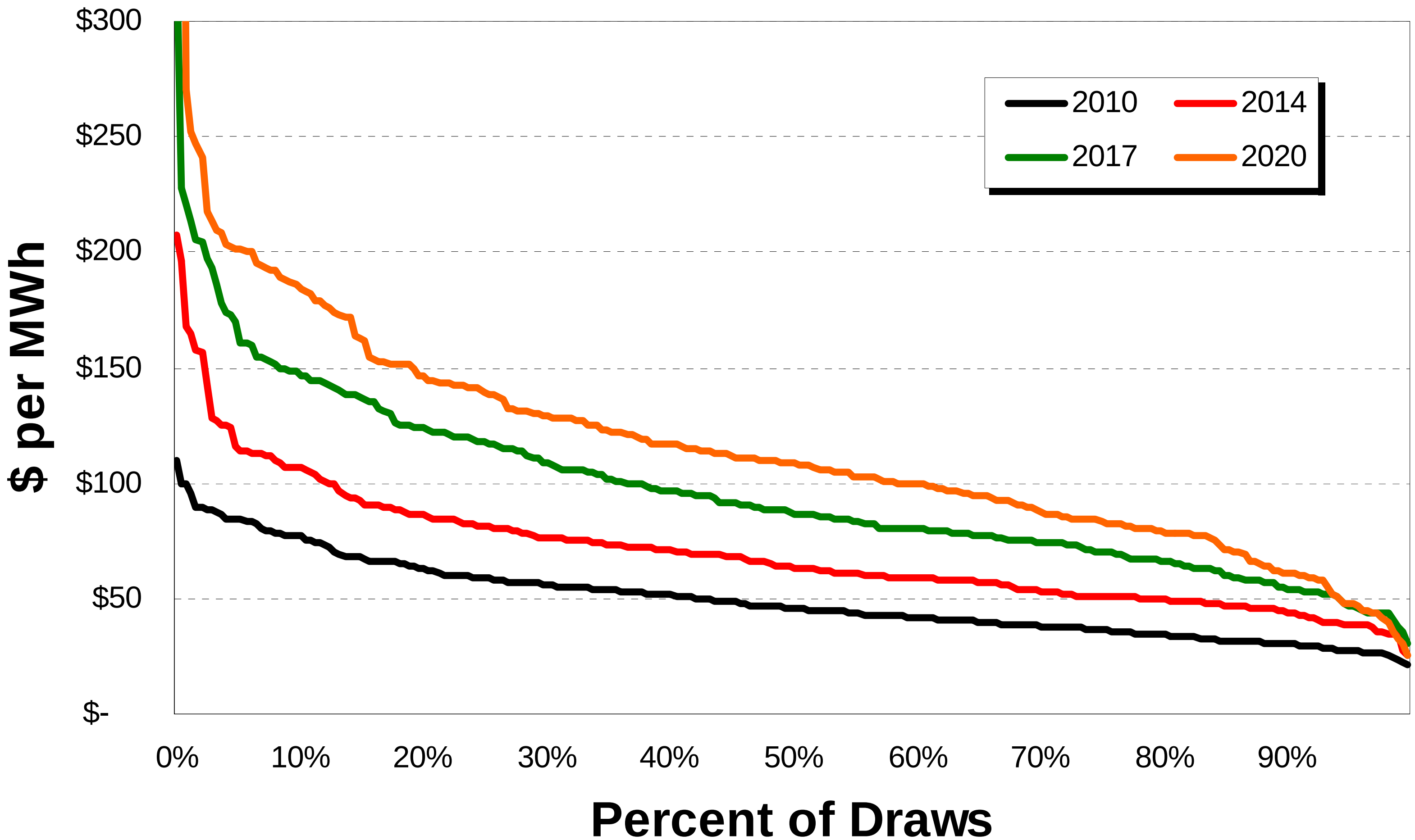
Deterministic vs. Stochastic Prices



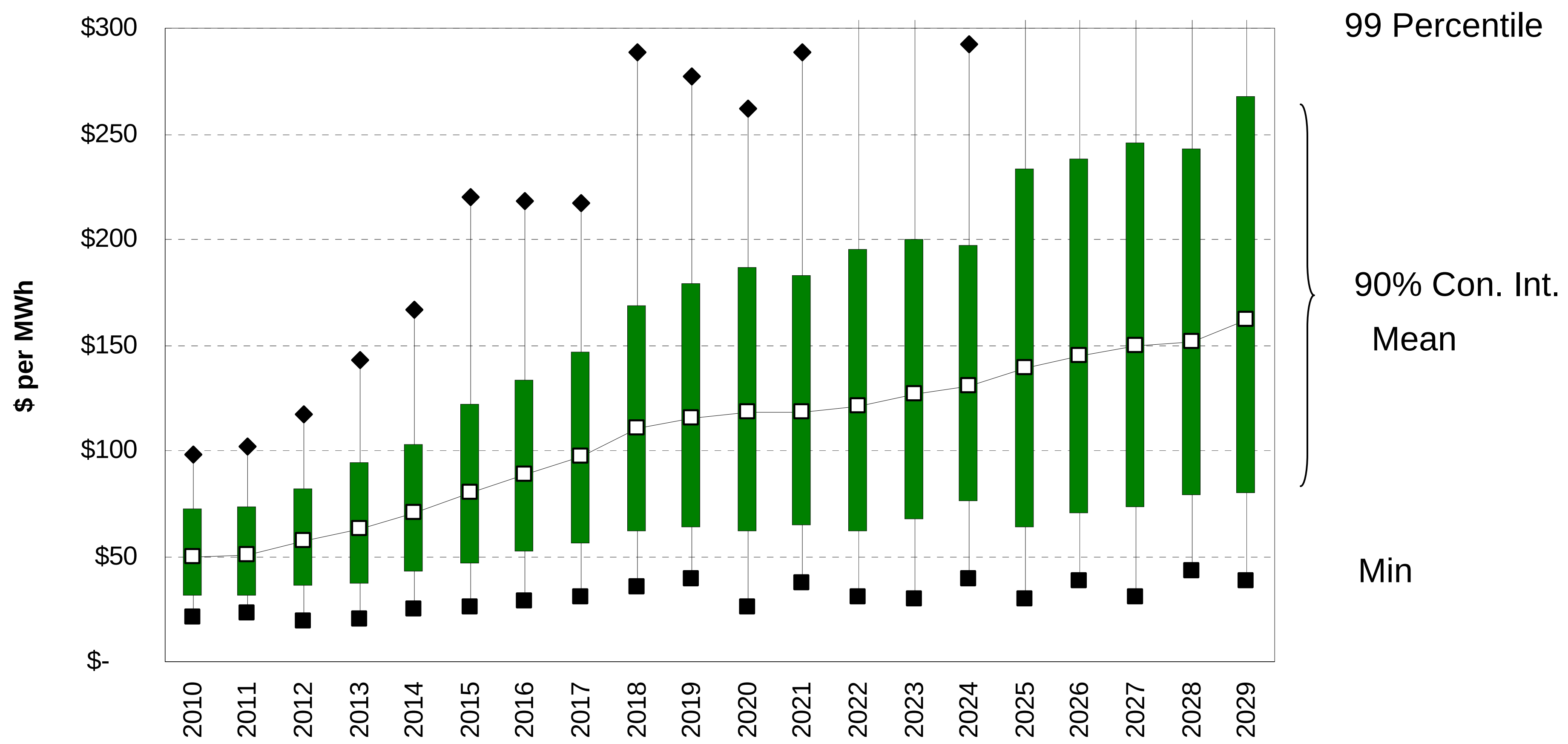
AVISTA

Annual Avg Mid-Columbia Prices

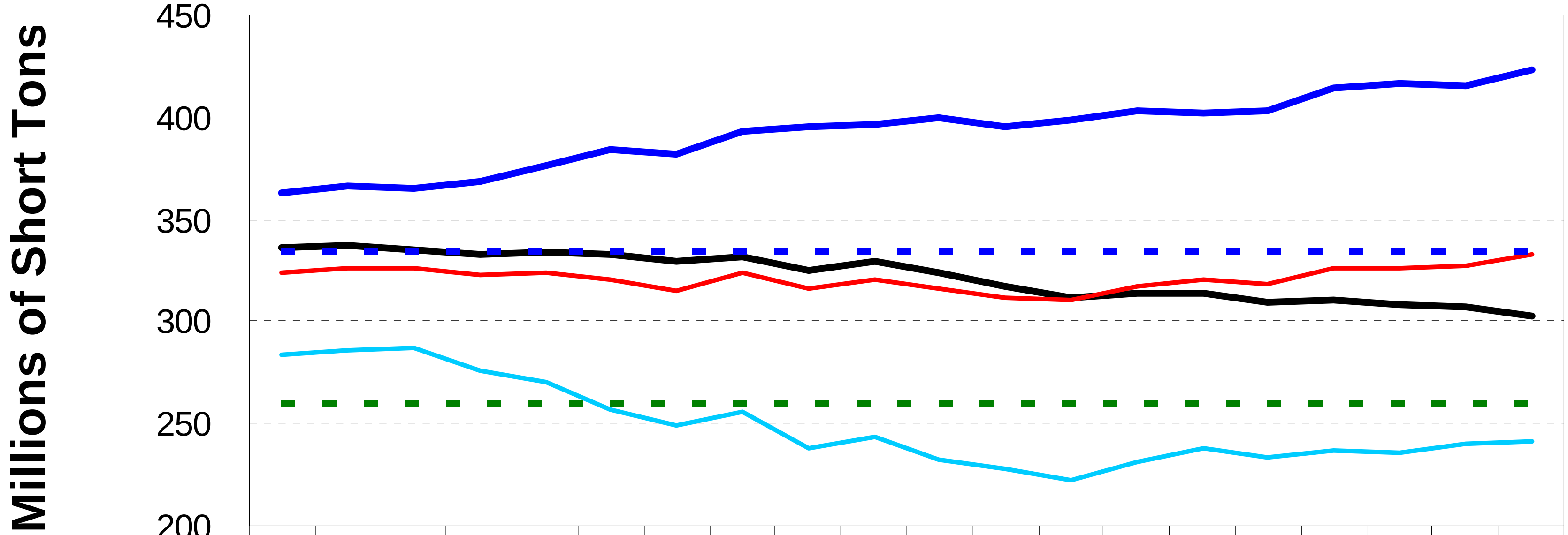
Select Years



Annual Mid-Columbia Stochastic Price Results



US- Western Interconnect Greenhouse Gas Emissions By Year



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Deterministic	336	337	335	332	334	333	330	332	325	329	323	317	312	314	314	309	310	309	307	303
Mean	323	326	326	322	323	321	315	324	316	320	316	312	311	317	320	319	326	326	328	333
Upper End Int 80%	363	366	365	369	376	385	382	393	395	397	400	395	398	403	402	403	415	417	415	424
Low er End Int 80%	284	286	287	276	270	257	249	256	238	243	233	228	223	232	238	234	237	236	240	241
2005 Levels	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334
1990 Levels	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259

2009 IRP Resource Assumptions

John Lyons, Ph.D.

2009 Electric Integrated Resource Plan
Fourth Technical Advisory Committee Meeting
January 28, 2009

Supply Side Resources

- Resource lists and data are developed from a variety of sources including: internal research, Power Council, consulting firms, published reports, and government studies
- Data is used to develop generic resource costs
- Fewer types of coal resources are included – only ultra critical and IGCC plants are being modeled for the 2009 IRP
- Alberta oil sands are not included as a resource option
- Adding more specifics for the Other Renewable Resources category – various geothermal, biomass, and solar resource technologies are being modeled separately for the 2009 IRP
- Pipeline cogeneration has been dropped due to lack of sufficient data

Non-Renewable Supply Side Resources

- Natural Gas Combined Cycle (CCCT)
  - 2 x 1 and 1 x 1 with duct burner water cooled (1x1 for PRS)
  - 2 x 1 and 1 x 1 with duct burner air cooled
  - 600 MW with sequestration
- Natural Gas-Fired Simple Cycle – Aero, Frame, and Hybrid
- Small cogeneration (< 5 MW)
- Coal: ultra critical, IGCC, and IGCC with sequestration
- Nuclear: only alllowed in scenario studies

Renewable Supply Side Resources

- Geothermal
- Wind – 100 MW, < 5 MW, and offshore
- CCCT Wood Boiler
- Wood Gasification Conversion
- Open Loop Biomass – landfill gas, wood, waste, etc.
- Closed Loop Biomass
- Solar Photovoltaic
- Solar Thermal
- Roof Top Solar
- Tidal Power
- Hydrokinetics
- Run of River Hydro
- Pumped Storage

AVISTA

Avista Resources and Upgrades

Hydro resources included as resource options

- Little Falls Unit #1 – 4 Upgrades
- Post Falls Unit #6 Upgrade
- Upper Falls Upgrade

Hydro resources considered for further study

- Long Lake new unit and new powerhouse
- Cabinet Gorge #5

Scheduled upgrades and resources presently included in the L&R

- Noxon Rapids Units #1 – 4 Upgrades (2009 – 2012)
- Lancaster Generation Facility Tolling Agreement (2010)

Transmission & Distribution Efficiencies

John Gibson

2009 Electric Integrated Resource Plan

Fourth Technical Advisory Committee Meeting

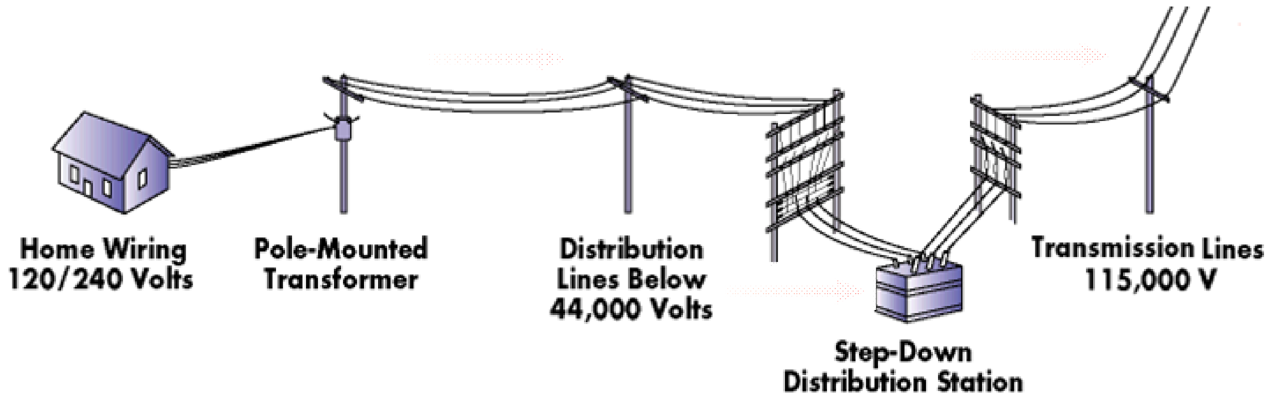
January 28, 2009

Introduction – System Efficiencies

- Distribution System
  - Analysis Methodology
  - Analysis Criteria
  - Prioritization Tabulation
  - Pilot Project: 9CE12F4
- Transmission System
  - Load Density
  - Grid Topology

Distribution Efficiency Programs

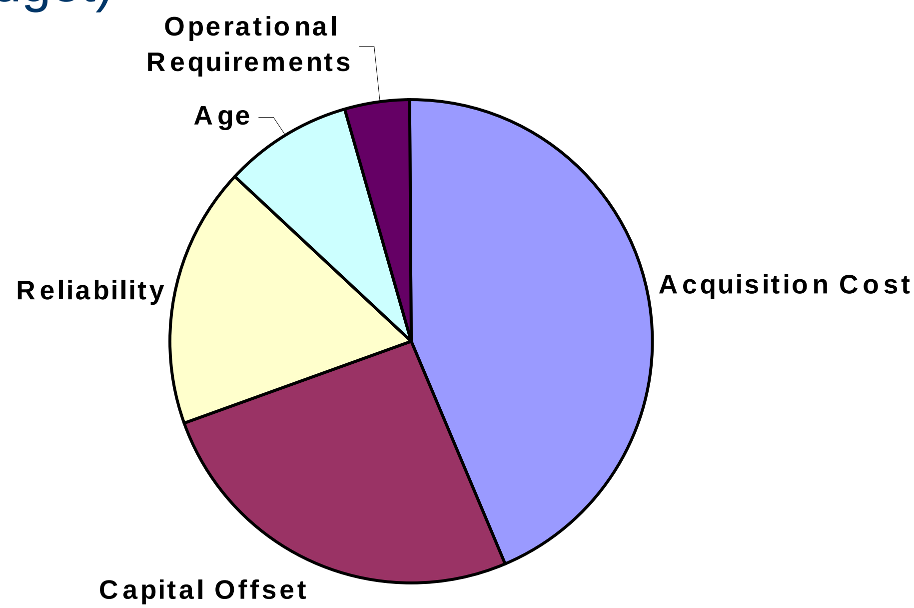
- Split feeders
- Distribution transformers efficiency – no load loss
- Secondary districts
- Reconductoring
- Reactive loading
- Voltage regulation



AVISTA

Distribution Analysis Criteria

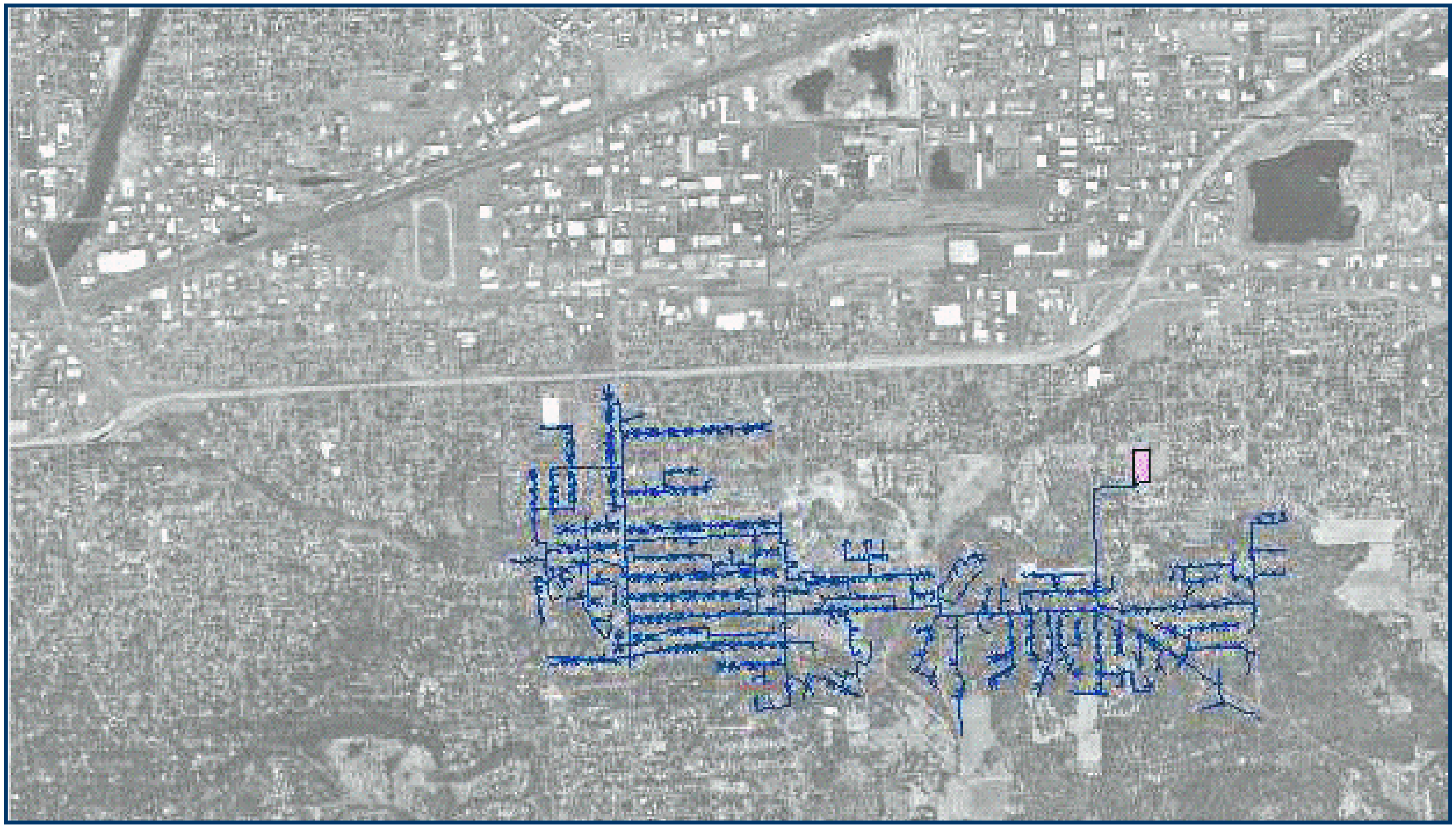
- Energy efficiency upgrades (acquisition cost)
- Capital offset (5year capital budget)
- Reliability Index
- Equipment age profile
- Operational requirements



Distribution Prioritization Tabulation

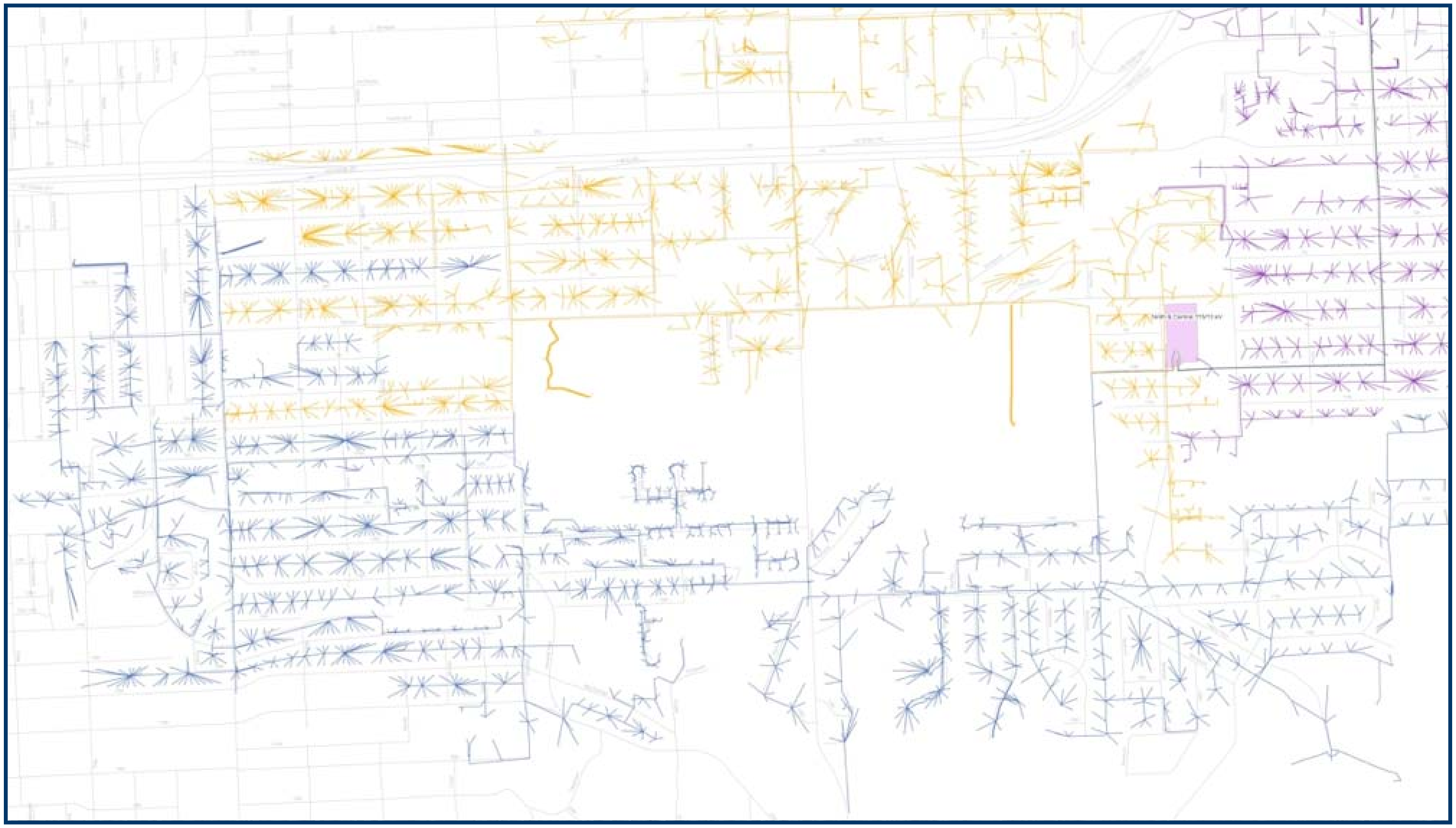
Feeder Project	Age	Reliability	Avoided Cost	Capital Offset	Operational Requirements	Overall Score
KET12F2	25.32	328	$85.07	$400,000	Low	0.596
ORI12F3	27.44	285	$73.30	$0	Low	0.591
SPI12F1	27.57	310	$90.76	$220,000	Low	0.558
PRV4S40	23.34	331	$94.10	$0	Low	0.544
ORO1281	30.33	197	$78.97	$0	Low	0.533
SUN12F3	25.20	312	$112.78	$0	High	0.522
COB12F2	27.32	283	$94.81	$0	Low	0.519
LAT421	27.39	309	$102.59	$0	Low	0.508
COB12F1	30.44	303	$108.77	$250,000	Low	0.502
CLV12F4	30.43	323	$108.47	$28,333	Low	0.502
LF34F1	21.71	299	$102.91	$0	Low	0.499
STM631	23.29	317	$109.19	$0	Low	0.490
SUN12F1	31.73	291	$125.03	$0	High	0.483
CLV12F2	30.06	298	$125.81	$780,833	Low	0.481

Feed Efficiency Upgrade – Pilot Project



AVISTA

Feed Efficiency Upgrade – Pilot Project



Feed Efficiency Upgrade – Pilot Project

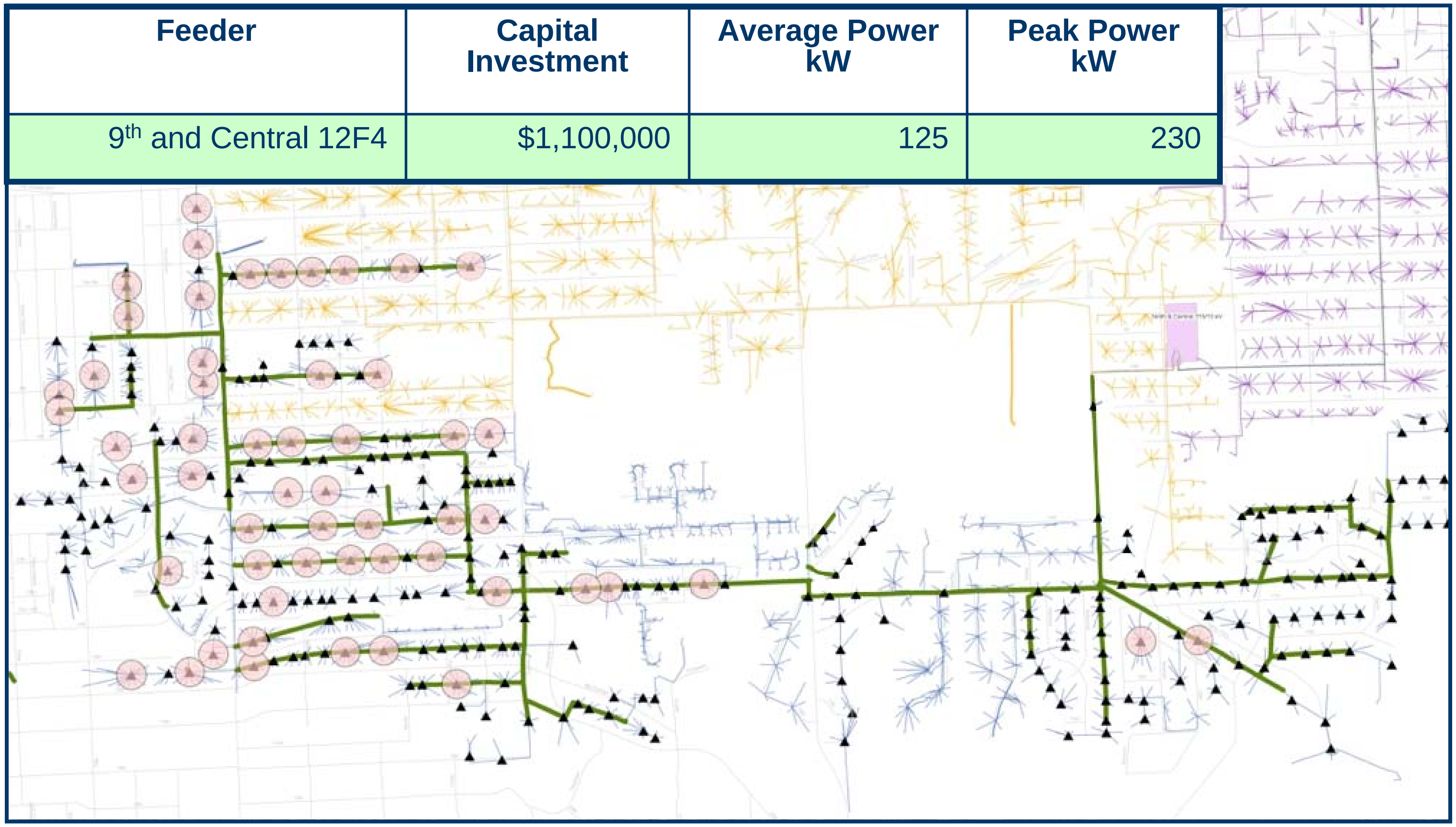
Feed Efficiency Upgrade – Pilot Project

9

AVISTA

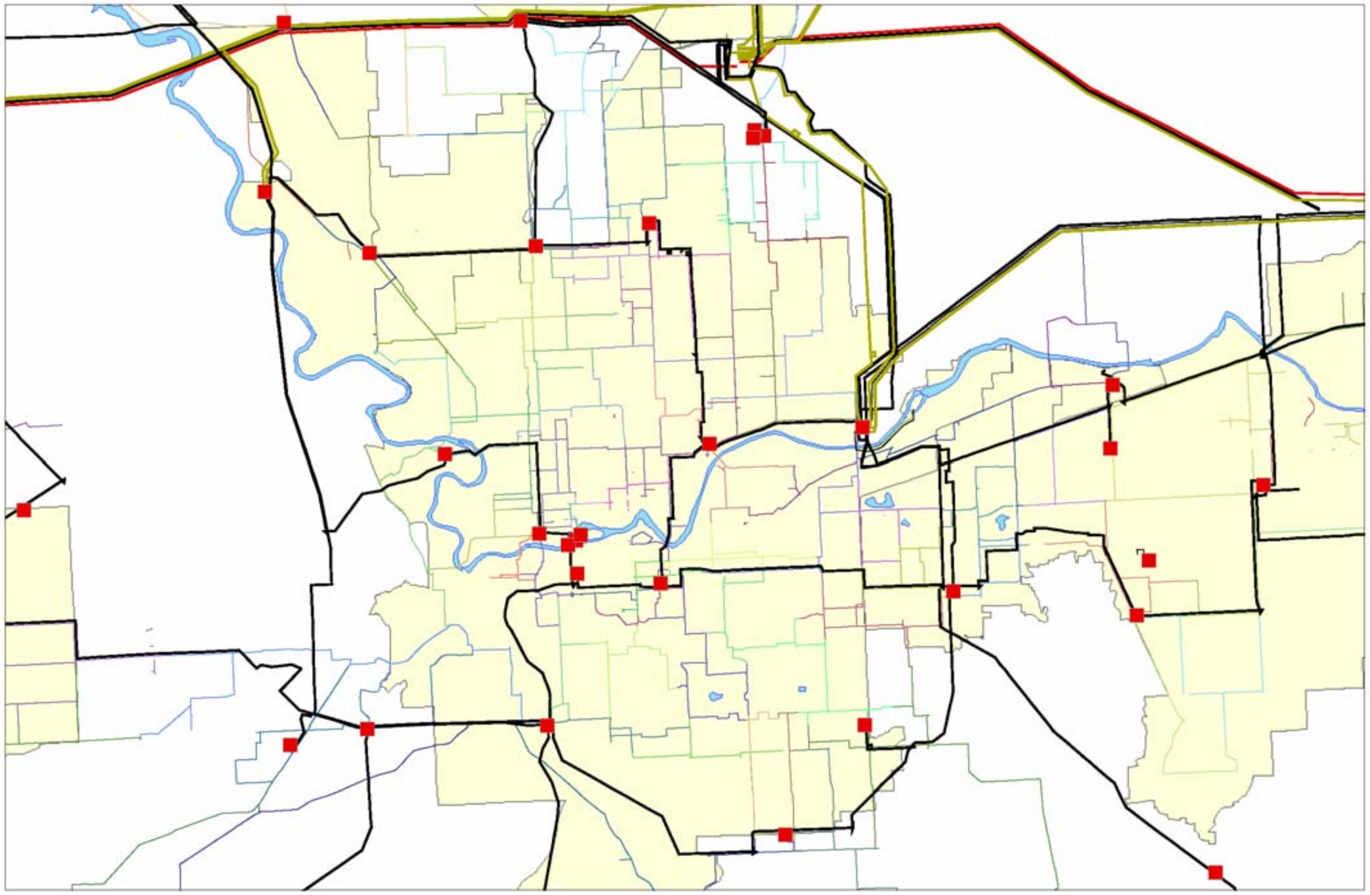
Feed Efficiency Upgrade – Pilot Project

Feeder	Capital Investment	Average Power kW	Peak Power kW
9th and Central 12F4	$1,100,000	125	230



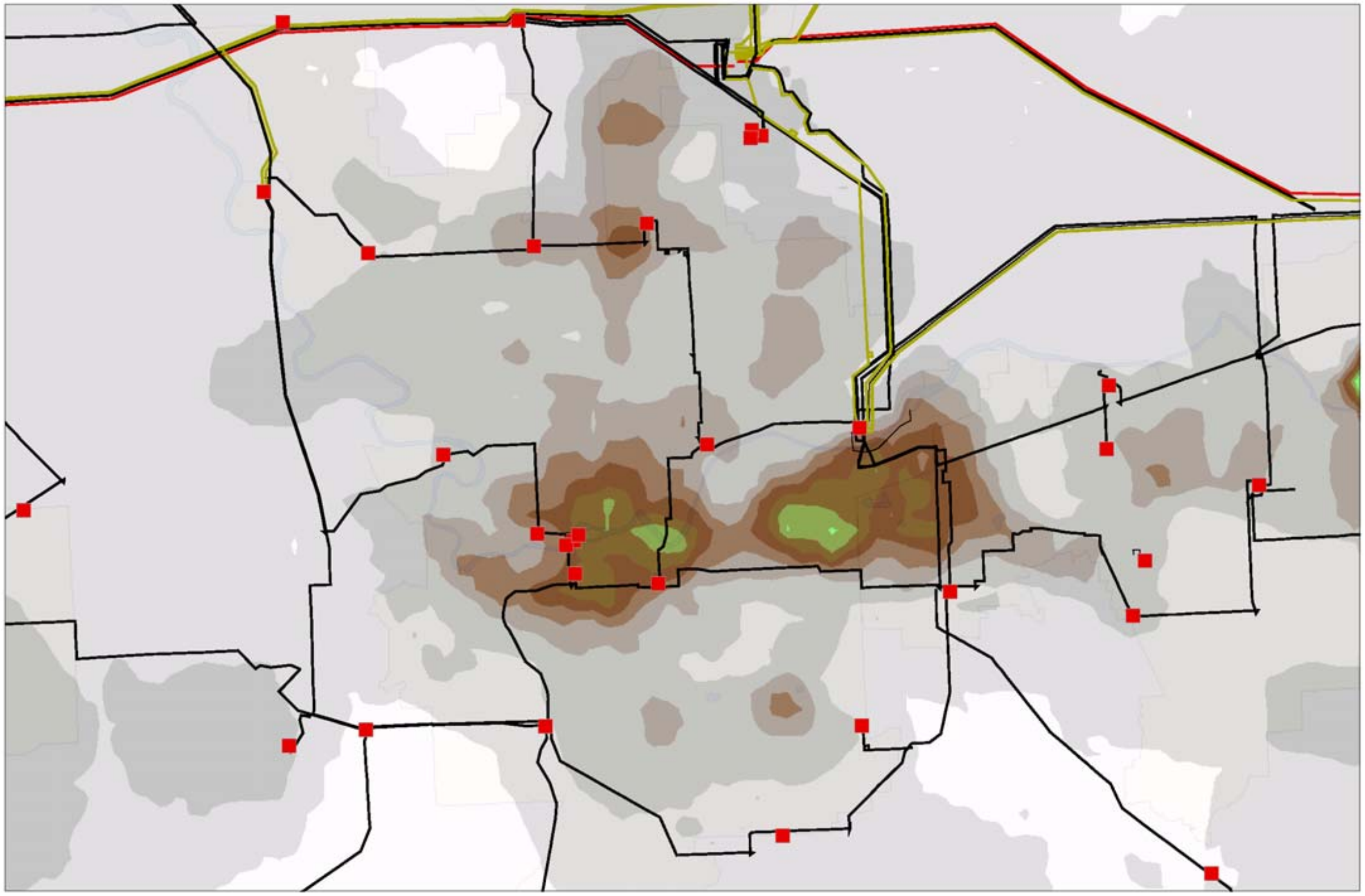
Transmission Efficiency Initiatives

- Load density and forecasted load growth



Transmission Efficiency Initiatives

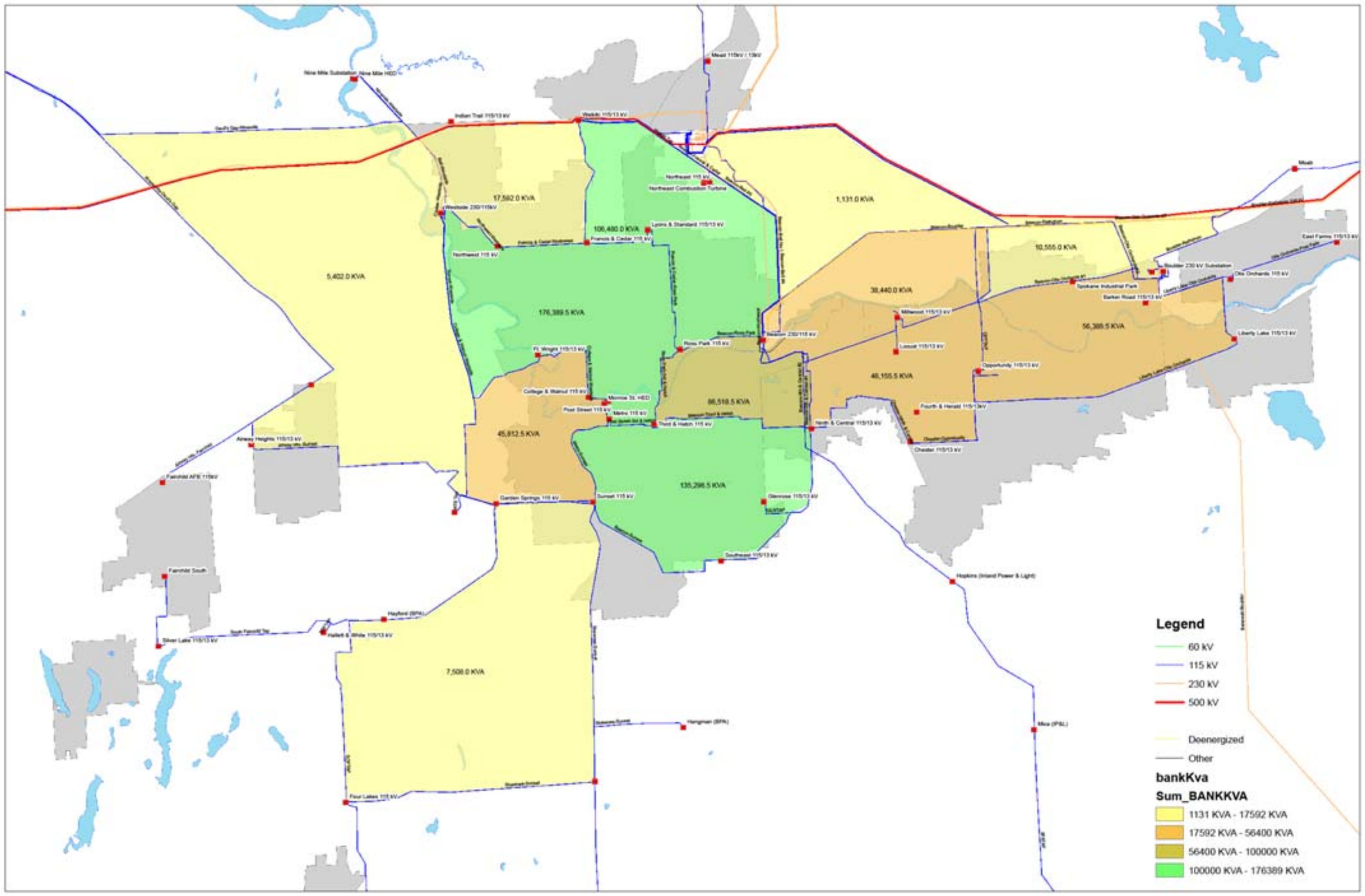
- Load density and forecasted load growth



AVISTA

Transmission Efficiency Initiatives

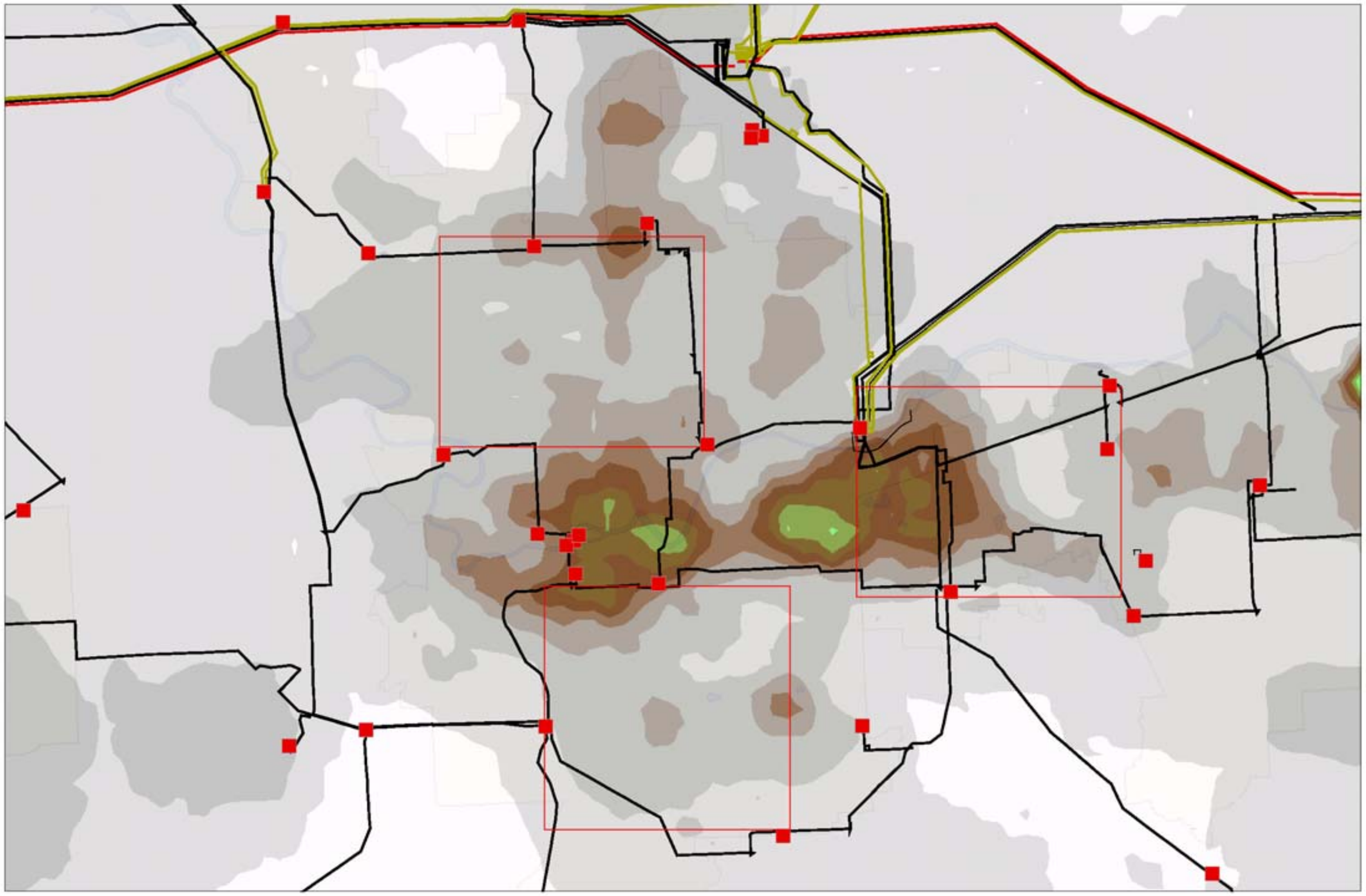
- Load density and forecasted load growth



AVISTA

Transmission Efficiency Initiatives

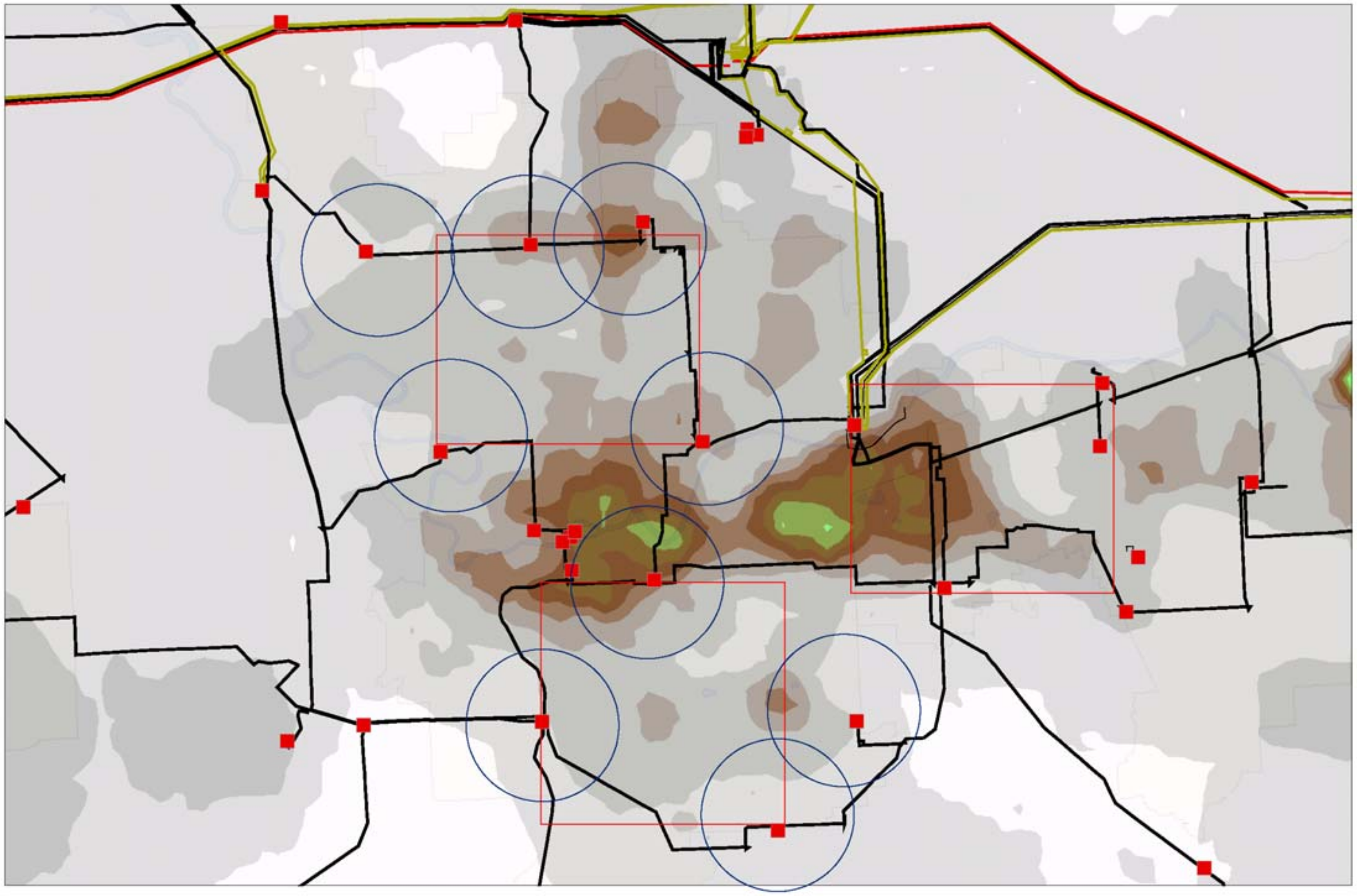
- Transmission topology
- Transmission archetypes



AVISTA

Transmission Efficiency Initiatives

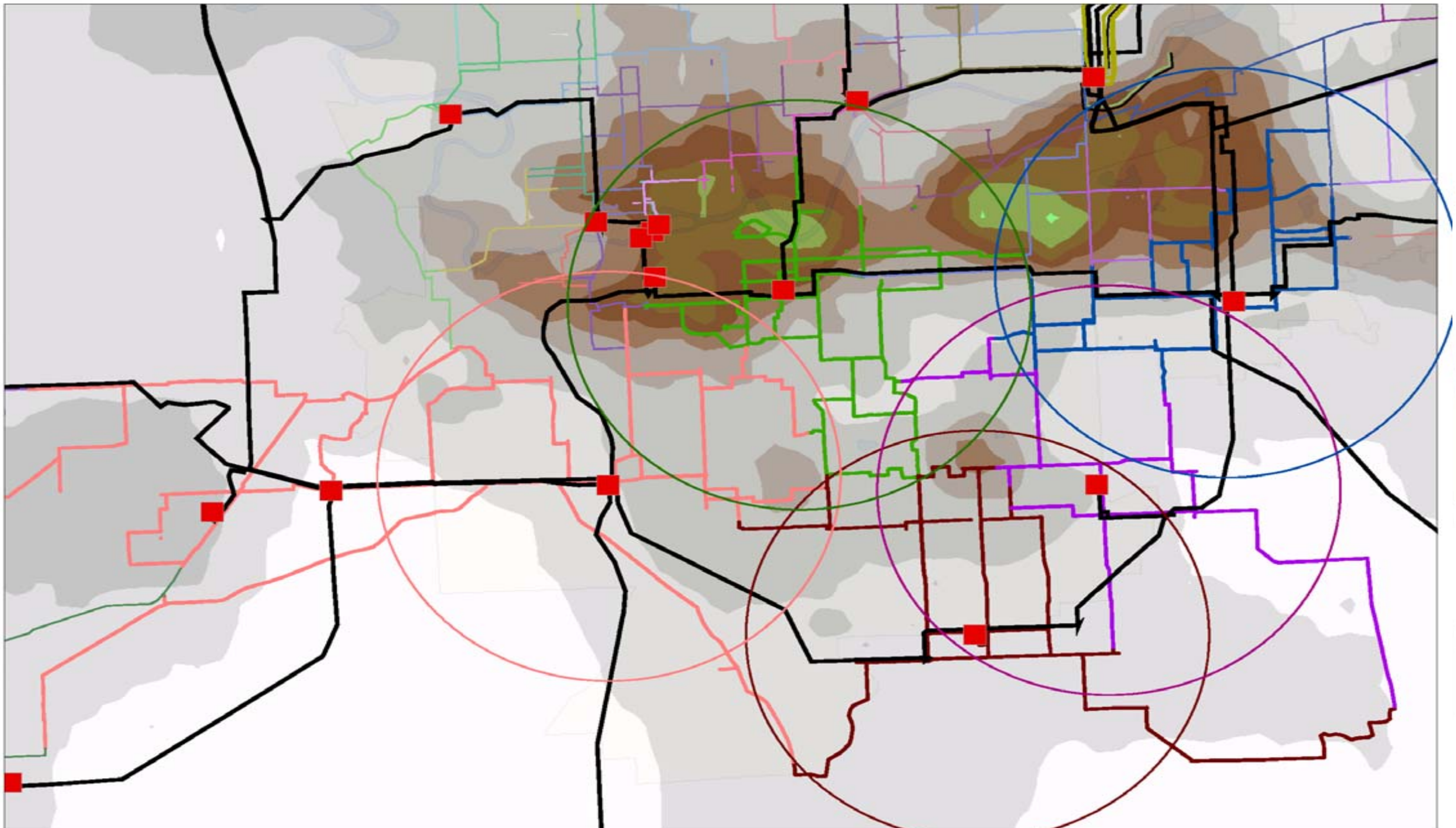
- Transmission topology
- Transmission archetypes



AVISTA

Transmission Efficiency Initiatives

- Transmission topology
- Transmission archetypes



AVISTA

Preferred Resource Strategy- DRAFT

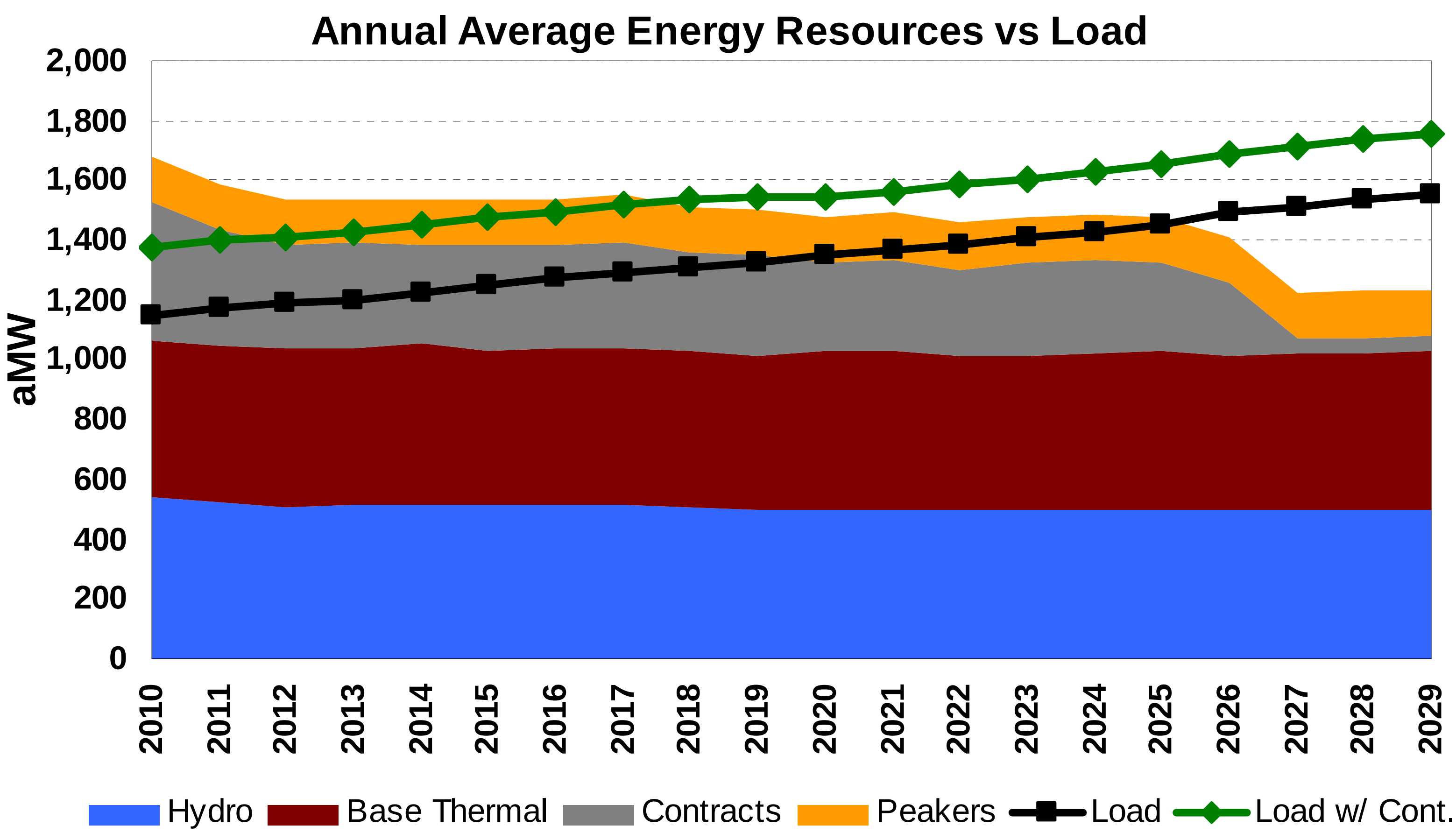
James Gall

2009 Electric Integrated Resource Plan

Fourth Technical Advisory Committee Meeting

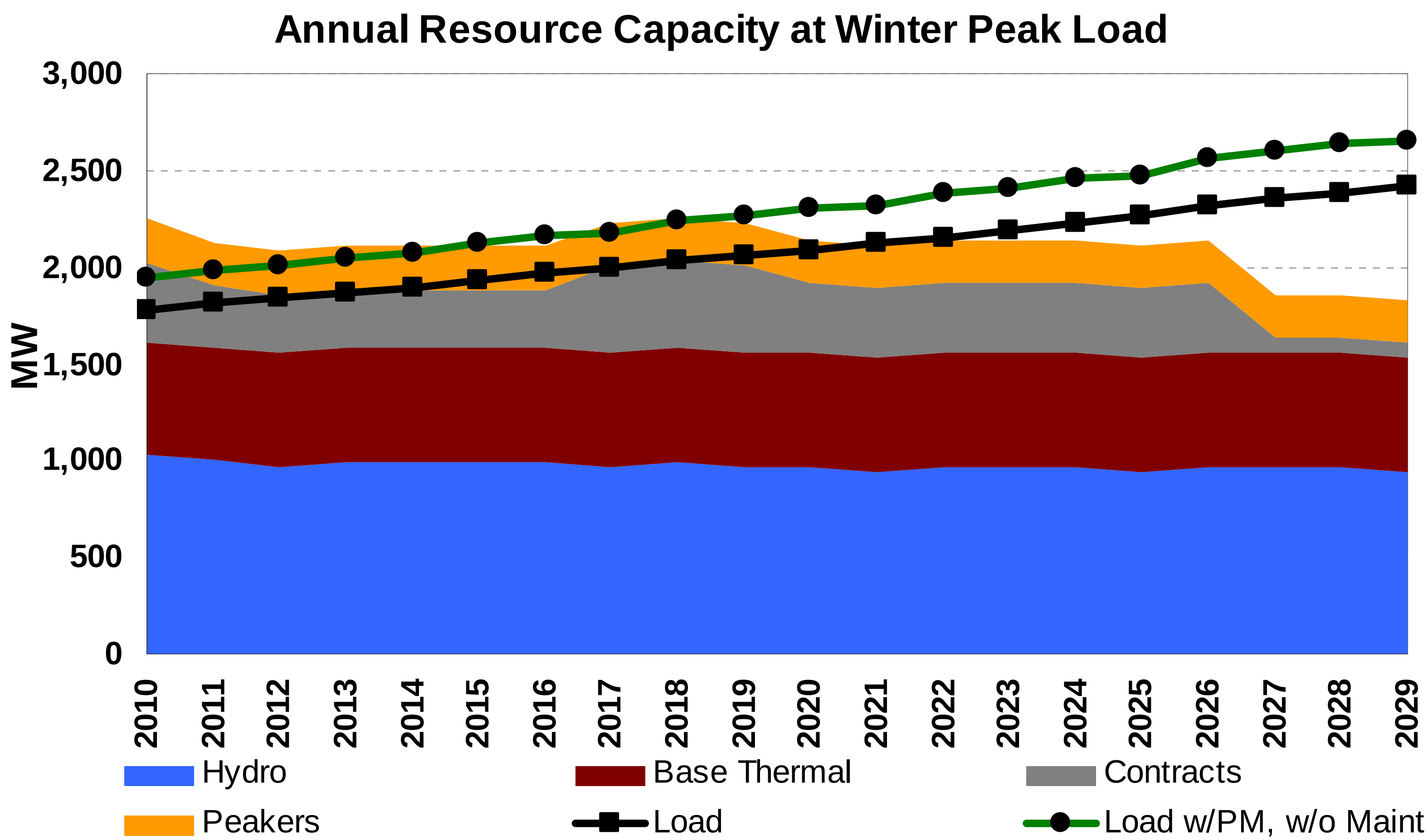
January 28, 2009

Resource Needs (Energy)



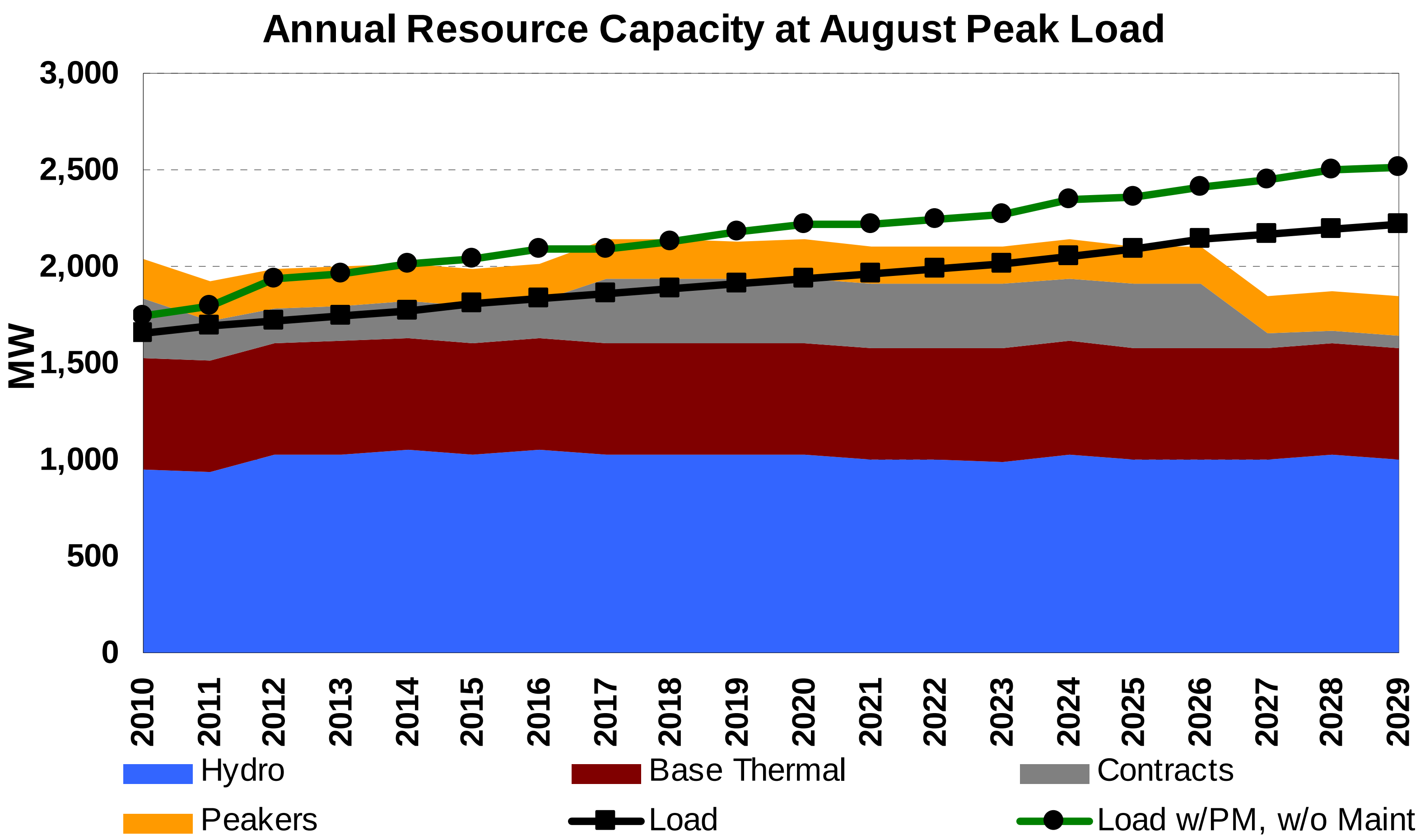
Load is net 2007 Conservation Levels

Resource Needs (Winter Capacity)



Load is net 2007 Conservation Levels

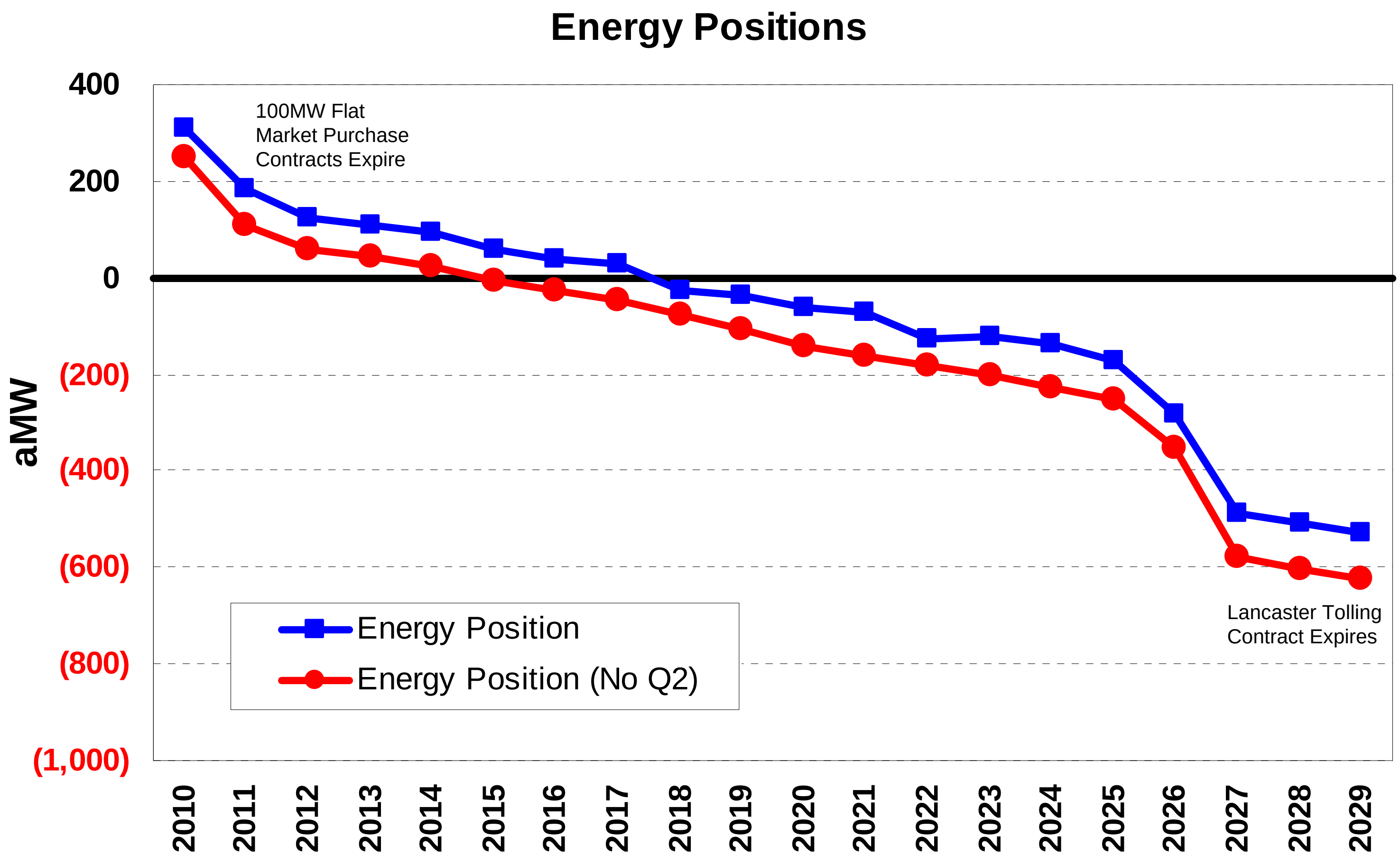
Resource Needs (Summer Capacity)



Load is net 2007 Conservation Levels

AVISTA

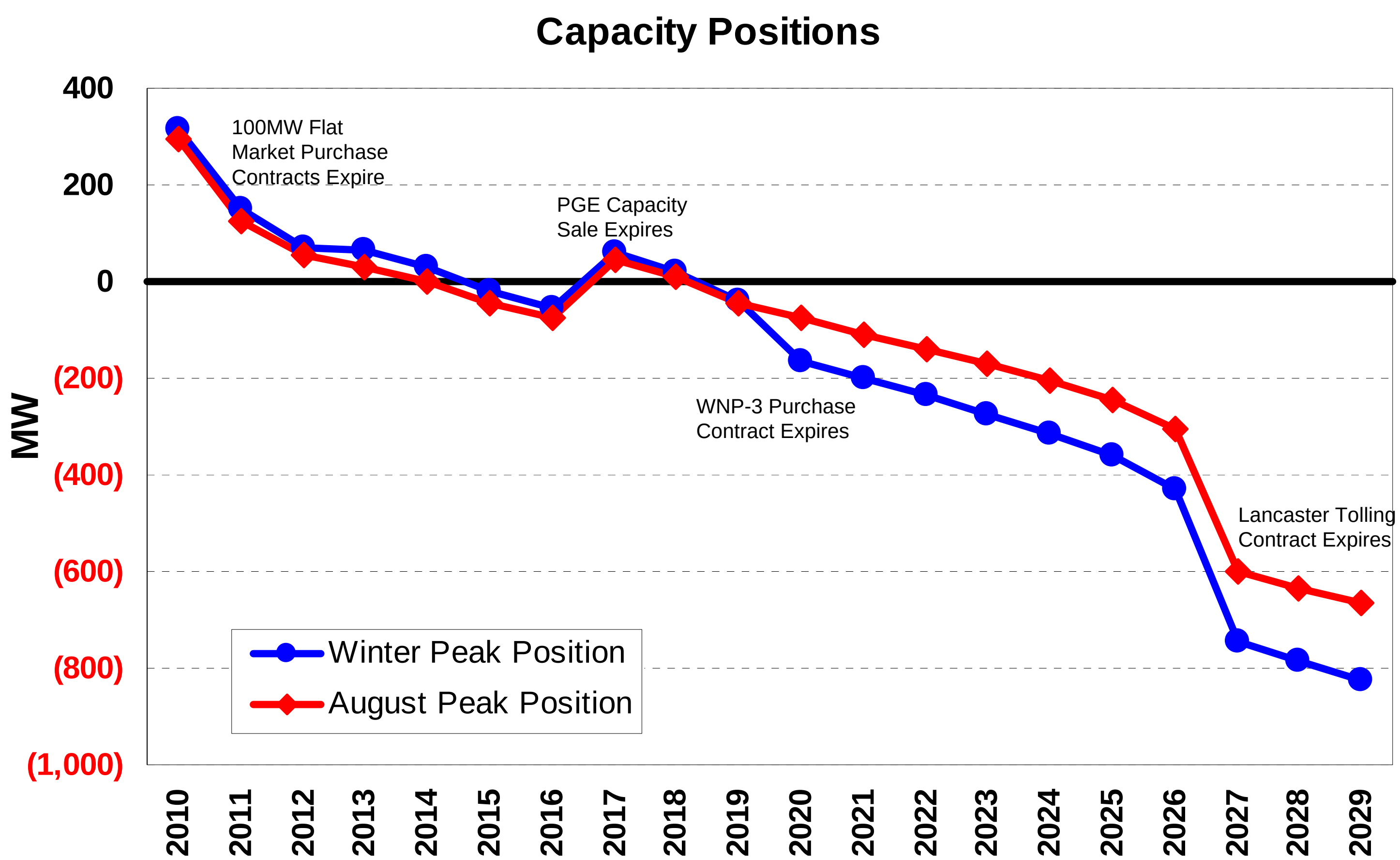
Resource Needs (Energy)



Net 2007 Conservation Levels

AVISTA

Resource Needs (Capacity)



Net 2007 Conservation Levels

PRiSM Objective Function

- Linear program solving for the optimal resource strategy to meet resource deficits over planning horizon.
- Model selects its resources to reduce cost, risk, or both.

Minimize: Total Power Supply Cost on NPV basis (2010-2050 with emphasis on first 11 years of the plan

Subject to:

- Risk Level
- Capacity Need +/- deviation
- Energy Need +/- deviation
- Renewable Portfolio Standards
- Resource Limitations and Timing
- Greenhouse Gas Limits

PRiSM Data Requirements

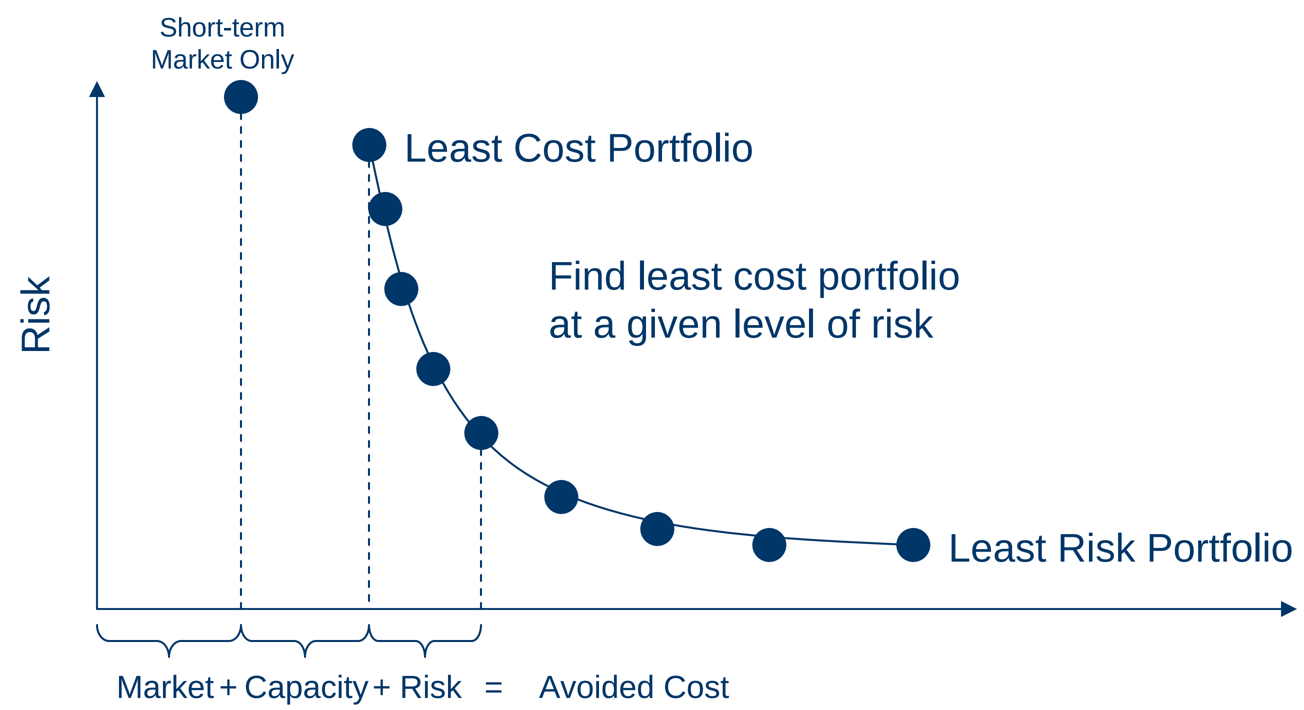
- Expected load & resource balance for next 20 years
- 20 year by 250 iteration matrix of resource values
  - Avista's current resource portfolio cost
  - Each new resource alternatives market value (electric price less fuel costs, variable O&M, and emissions costs)
  - Existing resource market value
- Conservation estimates
- Generation capital costs, fixed operating costs, transmission costs, revenue requirements
- Availability assumptions (size, when, where)

PRiSM New Enhancements

- Resources selections must be blocks of resources such as 50 MW wind, 75 MW SCCT, 125 MW CCCT (half unit)
- Use more precise method to estimate frontier curve
- Meets both summer & winter capacity requirements
- Ability to account for greenhouse gas levels
- More accurate ability to take into account post IRP time period
- Ability to retire resources *(used for sensitivity analysis only)*
- Higher cost conservation measures can be selected by the model *(available for final draft)*

Efficient Frontier

- Demonstrates the trade off of cost and risk
- Avoided Cost Method

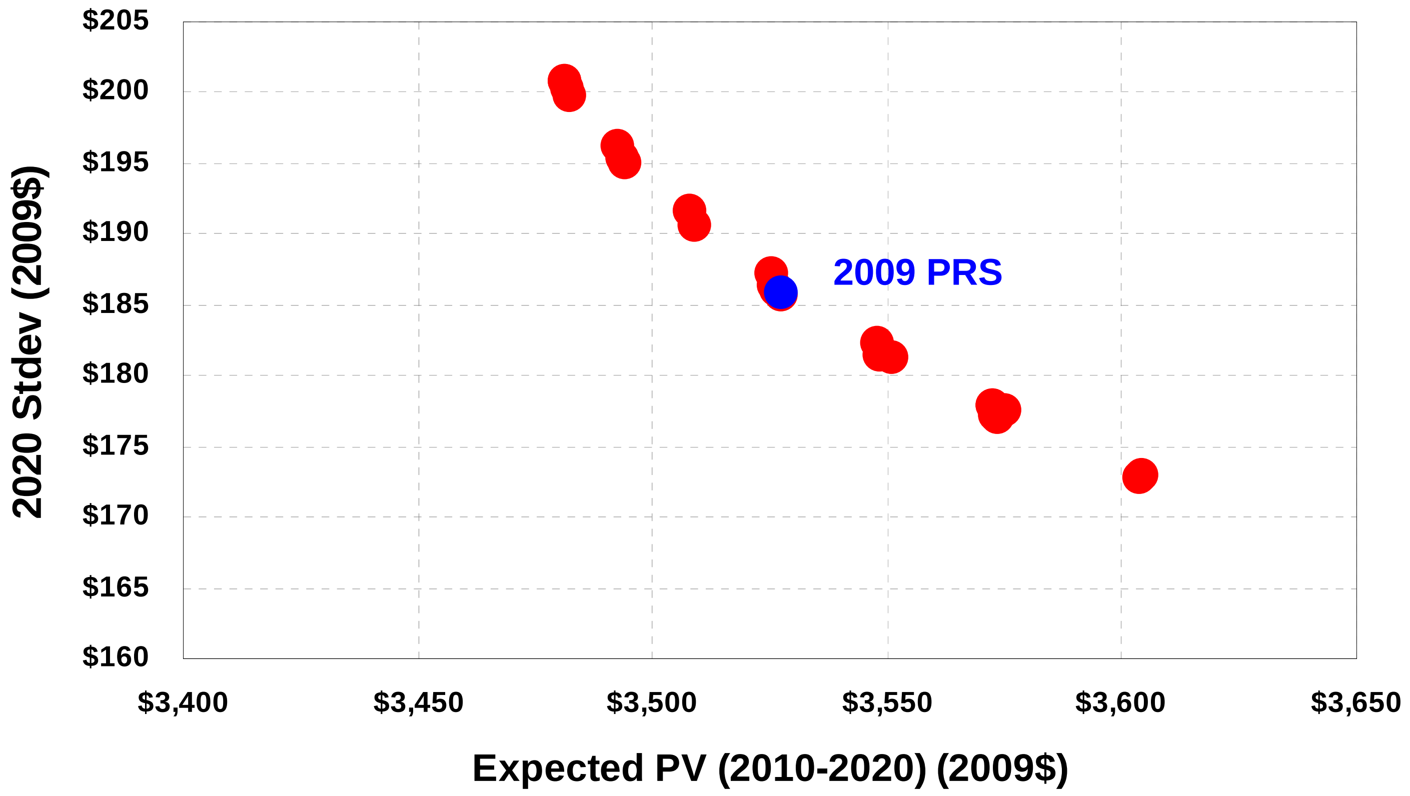


Portfolio Scenarios

1) Base Case
2) Case 1 + Small Renewable as Options
3) Case 2 + Large Hydro Upgrades as Options

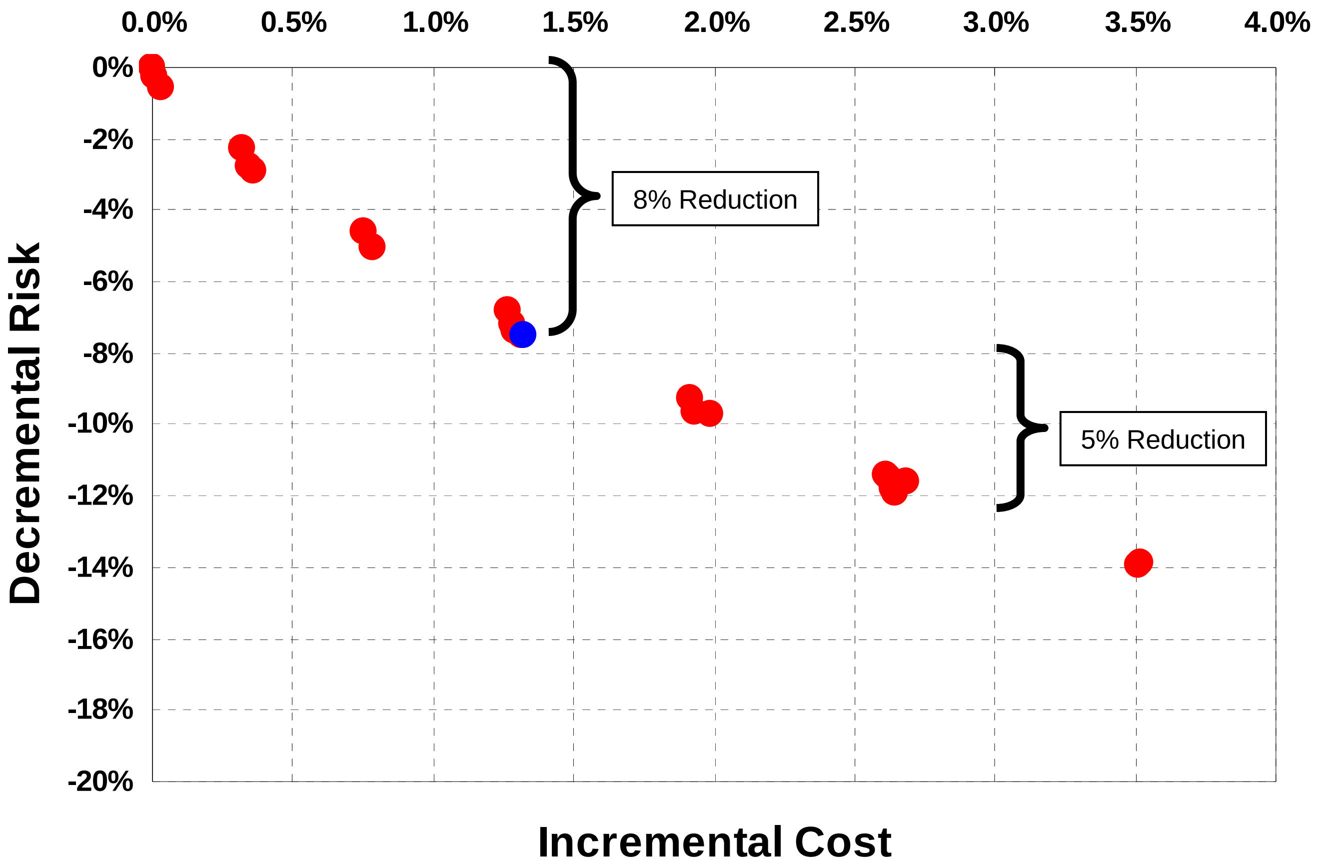
AVISTA

Efficient Frontier (millions)



AVISTA

Change From Least Cost Portfolio



AVISTA

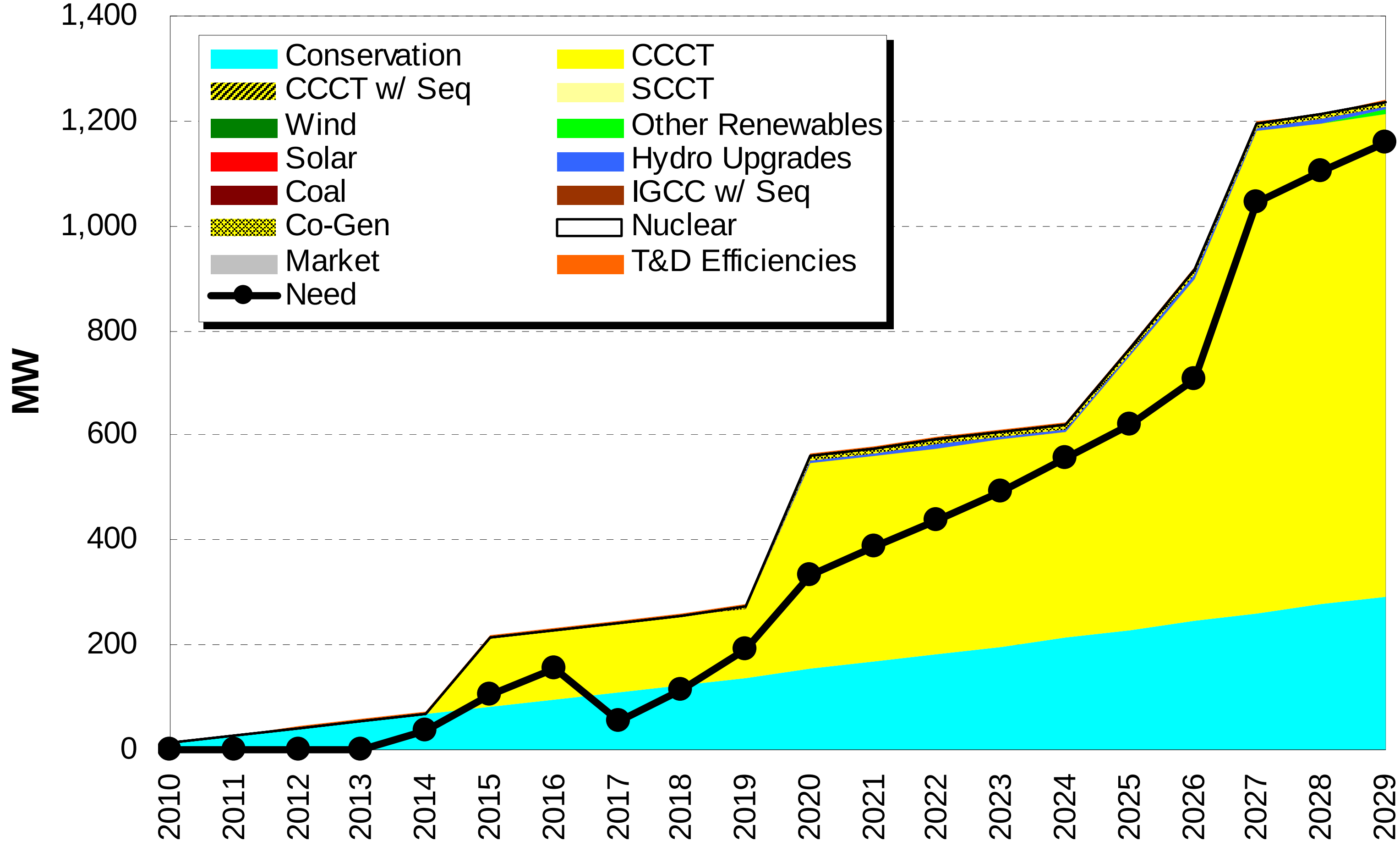
Preferred Resource Strategy (2020-2029

DRAFT- Base Case

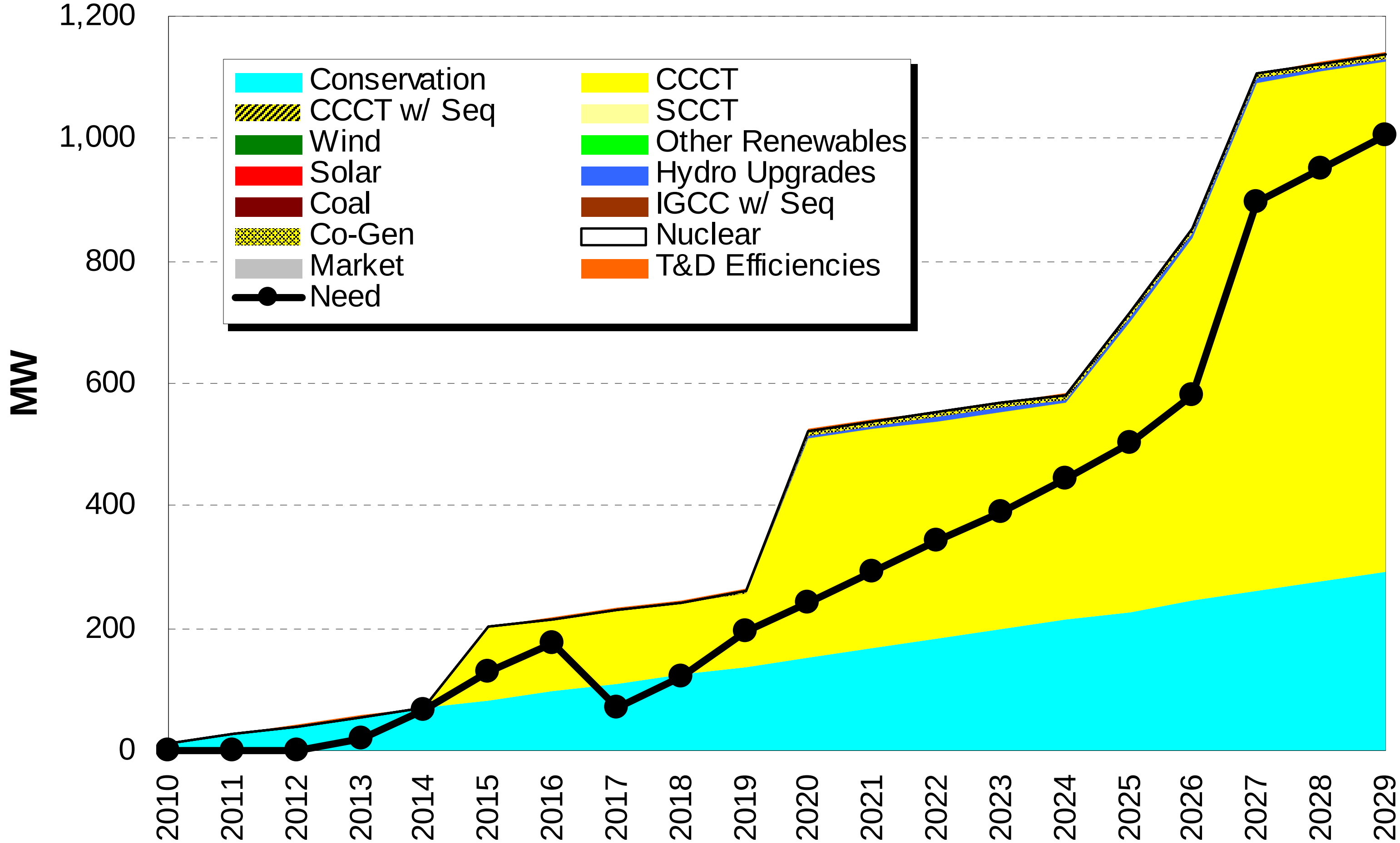
Year	CCCT	SCCT	Reardan	Wind	Other Renew	Solar	Hydro Upgrades	Coal	IGCC w/ Seq	Co-Gen	DSM	T&D	Total	Cumulative
2010											7.8	1.0	8.8	8.8
2011											7.9	1.0	8.9	17.6
2012			50.0								8.0	1.0	59.0	76.6
2013				100.0							8.2	1.0	109.2	185.8
2014											8.3	1.0	9.3	195.1
2015	125.0						1.0				8.4	1.0	135.4	330.5
2016											8.6		8.6	339.1
2017							1.0				8.7		9.7	348.8
2018				100.0							8.9		108.9	457.7
2019				100.0						2.5	9.0		111.5	569.2
2020	250.0			100.0			4.0			5.0	9.2		368.2	937.3
2021											9.3		9.3	946.7
2022											9.5		9.5	956.1
2023											9.6		9.6	965.8
2024											9.8		9.8	975.6
2025	125.0										10.0		135.0	1,110.6
2026	125.0										10.1		135.1	1,245.7
2027	250.0										10.3		260.3	1,506.0
2028				50.0							10.5		60.5	1,566.5
2029				100.0	7.0						10.7		117.7	1,684.2
2010-2019	125.0	-	50.0	300.0	-	-	2.0	-	-	2.5	83.7	6.0	569.2	
2010-2029	875.0	-	50.0	550.0	7.0	-	6.0	-	-	7.5	182.7	6.0	1,684.2	

“Yellow Light” conservation not modeled yet

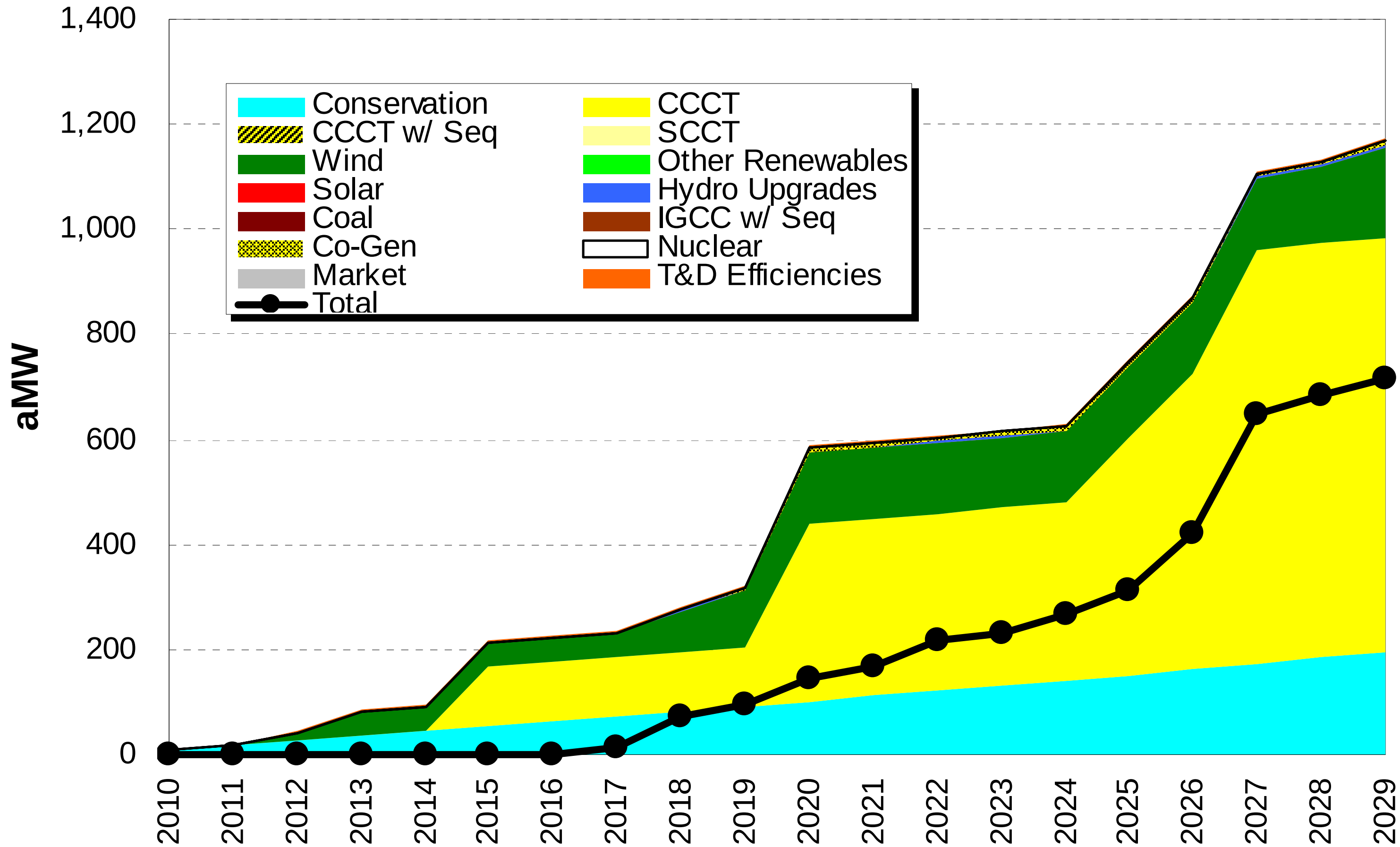
PRS: Winter Capacity



PRS: Summer Capacity

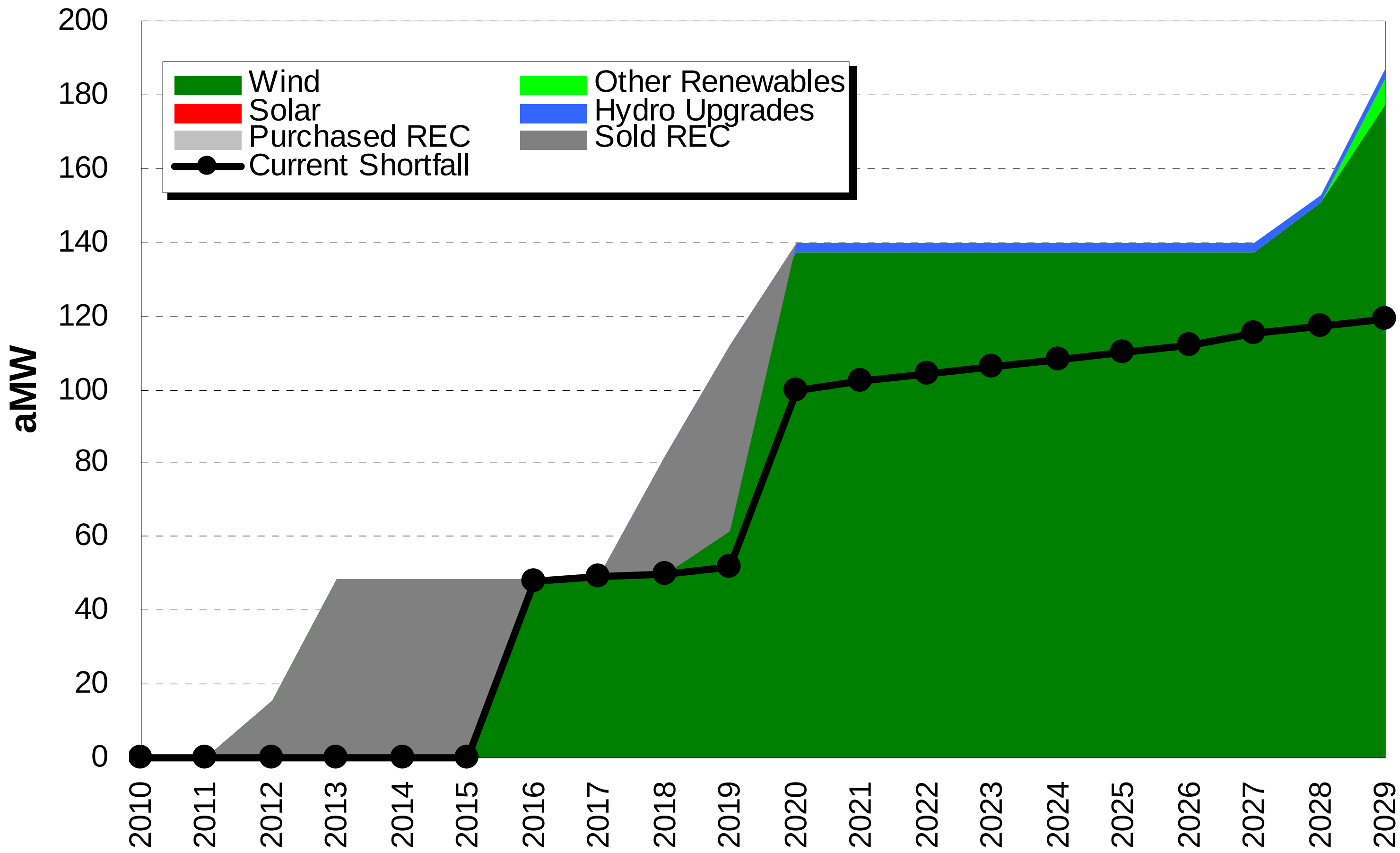


PRS: Annual Average Energy

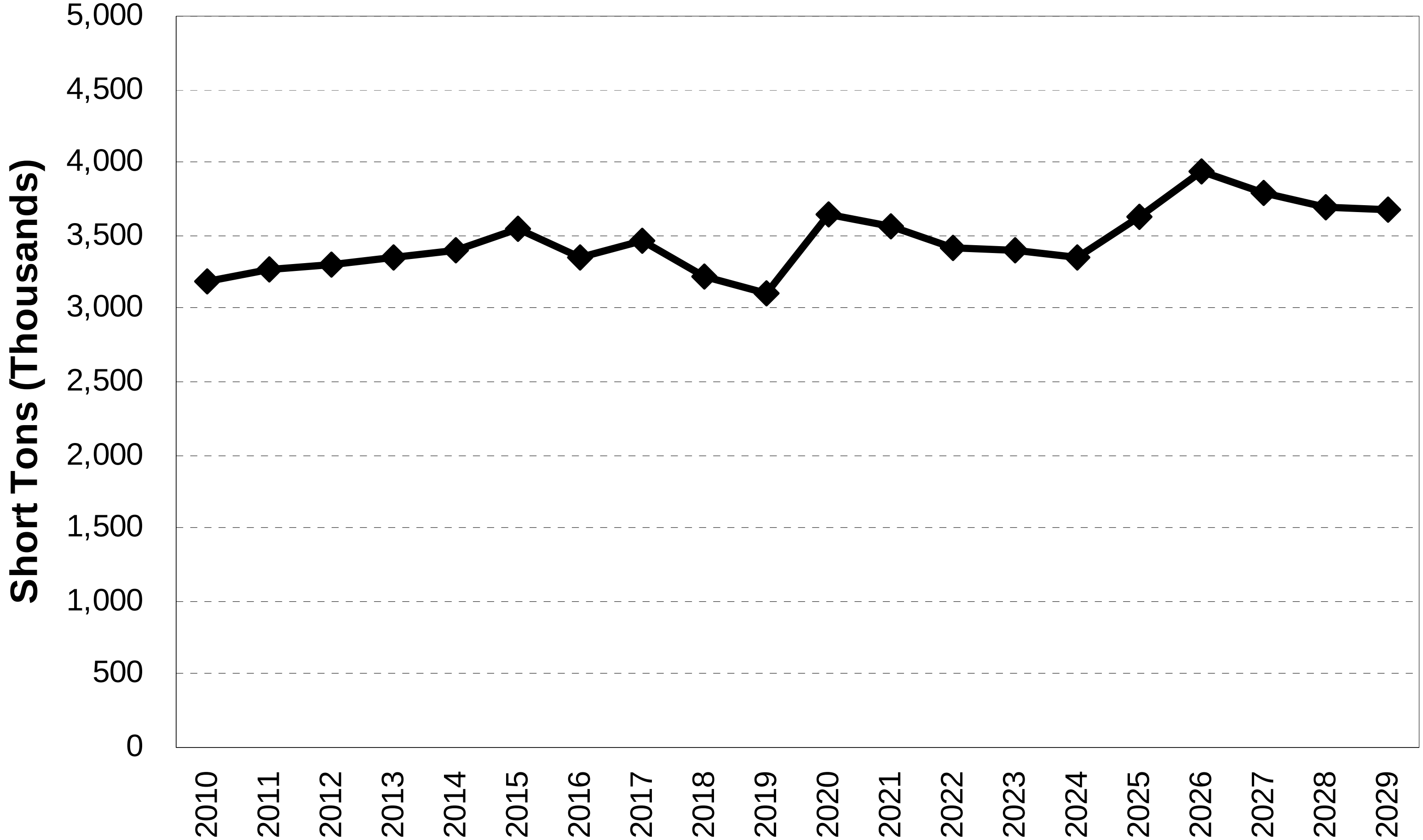


AVISTA

PRS: WA RPS Requirement

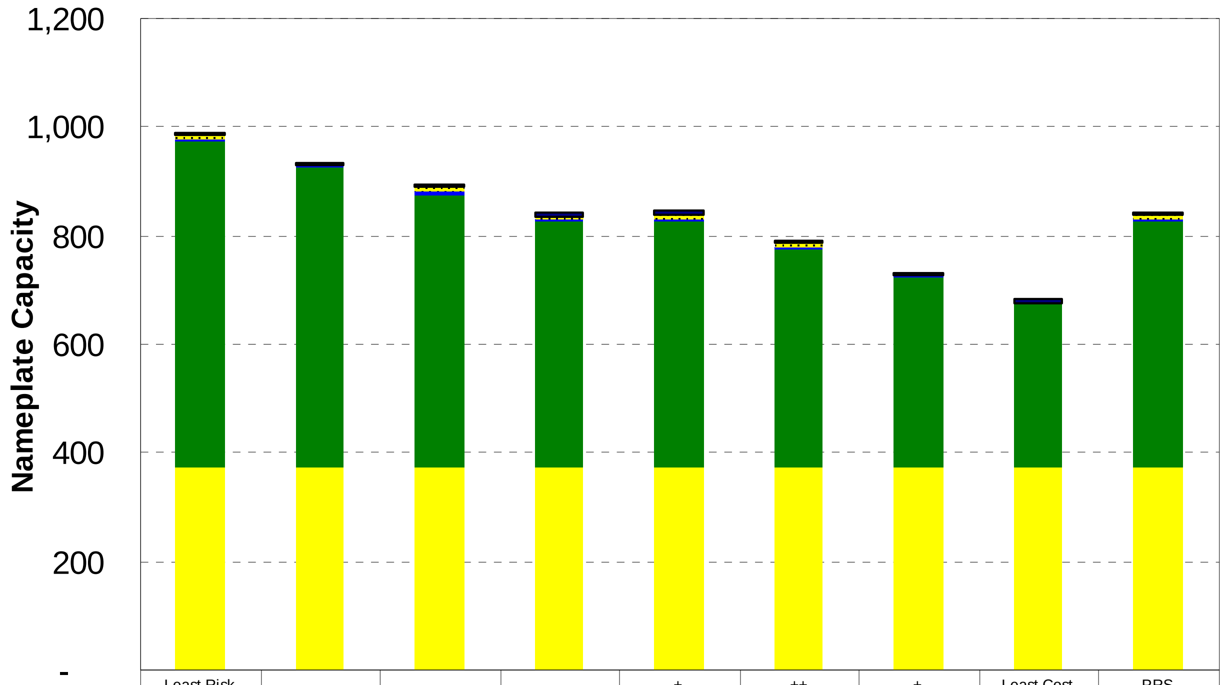


PRS: Greenhouse Gas Emissions



AVISTA

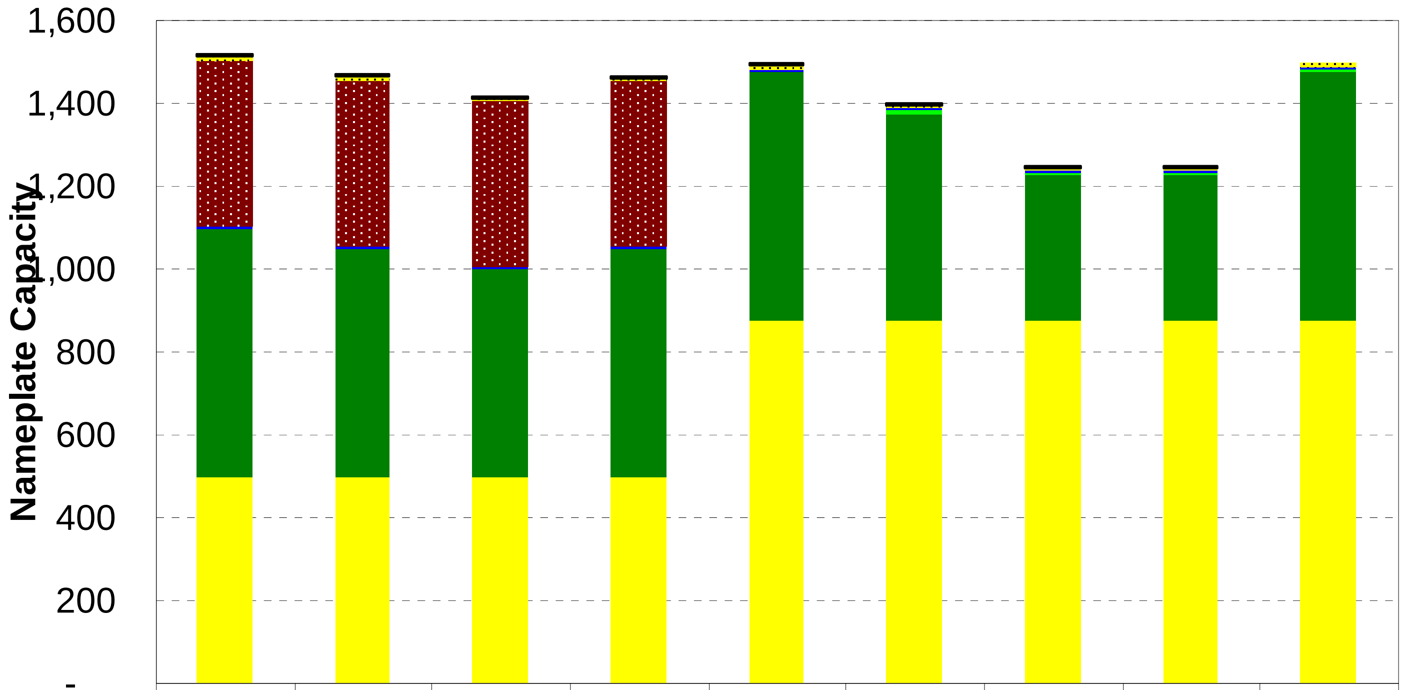
2020: Portfolios on the Efficient Frontier



	Least Risk	---	--	-	+	++	+	Least Cost	PRS
T&D Efficiencies	5	5	5	5	5	5	5	5	4
Co-Gen	5	-	8	5	8	8	-	-	8
IGCC w/ Seq	-	-	-	-	-	-	-	-	-
Coal	-	-	-	-	-	-	-	-	-
Hydro Upgrades	4	4	6	6	6	4	2	2	6
Solar	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	1	-	-	-	-
Wind	600	550	500	450	450	400	350	300	450
SCCT	-	-	-	-	-	-	-	-	-
CCCT	375	375	375	375	375	375	375	375	375

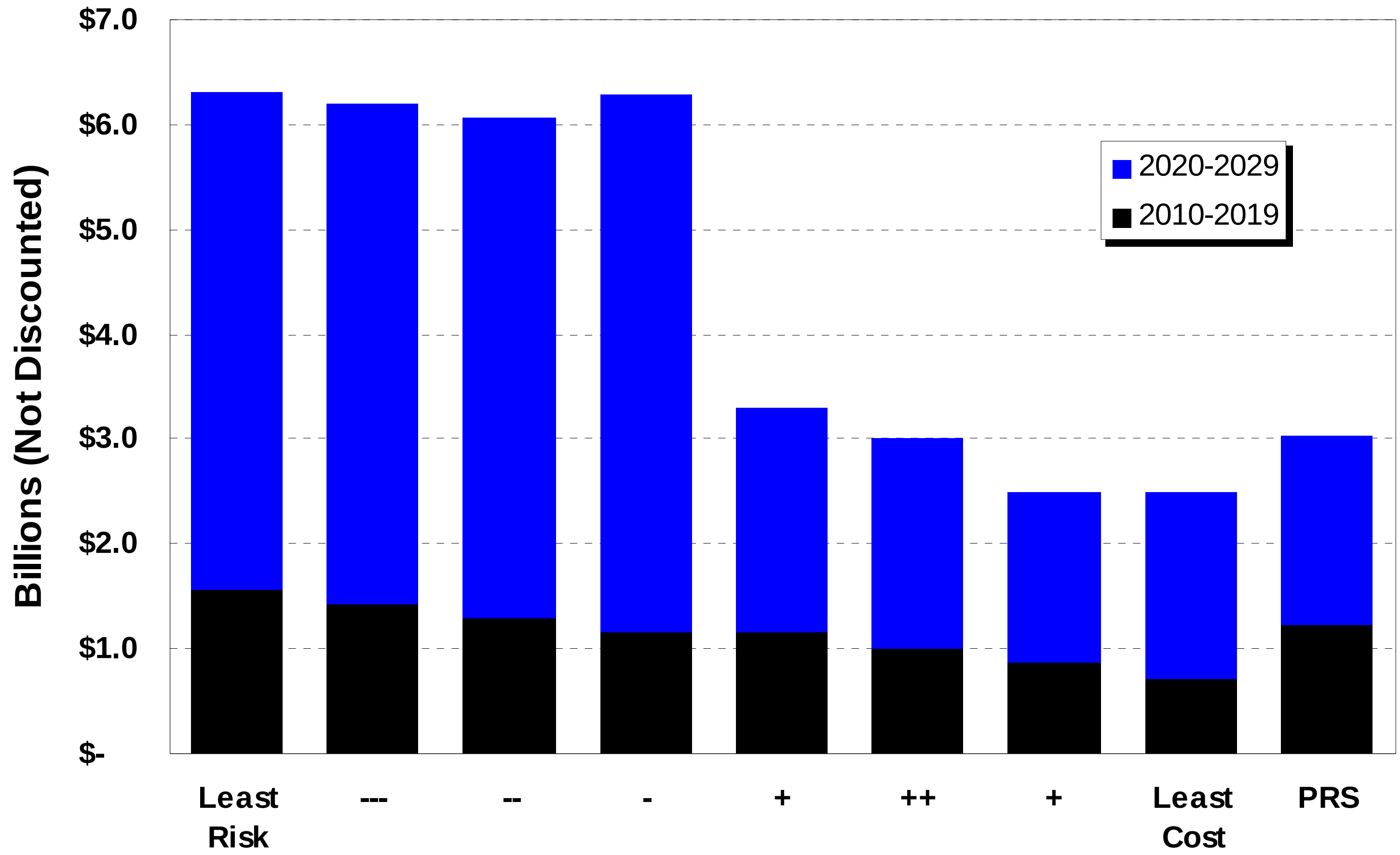
AVISTA

2029: Portfolios on the Efficient Frontier

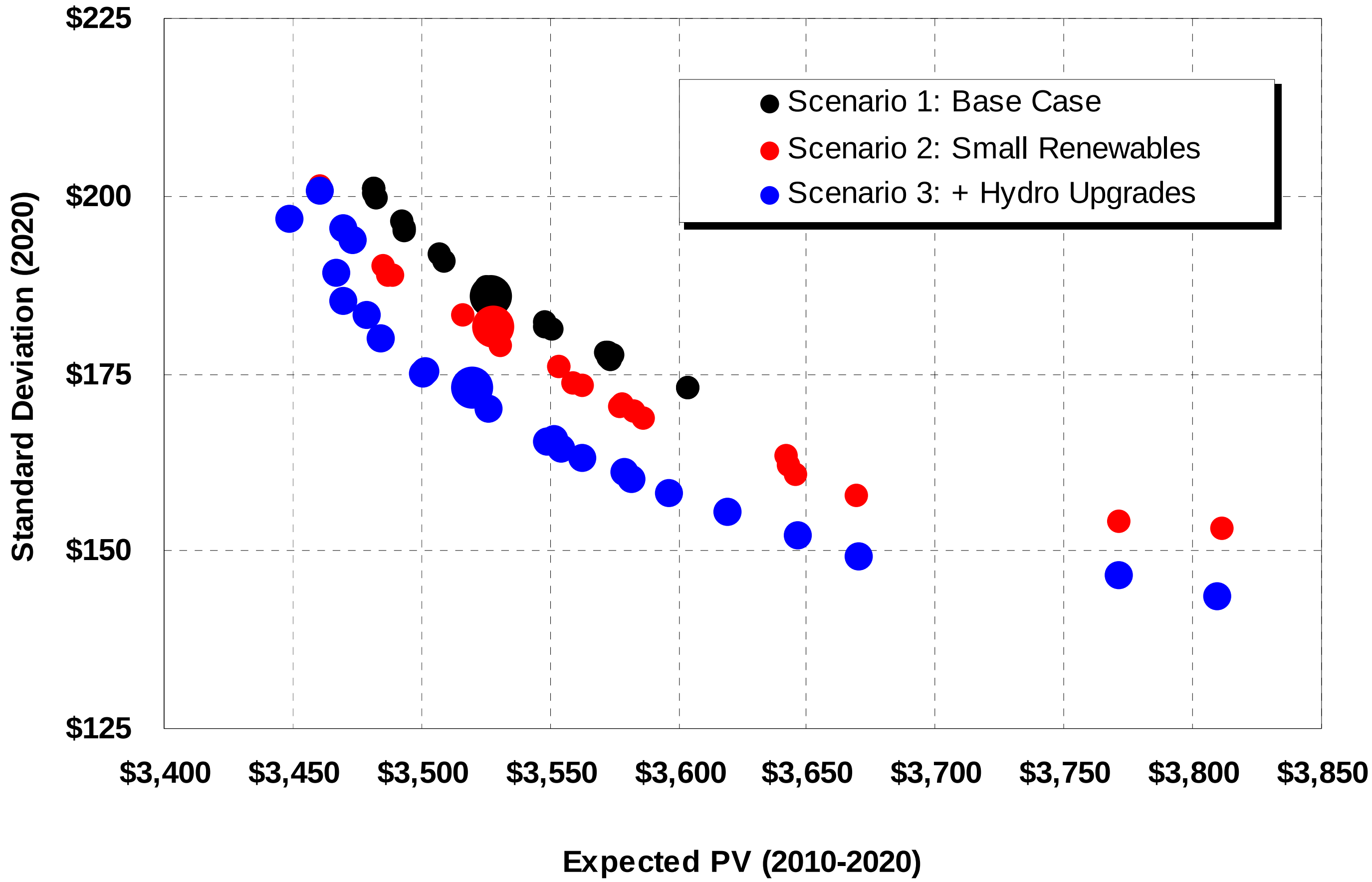


	Least Risk	---	--	-	+	++	+	Least Cost	PRS
T&D Efficiencies	5	5	5	5	5	5	5	5	4
Co-Gen	10	8	8	5	10	8	8	8	8
IGCC w/ Seq	400	400	400	400	-	-	-	-	-
Coal	-	-	-	-	-	-	-	-	-
Hydro Upgrades	4	6	6	6	6	5	5	5	6
Solar	-	-	-	-	-	-	-	-	-
Other Renewables	-	-	-	-	1	7	7	7	7
Wind	600	550	500	550	600	500	350	350	600
SCCT	-	-	-	-	-	-	-	-	-
CCCT	500	500	500	500	875	875	875	875	875

Efficient Frontier: Capital Requirements



Efficient Frontier Scenario Analysis



AVISTA

Scenario 2- Resource Selection

Small Renewables an Option

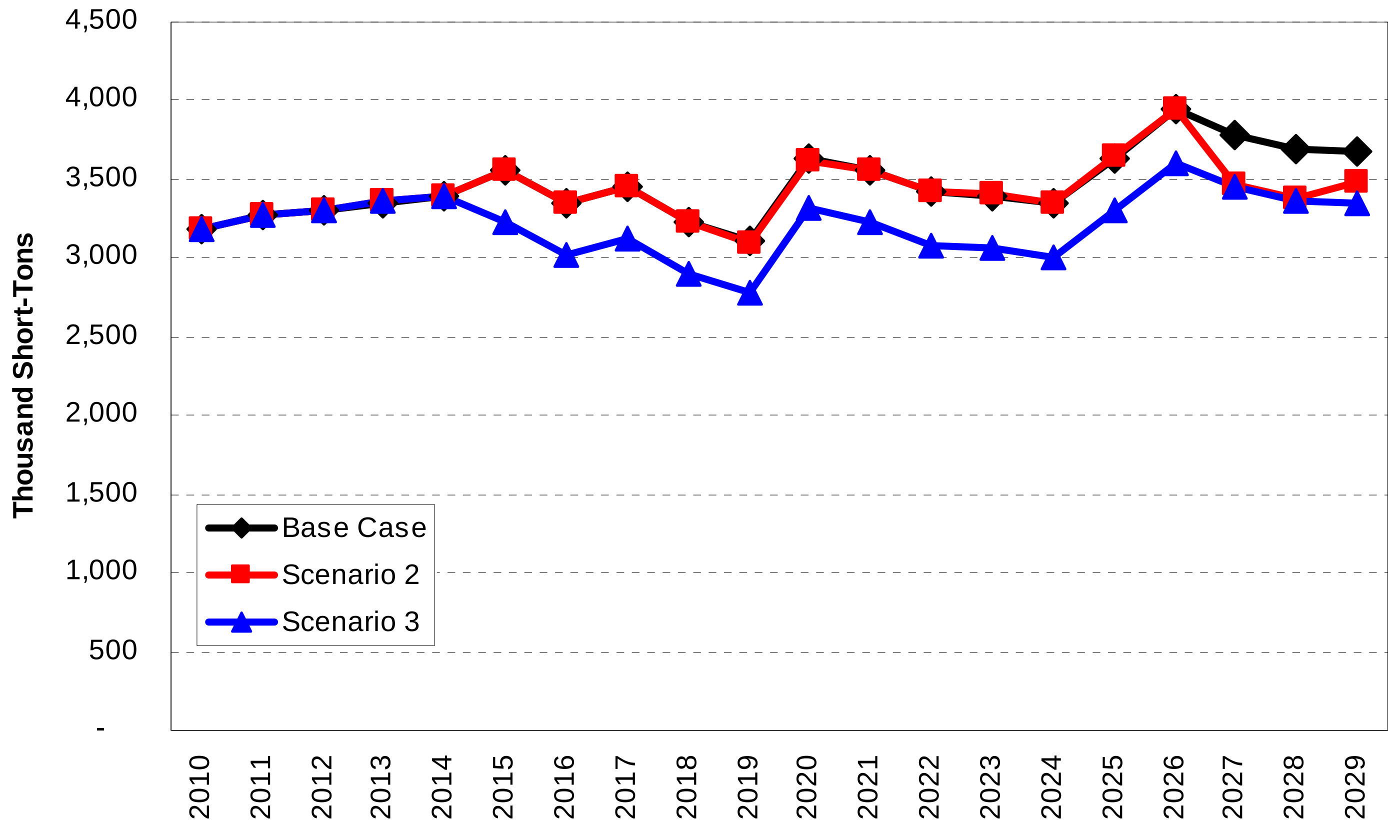
Year	CCCT	SCCT	Reardan	Wind	Other Renew	Solar	Hydro Upgrades	Coal	IGCC w/ Seq	Co-Gen	DSM	T&D	Total	Cumulative
2010											7.8	1.0	8.8	8.8
2011											7.9	1.0	8.9	17.6
2012					10.0						8.0	1.0	19.0	36.6
2013			50.0	50.0	5.0						8.2	1.0	114.2	150.8
2014											8.3	1.0	9.3	160.1
2015	125.0						1.0				8.4	1.0	135.4	295.5
2016					10.0						8.6		18.6	314.1
2017											8.7		8.7	322.8
2018				100.0	5.0						8.9		113.9	436.7
2019				100.0							9.0		109.0	545.7
2020	250.0			100.0		4.0	1.0				9.2		364.2	909.8
2021										5.0	9.3		14.3	924.2
2022							1.0			5.0	9.5		15.5	939.6
2023											9.6		9.6	949.3
2024											9.8		9.8	959.1
2025	125.0										10.0		135.0	1,094.1
2026	125.0										10.1		135.1	1,229.2
2027	125.0										10.3		135.3	1,364.5
2028											10.5		10.5	1,375.0
2029		100.0		100.0							10.7		210.7	1,585.7
2010-2019	125.0	-	50.0	250.0	30.0	-	1.0	-	-	-	83.7	6.0	545.7	
2010-2029	750.0	100.0	50.0	450.0	30.0	4.0	3.0	-	-	10.0	182.7	6.0	1,585.7	
2010-2019 (Delta)	-	-	-	(50.0)	30.0	-	(1.0)	-	-	(2.5)	-	-	(23.5)	
2010-2029 (Delta)	(125.0)	100.0	-	(100.0)	23.0	4.0	(3.0)	-	-	2.5	-	-	(98.5)	

Scenario 3- Resource Selection

Scenario 2 + Hydro Upgrades an Option

Year	CCCT	SCCT	Reardan	Wind	Other Renew	Solar	Hydro Upgrades	Coal	IGCC w/ Seq	Co-Gen	DSM	T&D	Total	Cumulative
2010											7.8	1.0	8.8	8.8
2011											7.9	1.0	8.9	17.6
2012					10.0						8.0	1.0	19.0	36.6
2013			50.0	50.0		4.0					8.2	1.0	113.2	149.8
2014						4.0					8.3	1.0	13.3	163.1
2015						4.0	60.0				8.4	1.0	73.4	236.5
2016					5.0		1.0				8.6		14.6	251.1
2017							1.0				8.7		9.7	260.8
2018				100.0							8.9		108.9	369.7
2019				100.0		4.0					9.0		113.0	482.7
2020	250.0			100.0		4.0	64.0			5.0	9.2		432.2	914.8
2021											9.3		9.3	924.2
2022											9.5		9.5	933.6
2023											9.6		9.6	943.3
2024											9.8		9.8	953.1
2025	125.0										10.0		135.0	1,088.1
2026	125.0										10.1		135.1	1,223.2
2027	250.0				5.0						10.3		265.3	1,488.5
2028				100.0							10.5		110.5	1,599.0
2029				100.0							10.7		110.7	1,709.7
2010-2019	-	-	50.0	250.0	15.0	16.0	126.0	-	-	-	83.7	6.0	482.7	
2010-2029	750.0	-	50.0	550.0	20.0	20.0	126.0	-	-	5.0	182.7	6.0	1,709.7	
2010-2019 (Delta)	(125.0)	-	-	(50.0)	15.0	16.0	124.0	-	-	(2.5)	-	-	(86.5)	
2010-2029 (Delta)	(125.0)	-	-	-	13.0	20.0	120.0	-	-	(2.5)	-	-	25.5	

Greenhouse Gas Scenario Comparison



Next Steps

- Add “Yellow Light” conservation projects as resource options
- Perform capital cost sensitivity analysis
- Study portfolios with renewable requirement changes
  - Resource Availability
  - National RPS
  - Higher WA state RPS target
- Study portfolio options with alternative market futures
- Test “Preferred Resource Strategies” against market scenarios
- Further evaluate large hydro upgrades

Avista's 2009 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 5 Agenda

March 25, 2009

	Topic	**Time**	**Staff**
1.	Introduction	9:30	Storro
2.	Conservation	9:35	Hermanson
3.	Lunch	11:30	
4.	Preferred Resource Strategy	12:30	Gall
5.	Scenarios and Futures	1:30	Gall/Lyons
6.	2009 IRP Topics	2:30	Lyons
7.	Adjourn	3:00	

DSM in the 2009 Electric IRP

Technical Advisory Committee Meeting

Lori Hermanson

March 25, 2009

Presentation Highlights

- DSM History
- Overview of DSM
  - What, why, how and who of DSM
- Customer segments reached and offerings
- Messaging and outreach through EveryLittleBit and Website
- Tariff Rider Funding
- Metrics
- Stakeholders
- 2008 Results and 2009 Focus
- Integration of DSM into IRP
- Business planning to program development

Brief DSM History

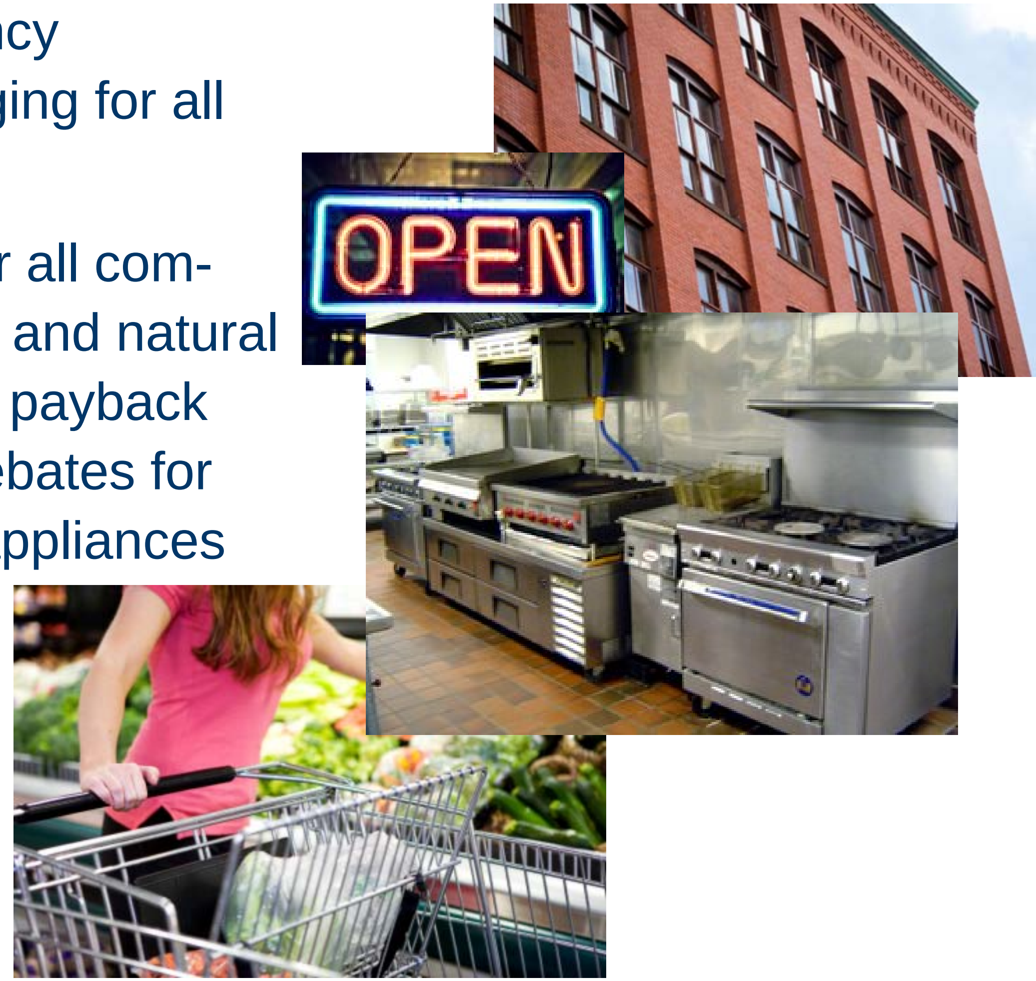
- Offered DSM since 1978
  - Energy exchanger – converted over 20,000 homes from electric to natural gas for space and water
  - Pioneered the country's first system benefit charge for energy efficiency in 1995
  - Immediate conservation response to 2001 Western energy crisis through expanded programs and enhanced incentives
    - – Tripled annual savings at twice the cost
  - During the past 30 years, we acquired 138.5 aMW of energy savings
    - – 109 aMW still online

What We Do

Deep and broad energy efficiency programs with strong messaging for all customers.

We provide financial rebates for all commercial and industrial electric and natural gas savings measures with a payback over one year and we offer rebates for weatherization and efficient appliances as well as low-cost/no-cost tips.

We provide renewable options and are testing end-use demand response pilots.



Why We Do It

Acquire lower cost resources to benefit all customers (IRP implementation)

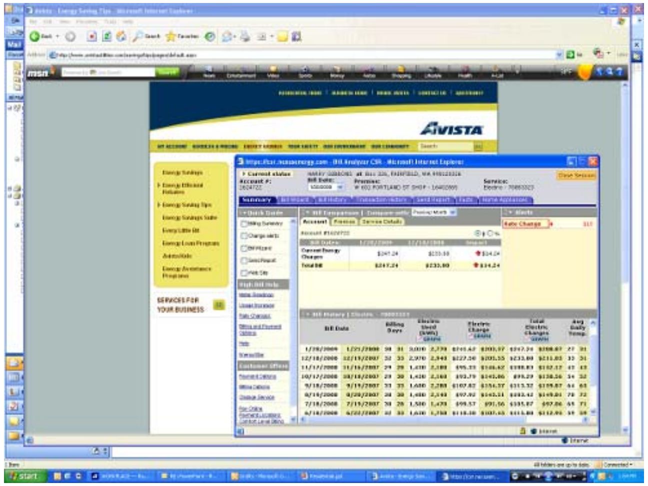
Customer assistance

- Reduction in customers' bills
- Gives customers some control in a higher energy cost environment

Regulatory obligation **<u>and</u>** sensibility

Reduced pressure on, or alternatives for, the capital budget

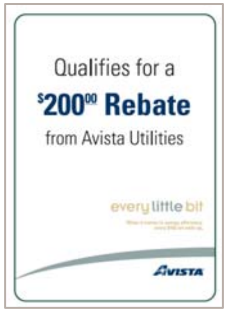
Carbon reduction and environmental focus



How We Do It

Pursue the Best Delivery Mechanisms for the Targeted Market

- ➢Standard Offers (“Prescriptive”) for residential & small commercial customers through mass marketing



- ➢Custom (“Site Specific”) for C&I customers with one point of contact through our Account Executive Team
- ➢Low Income through community action agencies
- ➢Regional through the NW Energy Efficiency Alliance
- ➢Special projects—RFPs, Pilot Programs, etc.
- ➢Promotion of Codes and Standards

SNAP
Spokane Neighborhood Action Programs

NORTHWEST ENERGY EFFICIENCY ALLIANCE

Who Does It

Program Managers and Coordinators →

- Catherine Bryan
- Renee Coelho
- Leona Doege
- Chris Drake
- Camille Martin
- Lisa McGarity
- Debby Reid
- Kerry Shroy
- Greta Zink

Analytical Group →

- Jon Powell
- Lori Hermanson

Engineering Team →

- Tom Lienhard
- Mike Dillon
- Damon Fisher
- Carlos Limon
- Ron Welch

Administration →

- Pat Lynch
- Bruce Folsom
- Rachelle McGrath

Students →

- Virginia Luka
- Rachael Roig
- Nate Thompson
- Kayla Trabun

Who Does It (cont.)

<<<Site Specific: **Account Executive Team**

Prescriptive: **Marketing Team**>>>

Contact Center assists customers with energy efficiency information

Corporate Communications provides earned media expertise

Community Relations partners with education and community involvement

State and Federal Regulation Department assists with PUC filings and communications

C/I Energy Efficiency Site Specific

Avista Customer
Summary of Proposed
Energy Efficiency Measures
Listed in order of Simple Payback

- Custom Projects
- Technical Assistance
- Free Energy Audits and Analysis
- Design Review
- Cash Incentives

Option No.	Brief EEM Description	EEM Cost	Electric kWh Savings	Demand kW Savings	Nat. Gas Therm Savings	Energy Cost Savings	Simple Payback before incentive	Potential Incentive	**Simple Payback After Incentive**
1	Site Lighting Retrofit	**$179,335**	**519,441**	76	**(4,014)**	**$33,206**	**5.4 yrs**	**$ 62,333**	**3.5 Years**
2	Warehouse Heater replacement	**$53,395**	-	-	**2,665**	**$2,804**	**19.0 yrs**	**$ 7,995**	**16.2 yrs**
3	Roof insulation	**$180,000**	-	-	**7,742**	**$8,146**	**22.1 yrs**	**$ 23,226**	**19.2 yrs**
4	Office HVAC retrofits	**$404,240**	**93,842**	-	**6,069**	**$11,893**	**34.0 yrs**	**$ 21,961**	**32.1 yrs**

Scope of Work:

- The above incentives are based on information provided by vendor. The costs for the insulation were based on $1.50 per square foot. Any higher costs will need verification, but may increase the incentive.
- The warehouse HVAC system change is based on a building model using a warehouse setting and the insulation having already been complete.
- The office HVAC changes are based on the complete sq.ft. of the office space increasing SEER/EER values to new construction standards and a slight increase in AFUE for heating.
- All reports are attached.

C/I Energy Efficiency Prescriptive

Standard Offer Programs

- Measures that have relatively uniform savings
- Pre-determined amount
- Streamlined approach
- Marketability
- Ease of understanding for customers and contractors

Avista Utilities Commercial Lighting Table

Please complete this Lighting Table and submit with Incentive Agreement and copies of invoices. The incentive will be applied to the installed fixture count unless the initial (prior) fixture count is less. In that case, the prior fixture count will be the basis for calculating the eligible incentive.

Existing Equipment	Existing Quantity	New Equipment Installed	Installed Quantity (units)	Per Unit Incentive	Total Incentive
2-Foot Fluorescent Fixtures					
2-Lamp T12 U-Lamp	______ fixtures	T8 U-Lamp or 2-Lamp F17 T8 Fixture/Retrofit	______ fixtures	$15	$______
4-Foot Fluorescent Fixtures					
4-Lamp T12 Fixture	______ fixtures	4-Lamp T8 Fixture/Retrofit	______ fixtures	$25	$______
4-Lamp T12 Fixture	______ fixtures	3-Lamp T8 Fixture*/Retrofit	______ fixtures	$40	$______
4-Lamp T12 Fixture	______ fixtures	2-Lamp T8 Fixture*/Retrofit	______ fixtures	$35	$______
3-Lamp T12 Fixture	______ fixtures	3-Lamp T8 Fixture/Retrofit	______ fixtures	$25	$______
3-Lamp T12 Fixture	______ fixtures	2-Lamp T8 Fixture*/Retrofit	______ fixtures	$30	$______
2-Lamp T12 Fixture	______ fixtures	2-Lamp T8 Fixture/Retrofit	______ fixtures	$15	$______
2-Lamp T12 Fixture	______ fixtures	1-Lamp T8 Fixture*/Retrofit	______ fixtures	$20	$______
1-Lamp T12 Fixture	______ fixtures	1-Lamp T8 Fixture/Retrofit	______ fixtures	$15	$______
8-Foot Fluorescent Fixtures					
4-Lamp T12 (or 2-Lamp HO) Fixture	______ fixtures	4-Lamp (or 2-Lamp HO) T8 Fixture/Retrofit	______ fixtures	$50	$______
2-Lamp T12 Fixture	______ fixtures	2-Lamp T8 Fixture/Retrofit (8' or 4' Lamps)	______ fixtures	$30	$______
1-Lamp T12 Fixture	______ fixtures	1-Lamp T8 Fixture/Retrofit (8' or 4' Lamps)	______ fixtures	$20	$______
2-Lamp T12 HO or VHO Fixture	______ fixtures	4-Lamp T5 High-Output Fixture/Retrofit	______ fixtures	$85	$______
HID Lighting (Metal Halide, High Pressure Sodium, Mercury Vapor)					
400 watt HID Fixture	______ fixtures	4-Lamp T5 High-Output Fixture	______ fixtures	$125	$______
400 watt HID Fixture	______ fixtures	6-Lamp T5 High-Output Fixture	______ fixtures	$90	$______
400 watt HID Fixture	______ fixtures	6-Lamp T8 Fixture (4-Foot Lamps)	______ fixtures	$125	$______
400 watt HID Fixture	______ fixtures	8-Lamp T8 Fixture (4-Foot Lamps)	______ fixtures	$110	$______
400 watt HID Fixture	______ fixtures	200 Watt Induction Fluorescent Fixture	______ fixtures	$220	$______
1000 watt HID Fixture	______ fixtures	(2) 6-Lamp T-5 High-Output Fixtures	______ fixtures	$320	$______
1000 watt HID Fixture	______ fixtures	400 Watt Induction Fluorescent Fixture	______ fixtures	$400	$______
Incandescents					
100 watt or less Incandescent	______ lamps	Compact Fluorescent Lamp (23 watt or Less Screw-In)	______ lamps	$3	$______
Over 100 watt to 200 watt Incandescent	______ lamps	Compact Fluorescent Lamp or Fixture (45 watt)	______ lamps	$15	$______
Over 200 watt Incandescent	______ lamps	Compact Fluorescent Lamp or Fixture (55-65 watt)	______ lamps	$25	$______
60 watt or greater Incandescent	______ lamps	Dimmable Compact Fluorescent or Cold Cathode**	______ lamps	$15	$______
100 watt or greater Incandescent flood	______ fixtures	Ceramic Metal Halide (25 watt)	______ fixtures/lamps	$35	$______
150 watt or greater Incandescent	______ fixtures	New Linear T8 Fluorescent Fixture	______ fixtures	$35	$______
Sign Lighting or Low Wattage Applications (Minimum Runtime Greater than 12 Hours Per Day)					
20-30 watt Incandescent	______ lamps***	LED or Low-Wattage Equivalent	______ lamps***	$15	$______
20-60 watt Incandescent	______ lamps	Cold Cathode	______ lamps/fixtures	$10	$______
Exit Signs					
Incandescent Exit Sign	______ exit sign	New LED Exit Sign	______ exit sign	$25	$______
Occupancy Sensors					
Manual Light Switch	______ sensors	Occupancy Sensor Controlling Less than 200-watts	______ sensors	$25	$______
Manual Light Switch	______ sensors	Occupancy Sensor Controlling Greater than 200-watts	______ sensors	$50	$______
Daylight Dimming (Applicable for lights that are no more than 20 feet from a window or skylight)					
No prior dimming control	______ fixtures	Individually Controlled Fixtures	______ fixtures	$25	$______
				Total Incentive	$______

*Reducing the number of lamps in a fixture may reduce light output. In order to achieve adequate light levels a specular reflector may be needed. Testing is encouraged prior to a comprehensive lighting retrofit. **Cold cathodes are only good for replacement of incandescents up to 65 watts.
***Incentive is per incandescent in original sign configuration. 3/08

C/I Prescriptive (Standard Offer) Programs

- Lighting
- Food Service Equipment
- PC Network Controls
- Premium Efficiency Motors
- Steam Trap Repair/ Replacement
- Demand Controlled Ventilation
- Side Stream Filtration
- Retro-Commissioning
- LEED Certification
- Vending Machine Controllers
- Refrigerated Warehouse
- Electric to Gas Water Heater Conversions
- Variable Frequency Drives
- Commercial Clothes Washers
- Energy Smart Grocer

Residential Prescriptive Offerings

- High efficiency equipment
- CFL lighting
- Refrigerator recycling
- Conversions from Straight Resistance
- Weatherization
- Rooftop dampers
- Ductless heat pump pilot
- UCONS Multi-family direct install
- www.everylittlebit.com (visit our house of rebates)

Limited Income Offerings

- Weatherization
- Windows/Doors
- Conversions
- Equipment Upgrades
- Health & Human Safety

Regional Programs (NEEA)

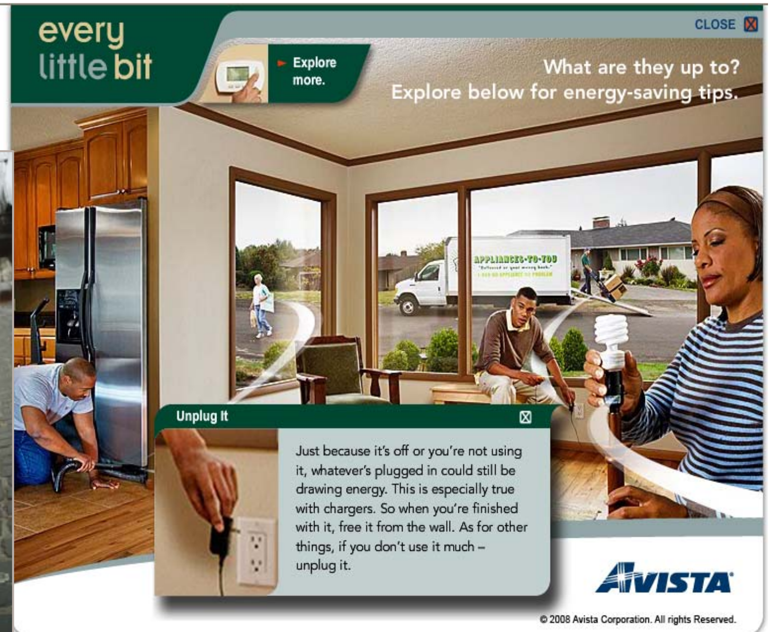
- Acquisition of electric efficiency through market transformation
- Funded by 5 IOUs, ETO, generating publics and BPA
  - Avista's portion – 3.94%
- Regional leaders are discussing expansion of efforts
  - Avista's portion will increase to 5.6%
  - Savings acquisition increase from 1.5 aMW to 2.94 aMW
- Historically been a cost-effective option to acquire resources
  - Levelized TRC cost of about 10 mills
  - Not necessarily representative of future costs

Messaging and Outreach: Every Little Bit

Market research done in 2007 found that Avista's customers believed they "were already efficiency, that energy efficiency is too expensive, and it doesn't make much difference."

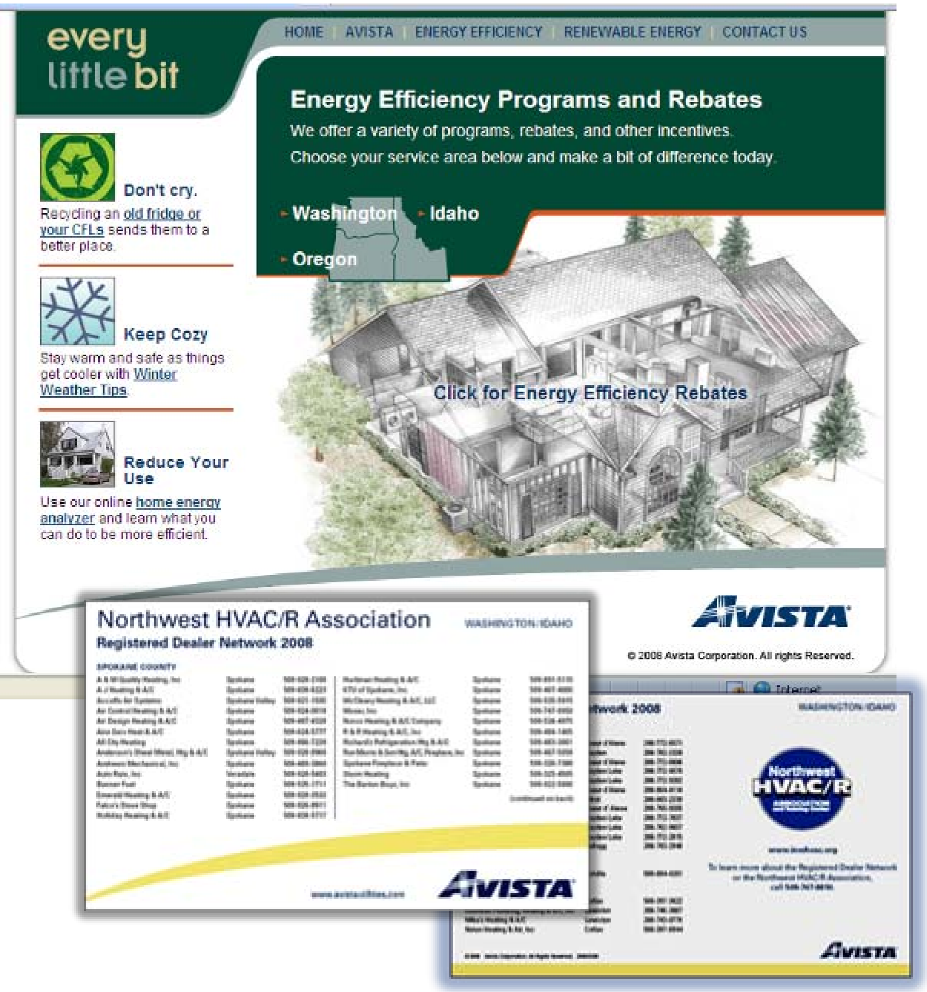
In response, the EveryLittleBit campaign was launched with a website, broadcast and print media, and collateral materials in a multi-channel, multi-year approach.

every little bit



AVISTA

Messaging and Outreach: Online Resources



- www.everylittlebit.com
- www.avistautilities.com
- Energy Saving Tips
- House of Rebates
- Downloadable Forms
- Energy Audit
- Bill Analyzer
- RDN Dealer List
- Efficiency Ave for Business – in process

Funding of Energy Efficiency Programs

DSM Tariff Rider

- A percentage of every dollar paid goes to energy efficiency
- Has multiple regulatory requirements for implementation

Provides for $23 million annual budget

Moving towards an annual “true-up”

First “System Benefit Charge” in North America in 1995

Continue to evaluate its efficacy and options

Potential Stimulus Funding

- Funding available for energy conservation and smart grid development
- Avista is currently evaluating possible programs that could be offered with additional funding from the stimulus bill
  - One possible project – regional smart grid pilot
    - Utility and non-utility sponsors
    - Scope includes everything from Advanced Metering Infrastructure (AMI), software and support, to demand response
    - Avista still considering participation but still has not committed to participation

Resource Portfolio Standards (RPS)

- Previously I-937, requires large utilities to obtain a fixed percentage of their electricity from qualifying renewable resources in addition to all cost-effective and acquirable energy conservation
  - 3% by 2012
  - 9% by 2016
  - 15% by 2020
- Avista is working with others to change this legislation to allow utilities to use energy conservation acquisition above the cost-effective levels in lieu of renewables
  - Benefits the customer
  - Truly lower cost resource

Metrics

Cost-Effectiveness, Measurement and Evaluation, Post-Verification, Triple E Reports, Prudence Findings in General Rate Cases

Table 15EG — **Calculation of Energy Savings vs. Utility Expenditure Proportionality**

	Adjusted Proportionality Calculation		Unadjusted Proportionality Calculation	
	Electric	**Gas**	**Electric**	**Gas**
Actual 1/1/08 to 12/31/08 cash expenditures	$ 14,553,058	$ 6,288,949	$ 14,553,058	$ 6,288,949
Less cash incentives	$ (9,918,978)	$ (5,085,264)	$ -	$ -
Add in derated incentives	$ 9,395,623	$ 5,404,090	$ -	$ -
Adjusted (for incentives) utility expenditures	$ 14,029,702	$ 6,607,775	$ 14,553,058	$ 6,288,949
Normalize NEEA expenditures	$ 61,379	$ -	$ -	$ -
Total adjusted utility expenditures	$ 14,091,081	$ 6,607,775	$ 14,553,058	$ 6,288,949
DSM revenues 1/1/08 to 12/31/08	$ 11,558,429	$ 4,433,213	$ 11,558,429	$ 4,433,213
Adjusted utility expenditures divided by actual revenues	122%	149%	126%	142%
Energy savings from Triple-E Report	74,861,160	1,888,061	74,861,160	1,888,061
IRP Goal	52,966,689	1,425,070	52,966,689	1,425,070
% of goal achieved	141%	132%	141%	132%
Proportionality (kWh and therm)	**116%**	**89%**	**112%**	**93%**
Proportionality (mmbtu)	**103%**		**103%**	

NOTES:

(1) Adjustments for the difference between cash incentives and those accrued as projects move through the "pipeline" (contracted to construction to completed) remove the effect of scheduling cash payment of incentives to future dates.

(2) NEEA revenues have been adjusted to equal our annual maximum contractual obligation. Regional energy savings are not reflected in this calculation.

Stakeholder Involvement

External Energy Efficiency Board (Triple E)

Non-binding oversight, technical advisory committee

Meets twice a year

Regular reporting

Periodic Newsletters

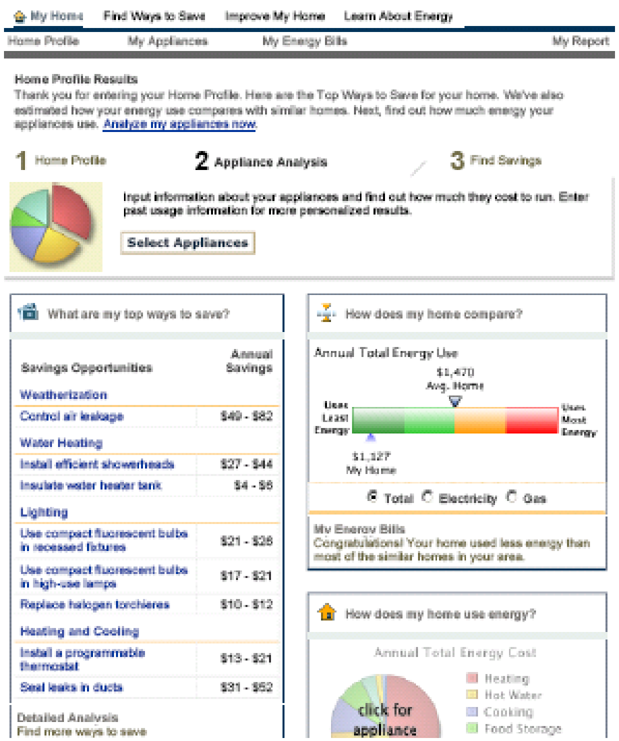
<u>Avista External Energy Efficiency Board</u>
Lynn Anderson – Idaho Public Utilities Commission
Nick Beamer –Aging and Long-Term Care of Eastern Washington
Sheryl Carter – Natural Resource Defense Council
Chris Davis – Spokane Neighborhood Action Programs
Carrie Dolwick – Northwest Energy Coalition
Michael Early – Industrial Customers of Northwest Utilities
Chuck Eberdt – The Energy Project
Tom Eckman – Northwest Power Planning Council
Donn English – Idaho Public Utilities Commission
Claire Fulenwider – Northwest Energy Efficiency Alliance
Stefanie Johnson – Washington Public Counsel
Steven Johnson – Washington Utilities and Transportation Commission
Lisa LaBolle – Idaho Office of Energy Resources
John Kaufman – Oregon Department of Energy
Mary Kimball – Washington Public Council
Lynn Kittilson – Oregon Public Utility Commission
Phil Kercher – Sacred Heart Medical Center
Ron Oscarson - Spokane County
Paula Pyron – Northwest Industrial Gas Users
Deborah Reynolds – Washington Utilities and Transportation Commission
Michael Shepard – E-Source

Incentives/Rebates Paid in 2008

- Slightly over $15 million paid to Avista customers.
  - $7.65 million to commercial/industrial customers
    - 768 projects received an incentive
  - $6.1 million to residential customers
    - 12,890 residential customers received incentives
  - $1.2 million to limited income customers
    - More than 450 households assisted

Avista's 2008 Energy Efficiency Results

- Exceeded electric IRP goal by 41% and natural gas IRP goal by 32%
- Total electric savings over 74.8 million kilowatt h
  - Commercial/Industrial over 41.8 million kwh
  - Residential over 31.1 million kwh
  - Limited Income over 1.8 million kwh
- Total natural gas savings over 1.8 million therms
  - Commercial/Industrial over 1.0 million therms
  - Residential – 749,199 therms
  - Limited Income – 102,438 therms



2009 Focus

Increasing electric and natural gas savings targets

Continued personalization, presence, and participation for and by customers

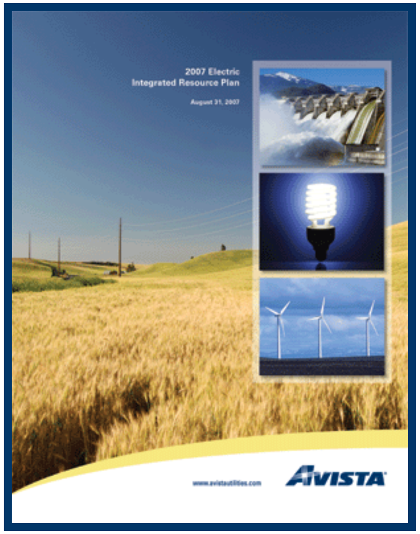
New Programs Under Consideration: Small Commercial Initiative, Energy Champion, Energy Coaching, Behavioral Programs, Bundling

Potential changes in Resource Portfolio Standards in Washington, Energy Trust of Oregon, Decoupling in all states

Earnings opportunities and potential for expansion

"Didn't ya hear? To save energy we have to keep the thermostat at 1,100 degrees instead of 1,200 degrees!"

From Planning to Customer Programs



2009 Washington / Idaho DSM Business Plan

A Working Document to Plan and Guide our 2009 Strategy and Operations

Avista Washington / Idaho DSM staff
Catherine Bryan
Renee Coelho
Mike Dillon
Leona Doege
Chris Drake
Damon Fisher
Bruce Folsom
Lori Hermanson
Tom Lienhard
Carlos Limon-Granados
Camille Martin
Rachelle McGrath
Jon Powell
Ron Welch
Greta Zink

Avista External Energy Efficiency Board
Lynn Anderson – Idaho Public Utilities Commission
Nick Beamer –Aging and Long-Term Care of Eastern Washington
Sheryl Carter – Natural Resource Defense Council
Chris Davis – Spokane Neighborhood Action Programs
Carrie Dolwick – Northwest Energy Coalition
Michael Early – Industrial Customers of Northwest Utilities
Chuck Eberdt – The Energy Project
Tom Eckman – Northwest Power Planning Council
Donn English – Idaho Public Utilities Commission
Claire Fulenwider – Northwest Energy Efficiency Alliance
Stefanie Johnson – Washington Public Counsel
Steven Johnson – Washington Utilities and Transportation Commission
Lisa LaBolle – Idaho Office of Energy Resources
John Kaufman – Oregon Department of Energy
Mary Kimball – Washington Public Council
Lynn Kittilson – Oregon Public Utility Commission
Phil Kercher – Sacred Heart Medical Center
Ron Oscarson - Spokane County
Paula Pyron – Northwest Industrial Gas Users
Deborah Reynolds – Washington Utilities and Transportation Commission
Michael Shepard – E-Source

Total Company Planning with >3000 DSM measures considered

From Planning to Tariffs and Programs

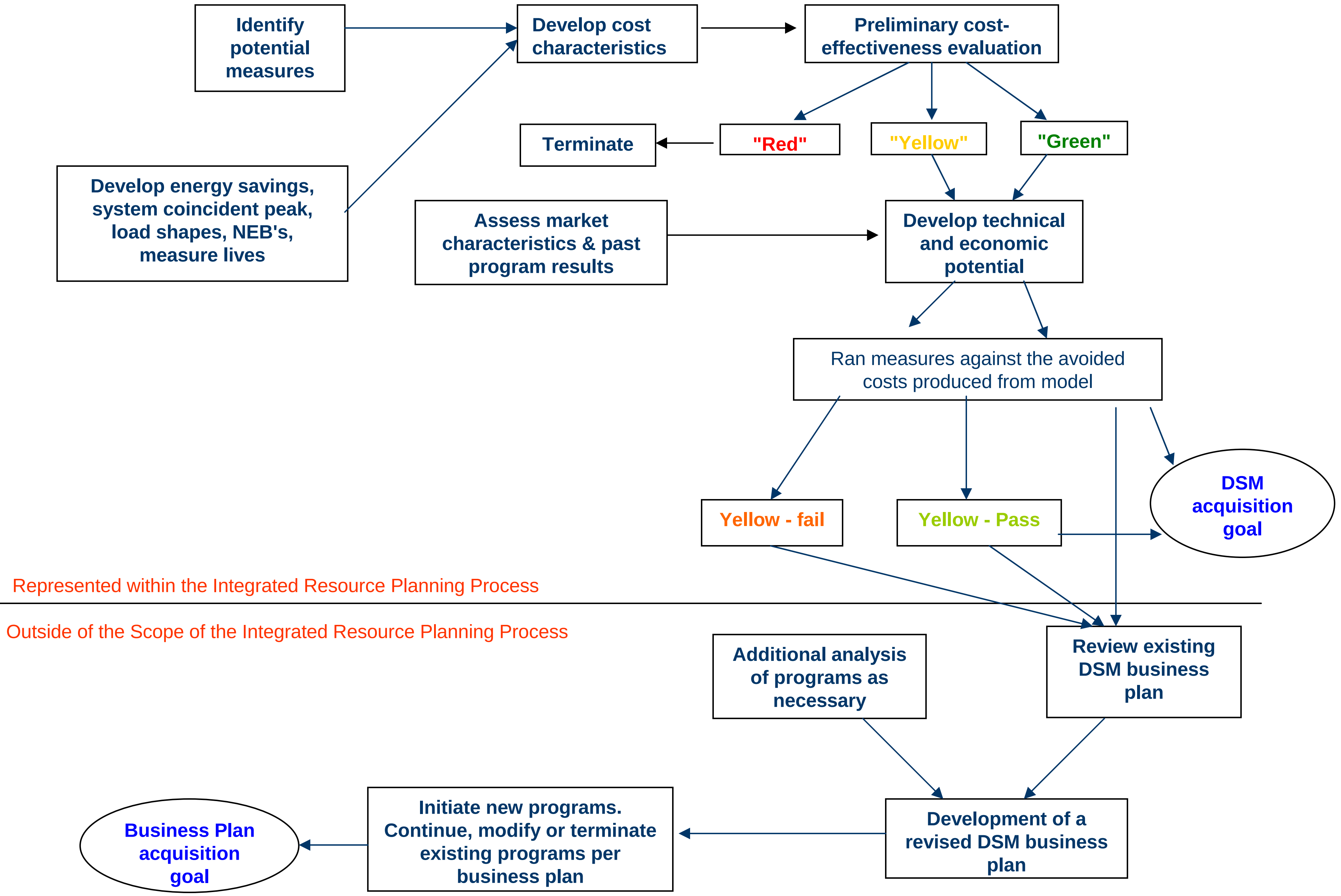
>30 Programs and >300 measures offered

Integration of DSM into the 2009 Electric IRP

- Interactive process that meets regulatory requirements and produces results for the business planning process
  - Identify all commercially available technologies or measures
    - "Acceptance" or "rejection" within the IRP will not remove any technology or application from potentially being included
    - Nearly 2,500 measures were evaluated for this IRP
  - Re-evaluate existing residential measures and evaluate the inclusion of addition measures
    - May change the menu of residential offerings
    - Nearly 800 measures were evaluated for this IRP

Integration of DSM into the 2009 Electric IRP (cont.)

- Inclusion of limited income and non-residential site specific programs are done by modifying the historical baseline
  - Not necessarily limited to modifying baseline for price elasticity and load growth
  - Site specific measures that fit into the 3,000+ measures evaluated are evaluated through the normal IRP process outside of this modified historical baseline approach


Identify potential measures
Develop cost characteristics
Preliminary cost-effectiveness evaluation
Terminate
"Red"
"Yellow"
"Green"
Develop energy savings, system coincident peak, load shapes, NEB's, measure lives
Assess market characteristics & past program results
Develop technical and economic potential
Ran measures against the avoided costs produced from model
Yellow - fail
Yellow - Pass
DSM acquisition goal
Represented within the Integrated Resource Planning Process
Outside of the Scope of the Integrated Resource Planning Process
Additional analysis of programs as necessary
Review existing DSM business plan
Business Plan acquisition goal
Initiate new programs. Continue, modify or terminate existing programs per business plan
Development of a revised DSM business plan

Evaluation of Measures

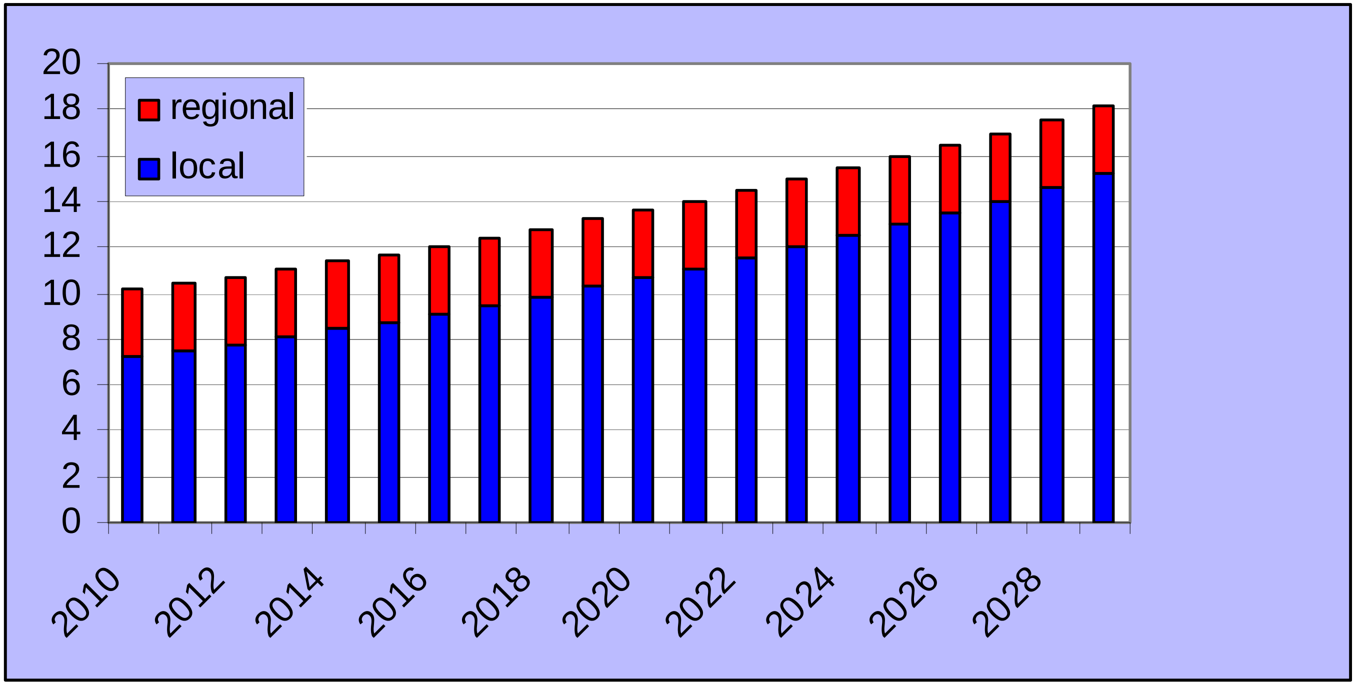
- Based on levelized TRC, measures are categorized into “greens”, “yellows” and “reds”
  - “Greens” automatically selected and entered into model
  - “Yellows” are tested - range ended up being $90-$140/MWh
  - “Reds” – no further testing
- IRP process results in DSM goal and updated avoided costs
  - 63,119,081 kWh for 2010
  - 65,643,844 kWh for 2011
  - Avoided costs are used to evaluate new measures or technologies that may arise between IRPs

Business Planning Process

- Selected measures are further evaluated by program managers
  - Market research
  - Program bundling
  - Program development
- Budgets is prepared for individual programs
  - Update economic potential savings acquisition
  - Projection of FTE
  - Estimate of participation levels, incentives, and other expenses
- Business plan goal
  - Historically, has been at or above IRP goal

Where Are We At in the IRP Process?

- Goals complete for 2010/2011
- Projection of 20 year DSM acquisition complete



Where Are We At in the IRP Process? (cont.)

- Written contribution for the IRP document
  - Drafts to J. Powell and B. Folsom for review and edits
  - Insert final numbers and changes
  - Final document due end of March

2009 Preferred Resource Strategy

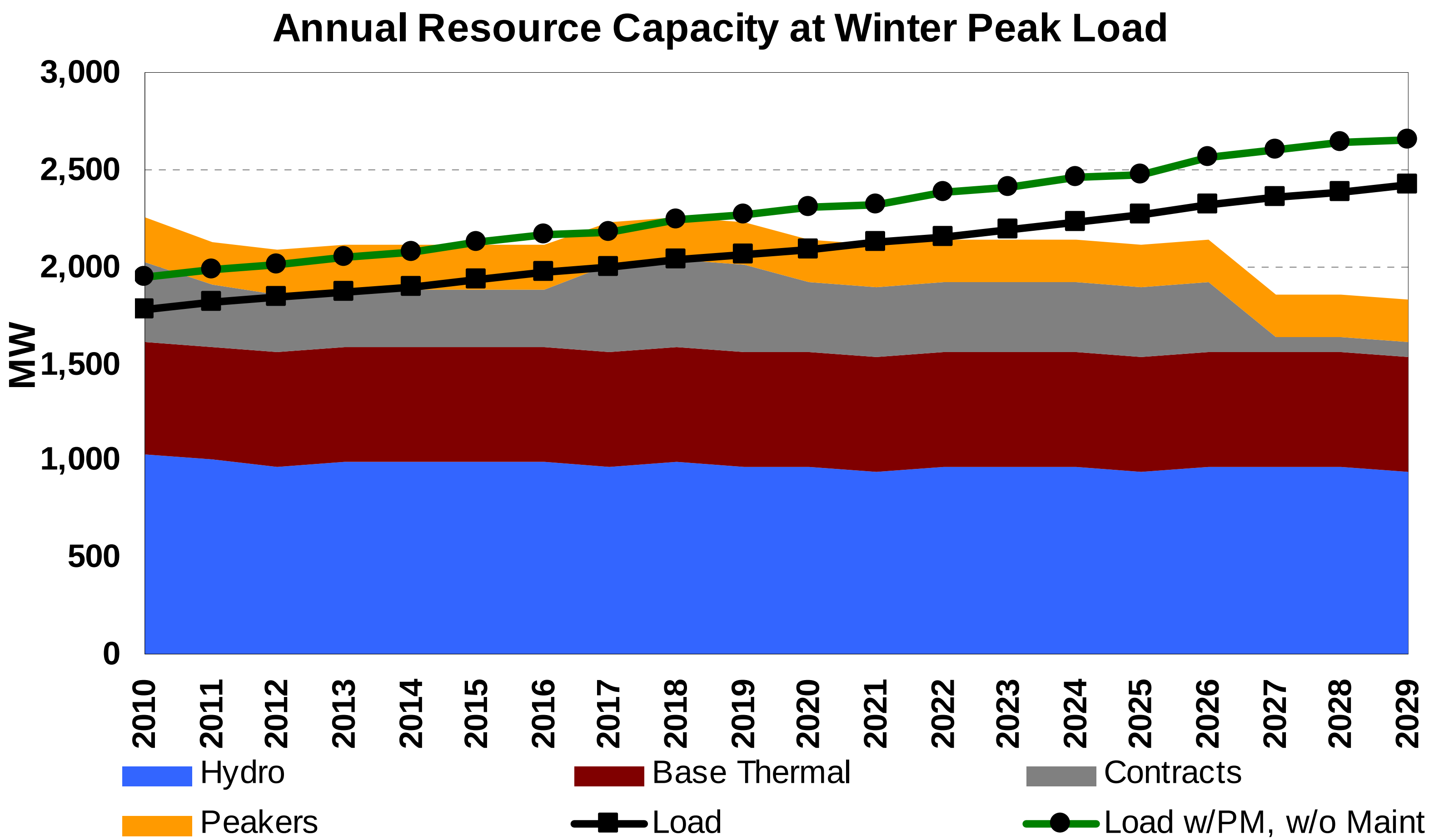
James Gall

2009 Electric Integrated Resource Plan

Fifth Technical Advisory Committee Meeting

March 25, 2009

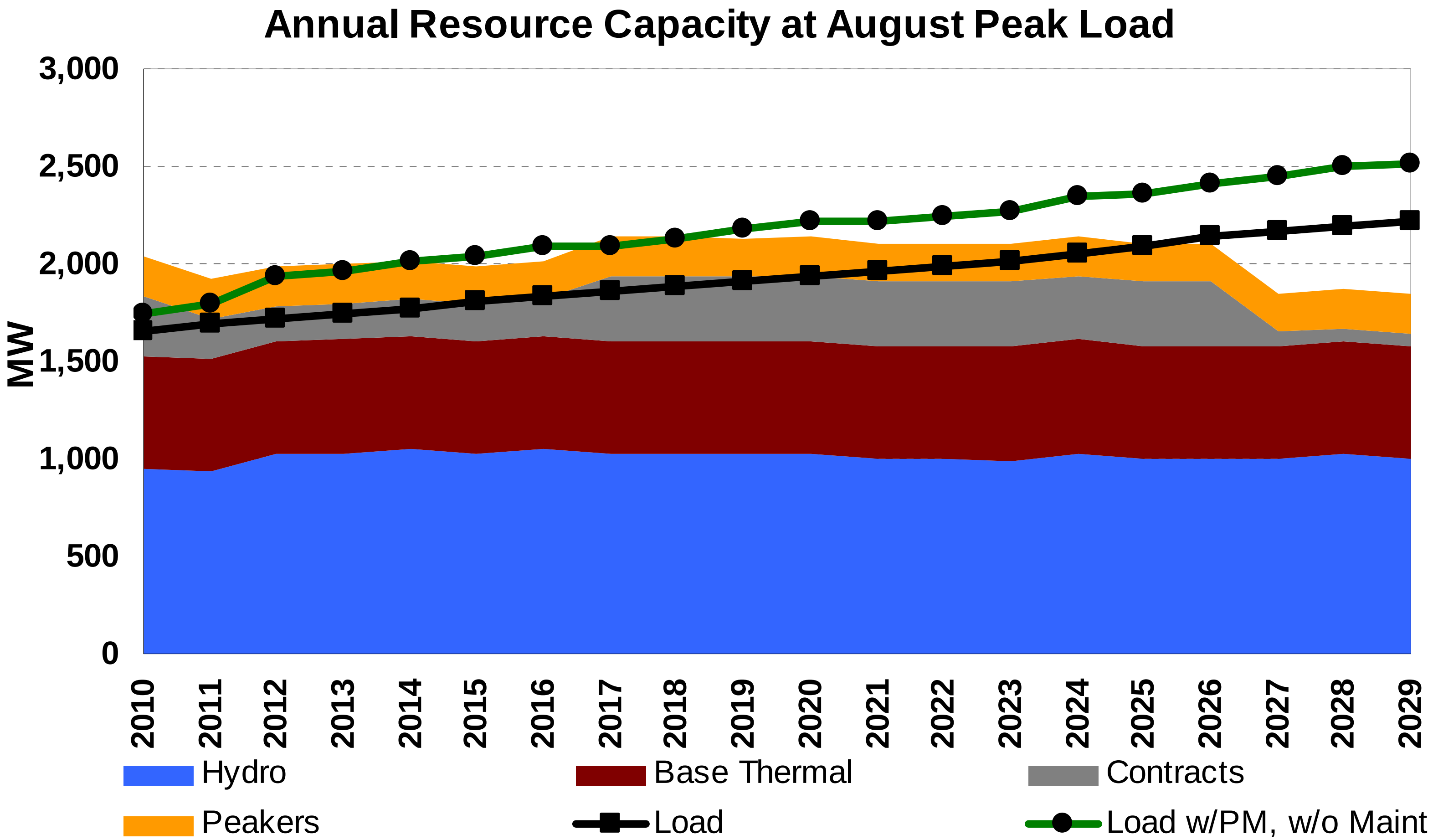
January Capacity L&R Balance



Load is net 2007 Conservation Levels

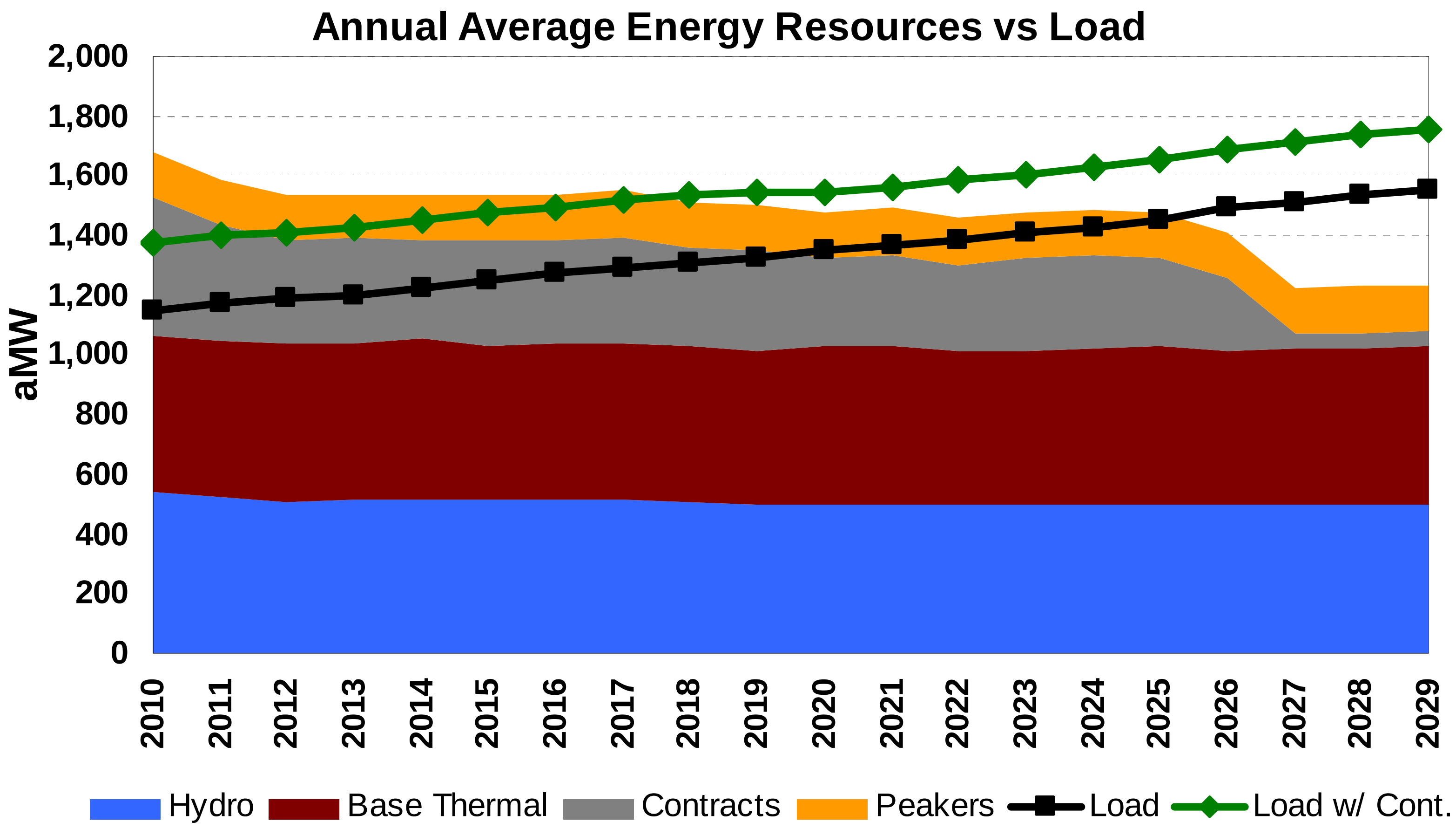
AVISTA

August Capacity L&R Balance



Load is net 2007 Conservation Levels

Annual Energy L&R Balance



Load is net 2007 Conservation Levels

PRiSM Objective Function

- Linear program solving for the optimal resource strategy to meet resource deficits over planning horizon.
- Model selects its resources to reduce cost, risk, or both.

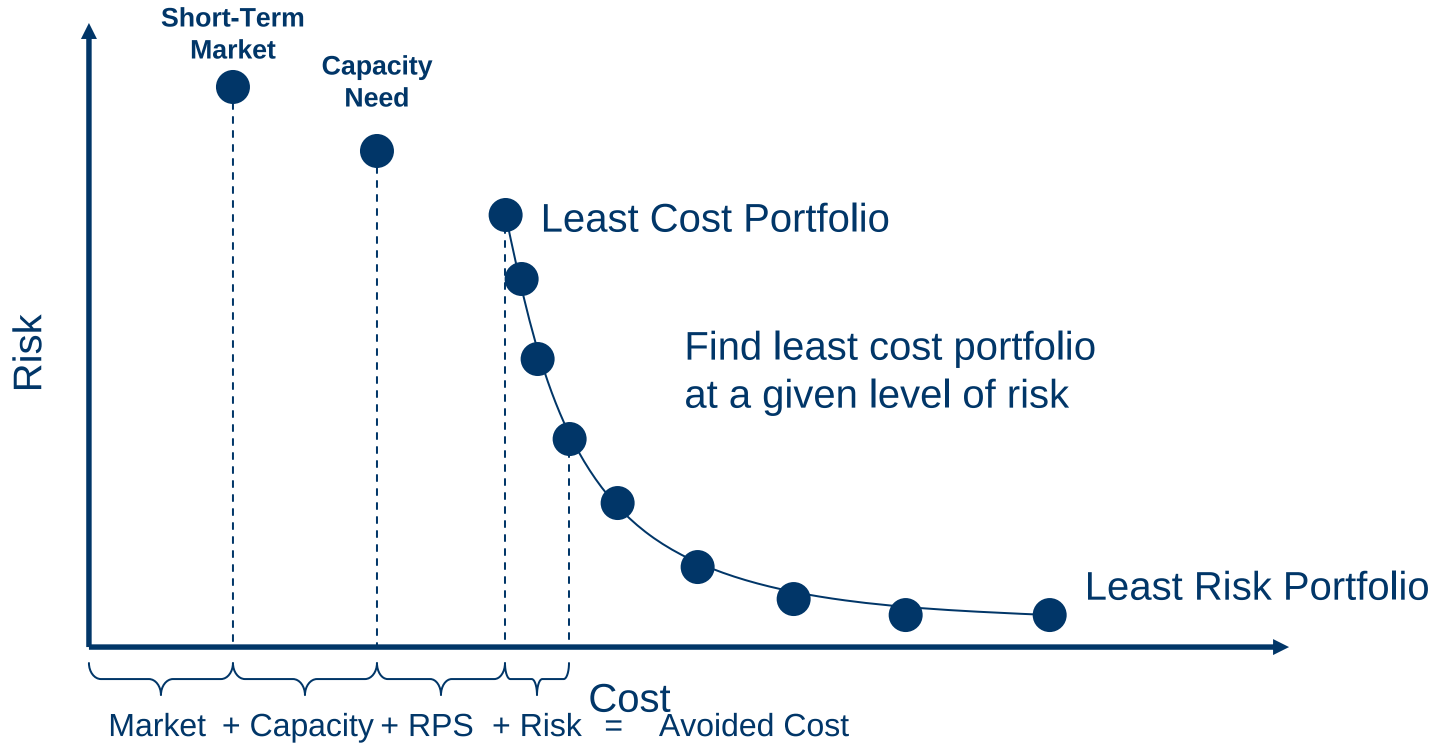
Minimize: Total Power Supply Cost on NPV basis (2010-2050 with emphasis on first 11 years of the plan)

Subject to:

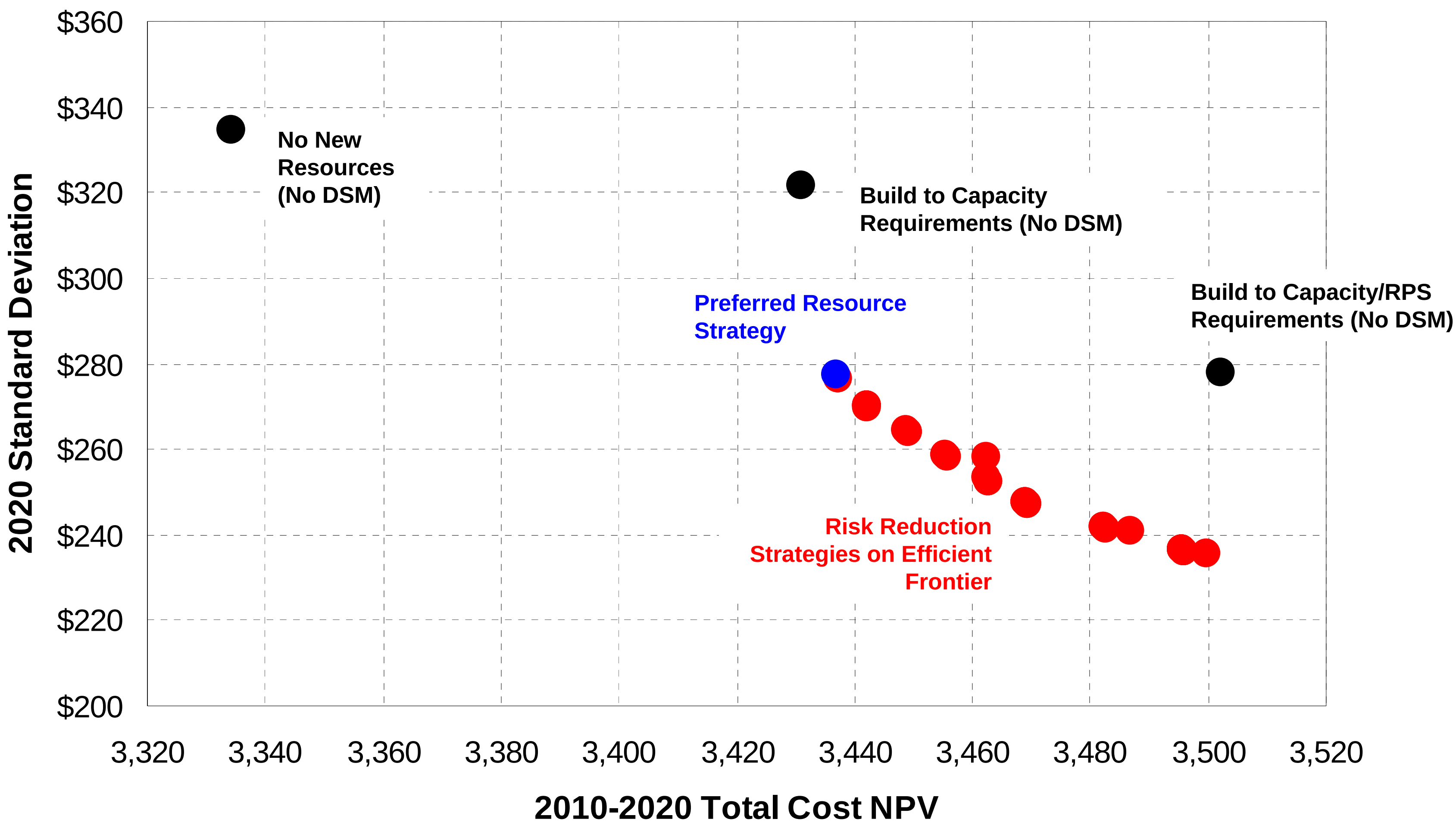
- Risk Level
- Capacity Need +/- deviation
- Energy Need +/- deviation
- Renewable Portfolio Standards
- Resource Limitations and Timing
- Greenhouse Gas Limits

Efficient Frontier

- Demonstrates the trade off of cost and risk
- Avoided Cost Calculation

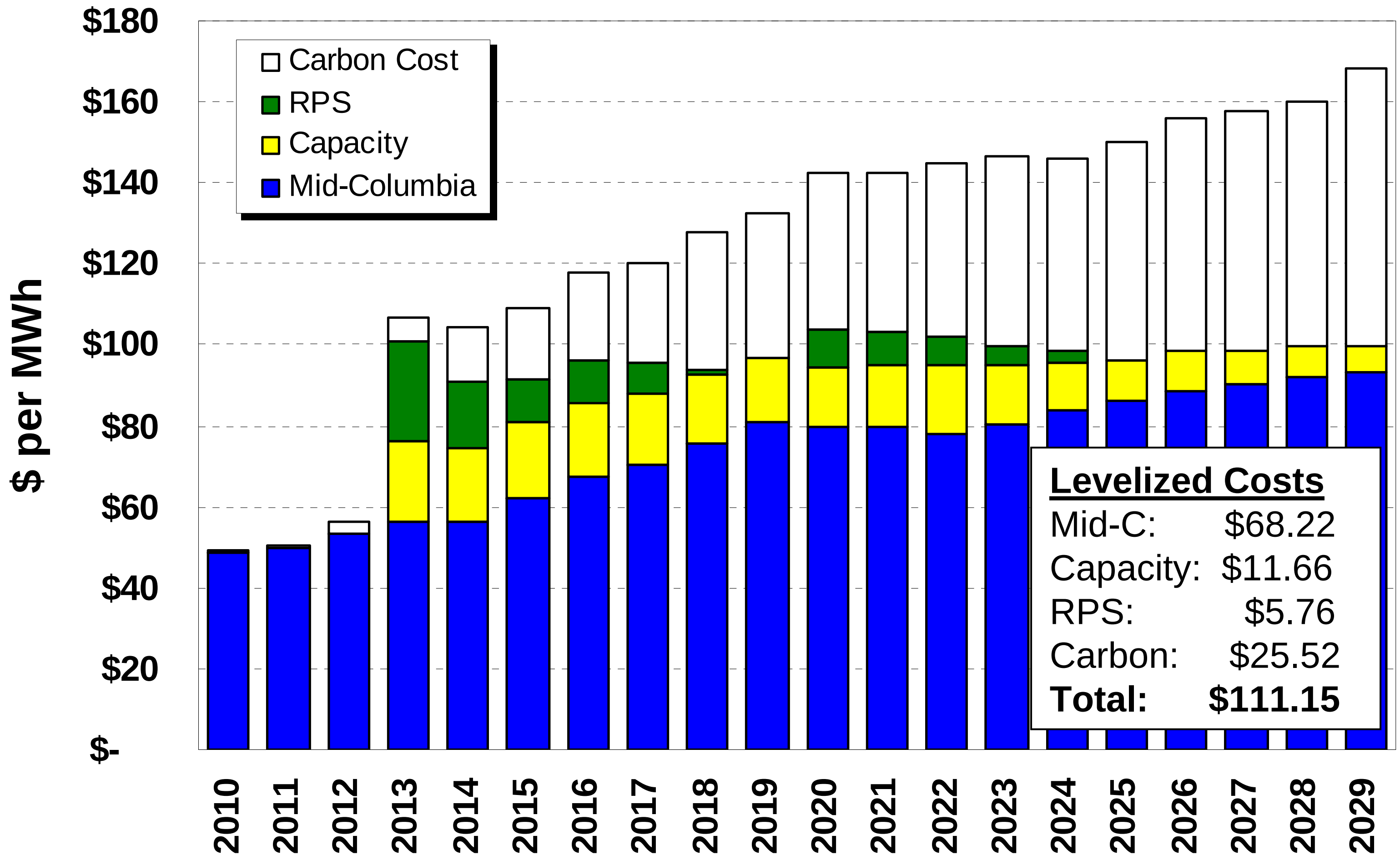


Efficient Frontier



AVISTA

Avoided Resource Cost



AVISTA

2007 Preferred Resource Strategy

(Capacity MW)

Year	CCCT	SCCT	Wind	Hydro Upgrades	Non-Wind Renewables	Low Carbon Baseload	DSM	T&D Efficiency
2008	-	-	-	-	-	-	9	-
2009	-	-	-	-	-	-	10	-
2010	275	-	-	-	-	-	11	-
2011	-	-	-	-	20	-	12	-
2012	-	-	-	-	10	-	13	-
2013	-	-	-	-	-	-	14	-
2014	-	-	100	-	5	-	15	-
2015	-	-	-	-	-	-	15	-
2016	-	-	100	-	-	-	16	-
2017	-	-	100	-	-	-	16	-
2018	-	-	-	-	-	-	16	-
2019	-	-	-	-	-	-	16	-
2020	81	-	-	-	10	-	17	-
2021	32	-	-	-	10	-	17	-
2022	38	-	-	-	5	-	17	-
2023	15	-	-	-	-	-	18	-
2024	58	-	-	-	-	-	18	-
2025	38	-	-	-	-	-	18	-
2026	35	-	-	-	-	-	19	-
2027	305	-	-	-	-	-	19	-
2008-2017	275	-	300	-	35	-	130	-
2008-2027	877	-	300	-	60	-	304	-

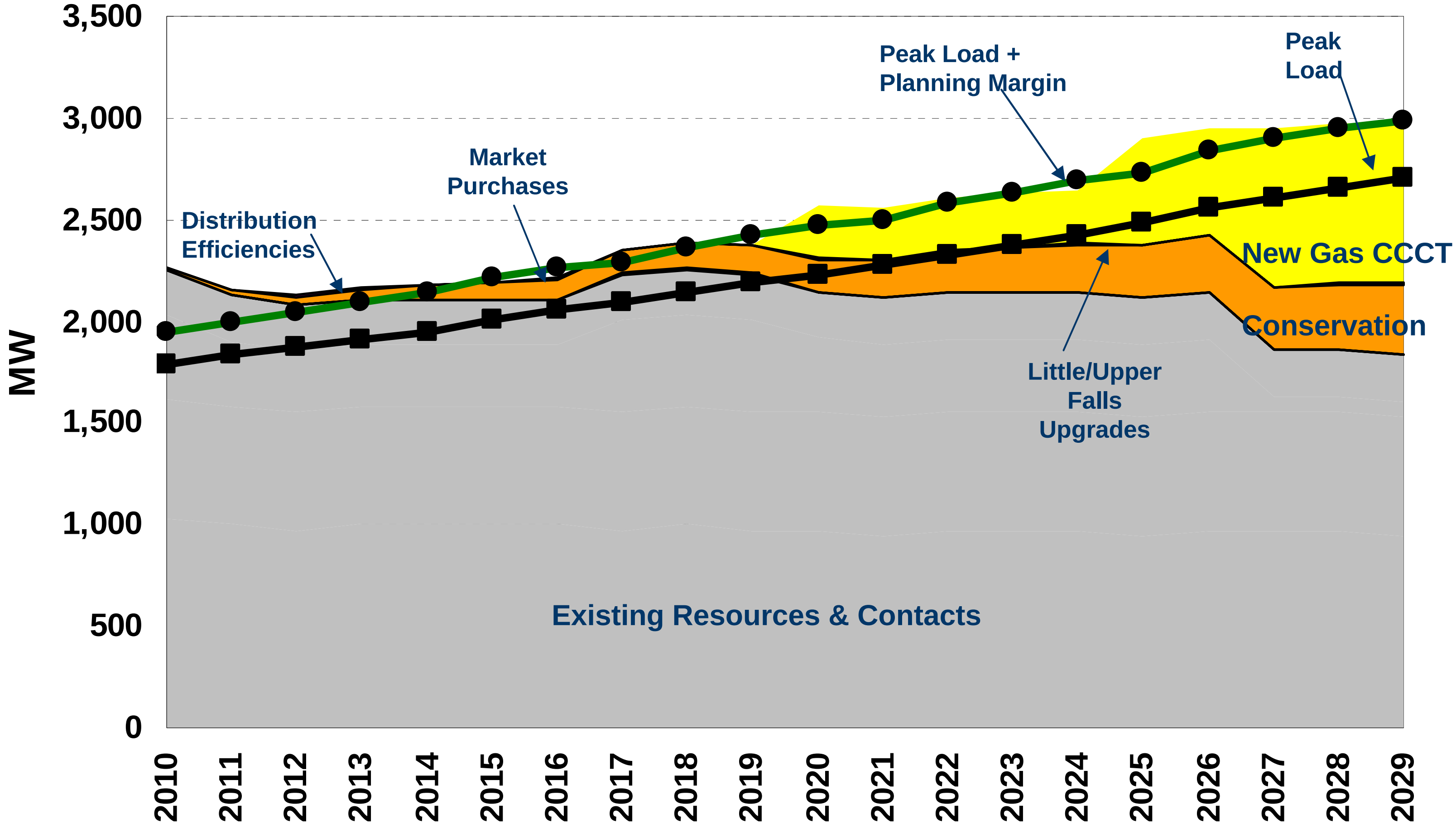
Preferred Resource Strategy

(Capacity MW)

Year	CCCT	SCCT	Wind	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	12	1
2011	-	-	-	-	-	12	1
2012	-	-	-	-	-	12	1
2013	-	-	150	-	-	12	1
2014	-	-	-	1	-	14	1
2015	-	-	-	1	-	14	-
2016	-	-	-	-	-	15	-
2017	-	-	-	1	-	15	-
2018	-	-	-	-	-	15	-
2019	-	-	-	-	-	17	-
2020	250	-	150	-	-	17	-
2021	-	-	-	2	-	18	-
2022	-	-	-	-	-	18	-
2023	-	-	50	-	-	20	-
2024	-	-	-	-	-	20	-
2025	250	-	-	-	-	21	-
2026	-	-	-	-	-	21	-
2027	250	-	-	-	-	23	-
2028	-	-	-	-	-	23	-
2029	-	-	-	-	-	24	-
2010-2019	-	-	150	3	-	137	5
2010-2029	750	-	350	5	-	339	5

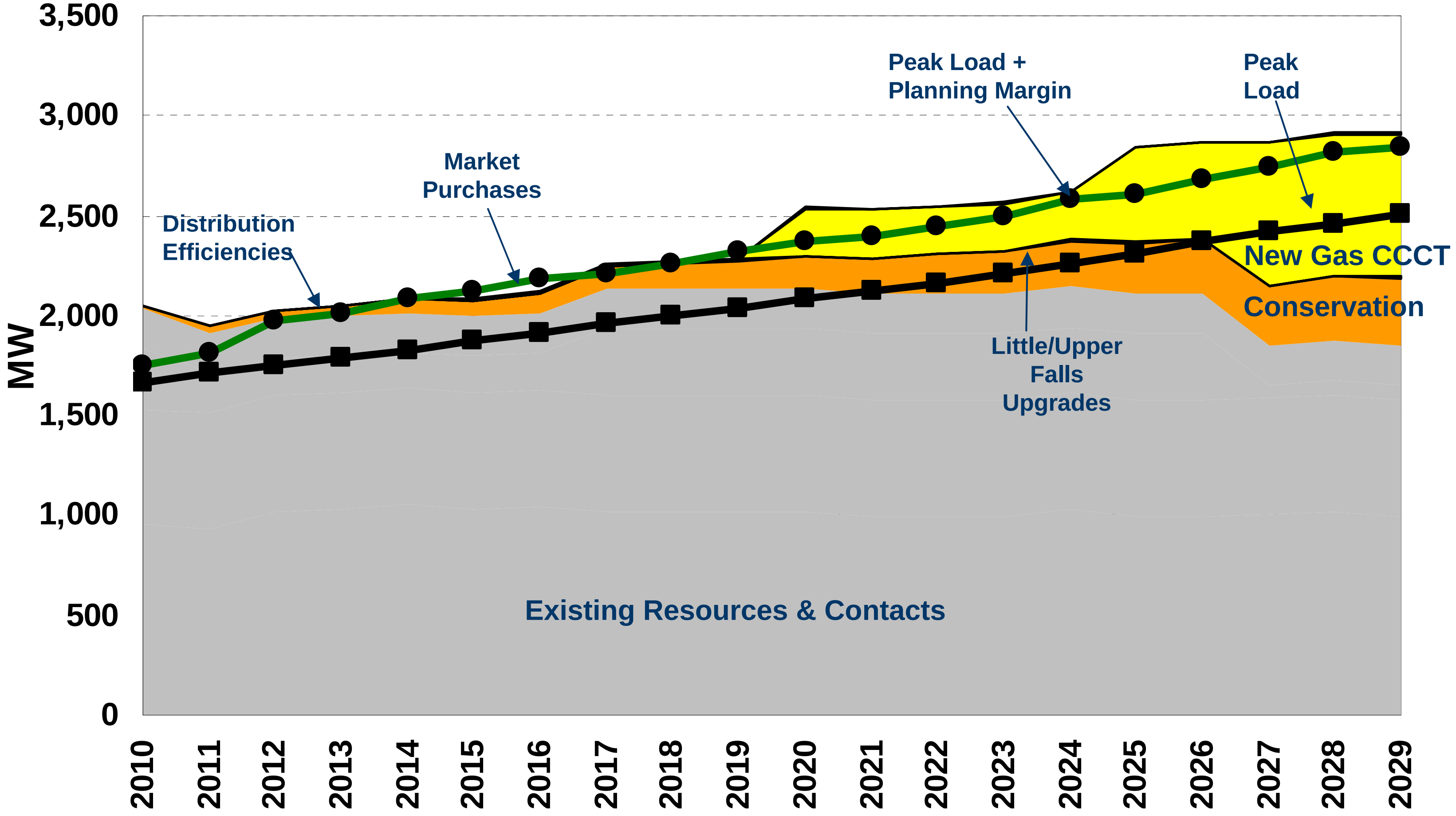
AVISTA

January Capacity L&R w/ New Resources

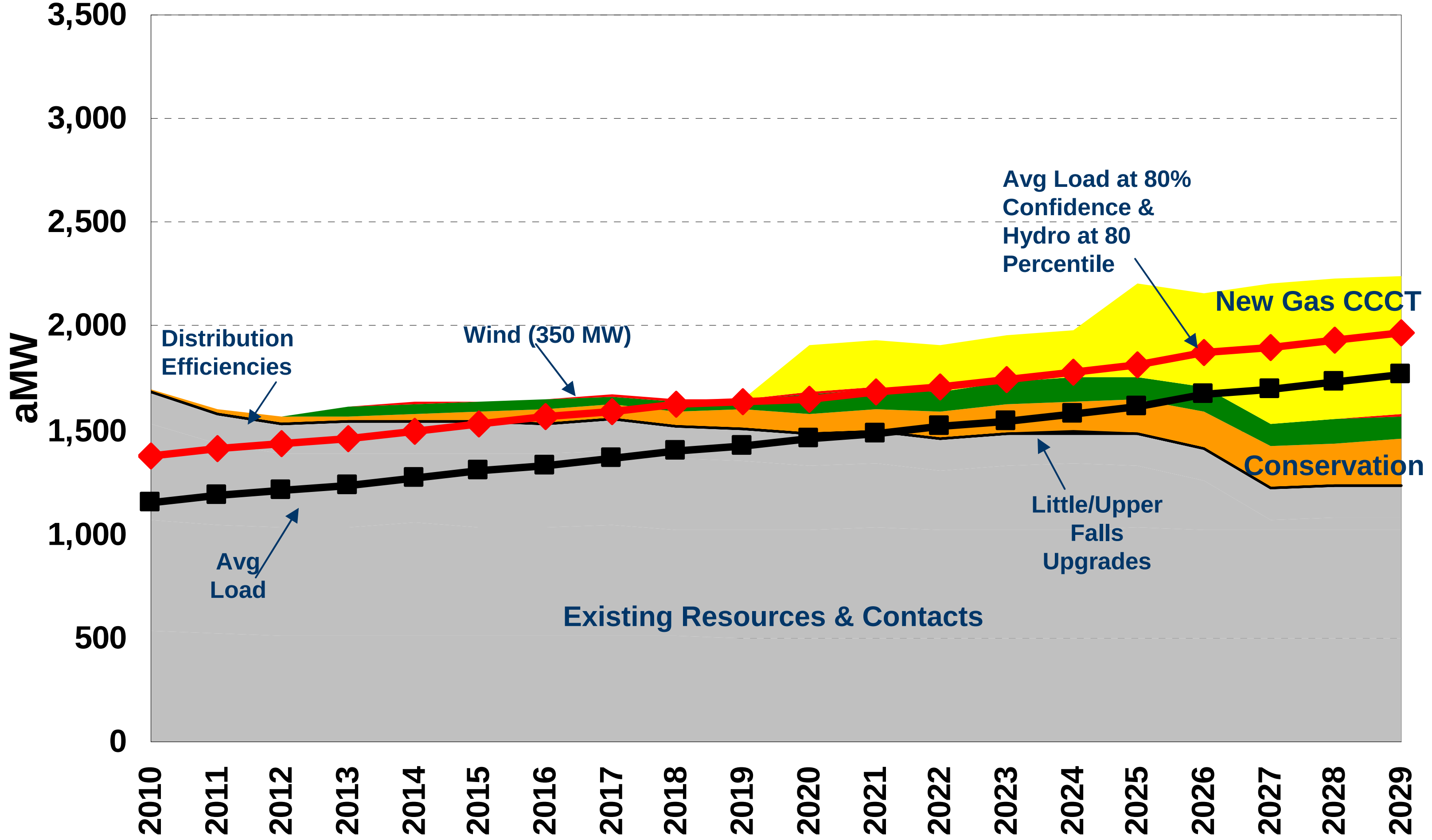


AVISTA

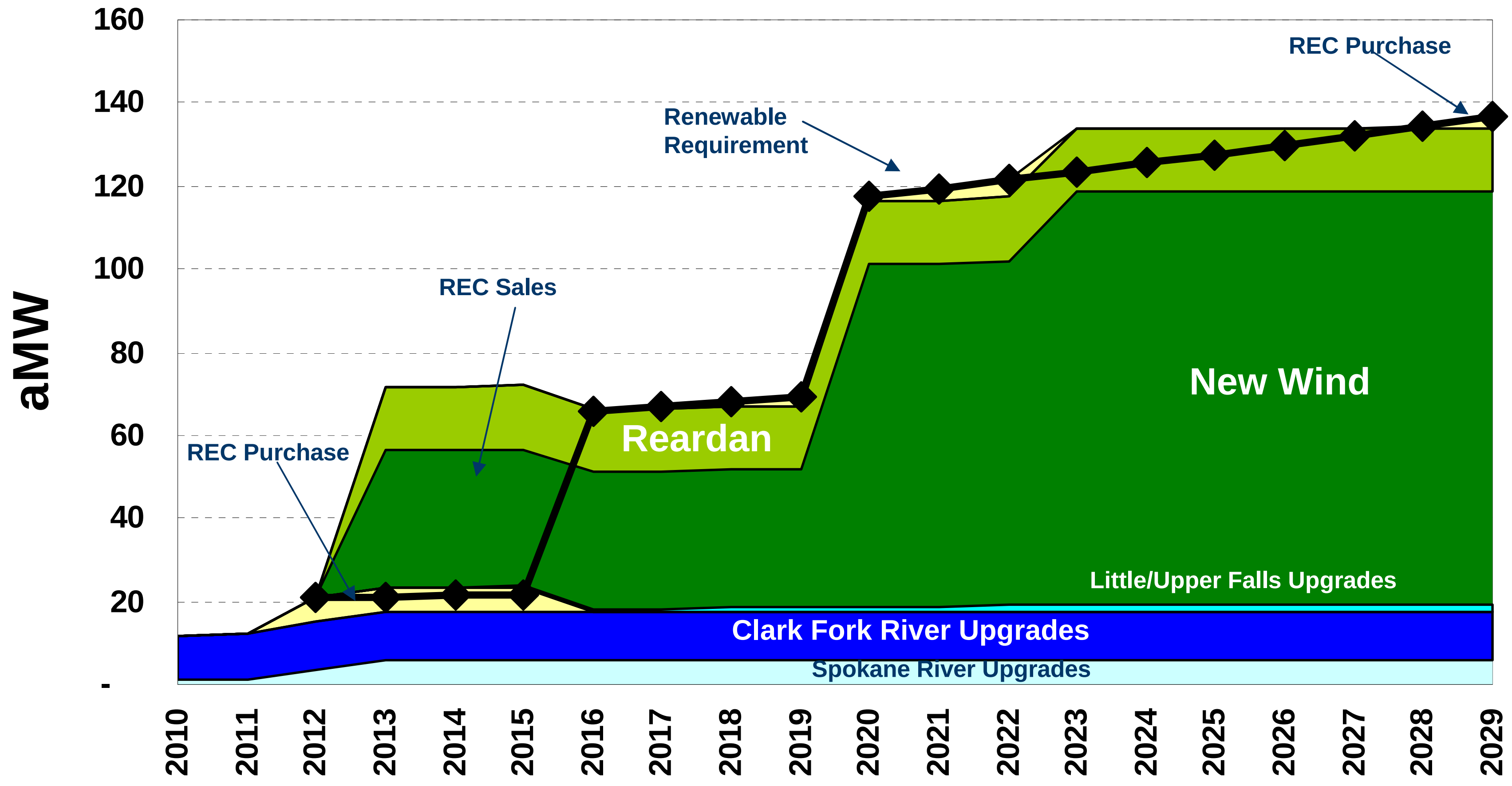
August Capacity L&R w/ New Resources



Annual Energy L&R w/ New Resources

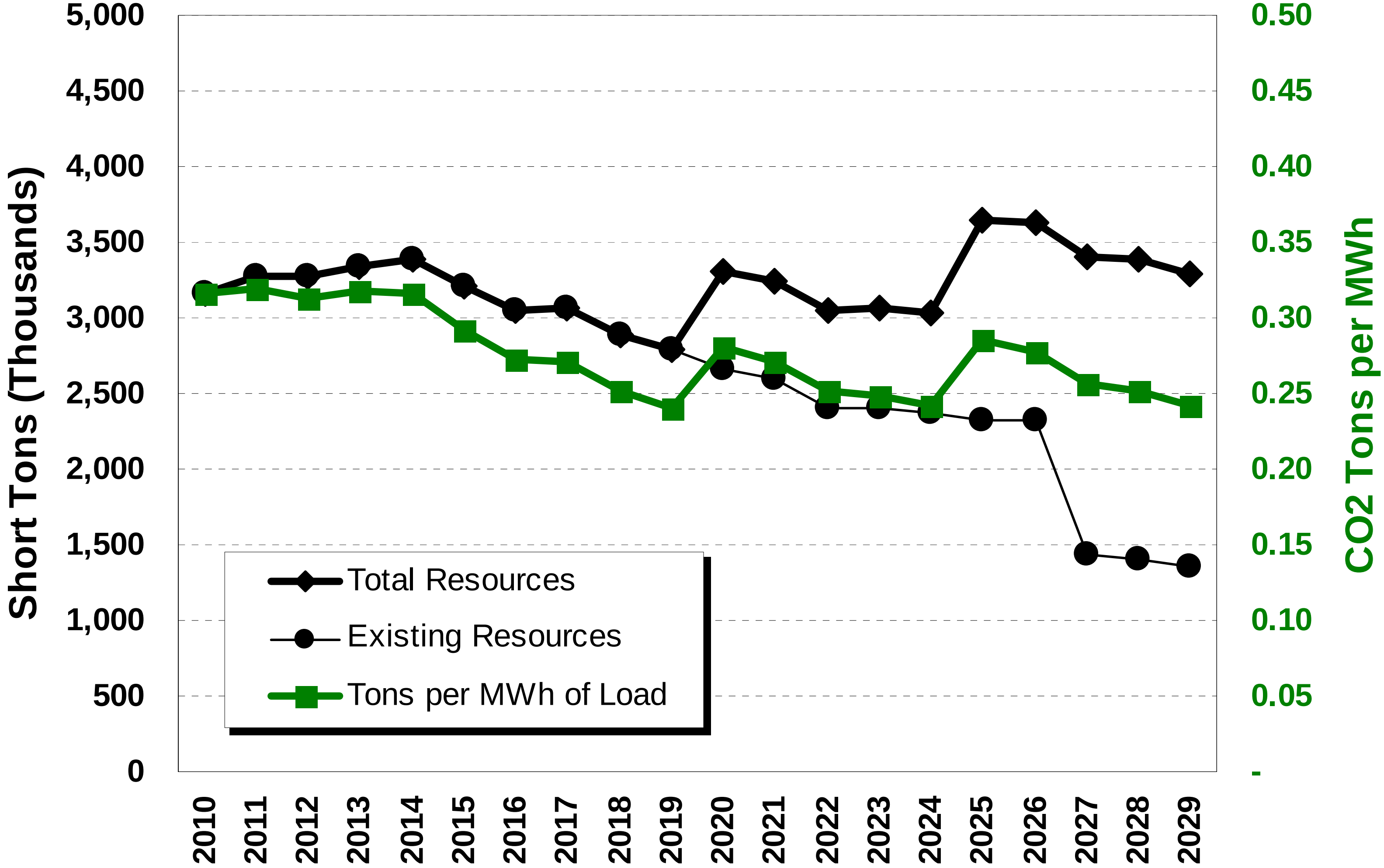


Washington State RPS Compliance



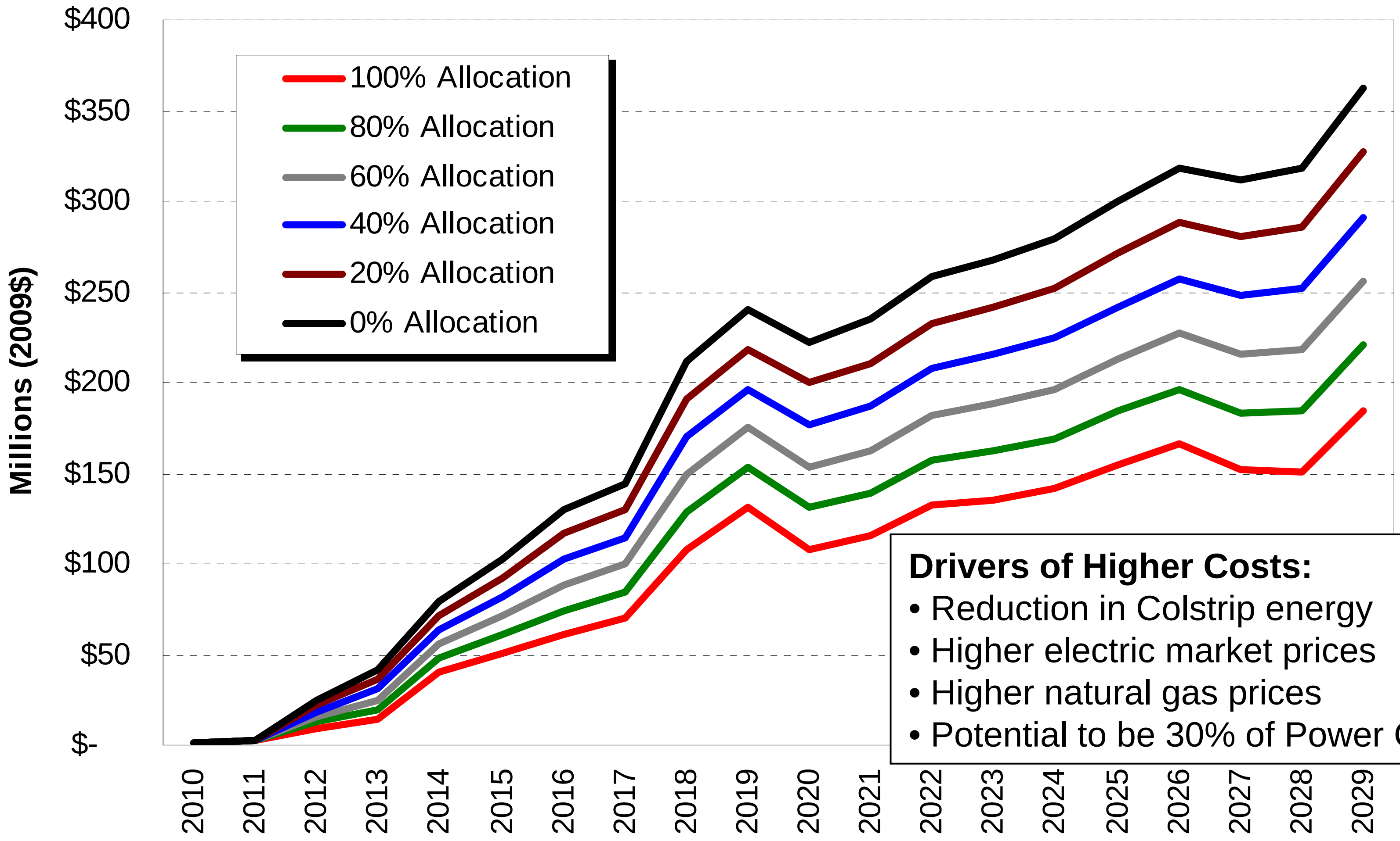
AVISTA

Greenhouse Gas Emissions



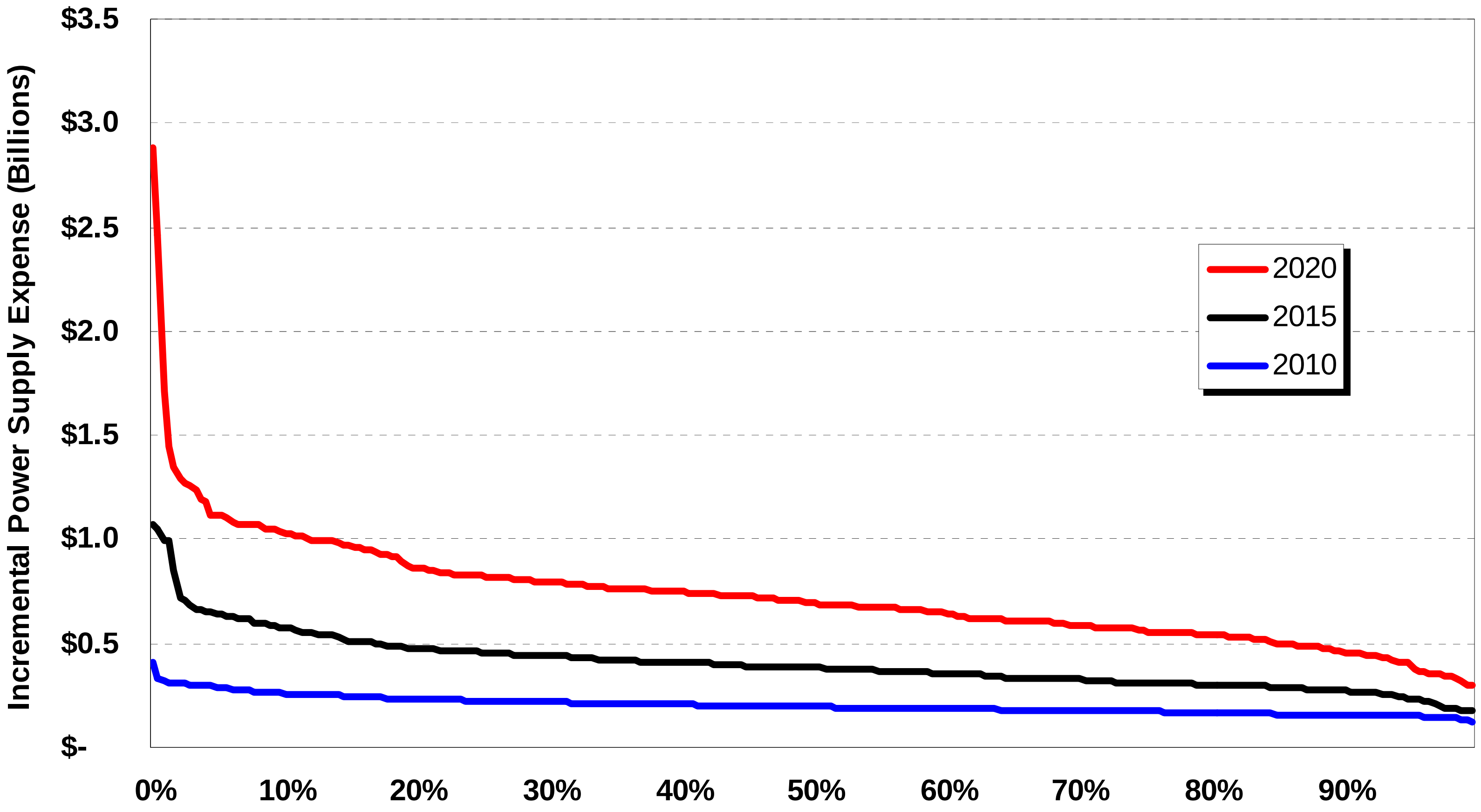
AVISTA

Total Cost of Carbon Legislation



Drivers of Higher Costs:
- Reduction in Colstrip energy
- Higher electric market prices
- Higher natural gas prices
- Potential to be 30% of Power Costs

Portfolio Cost Duration Curve (2009$)



Scenarios

James Gall & John Lyons

2009 Electric Integrated Resource Plan
Fifth Technical Advisory Committee Meeting
March 25, 2009

AVISTA®

Market Scenarios

Market Futures (Stochastic)

- Base Case
- No Carbon Costs

Market Scenarios (Deterministic)

- High Natural Gas Prices
- Low Natural Gas Prices
- Solar Saturation (“Buck-a-Watt”)

No Carbon Cost Scenario

Avista Portfolio Cost versus Risk Analysis

Portfolios:

- Market reliance
- Build to capacity requirements
- Least cost strategy
- Efficient frontier

Avista Portfolio Scenarios

Fundamental Changes

- No State RPS
- Alternative load forecasts (High/Low)
- Least carbon emissions

Capital Cost Sensitivities

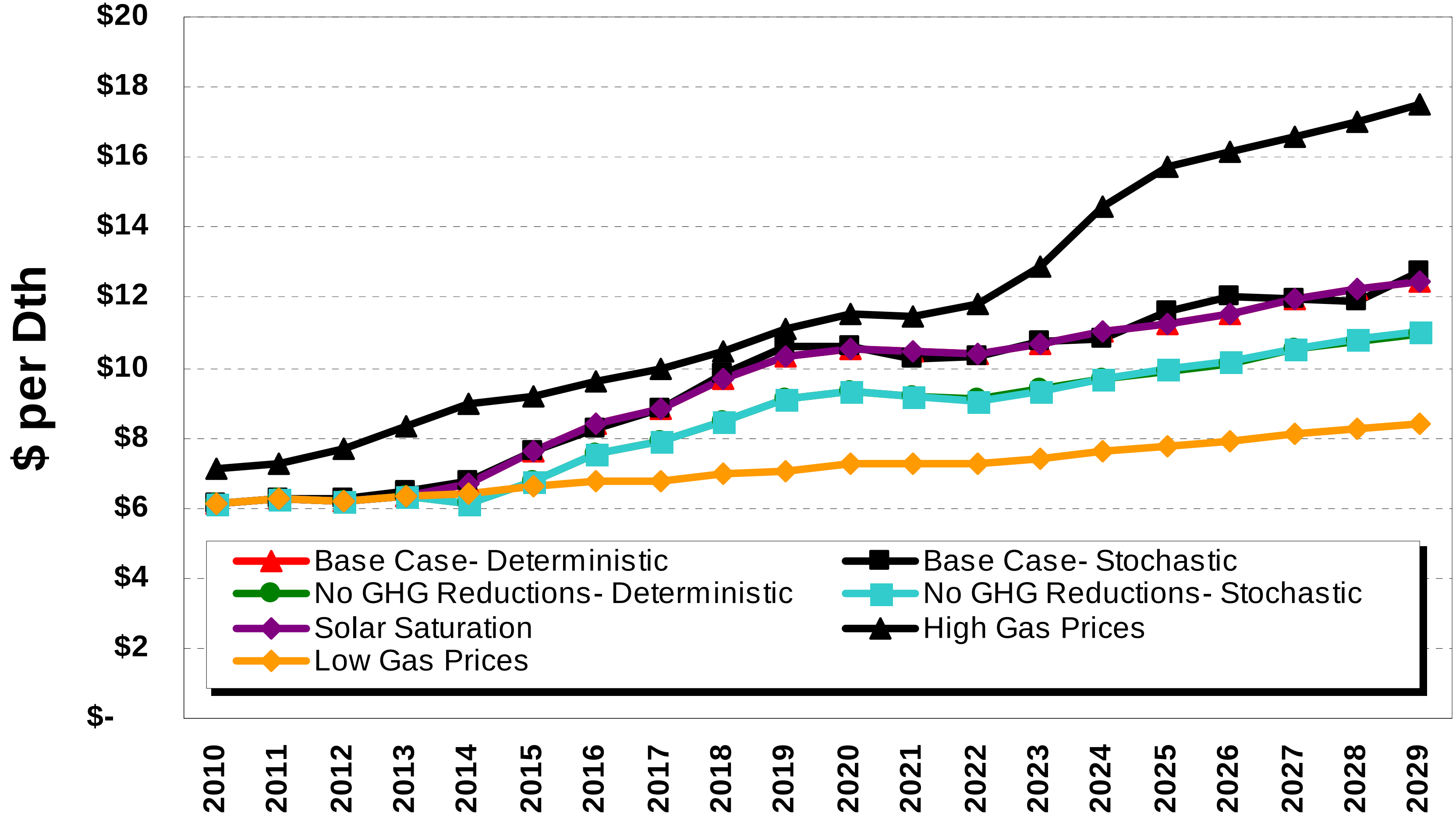
- Required capital cost to build wind in 2010
- Required capital cost to move from CCCT to SCCT

Resource Availability

- Large hydro upgrades, with capital cost sensitivities
- Other renewables (Biomass/Geothermal/Hydro Upgrades)
- Nuclear

Market Scenarios

Malin Natural Gas Prices (Nominal $)

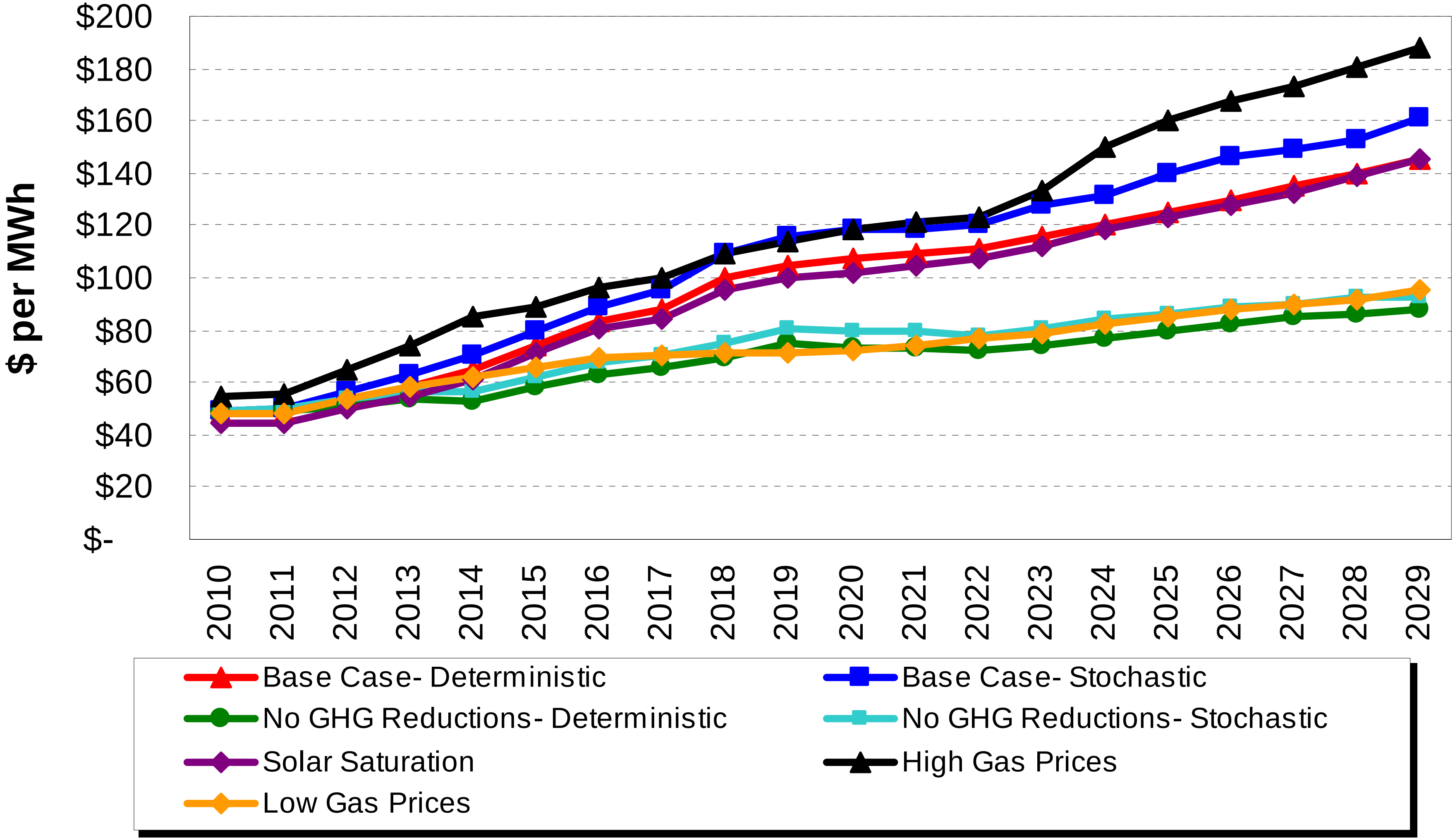


Malin Nominal Levelized Price Forecast (2010-2029)

Scenario	$/Dth
Base Case- Deterministic	$8.63
Base Case- Stochastic	$8.67
No GHG Reductions- Deterministic	$7.86
No GHG Reductions- Stochastic	$7.87
Solar Saturation	$8.63
High Gas Prices	$10.52
Low Gas Prices	$6.88
2007 IRP Base Case	$7.15
2007 Climate Stewardship Act Future	$7.15

AVISTA

Mid-Columbia Electric Price Forecasts (2010-2029, Nominal $)



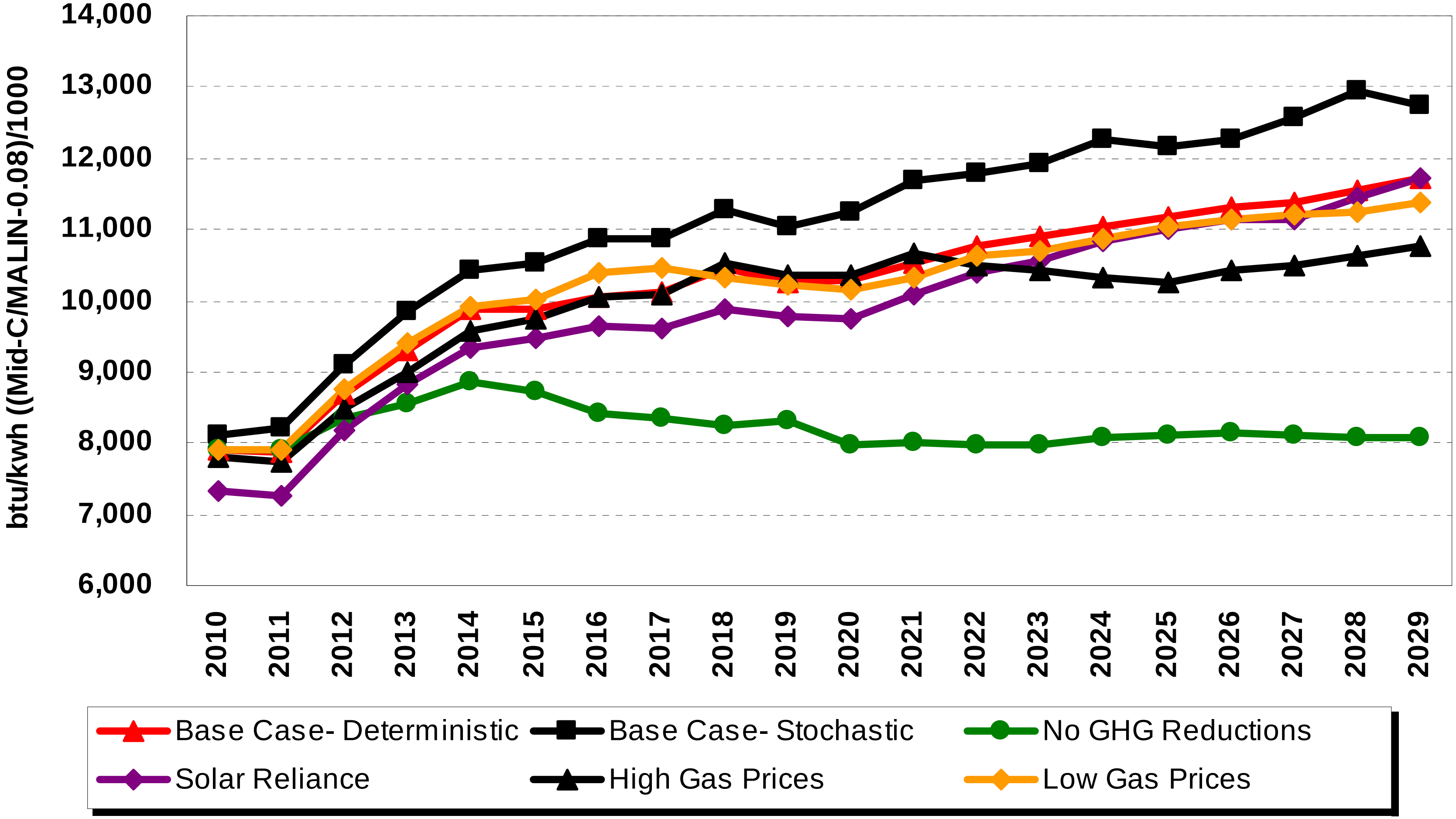
Mid-Columbia Nominal Levelized Price Forecast

Scenario	$/MWh
Base Case- Deterministic	$86.36
Base Case- Stochastic	$93.74
No GHG Reductions- Deterministic	$63.93
No GHG Reductions- Stochastic	$68.22
Solar Saturation	$82.87
High Gas Prices	$102.61
Low Gas Prices	$67.48
2007 IRP Base Case	$62.16
2007 Climate Stewardship Act Future	$73.50

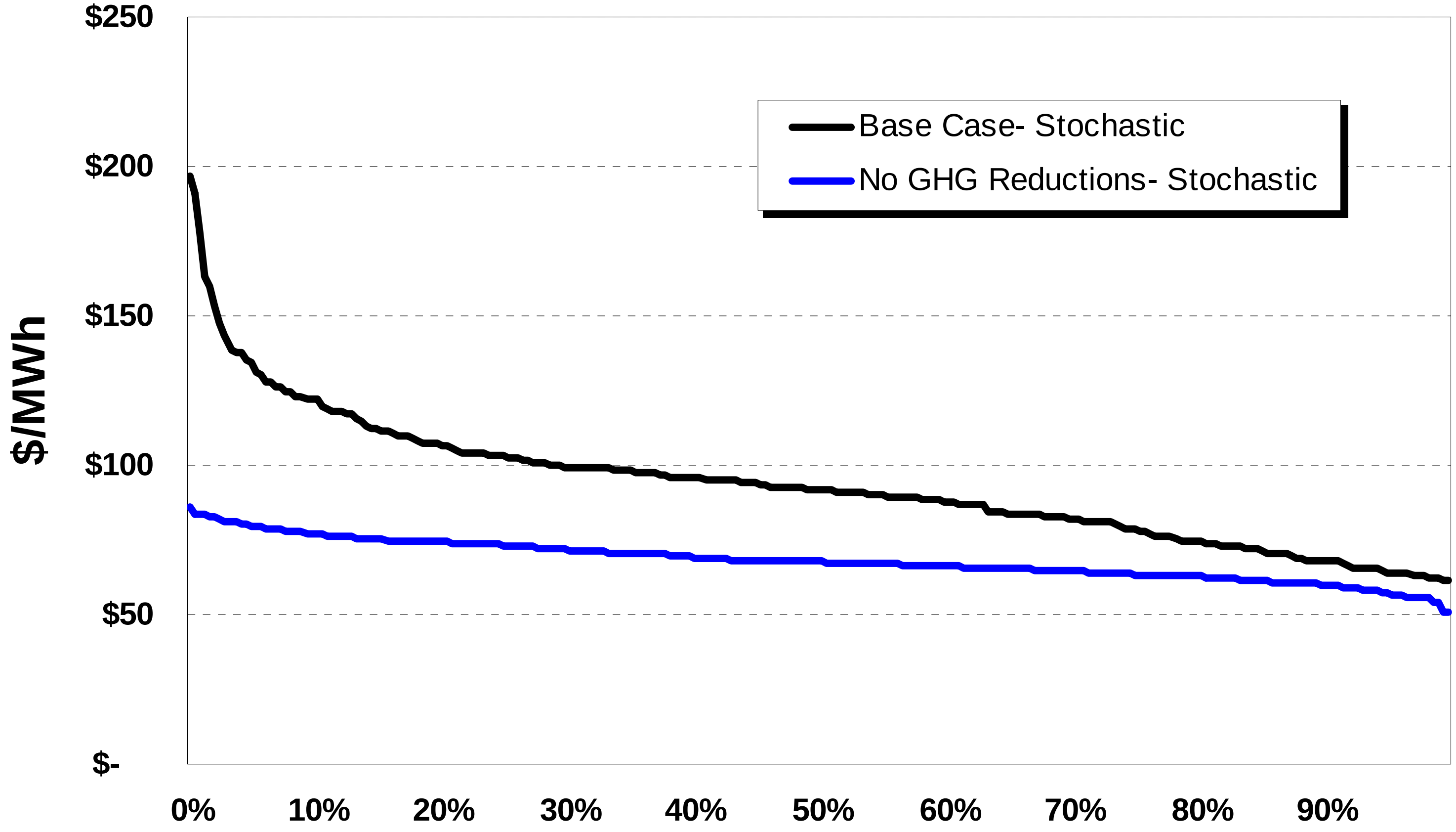
More on Solar Saturation Scenario

- Reduce capital cost by 80%
- Increased solar energy in 2029 from 4,243 aMW to 20,486 aMW or 75 GW of capacity
- Reduced Western Interconnect fuel costs by 18% or $10 billion in 2029 or $36.4 billion (PV 2009$)
- Reduced 2029 power generation greenhouse gas emissions by 10%
- Small reduction in Q2 and Q3 on-peak power prices, although higher solar saturation rates could further reduce on-peak power prices

Implied Market Heat Rates

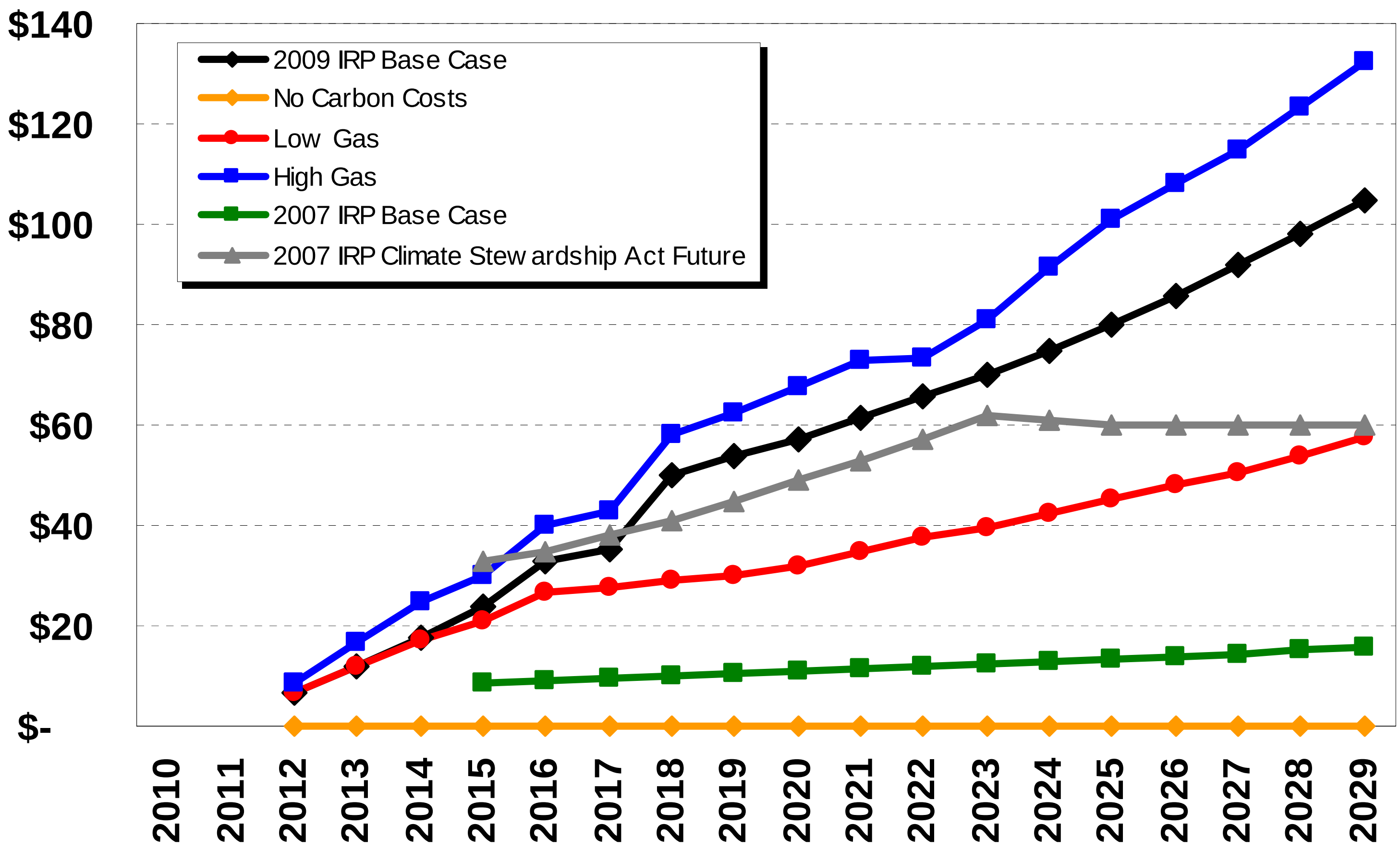


Mid-Columbia Levelized Price (2010-2029) Duration Curve

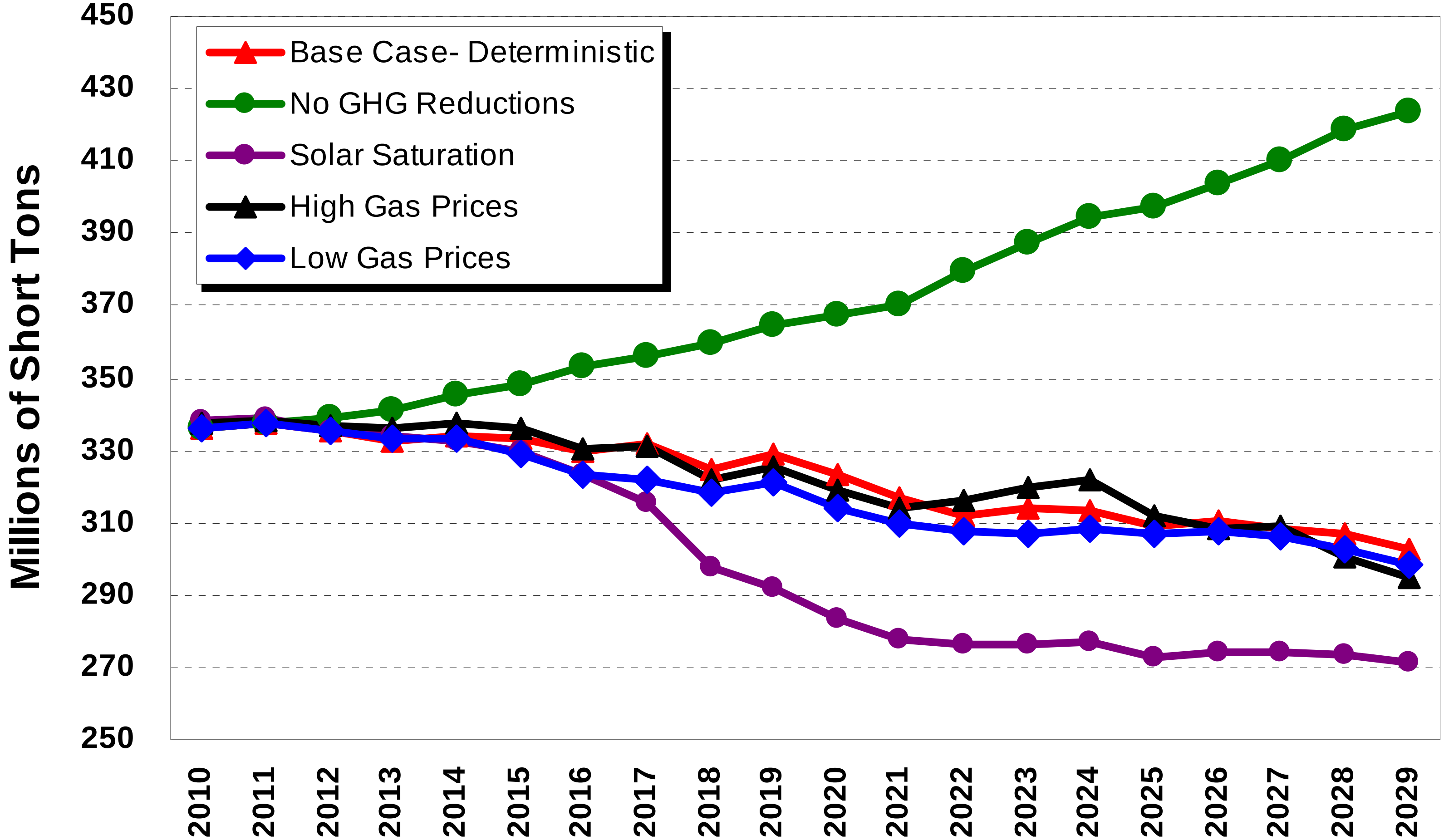


AVISTA

Greenhouse Gas Prices ($/Ton)

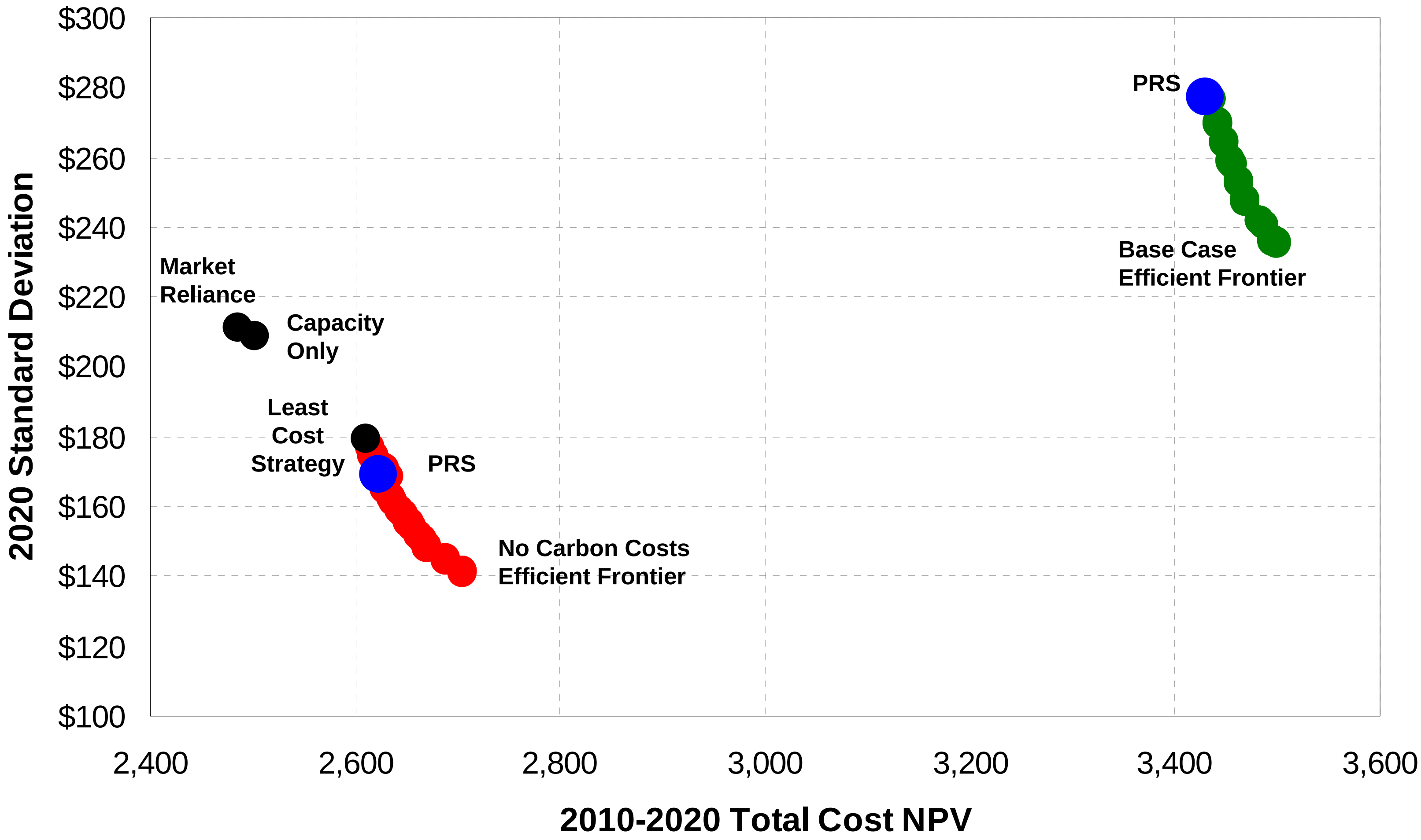


US WECC Greenhouse Gas Levels



No Carbon Costs Scenario

No Carbon Costs Scenario



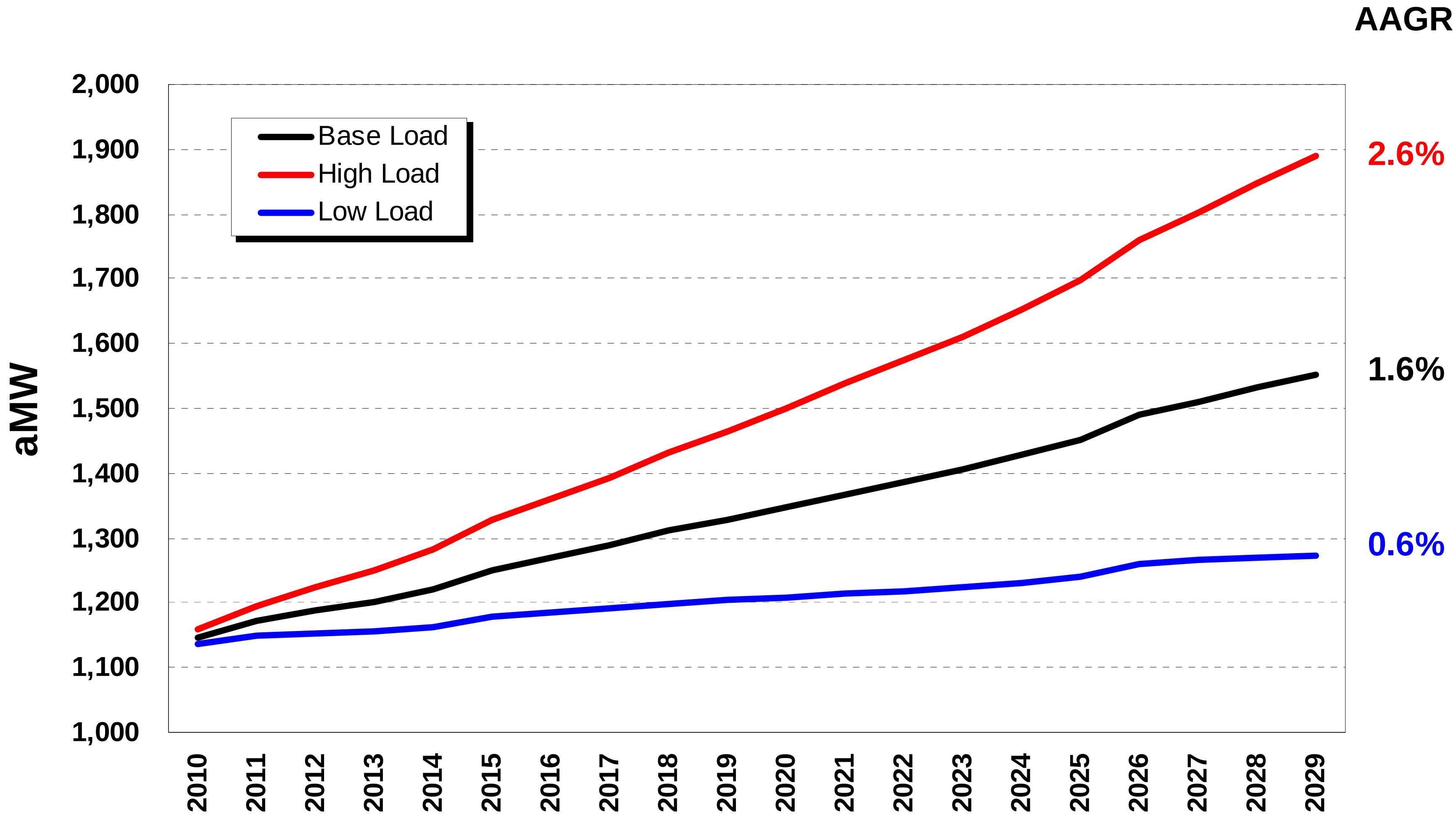
AVISTA

No CO_2 Costs: Least Cost Strategy (MW)

Year	CCCT	SCCT	Wind	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	12	1
2011	-	-	-	-	-	12	1
2012	-	-	-	-	-	12	1
2013	-	-	150	-	-	12	1
2014	-	-	-	-	-	14	1
2015	-	-	-	-	-	14	-
2016	-	-	-	-	-	15	-
2017	-	-	-	1	-	15	-
2018	-	-	-	-	-	15	-
2019	-	-	-	1	-	17	-
2020	-	200	150	-	-	17	-
2021	-	-	-	-	-	18	-
2022	-	-	-	2	-	18	-
2023	-	100	50	-	-	20	-
2024	-	-	-	-	-	20	-
2025	-	-	-	-	-	21	-
2026	-	100	-	-	-	21	-
2027	-	300	-	-	-	23	-
2028	-	-	-	-	-	23	-
2029	-	100	-	-	-	24	-
2010-2019	-	-	150	2	-	137	5
2010-2029	-	800	350	4	-	339	5

Fundamental Portfolio Changes

Alternative Load Forecasts (Energy)



High Load Least Cost Strategy (MW)

Year	CCCT	SCCT	Wind	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	12	1
2011	-	-	-	-	-	12	1
2012	-	60	-	-	-	14	1
2013	-	-	200	-	-	14	1
2014	-	100	-	1	-	15	1
2015	-	-	-	1	-	15	-
2016	-	-	-	-	-	17	-
2017	-	-	-	1	-	17	-
2018	-	100	-	-	-	18	-
2019	-	-	-	-	-	18	-
2020	-	100	200	-	-	20	-
2021	250	-	-	2	-	20	-
2022	-	-	-	-	-	21	-
2023	-	-	50	-	-	23	-
2024	-	-	-	-	-	23	-
2025	250	-	50	-	-	24	-
2026	-	-	-	-	-	26	-
2027	500	-	-	-	-	27	-
2028	-	-	50	-	-	29	-
2029	-	-	-	-	-	29	-
2010-2019	-	260	200	3	-	150	5
2010-2029	1,000	360	550	5	-	389	5

AVISTA

Low Load Least Cost Strategy (MW)

Year	CCCT	SCCT	Wind	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	12	1
2011	-	-	-	-	-	12	1
2012	-	-	-	-	-	12	1
2013	-	-	150	-	-	12	1
2014	-	-	-	1	-	14	1
2015	-	-	-	1	-	14	-
2016	-	-	-	-	-	15	-
2017	-	-	-	1	-	15	-
2018	-	-	-	-	-	15	-
2019	-	-	-	-	-	17	-
2020	-	-	100	-	-	17	-
2021	-	-	-	-	-	18	-
2022	-	-	-	-	-	18	-
2023	-	-	-	-	-	20	-
2024	-	-	-	-	-	20	-
2025	-	-	-	-	-	21	-
2026	250	-	-	-	-	21	-
2027	-	-	-	-	-	23	-
2028	-	100	-	-	-	23	-
2029	-	-	-	2	-	24	-
2010-2019	-	-	150	3	-	137	5
2010-2029	250	100	250	5	-	339	5

Least Avista Greenhouse Gas Emissions Scenario

- Model selected small renewable and hydro upgrades, simple cycle gas turbines and low carbon emitting resource (nuclear/carbon sequestration)
- Wind resources reduce Western Interconnect emissions, but likely would not significantly reduce Avista's greenhouse gas emissions
- Carbon reductions could be from retiring resources such as Colstrip and Coyote Springs 2

Capital Cost Sensitivities

Wind Capital Cost Sensitivity

Starting Point: 150 MW Wind by December 31, 2012

- 50 MW Reardan ($2,423 per kW) [2009$: $2,262]
- 100 MW Generic Wind ($2,513 kW) [2009$: $2,183]
  - Assumes Avista can only take advantage of 90% of tax credit beginning in 2011, due to not enough tax liability

Scenario: At what capital cost does PRiSM select Reardan earlier?

- Model selected Reardan in 2010, if capital costs are less than $1,877 per kW [2009$: $1,832]

AVISTA

CCCT Capital Cost Sensitivity

Starting Point: 250 MW CCCT beginning January 1, 2020

- Generic CCCT ($1,949 per kW) [2009$: $1,461]

Scenario: At what price is CCCT no longer preferred on a least cost basis, if SCCT cost remain equal.

- If cost are above ($2,051 per kW) [2009$: $1,535] the least cost strategy includes 300MW of LMS 100 in 2020-21
- Although, the 2020 standard deviation of power supply expense increases by 3.5%

Resource Availability Scenarios

Large Hydro Upgrades

- Base Case does not include Cabinet Gorge Unit 5 or Long Lake 2nd PH/Unit 5 as options.
- These units were not considered options at this time, due to cost uncertainty.
- Assumption (2009$):
  - Cabinet Gorge 5: $1,478 kW
  - Long Lake U5: $2,168 kW
  - Long Lake 2nd PH: $2,000 kW

This analysis first allows these units to be available at estimated costs, then studies how cost change impacts the PRS.

Least Cost Strategy:
With Large Hydro Options (MW)

Year	CCCT	SCCT	Wind	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	12	1
2011	-	-	-	-	-	12	1
2012	-	-	-	-	-	12	1
2013	-	-	150	-	-	12	1
2014	-	-	-	1	-	14	1
2015	-	-	-	1	-	14	-
2016	-	-	-	-	-	15	-
2017	-	-	-	1	-	15	-
2018	-	-	-	-	-	15	-
2019	-	-	-	-	-	17	-
2020	-	100	100	60	-	17	-
2021	250	-	-	-	-	18	-
2022	-	-	-	-	-	18	-
2023	-	-	50	-	-	20	-
2024	-	-	-	-	-	20	-
2025	-	-	-	-	-	21	-
2026	-	-	-	-	-	21	-
2027	400	-	-	-	-	23	-
2028	-	-	-	-	-	23	-
2029	-	-	-	2	-	24	-
2010-2019	-	-	150	3	-	137	5
2010-2029	650	100	300	65	-	339	5

Least Cost Strategy With *Cabinet 4 and Long Lake 2nd PH (MW)*

Year	CCCT	SCCT	Wind	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	12	1
2011	-	-	-	-	-	12	1
2012	-	-	-	-	-	12	1
2013	-	-	150	-	-	12	1
2014	-	-	-	1	-	14	1
2015	-	-	-	61	-	14	-
2016	-	-	-	-	-	15	-
2017	-	-	-	1	-	15	-
2018	-	-	-	-	-	15	-
2019	-	-	-	-	-	17	-
2020	-	-	100	60	-	17	-
2021	250	-	-	-	-	18	-
2022	-	-	-	-	-	18	-
2023	-	-	50	-	-	20	-
2024	-	-	-	-	-	20	-
2025	-	-	-	-	-	21	-
2026	-	-	-	-	-	21	-
2027	400	-	-	-	-	23	-
2028	-	-	-	-	-	23	-
2029	-	-	-	2	-	24	-
2010-2019	-	-	150	63	-	137	5
2010-2029	650	-	300	125	-	339	5

AVISTA

Large Hydro Upgrade Capital Cost Analysis

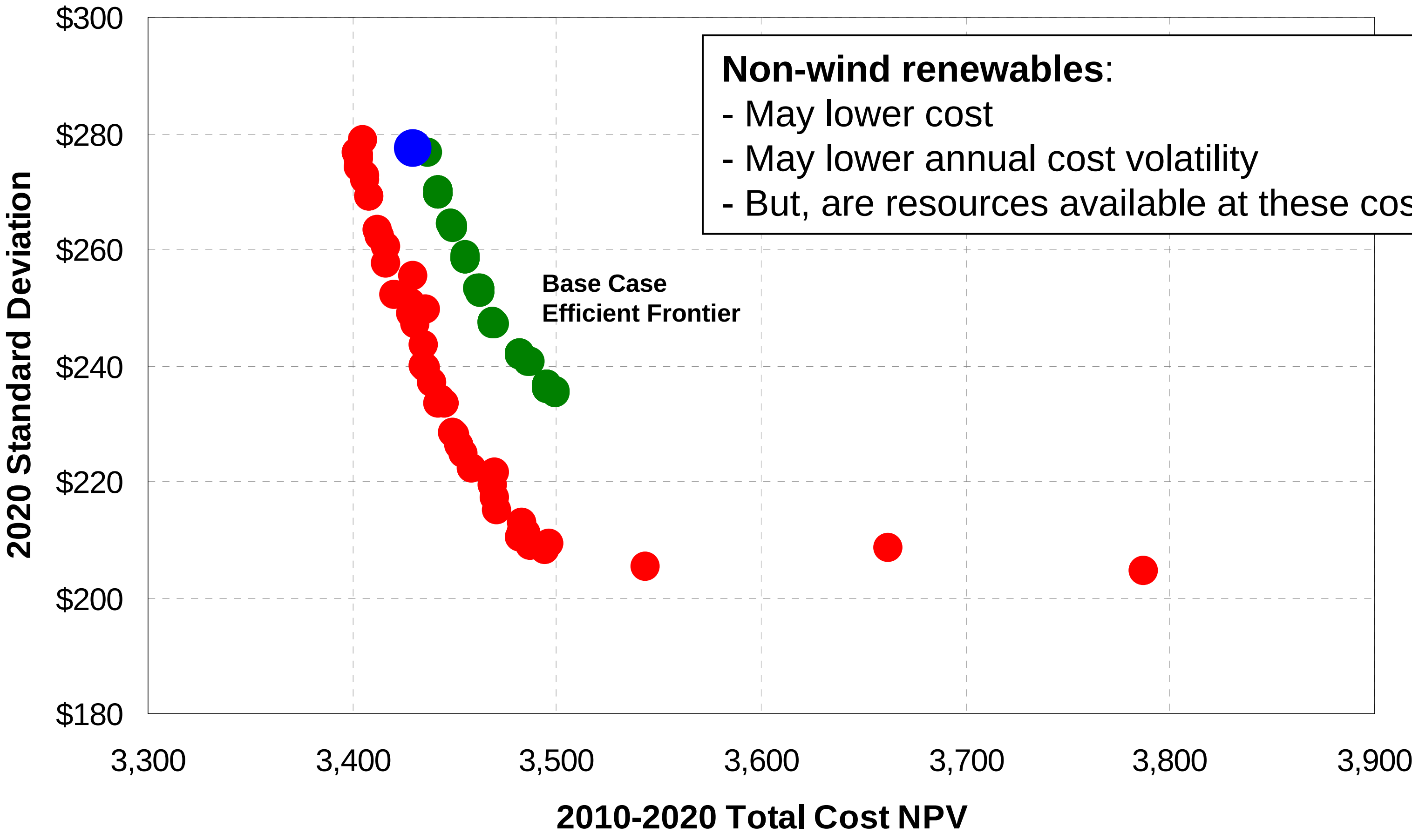
Long Lake 2nd Powerhouse is favored by PRiSM, due to larger capacity size and similar cost per MWh

- The plant is selected as least cost resource until the cost reaches $2,150 kW

Cabinet Gorge U5 is not selected as a least cost resource, due to low capacity factor, if costs were less than $1,100 per kW, the plant would be selected

While these resources have capital cost uncertainty, they are a viable alternative to reduce carbon emissions

Non-Wind Renewable Resources Available



Non-wind renewables:
- May lower cost
- May lower annual cost volatility
- But, are resources available at these costs?

Least Cost Strategy- Small Renewables Available (MW)

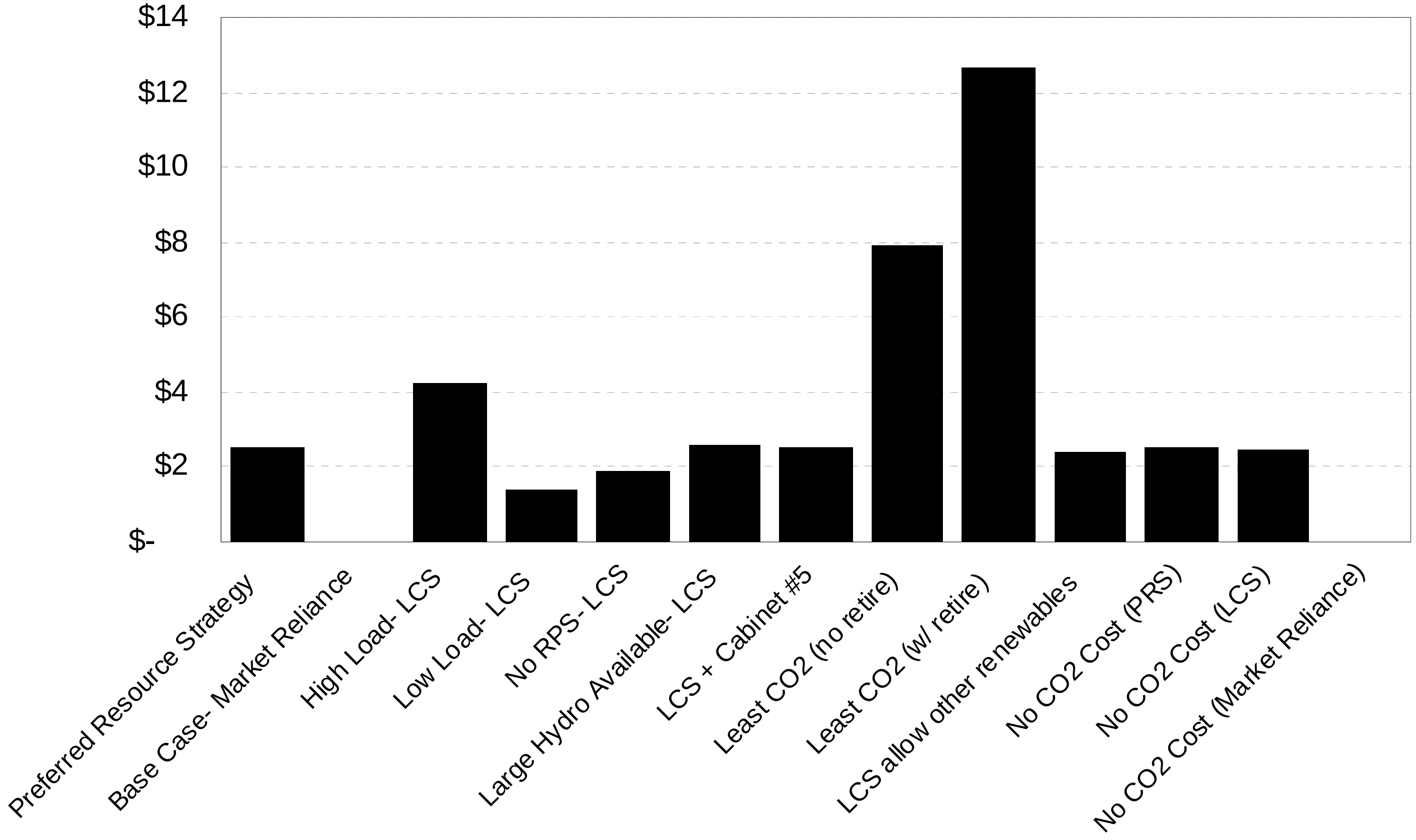
Year	CCCT	SCCT	Wind	Non-Wind Renewable	Hydro Upgrades	Low Carbon Baseload	DSM	T&D Effic.
2010	-	-	-	-	-	-	12	1
2011	-	-	-	-	-	-	12	1
2012	-	-	-	10	-	-	12	1
2013	-	-	100	5	-	-	12	1
2014	-	-	-	5	1	-	14	1
2015	-	-	-	-	-	-	14	-
2016	-	-	-	-	1	-	15	-
2017	-	-	-	-	1	-	15	-
2018	-	-	-	5	-	-	15	-
2019	-	-	-	-	-	-	17	-
2020	-	100	100	7	2	-	17	-
2021	250	-	-	-	-	-	18	-
2022	-	-	-	-	-	-	18	-
2023	-	-	-	-	-	-	20	-
2024	-	-	50	-	-	-	20	-
2025	-	-	-	-	-	-	21	-
2026	-	-	-	-	-	-	21	-
2027	400	-	-	-	-	-	23	-
2028	-	-	-	-	-	-	23	-
2029	-	-	-	-	-	-	24	-
2010-2019	-	-	100	25	3	-	137	5
2010-2029	650	100	250	32	5	-	339	5

Nuclear

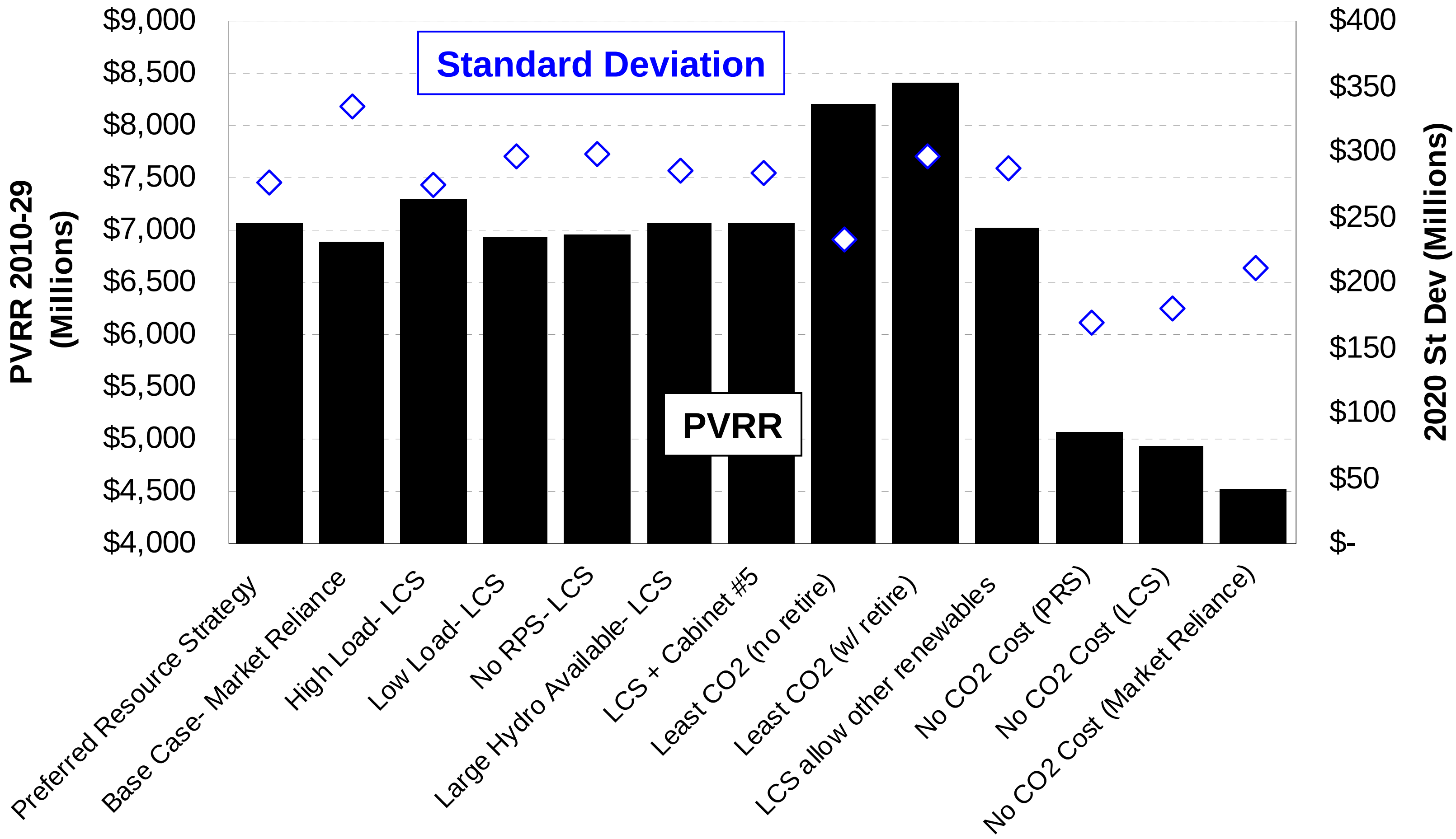
If Nuclear was allowed as a resource beginning in 2020 at a 2009$ capital cost of $5,500 per kW in 250 MW sizes.

- At this cost it would not be selected in the Least Cost Strategy.
- Although, if costs were $3,800 per kW the resource would be selected
- If Avista were to acquire the plant in 100MW quantities it would be least cost at $4,000 per kW.

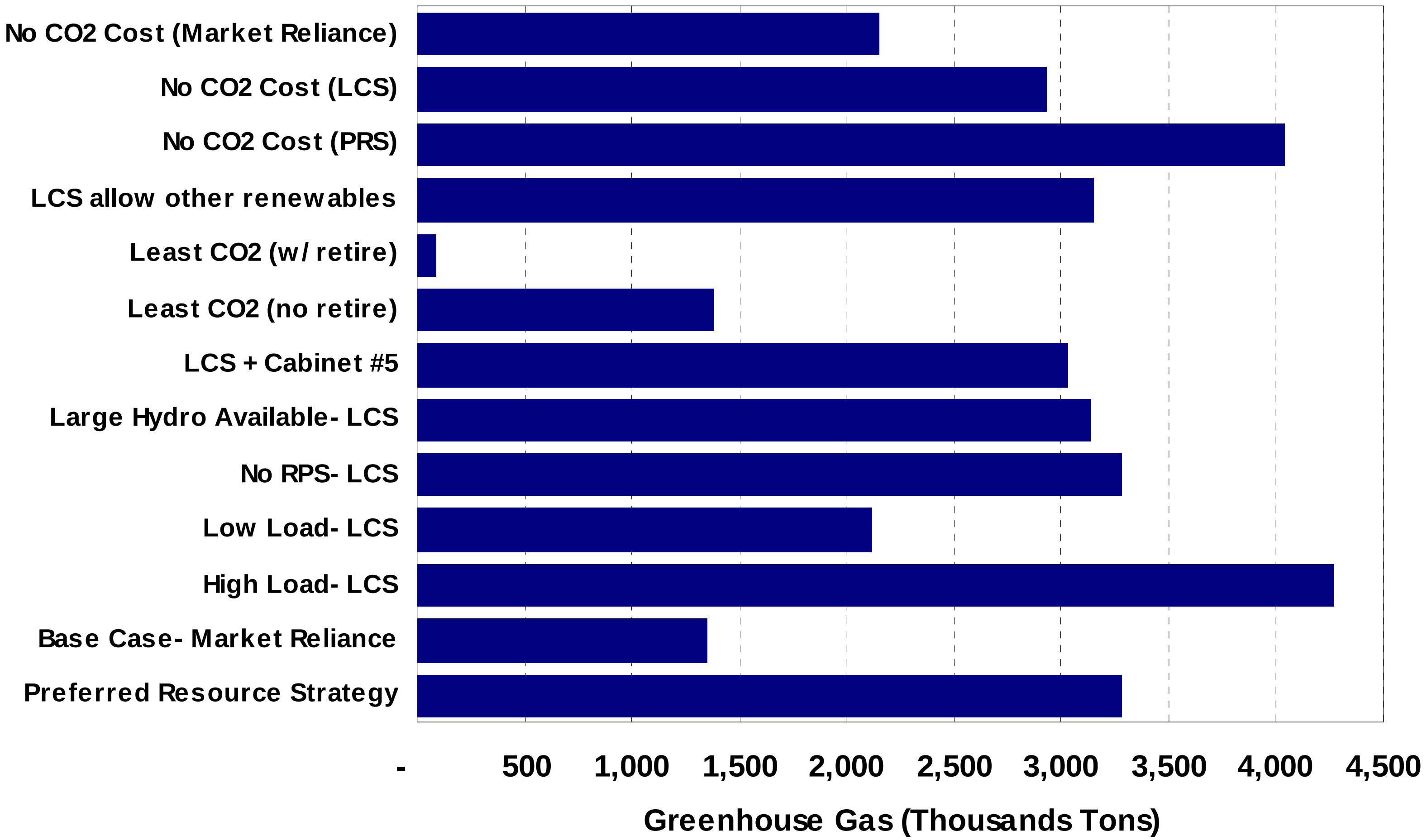
Capital Expense in Billions Dollars
(Nominal 2010-29)



Portfolio Cost/Risk Comparison



Avista Greenhouse Gas Emissions (2029)



2009 IRP Topics

John Lyons

2009 Electric Integrated Resource Plan

Fifth Technical Advisory Committee Meeting

March 25, 2009

Executive Summary

- Resource needs
- Modeling and results
- Electricity and natural gas market price forecasts
- Demand side management
- Preferred Resource Strategy
- Environmental issues
- Action items

Introduction & Stakeholder Involvement

- IRP process
- Public involvement
- 2009 IRP chapter overview

Loads and Resources

- Economic forecast
- Load forecast
- Forecast scenarios
- Overview of current resources
- Planning margins and resource requirements

Demand Side Management

- Overview of DSM programs
  - Historical
  - Residential
  - Commercial and Industrial
- DSM programs for 2009 IRP
  - Programs considered
  - Analytics
  - DSM business plan and future commitments

Environmental Issues

- Environmental initiatives and policies
- Avista's Climate Change Committee
- State and federal renewable portfolio standards issues
- State and federal greenhouse gas legislation

Transmission & Distribution Planning

- Overview of Avista’s transmission system
- Regional transmission issues
- Transmission cost estimates
- Distribution efficiency projects
- Transmission efficiency projects

Modeling Approach

- Market modeling
- Key assumptions and inputs
  - Hydro
  - Fuel prices: coal and natural gas
  - Emissions: SO_2, NO_x and greenhouse gases
  - Risk modeling
  - Resource alternatives
- PRiSM model

Market Modeling Results

- Base Case
- Market Scenarios
- Portfolio Scenarios
  - Fundamental changes
  - Capital cost sensitivities
  - Resource availability

Preferred Resource Strategy

- 2009 Preferred Resource Strategy
- Comparisons with prior plans
- Portfolio strategies and performance across scenarios

2009 IRP Action Items

- Progress on 2007 IRP Action Items
- 2009 Action Items
  - Renewables
  - DSM
  - Greenhouse gas issues
  - Modeling and forecasting enhancements
  - Transmission planning

Avista's 2009 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 6 Agenda

June 24, 2009

	Topic	**Time**	**Staff**
1.	Introductions	10:00	Storro
2.	IRP Section Highlights	10:05	Kalich
3.	Preferred Resource Strategy	10:30	Gall
4.	Lunch	11:30	
5.	Preferred Resource Strategy	12:30	Kalich/Gall
6.	IRP Action Items	1:30	Lyons
7.	Adjourn	2:00	

Draft Chapter Highlights

Loads & Resources

- Weak economic growth is expected until 2011 in the service territory.
- Historic conservation acquisitions are included in the load forecast; higher acquisition levels anticipated in this IRP reduce the load forecast further.
- Annual electricity sales growth from 2010-2020 averages 1.6 percent over the next decade (199 aMW) and 1.8 percent over the entire 20-year forecast.
- Peak loads are expected to grow at 1.6 percent annual rate over the next 10 years (312 MW) and also 1.6 percent over the entire 20-year forecast.
- Avista's resource deficits begin 2018; without conservation resources deficits would begin in 2016.
- Capacity deficiencies now are the predominate driver of resource need.

Energy Efficiency

- Avista has offered conservation programs for over 30 years.
- The Company has acquired 138.5 aMW of electric-efficiency in the past three decades; an estimated 109 aMW is still in service, reducing overall load by approximately 10 percent.
- 20,000 additional customers heat their homes with natural gas today because of Avista's first fuel-switching program.
- The Company has developed and maintains the infrastructure necessary to respond quickly to an energy efficiency ramp-up if another energy crisis or opportunity occurs.
- Approximately 3,000 concepts were evaluated by Avista's demand-side management analysts for the 2009 IRP.
- 7 aMW of local and 2.9 aMW of regional conservation is expected in 2010
- Conservation additions provide 26 percent of new supplies through 2020.
- 2009 IRP includes 0.3 aMW (3.3%) more annual conservation acquisition than 2007 plan, building on a 50% increase in the 2005 and another 25% in the 2007 IRP.

Transmission & Distribution

- Avista has completed a $130 million transmission improvement project.
- Avista has over 2,200 miles of high voltage transmission.
- Avista remains actively involved in regional transmission planning efforts.
- The cost of selected new transmission lines and upgrades are included in the 2009 Preferred Resource Strategy.
- 2.7 aMW of distribution efficiencies are included in this IRP.

Generation Resource Options

- Only resources with well known costs were considered in the PRS analysis, other resources were studied in sensitivities.
- Federal tax credits were extended to 1/1/2013 for wind and 1/1/2014 for non-wind renewables with a choice of the PTC ($20/mwh or 30% ITC)
- Large hydro upgrades at Long Lake and Cabinet Gorge are not considered as new resources, but will be further studied for inclusion in the 2011 IRP analysis.
- Small hydro upgrades and wood fired upgrades were considered in this IRP.
- Solar is included as resource option for this first time.

Market Analysis

- Mid-Columbia electric and Malin natural gas prices are 27 and 20 percent higher than the 2007 IRP, primarily due to carbon legislation impacts
- Mid-Columbia electric prices are expected to be $79.56 per megawatt-hour over the next 20 years
- Malin natural gas prices are expected to be $7.36 per decatherm over the next 20 years
- Gas-fired resources continue to serve most new loads and take the place of coal generation to reduce greenhouse gas emissions
- Future carbon credit prices will depend on reduction goals and the differential between natural gas and coal prices
- Carbon legislation increases total fuel expenses in the Western Interconnect by over 16 percent

Preferred Resource Strategy

- Avista’s physical energy needs begin in 2018; capacity needs begin in 2016.
- Near-term resource acquisitions are driven by pending environmental regulation and risk reduction.
- The first supply-side resource acquisitions are 150 MW of wind by 2012.
- Conservation additions provide 26 percent of new supplies through 2020.
- A 250 MW natural gas-fired combined cycle project is required by 2020.
- Large hydro upgrades have the potential to change the preferred resource mix.
- The 2020 CCCT acquisition could be moved forward to as soon as 2015 without a significant impact on the preferred resource strategy.

Draft Action Items Highlights

Resource Additions & Analysis

- Continue to explore the potential for wind and non-renewable resources.
- Issue an RFP for turbines at Reardan and up to 100 MW of wind or other renewables in 2009.
- Finish studies regarding the costs and environmental benefits of the large hydro upgrades at Cabinet Gorge, Long Lake, Post Falls, and Monroe Street.
- Study potential locations for the natural gas fired resource identified to be on-line between 2015 and 2020.

Demand Side Management

- Pursue American Reinvestment and Recovery Act funding and its affect on the amount of low income weatherization.
- Analyze and report on the results of the July 2007 through December 2009 demand response pilot in Moscow and Sandpoint.

Environmental Policy

- Continue to study the potential impact of state and federal climate change legislation.
- Continue and report on the work of Avista's Climate Change Committee.

Modeling and Forecasting Enhancements

- Refine the stochastic model for cost driver relationships.
- Continue to refine the PRiSM model.
- Continue developing Loss of Load Probability and Sustained Peaking analysis for inclusion in the IRP process

Transmission Planning

- Work to maintain/retain existing transmission rights on the Company's transmission system, under applicable FERC policies, for transmission service to bundled retail native load.
- Continue involvement in BPA transmission practice processes and rate proceedings to minimize costs of integrating existing resources outside of the company's service area.
- Continue participation in regional and sub-regional efforts to establish new regional transmission structures (ColumbiaGrid and other forums) to facilitate long-term expansion of the regional transmission system.
- Evaluate costs to integrate new resources across Avista's service territory and from regions outside of the Northwest.
- Further study and implement distribution feeder rebuild projects to reduce system losses.
- Study transmission re-configurations to economical reduce system losses.

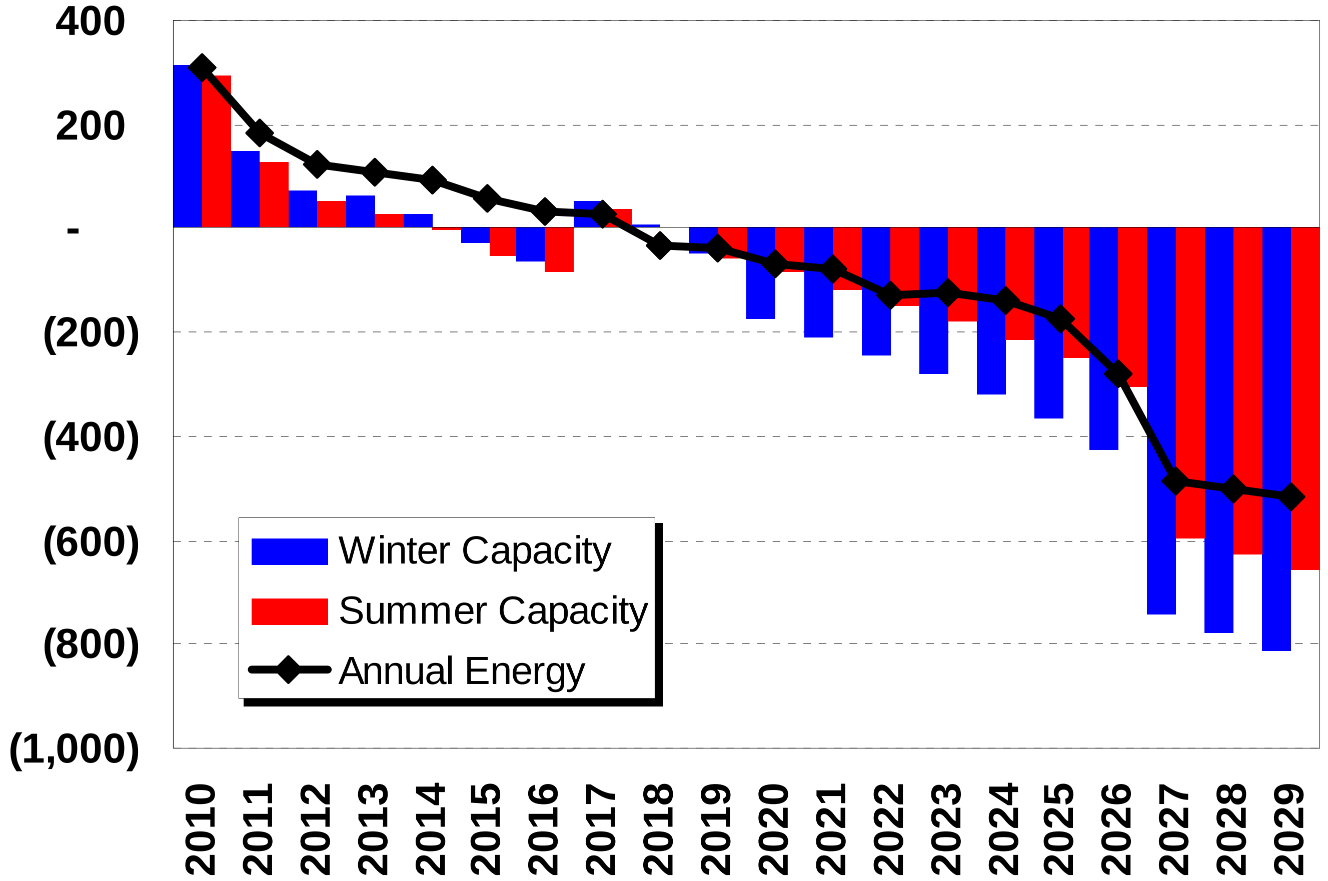
2009 IRP
Preferred Resource Strategy

2009 Electric Integrated Resource Plan

Sixth Technical Advisory Committee Meeting

June 24, 2009

L&R Balances



Load is net 2007 Conservation Levels

Preferred Resource Strategy Approach

Least Cost Strategy that meets

1. Capacity Needs
2. Energy Needs
3. RPS Requirements
4. Conservation Requirements
5. Emissions Regulation
6. Actionable

Flexible Strategy

Preferred Resource Strategy

But, what if?

Capital Costs Change

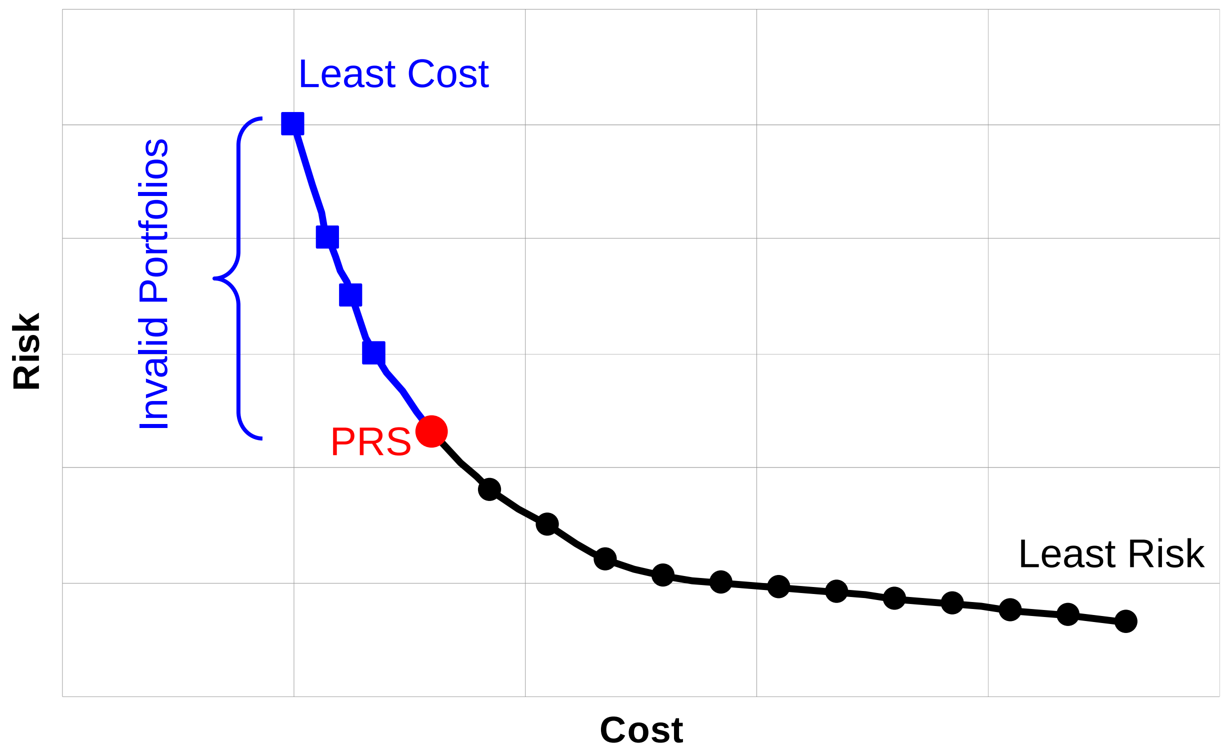
Load Growth Rate Changes

Large Hydro Upgrades Are Cost Effective

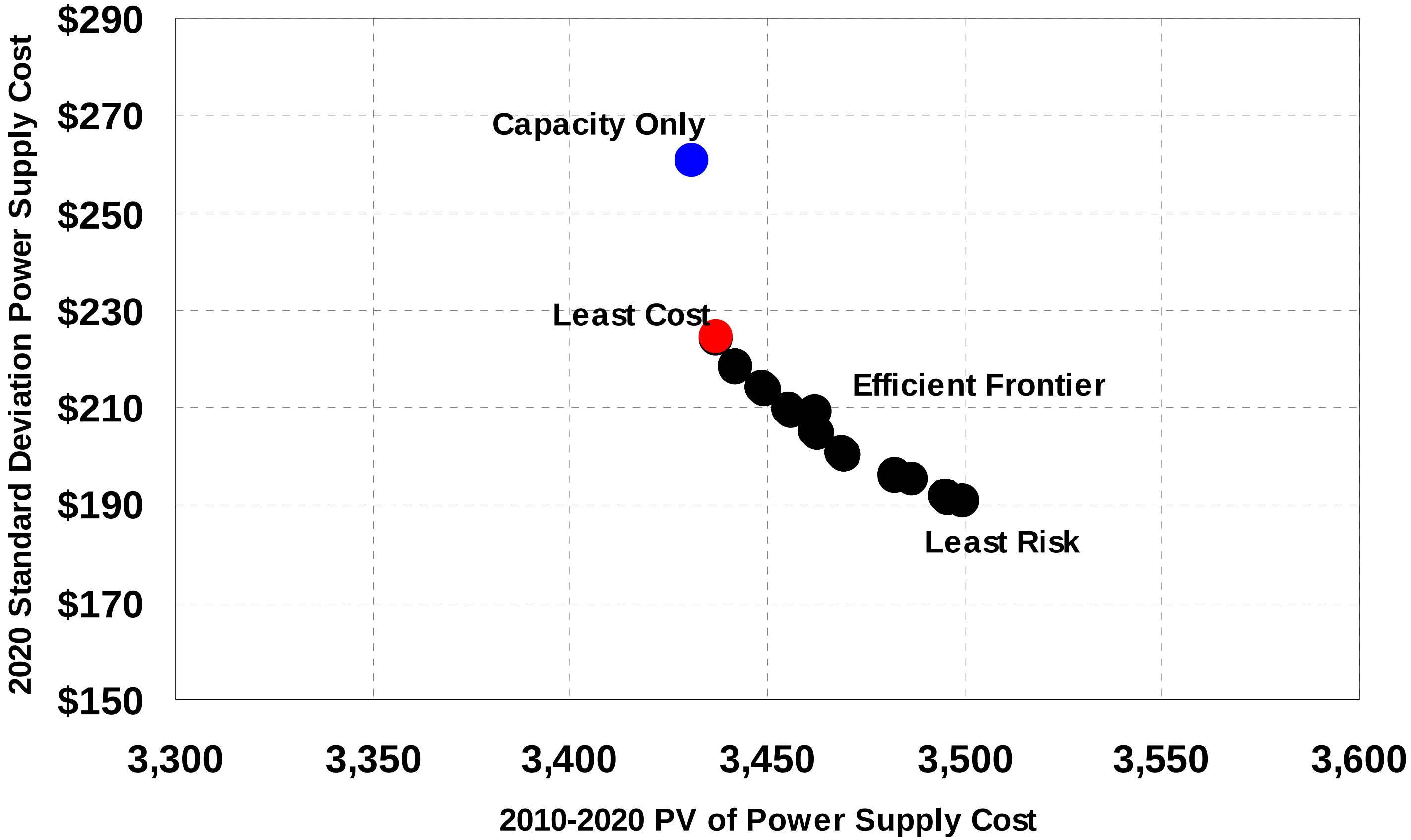
Non-Wind Renewables Become Abundant

Is Nuclear a Solution

Conceptual Efficient Frontier

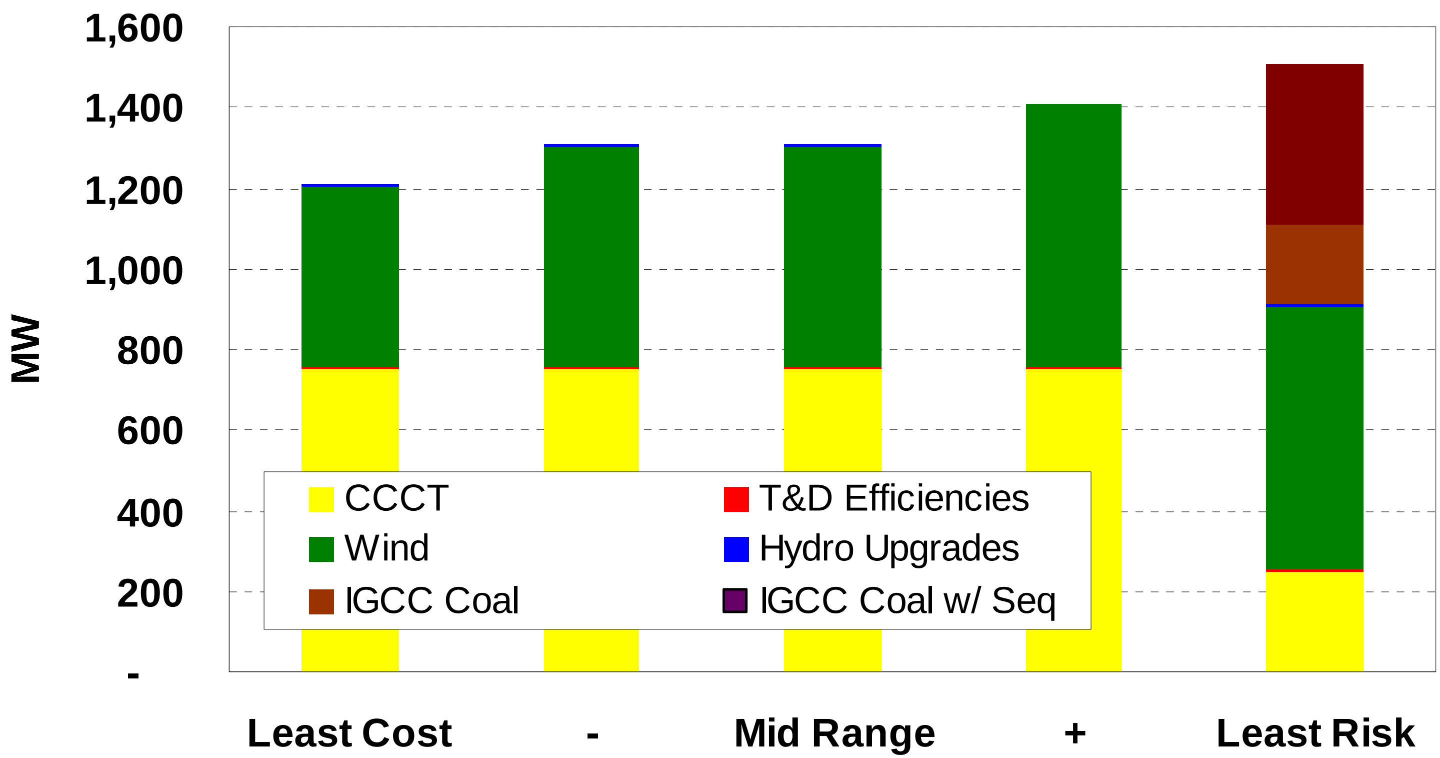


Efficient Frontier



AVISTA

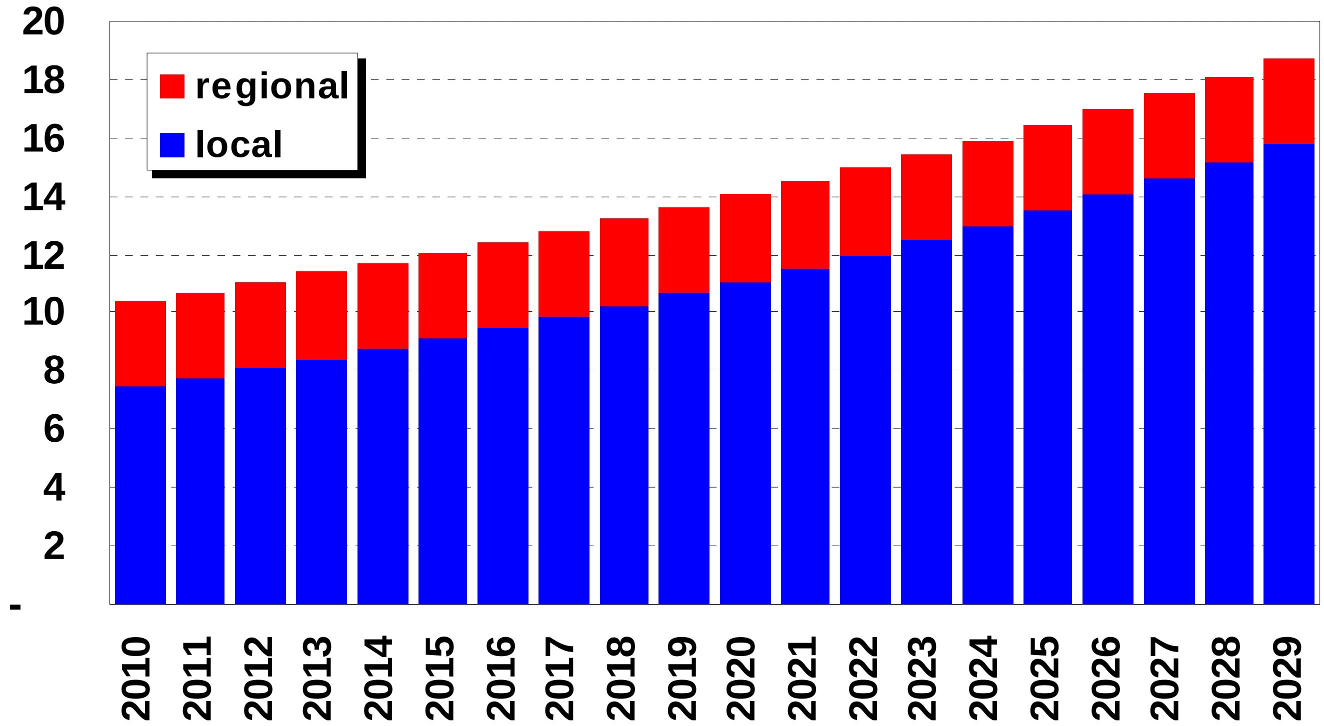
Efficient Frontier Portfolios



2009 Preferred Resource Strategy

Resource	By the End of Year	Nameplate (MW)	Energy (aMW)
NW Wind	2012	150.0	50.0
Distribution Efficiencies	2010-2015	5.0	2.0
Little Falls 1	2013	1.0	0.3
Little Falls 2	2014	1.0	0.3
Little Falls 4	2016	1.0	0.3
NW Wind	2019	150.0	50.0
CCCT	2019	250.0	225.0
Upper Falls	2020	2.0	1.0
NW Wind	2022	50.0	17.0
CCCT	2024	250.0	225.0
CCCT	2027	250.0	225.0
Conservation	All Years	339.0	226.0
Total		**1,449.0**	**1,019.9**

Annual Conservation Acquisition



Local
90 aMW over first 10 years
226 aMW over 20 years

Regional
29 aMW over first 10 years
59 aMW over 20 years

Local Energy Efficiency Targets

Portfolio	2010 Target	2011 Target
Limited Income Residential	1,977,099	2,056,183
Residential	20,518,584	21,339,327
Prescriptive Non-Residential	18,211,396	18,939,852
Site-Specific Non-Residential	24,936,765	25,934,236
Total Local Acquisition (kWh)	**65,643,844**	**68,269,598**
Local	7.5	7.8
Regional	2.9	2.9
Total Acquisition (aMW)	**10.4**	**10.7**
Draft NPCC 6th Plan Goal	11.2	12.4

AVISTA

Rate Base Additions for Capital Expenditures (Millions)

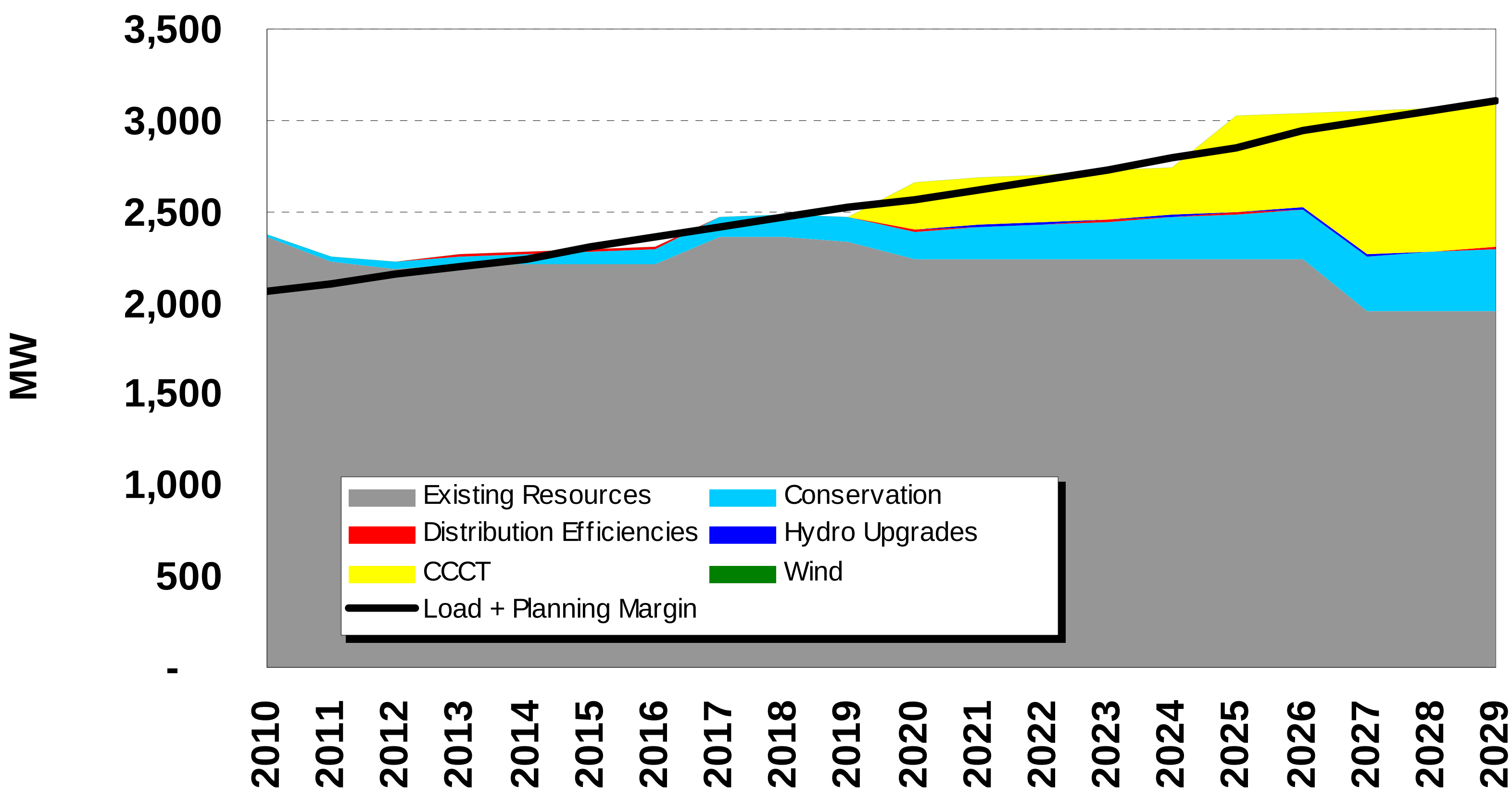
Year	Investment	Year	Investment
2010	4.9	2020	942.1
2011	5.0	2021	10.6
2012	5.1	2022	0.0
2013	278.1	2023	163.3
2014	7.7	2024	0.0
2015	2.3	2025	542.0
2016	0.0	2026	0.0
2017	1.7	2027	0.0
2018	0.0	2028	571.6
2019	0.0	2029	0.0

Totals *
$0.3 billion thru 2019
$2.5 billion thru 2029 **

* Excludes conservation funding
** $1.0 billion NPV @ 8% discount rate

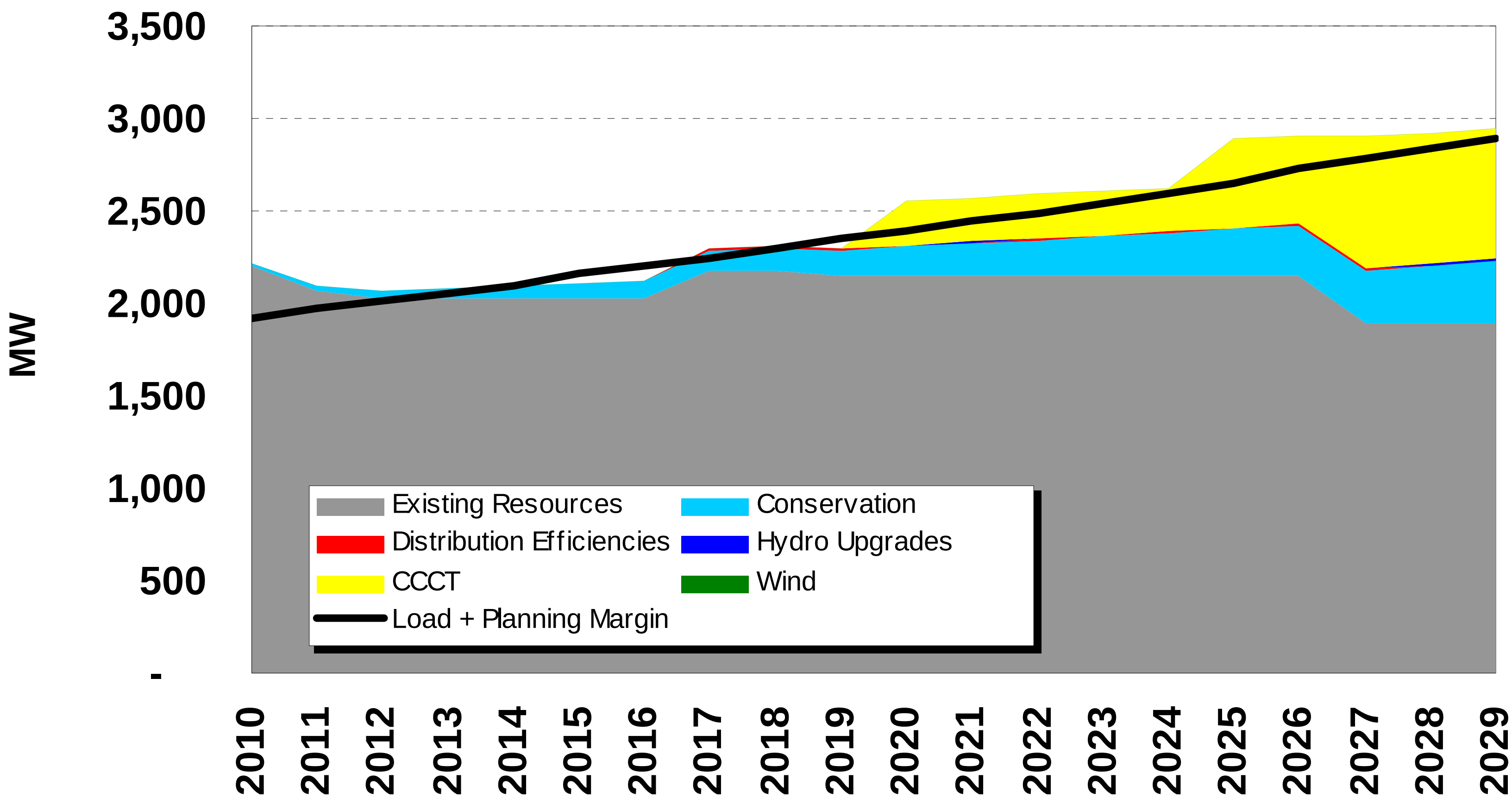
AVISTA

January Capacity L&R w/ New Resources

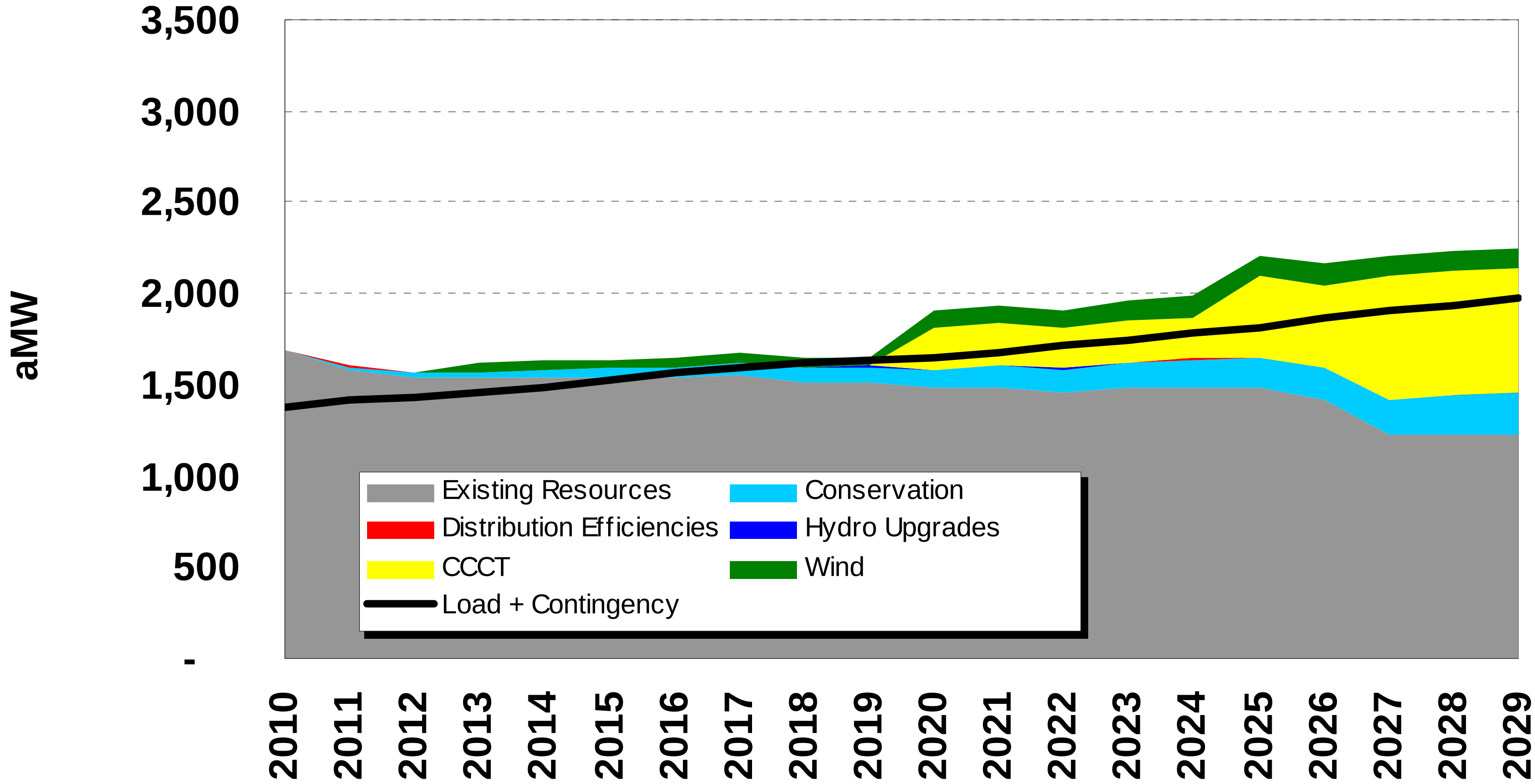


AVISTA

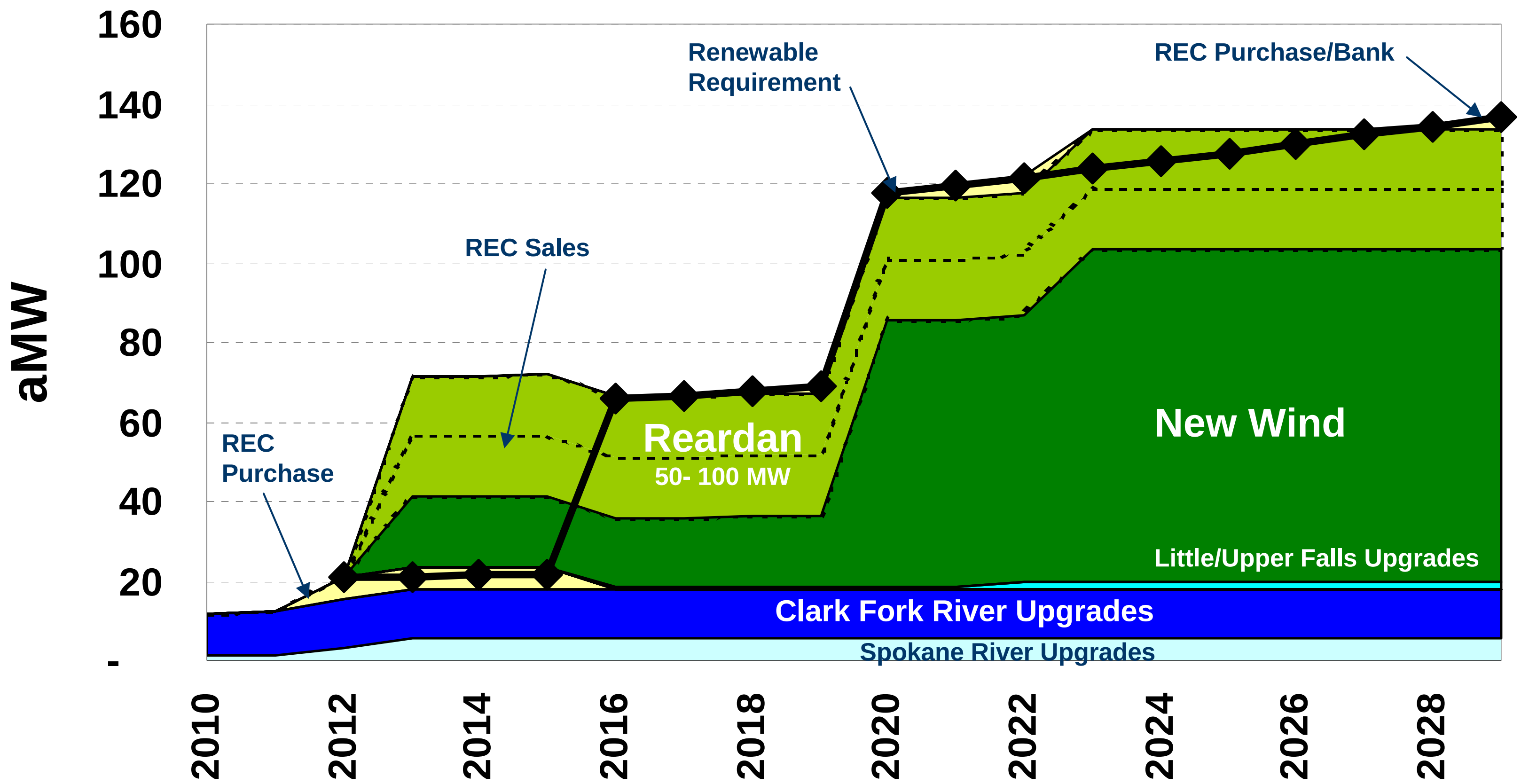
August Capacity L&R w/ New Resources



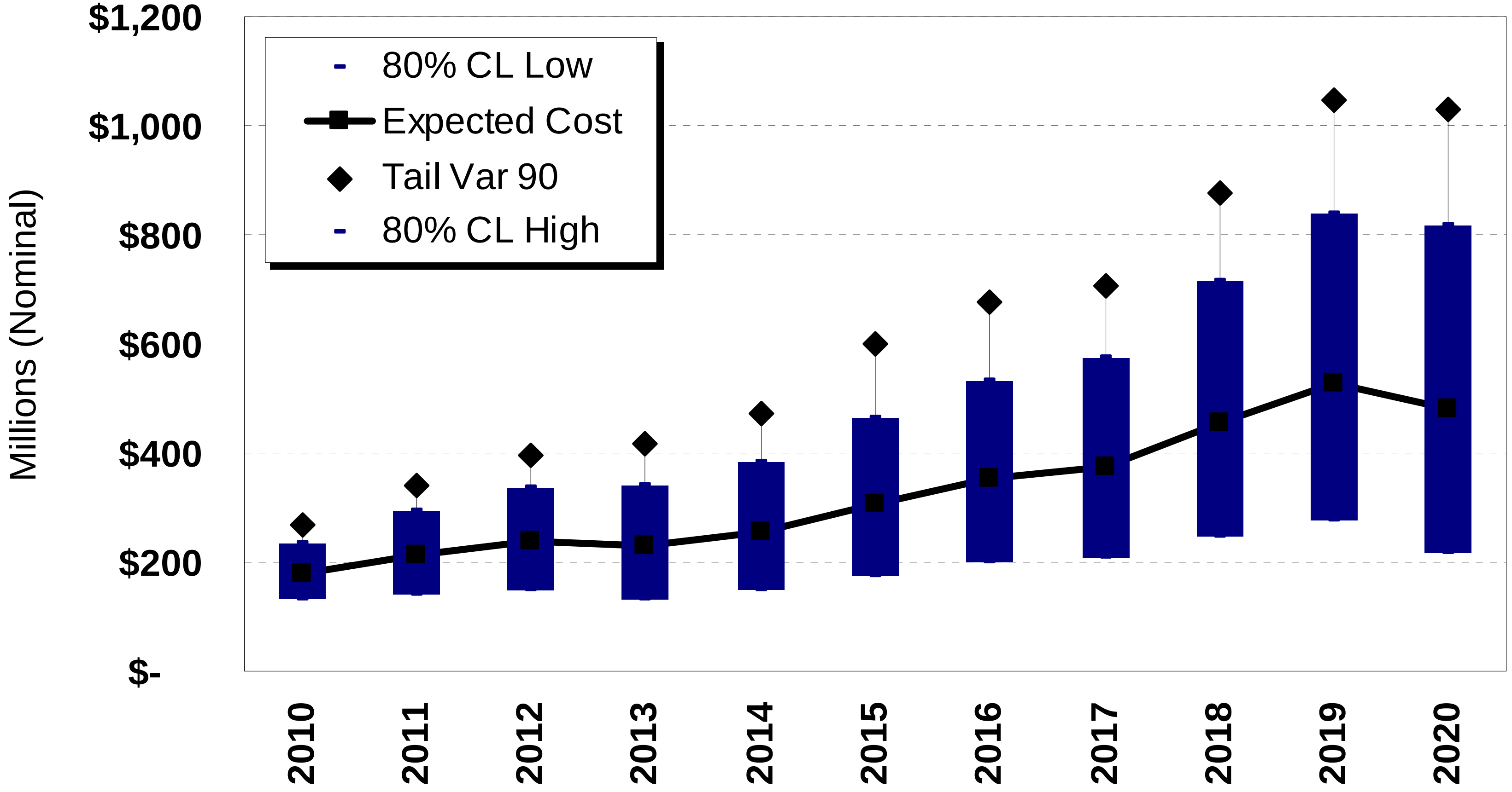
Annual Energy L&R w/ New Resources



Washington State RPS Compliance

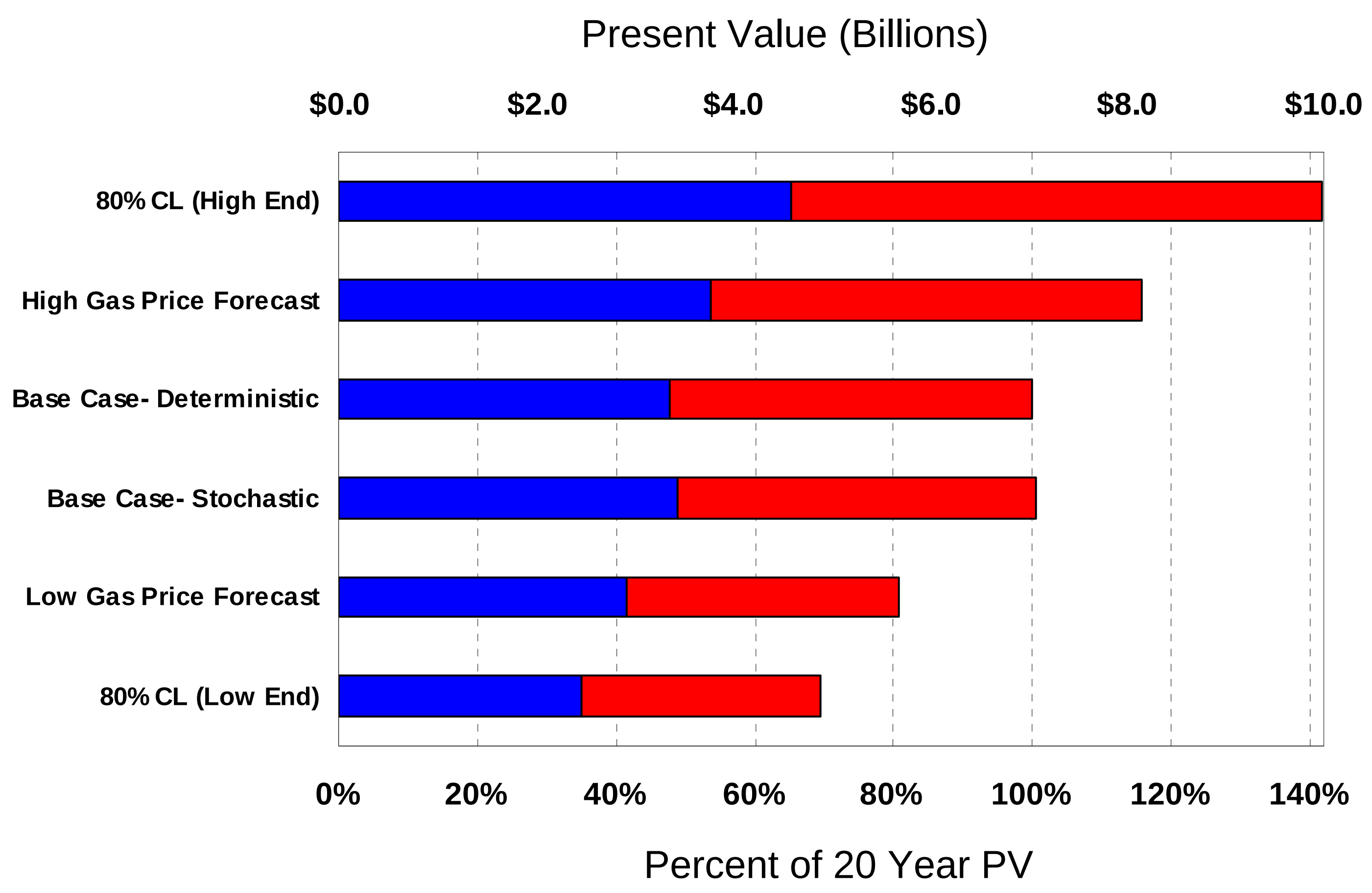


Power Supply Cost Variation

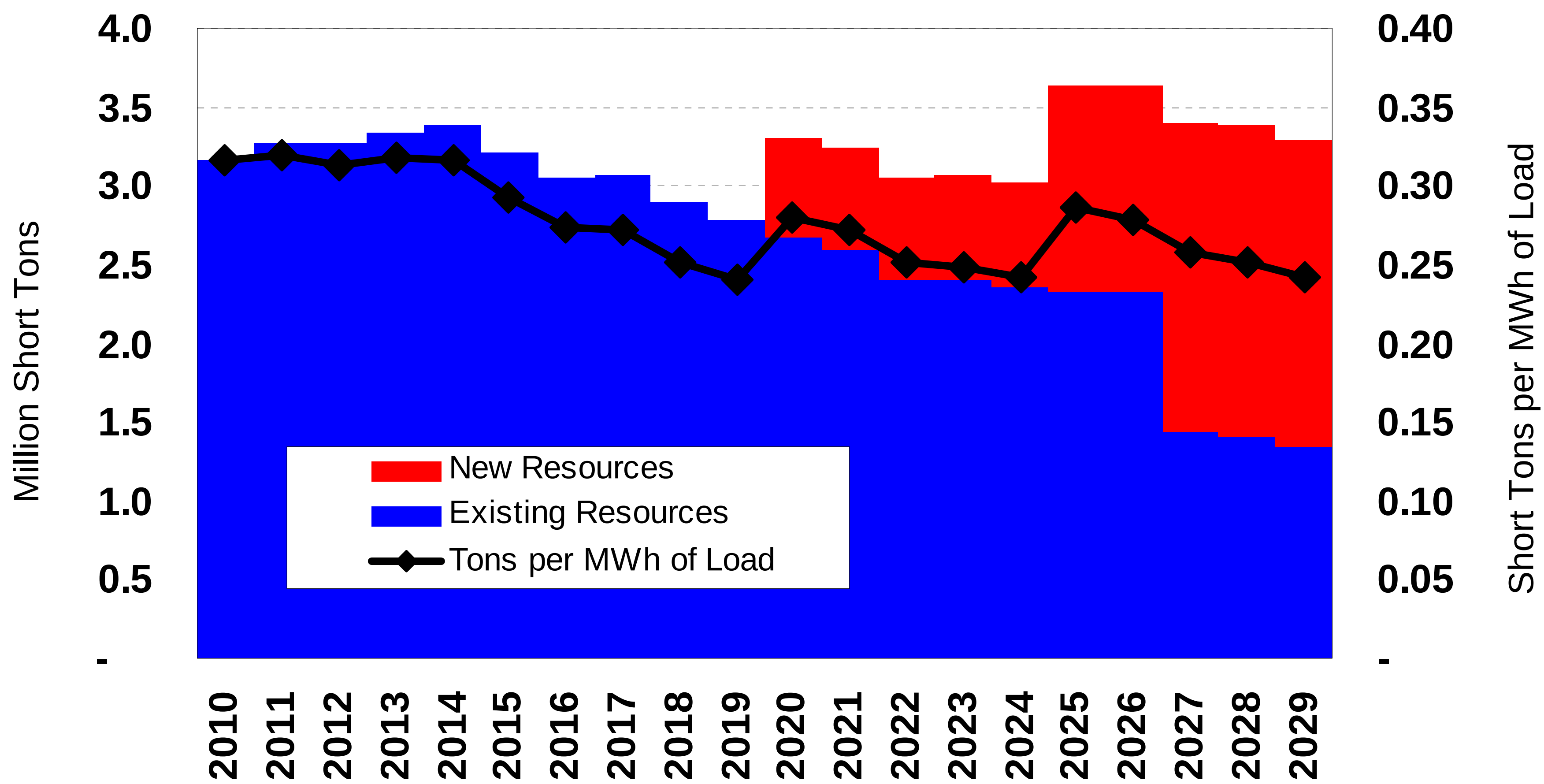


AVISTA

Power Supply Cost Ranges

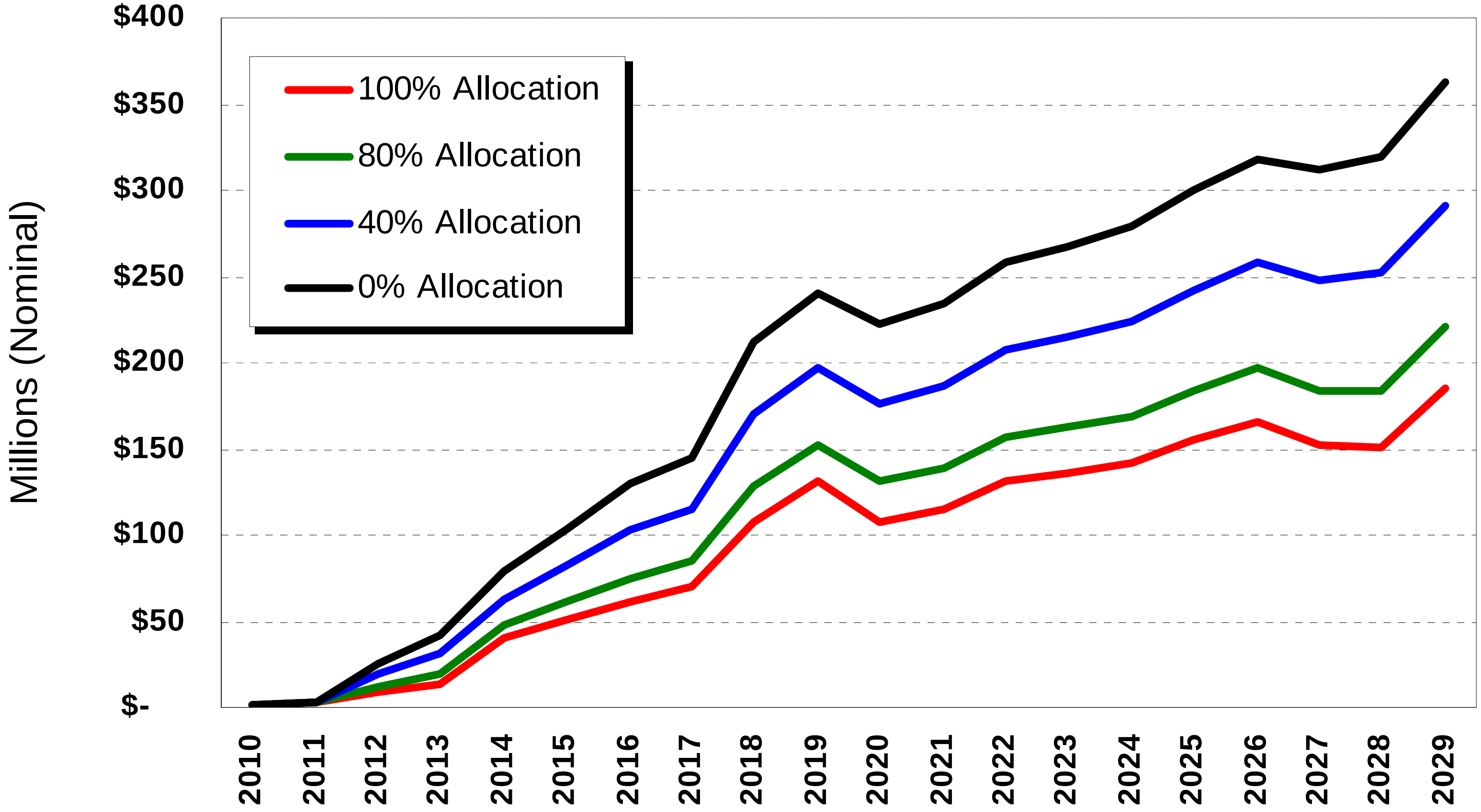


Avista Generator GHG Emissions



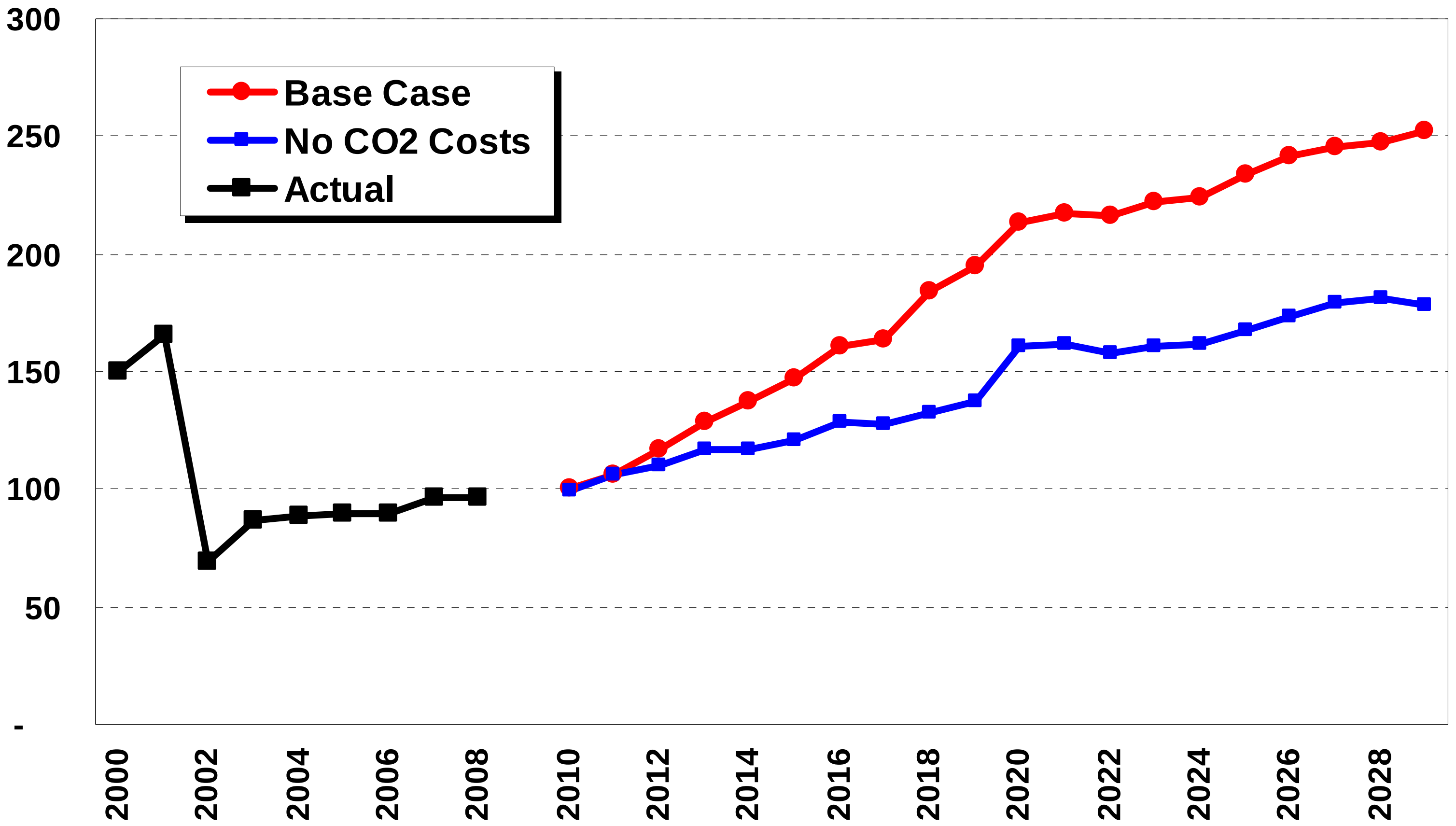
AVISTA

Total Cost GHG Legislation



Future Power Supply Costs

(Index: 2010= 100)



AVISTA

Flexible Strategy

What are the tipping points for key capital costs?	wind capital cost <$1,830/kW, build early CCCT cost >$1,610/kW, consider SCCT
What are the impacts of load growth changes?	High: 260/100 MW more gas/wind next 10 years Low: 250/50 MW less gas/wind in next 10 years
What if large hydro upgrades are viable?	eliminate 50/100 MW of wind/gas over 20 years?
What if non-wind renewables are abundant?	non-wind renewables replace some wind; could reduce gas by 100 MW
Is Nuclear a solution?	least-cost if <=$4,000/kW (current range $5-$10k)

AVISTA

Schedule

June 22:	Internal draft released
June 24:	Final Technical Advisory Committee meeting
July 1:	“Big Picture” internal comments
July 6:	External draft released
July 20:	Comment deadline
Aug 31:	IRP Filed with Commissions
~April 2010:	Begin 2011 IRP Process

2009 IRP Action Items

John Lyons

2009 Electric Integrated Resource Plan
Sixth Technical Advisory Committee Meeting
June 24, 2009

2007 IRP Action Items

- Renewable Energy
- Demand Side Management
- Emissions
- Modeling and Forecasting Enhancements
- Transmission Planning

Renewable Energy

- Continue studying wind potential in the Company's service territory, possibly including the placement of anemometers at the most promising wind sites.
- Commission a study of Montana wind resources that are strategically located near existing Company transmission assets
- Learn more about non-wind renewable resources to satisfy renewable portfolio standard requirements and decrease the Company's carbon footprint.

Demand Side Management

- Update processes and protocols for integrating energy efficiency programs into the IRP to improve and streamline the process.
- Study and quantify transmission and distribution efficiency concepts.
- Determine the potential impacts and costs of load management options currently being reviewed as part of the Heritage Project.
- Develop and quantify the long-term impacts of the newly signed contractual relationship with the Northwest Sustainable Energy for Economic Development organization.

Emissions

- Continue to evaluate the implications of new rules and regulations affecting power plant operations, most notably greenhouse gases.
- Continue to evaluate the merits of various carbon quantification methods and emissions markets.

Modeling and Forecasting Enhancements

- Study the potential for fixing natural gas prices through financial instruments, coal gasification, investments in gas fields, or other means.
- Continue studying the efficient frontier modeling approach to identify more and better uses for its information.
- Further enhance and refine the PRiSM LP model
- Continue to study the impact of climate on the load forecast.
- Monitor the following conditions relevant to the load forecast: large commercial load additions, Shoshone county mining developments, and the market penetration of electric cars.

Transmission Planning

- Work to maintain/retain existing transmission rights on the Company's transmission system, under applicable FERC policies, for transmission service to bundled retail native load.
- Continue involvement in BPA transmission practice processes and rate proceedings to minimize costs of integrating existing resources outside of the company's service area.
- Continue participation in regional and sub-regional efforts to establish new regional transmission structures (ColumbiaGrid and other forums) to facilitate long-term expansion of the regional transmission system.
- Evaluate costs to integrate new resources across Avista's service territory and from regions outside of the Northwest.

2009 IRP Action Items

- Resource Additions and Analysis
- Demand Side Management
- Environmental Policies
- Modeling and Forecasting Enhancements
- Transmission and Distribution Planning

Resource Additions and Analysis

- Continue to explore the potential for wind and non-renewable resources.
- Issue an RFP for turbines at Reardan and up to 100 MW of wind or other renewables in 2009.
- Finish studies regarding the costs and environmental benefits of the large hydro upgrades at Cabinet Gorge, Long Lake, Post Falls, and Monroe Street.
- Study potential locations for the natural gas fired resource identified to be on-line between 2015 and 2020.

Demand Side Management

- Pursue American Reinvestment and Recovery Act funding
- Analyze and report on the results of the demand response pilot in Moscow and Sandpoint
- Processing and implementing I-937 requirements

Environmental Policies

- Continue to study the potential impact of state and federal climate change and renewable portfolio legislation
  - Western Climate Initiative
  - Waxman-Markey – American Clean Energy and Security Act of 2009
- Continue to report on Avista's Climate Change Committee

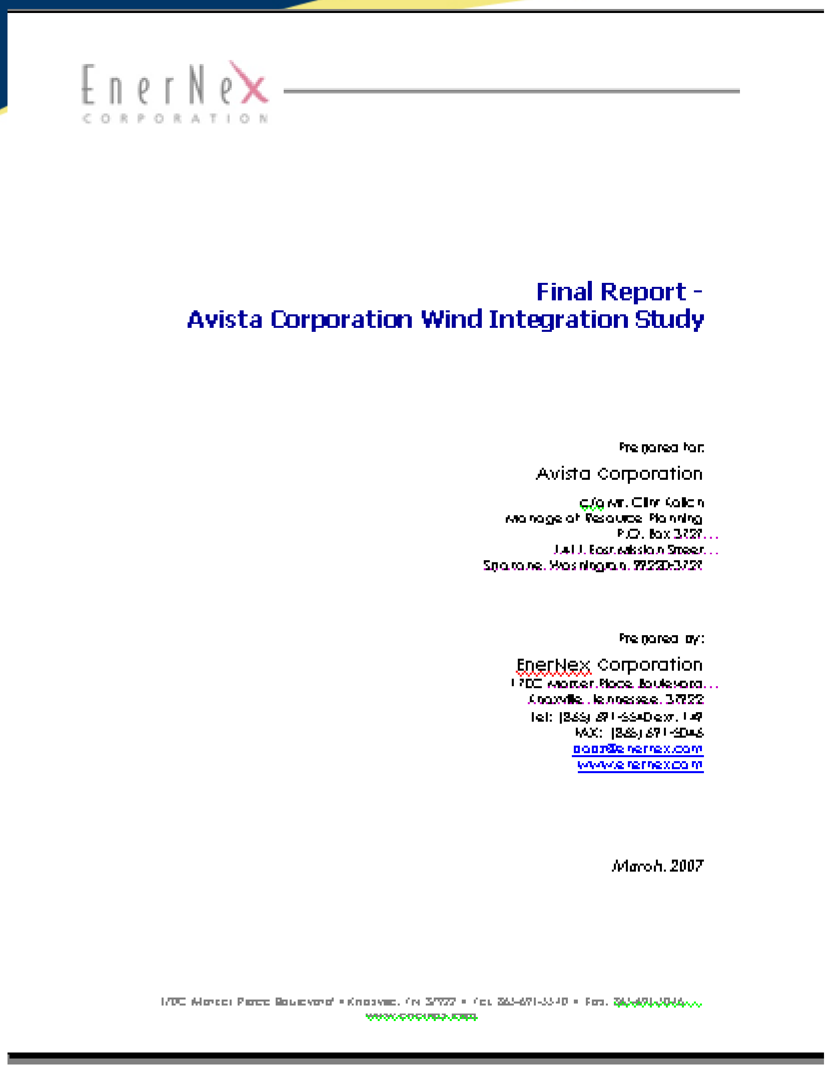
AVISTA

Modeling and Forecasting Enhancements

- Refine the stochastic model for cost driver relationships
- Continue to refine the PRiSM model
- Continue developing Loss of Load Probability and Sustained Peaking analysis for inclusion in the IRP process
- Study cooling degree day trend coefficient for inclusion in the load forecast

Transmission and Distribution Planning

- Work to maintain and retain existing transmission rights on Avista's transmission system
- Continued involvement in BPA transmission processes and rate proceedings
- Continued participation in regional and sub-regional efforts to establish new regional transmission structures and to facilitate long-term expansion of the regional transmission system
- Evaluate costs to integrate new resources across Avista's service territory and from regions outside of the Northwest
- Study and implement distribution feeder rebuild projects
- Study transmission re-configurations to reduce system losses


Final Report -
Avista Corporation Wind Integration Study

Prepared for:

Avista Corporation

Prepared by:

EnerNex Corporation

March, 2007

Defining Wind Integration & Overview of Avista Study

Clint Kalich
Manager of Resource Planning & Power Supply Analyses
clint.kalich@avistacorp.com
October 21, 2008

Outline of Presentation

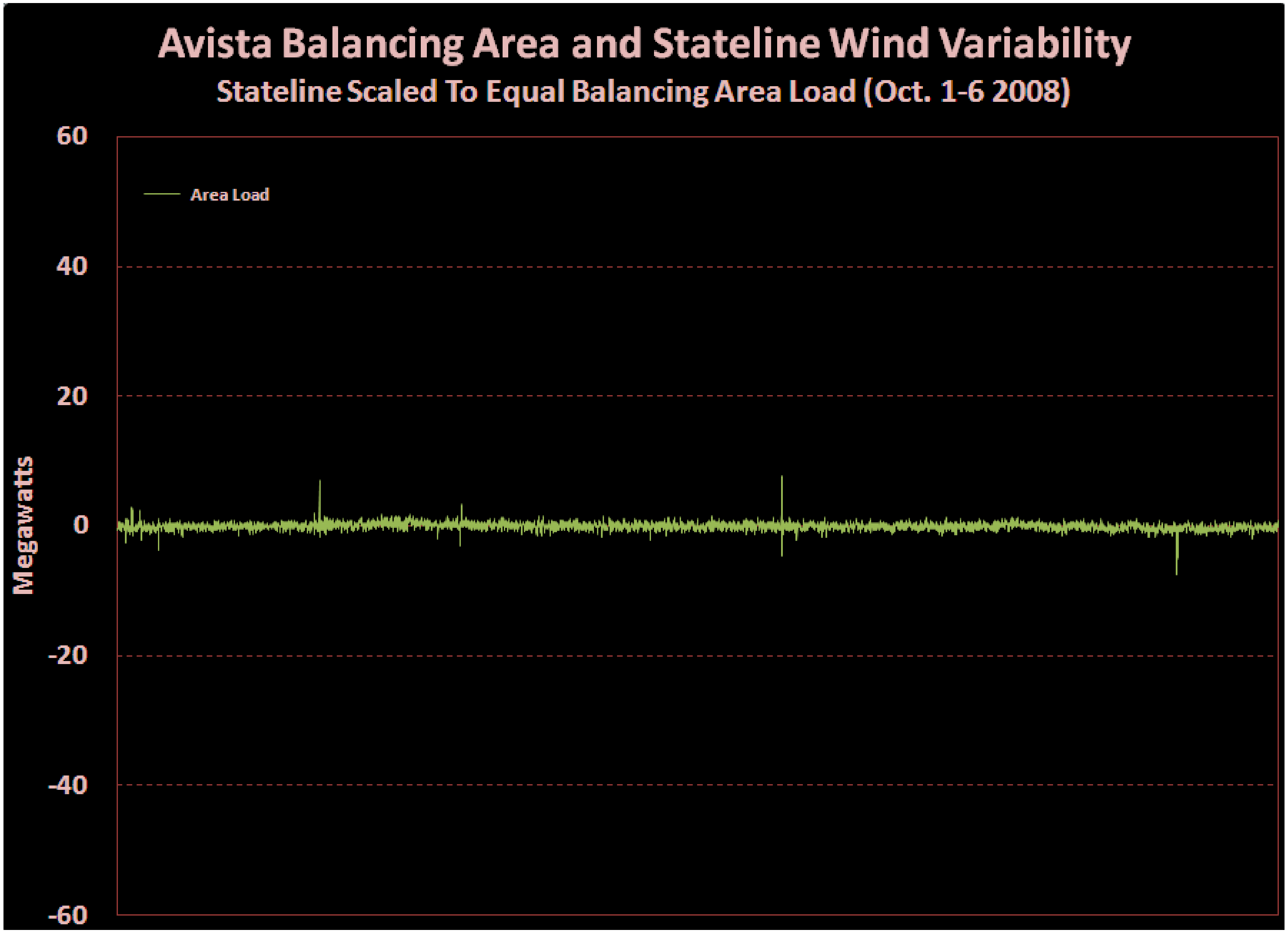
- Defining Wind Integration
- Overview of Avista's System
- Evaluating Overall Cost of Wind
- Methodology Overview
- Wind Integration Cost Components
- Impact of Shorter Market Time Step
- Benefit of Wind Feathering
- Hydro Re-Dispatch Costs
- Next Steps/Modeling Enhancements
- Other Wind Integration Study Results

Defining Wind Integration

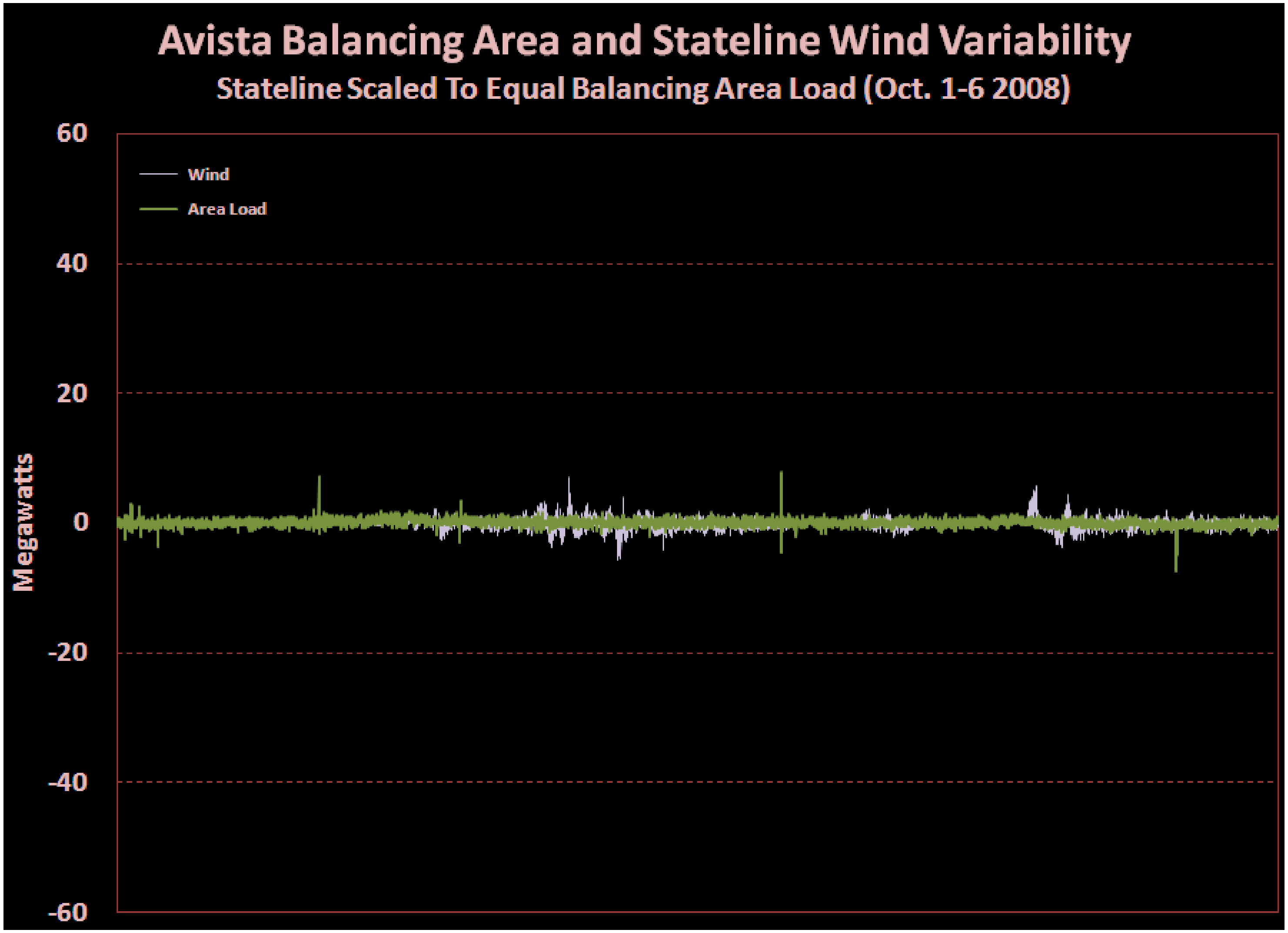
- **Incremental Reserves (Avista Study Method)**
  - Regulation (<1 minute)
  - Load following
    - covers timeframe from end of regulation up to next ramp (1 hour in WECC)
  - Forecast error
    - difference between forecast and actual generation
- **Other Things Sometimes Called Wind Integration**
  - Shape of delivered energy
  - Fuel savings from wind operations
  - Capital costs
  - Environmental attributes

Bottom Line: Be Careful When Assuming 2 Studies are "Apples-to-Apples"

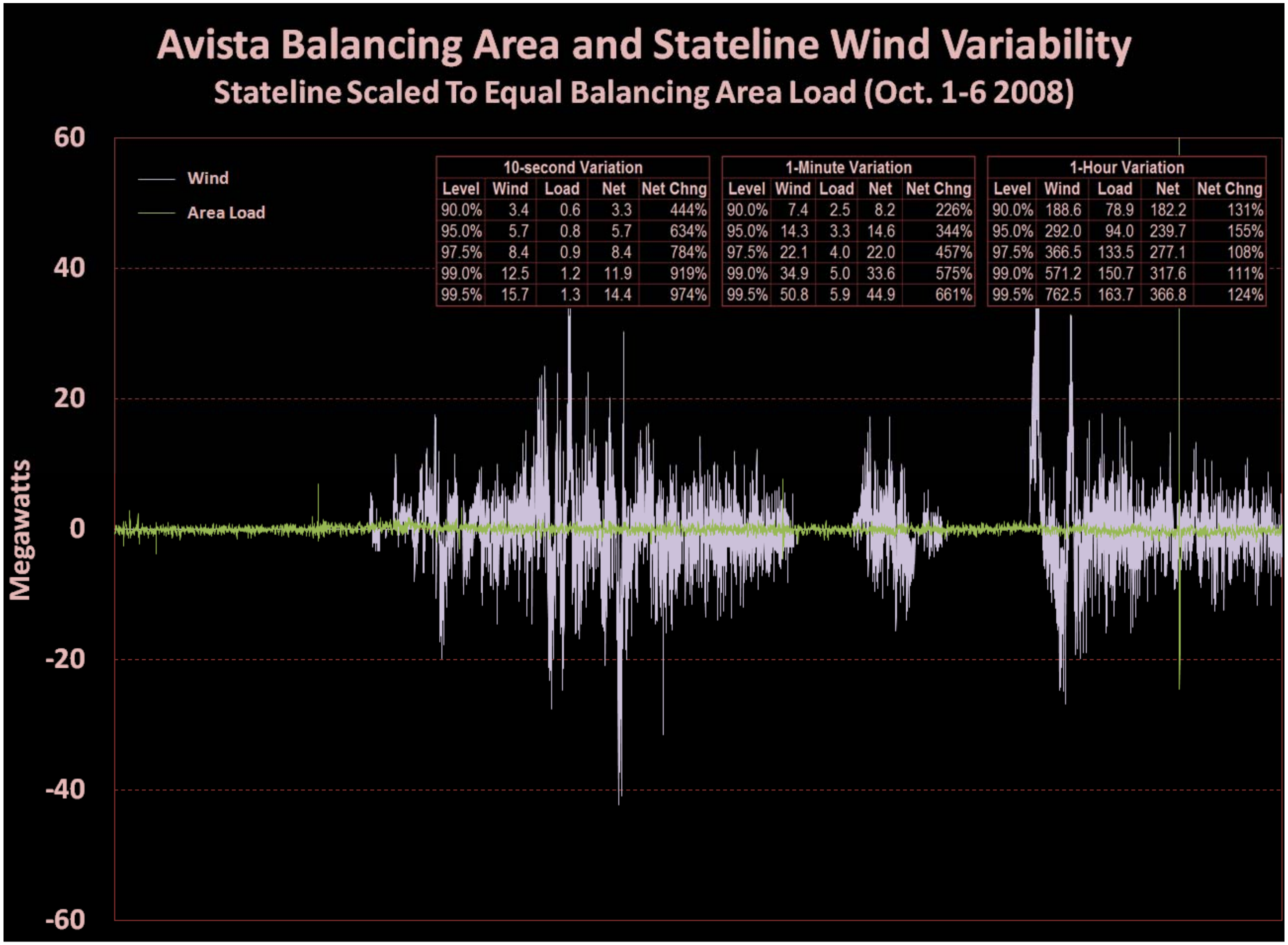
Defining Wind Integration — A Graphical View



Defining Wind Integration — A Graphical View



Defining Wind Integration — A Graphical View



10-second Variation				
Level	Wind	Load	Net	Net Chng
90.0%	3.4	0.6	3.3	444%
95.0%	5.7	0.8	5.7	634%
97.5%	8.4	0.9	8.4	784%
99.0%	12.5	1.2	11.9	919%
99.5%	15.7	1.3	14.4	974%

1-Minute Variation				
Level	Wind	Load	Net	Net Chng
90.0%	7.4	2.5	8.2	226%
95.0%	14.3	3.3	14.6	344%
97.5%	22.1	4.0	22.0	457%
99.0%	34.9	5.0	33.6	575%
99.5%	50.8	5.9	44.9	661%

1-Hour Variation				
Level	Wind	Load	Net	Net Chng
90.0%	188.6	78.9	182.2	131%
95.0%	292.0	94.0	239.7	155%
97.5%	366.5	133.5	277.1	108%
99.0%	571.2	150.7	317.6	111%
99.5%	762.5	163.7	366.8	124%

Overview of Avista's System (2010)

- **2,200 MW Control Area Peak**
- **875 MW Minimum Load**
- **1,200 MW Hydro**
  - Very flexible with generous short-term storage
  - Provides majority of reserves for wind
    - regulation, spinning, supplemental
- **785 MW Gas Turbines**
  - 550 MW CCCT with 100 MW of spinning & supplemental reserves
  - 210 MW (4 units) provide only supplemental reserves
  - Remaining 7 (small) units cannot provide reserves

Overview of Avista's System, Cont

- **230 MW Coal & 50 MW Biomass**
  - Do not provide reserves
- **35 MW of Stateline Wind**
- **~750 MW Contracts Rights**
  - 350 MW for "native load"
  - 400 MW 3rd party resources to serve 3rd party loads in control area
  - No reserve capabilities
- **~200 MW Capacity Contract Obligations**
  - Sales of AGC and spinning reserves for 3rd party load and wind

Evaluating Overall Cost of Wind

- **Commodity Value of Energy**
  - Consider hourly pattern
  - Wind doesn't generate flat or at the operator's control
- **Transmission Cost ~ 3 Times Traditional Resources**
- **Impact on Operation of Other Owned Resources**
  - Fuel savings and/or impact on market sales & purchases
- **Incremental Reserve Obligations**
  - Avista definition of wind integration
  - Regulation, load following, forecast error
    - load following and forecast error are greatly affected by spot market timeframe
- **Capital Recovery and Operation Costs**
- **Environmental Attribute Values (green tags, reduced CO_2)**
- **Capacity Contribution (or lack thereof)**

Methodology Overview

- **Develop Hourly LP Model Of Avista System**
  - Model of both Real-Time and Pre-Schedule timeframes
    - pre-schedule commitment and market transactions "honored" in Real-Time
  - Represent inherent flexibility and constraints
    - hydro storage and minimum flow
    - minimum up/down requirements
    - reserve capabilities and ramping rates
    - transmission paths
    - hydro spill and wind "feathering"
  - Access to energy market for balancing and optimization
    - pre-schedule and real-time markets

Methodology Overview (Cont.)

- **Run Model With and Without Wind Variability**
  - Over same historical timeframe (2002-04)
    - using actual loads
    - wind is priced in each hour at market
    - eliminates potential for wind shape to bias result
    - carry additional reserves in “With Wind” case
- **Compare System Values**
  - Change is spread over wind deliveries to arrive at an integration cost
    - per MWh (absolute or % of market price)
    - per kW-month (absolute or % of market price)

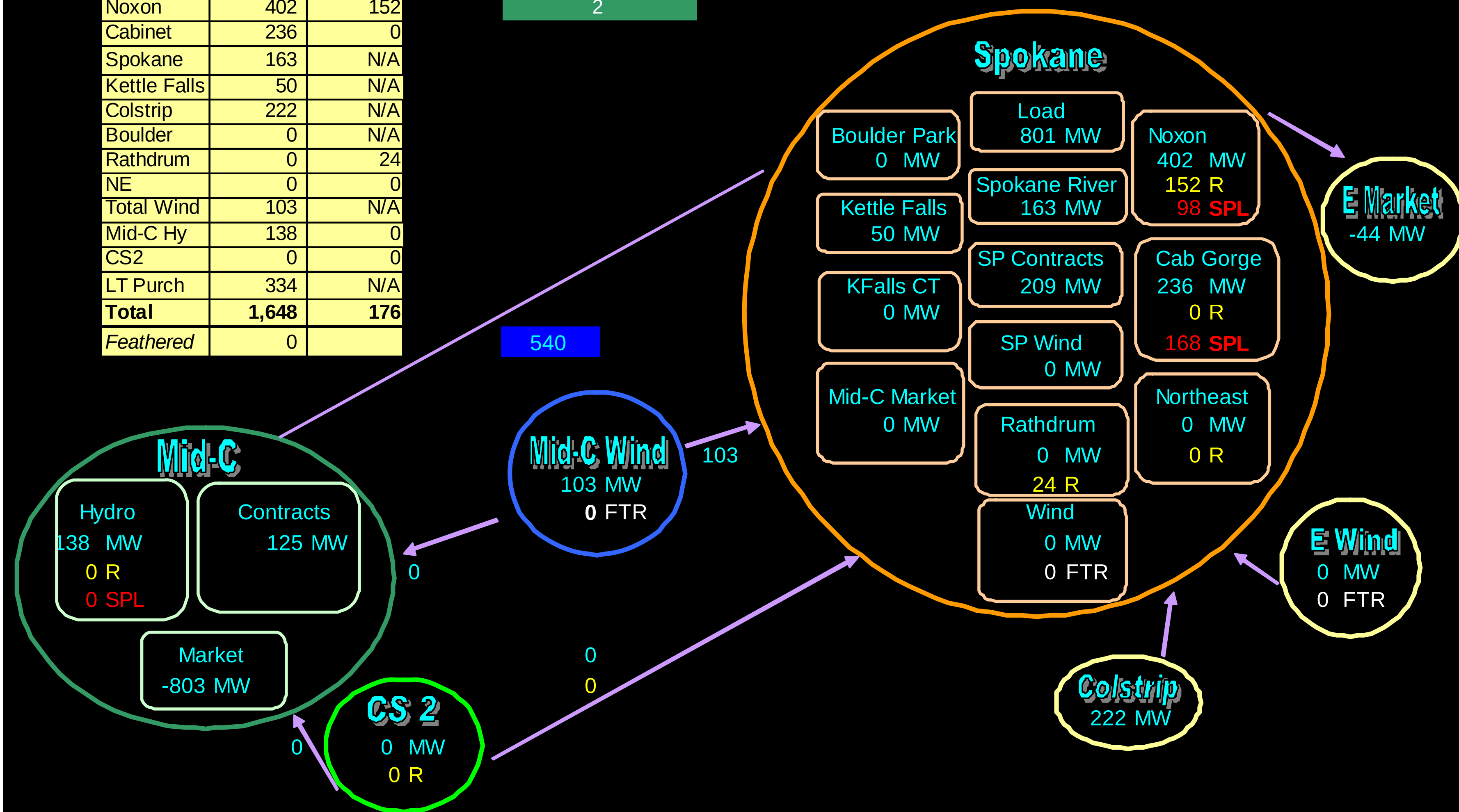
Pre-Schedule Wind Model Delivery Schematic

Generation Summary

Resource	*Power*	*Res*
Noxon	402	152
Cabinet	236	0
Spokane	163	N/A
Kettle Falls	50	N/A
Colstrip	222	N/A
Boulder	0	N/A
Rathdrum	0	24
NE	0	0
Total Wind	103	N/A
Mid-C Hy	138	0
CS2	0	0
LT Purch	334	N/A
Total	**1,648**	**176**
Feathered	0	

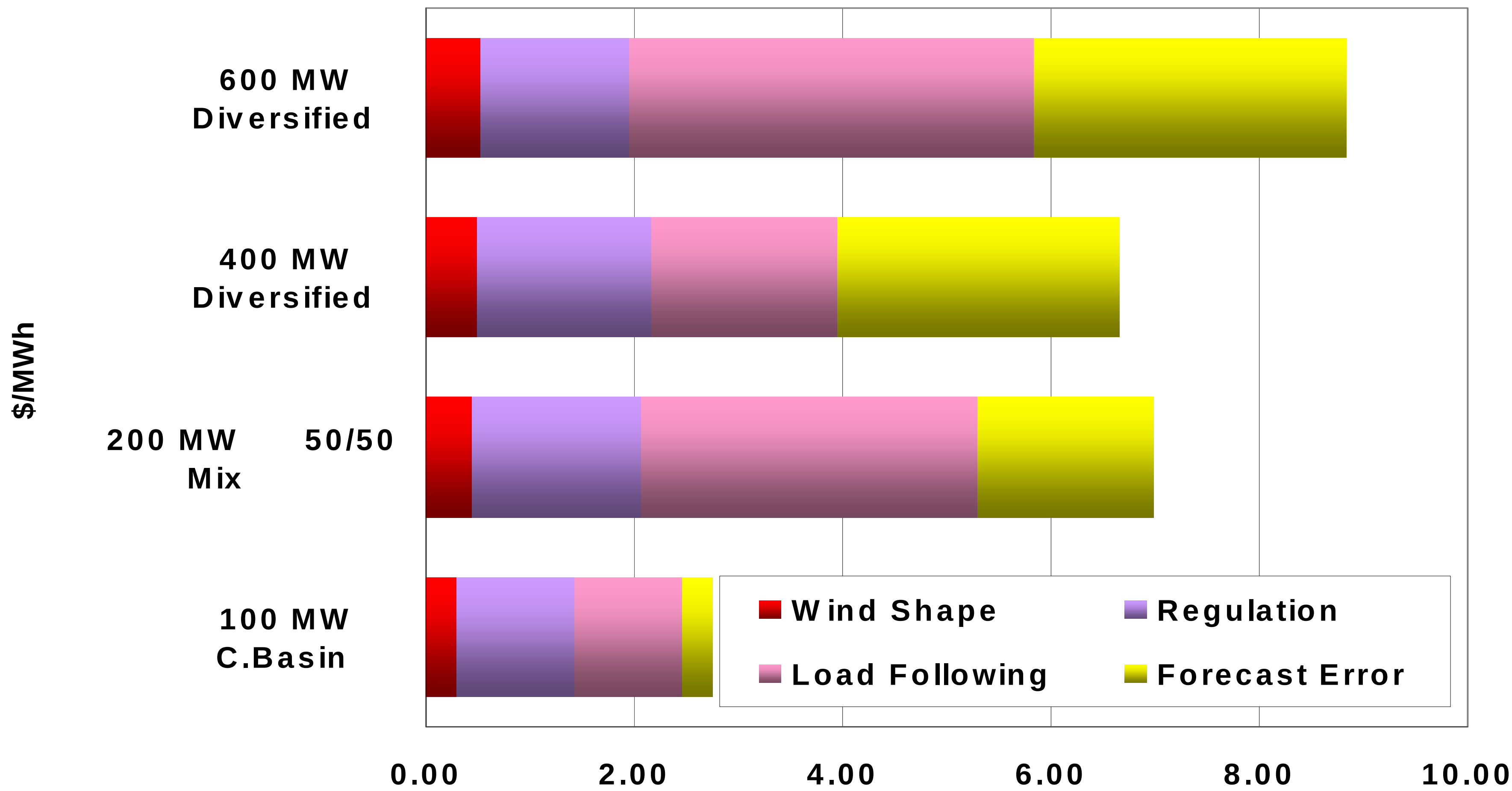
Modeled Hour
2

540



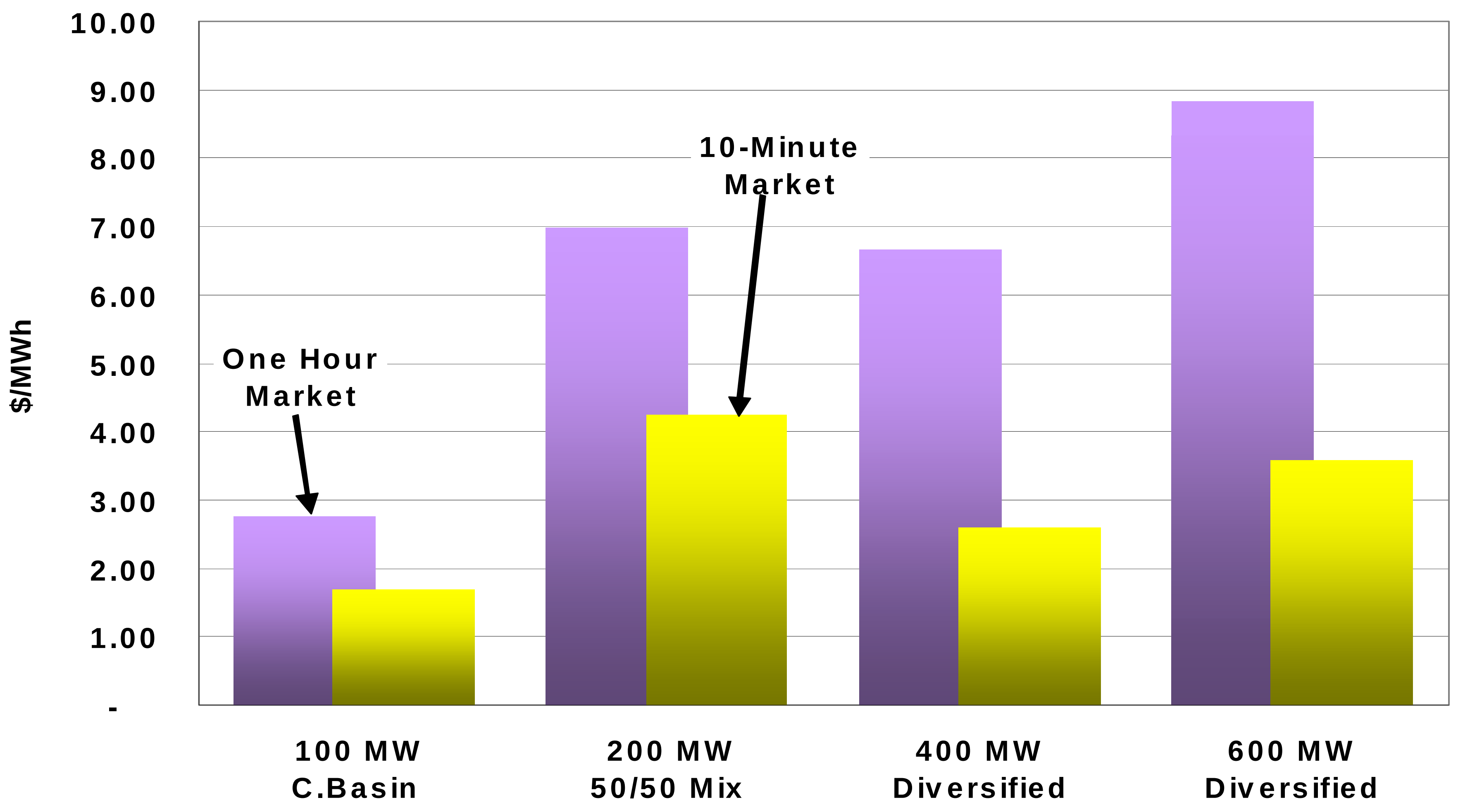
AVISTA

Wind Integration Cost Components

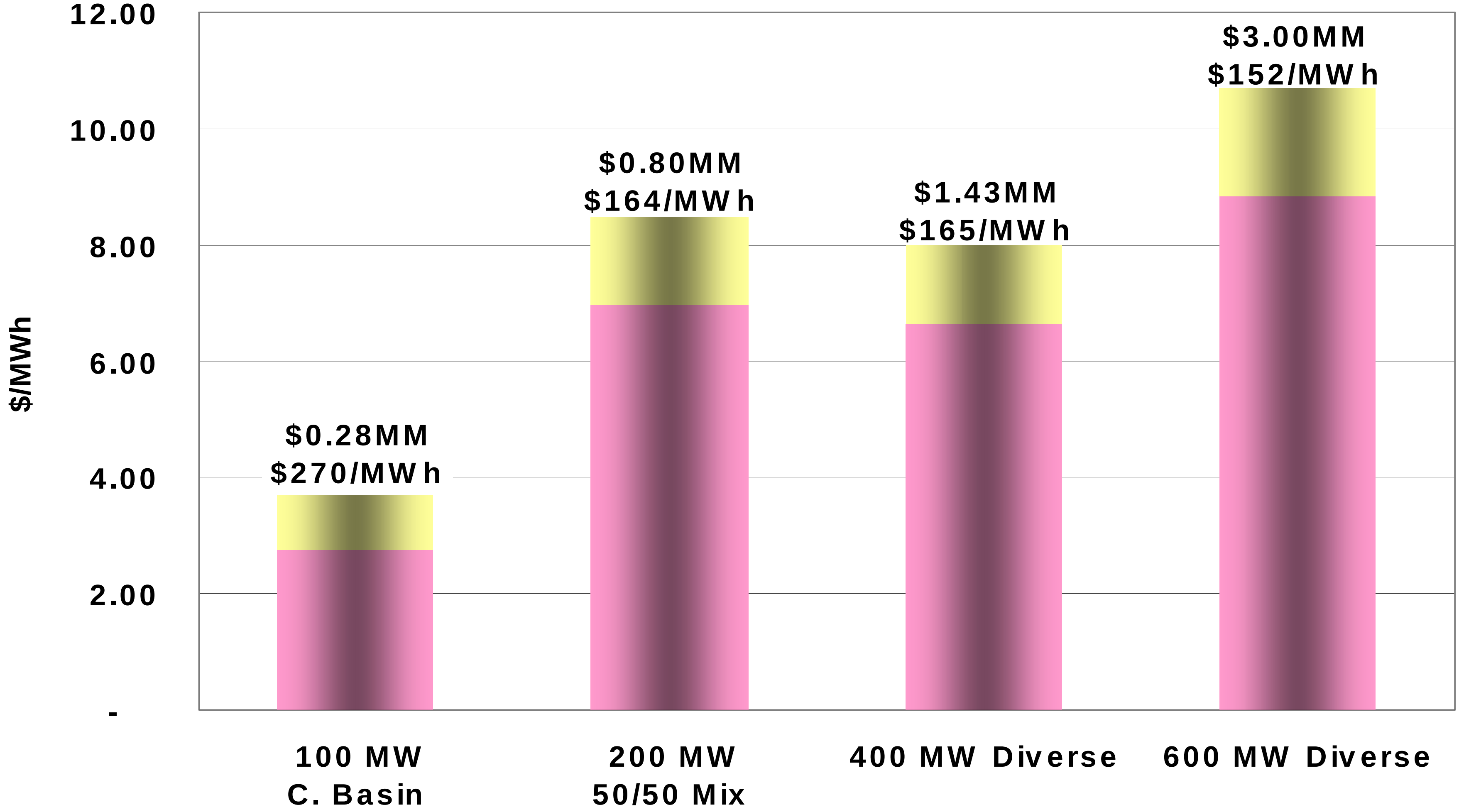


AVISTA

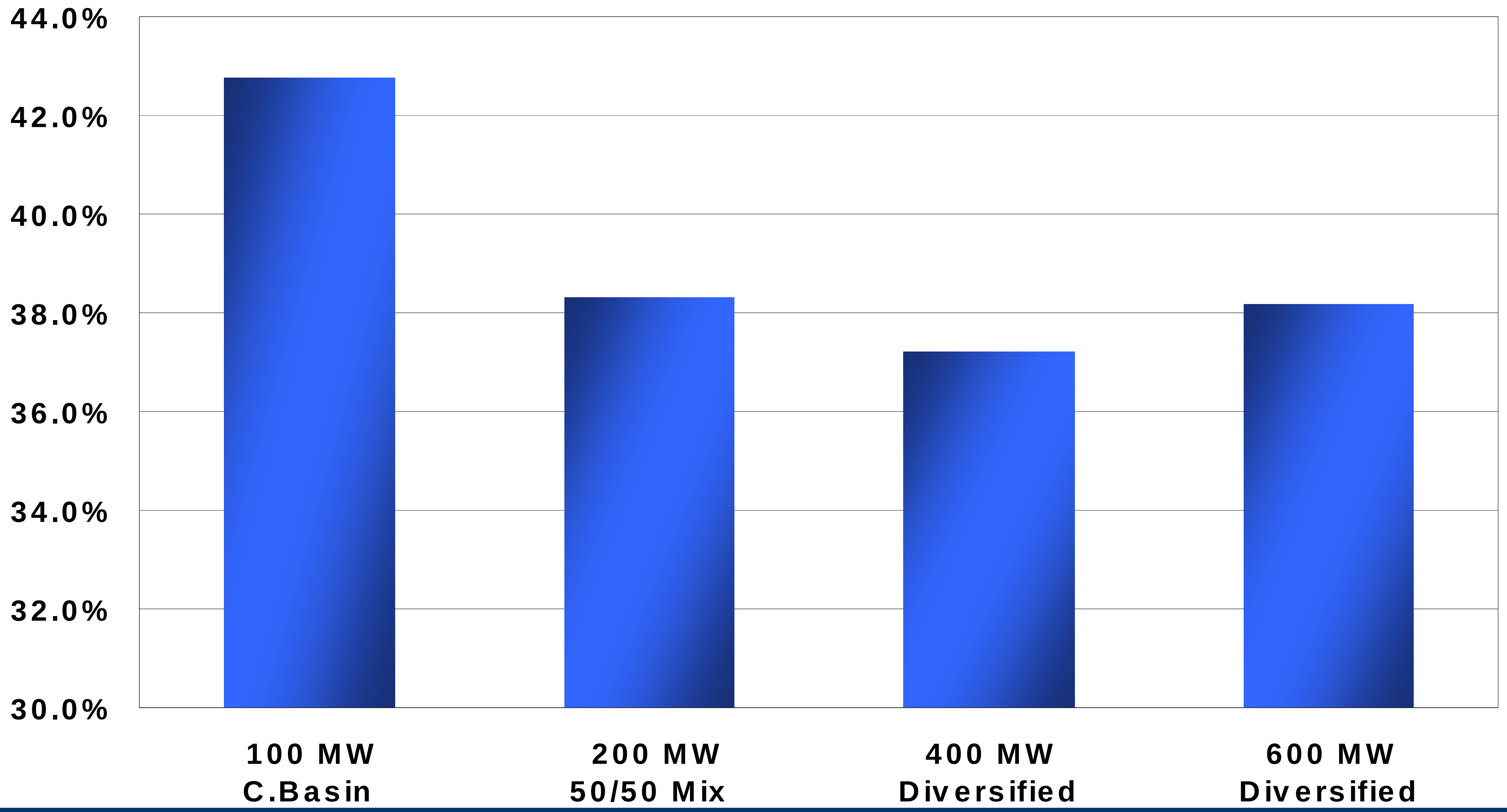
Impact of Shorter Market Time Step



Benefit of Wind Feathering



Hydro Re-Dispatch Costs



Next Steps/Modeling Enhancements

- **Update With Latest Data**
  - Augment limited NW data sets with data from outside the NW
  - Update to data through 2006
  - Use NPCC/BPA 3-Tier meso-scale wind data when available
- **Evaluate Regulation, Load Following, Forecast Errors Using Root-Mean-Squares Method**
- **Search For Better Wind Forecasting Algorithms**
- **Enhance Start-Up Cost Logic For Thermal Plants**
- **Model Reserve Capabilities of Coal-Fired Plants**
- **Evaluate Real-Time to Pre-Schedule Relationships**

Other Integration Study Results

Wind Integration Study Costs ($US/MWh)					
Entity	Low	High	Entity	Low	High
APS 2007	0.91	4.08	Maritimes (E. Canada) 2007	3.66	6.13
Avista 2007	2.75	9.00	Minnesota 2004	2.25	5.25
BPA 2007	1.90	4.60	Minnesota 2006	3.45	5.10
BPA 2008			Nordic 2004	1.50	3.15
California	0.45		Norway (Greennet)	0.30	0.68
Colorado 2007	4.00	8.00	PacifiCorp 2006	1.86	5.94
Denmark (Greennet)	0.60		Puget Sound Energy	3.73	4.06
Finland (Greennet)	0.30	2.10	Sweden (Greennet)	0.38	0.90
Finland 2004	3.00	4.50	UK 2002	5.10	6.08
Germany (Greennet)	3.23		UK 2007	2.10	5.10
Idaho Power 2007	6.00	9.00	WeEnergies 2003	1.90	2.90
Ireland	0.38	0.75			

The End

Defining Wind Integration in the 2009 Integrated Resource Plan

Clint Kalich
Manager of Resource Planning & Power Supply Analyses
clint.kalich@avistacorp.com
May 22, 2009

Agenda

10:00 Introductions

10:15 Wind Integration and the 2009 IRP

11:15 Questions/Suggestions for Further Work

12:00 Adjourn

Defining Wind Integration and Its Costs

2009 Integrated Resource Plan

Outline of Presentation

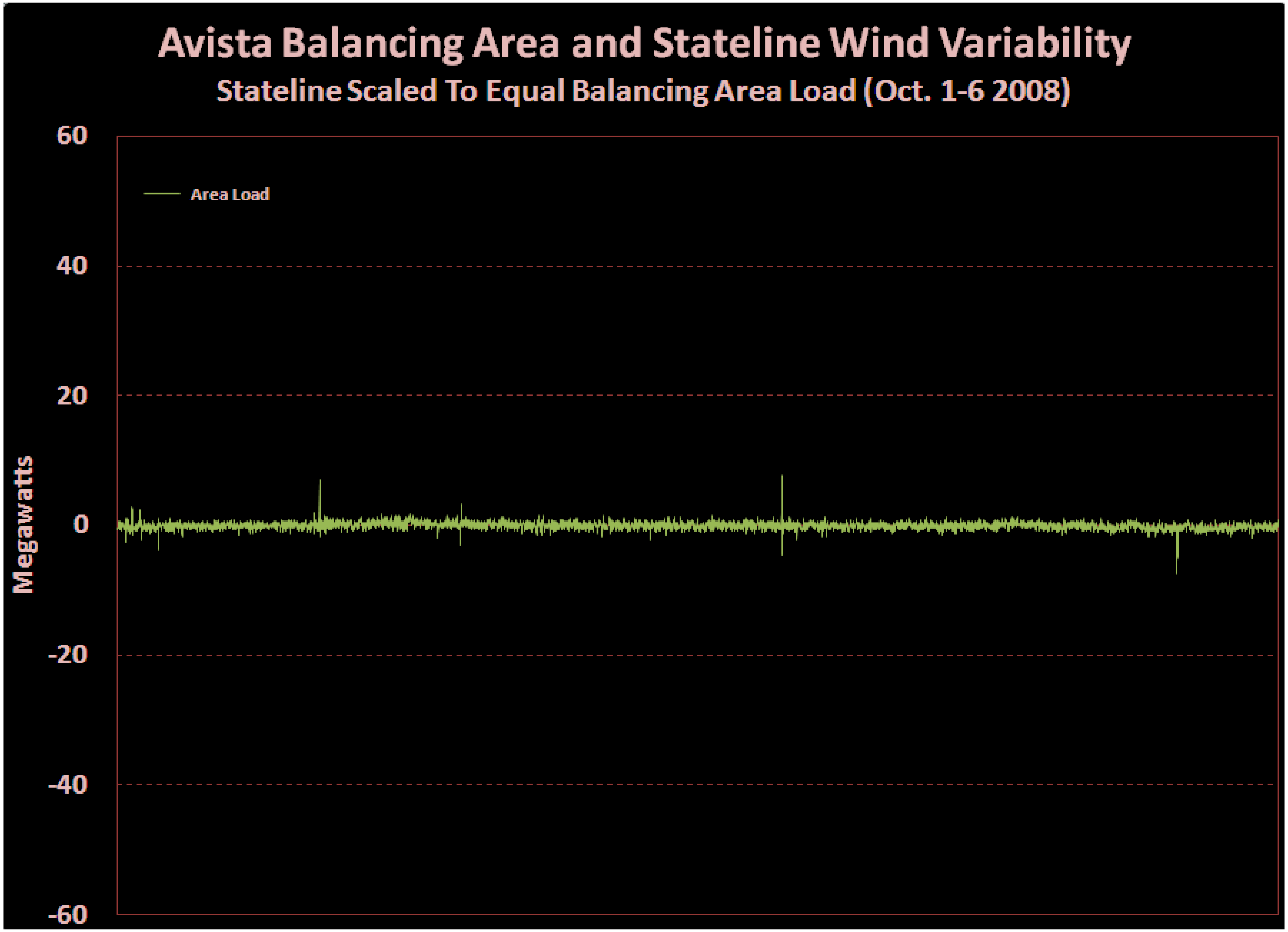
- **Defining Wind Integration**
- **Wind Integration Cost Components**
- **Preferred Resource Strategy Model (PRiSM)**
  - What is PRiSM?
  - The Efficient Frontier
    - covers timeframe from end of regulation up to next ramp (1 hour in WECC)
  - Wind modeling in 2009 IRP
  - Recent enhancements to PRiSM
- **Questions**

Defining Wind Integration

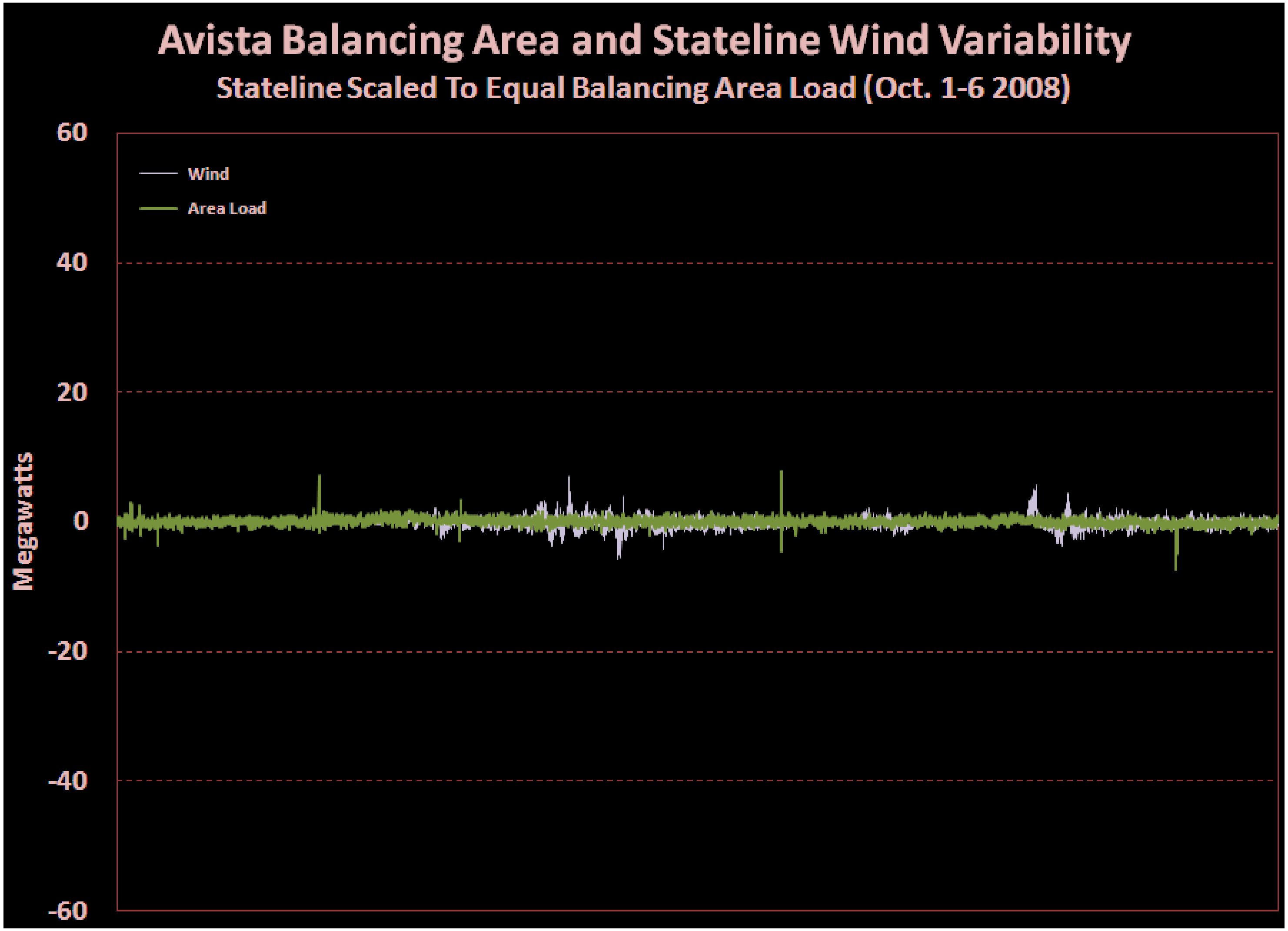
- **Incremental Reserves (Avista Study Method)**
  - Regulation (<1 minute)
  - Load following
    - covers timeframe from end of regulation up to next ramp (1 hour in WECC)
  - Forecast error
    - difference between forecast and actual generation
- **Other Things Sometimes Called Wind Integration**
  - Shape of delivered energy
  - Fuel savings from wind operations
  - Capital costs
  - Environmental attributes

Bottom Line: Be Careful When Assuming 2 Studies are “Apples-to-Apples”

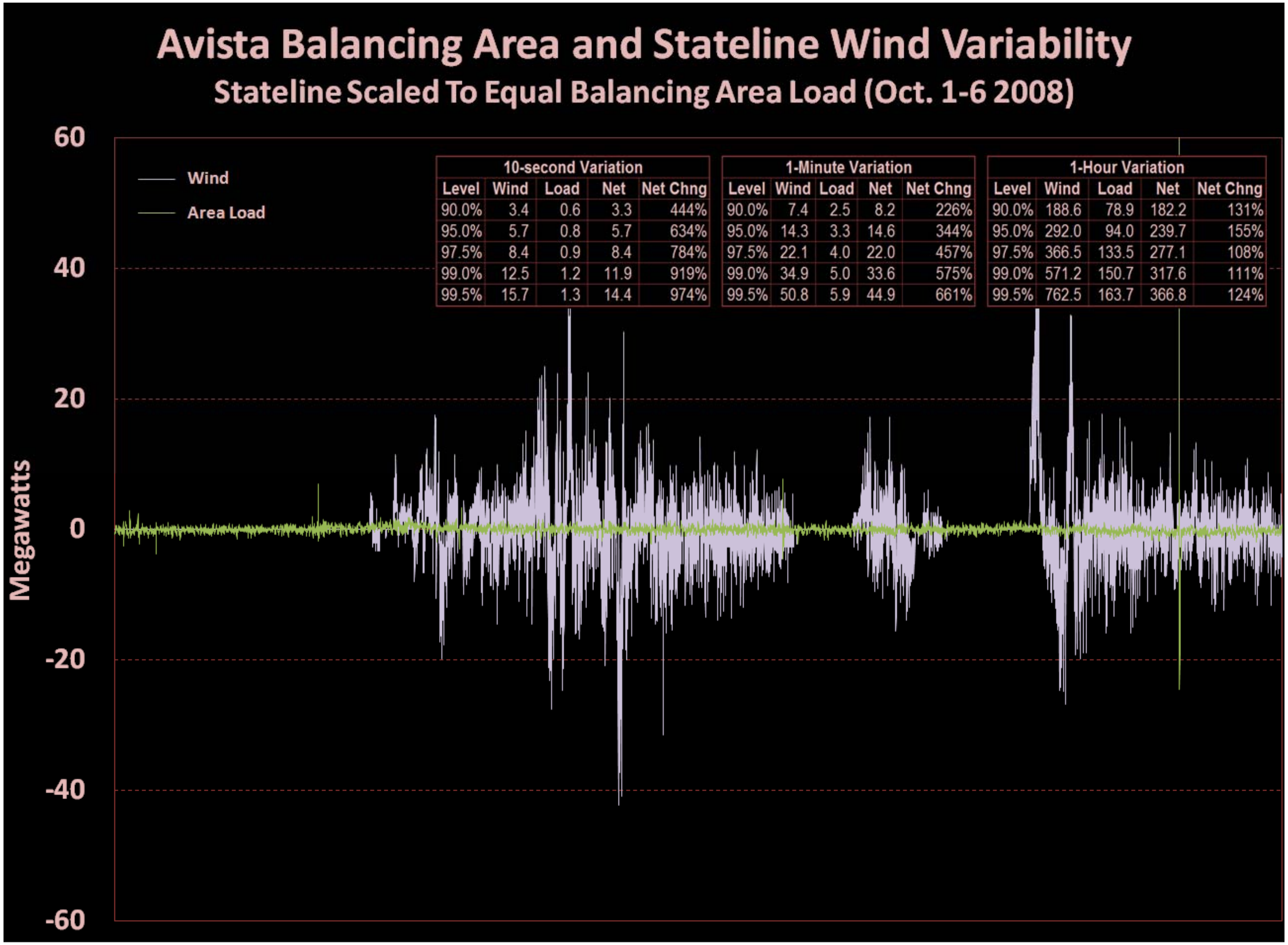
Defining Wind Integration — A Graphical View



Defining Wind Integration — A Graphical View



Defining Wind Integration — A Graphical View

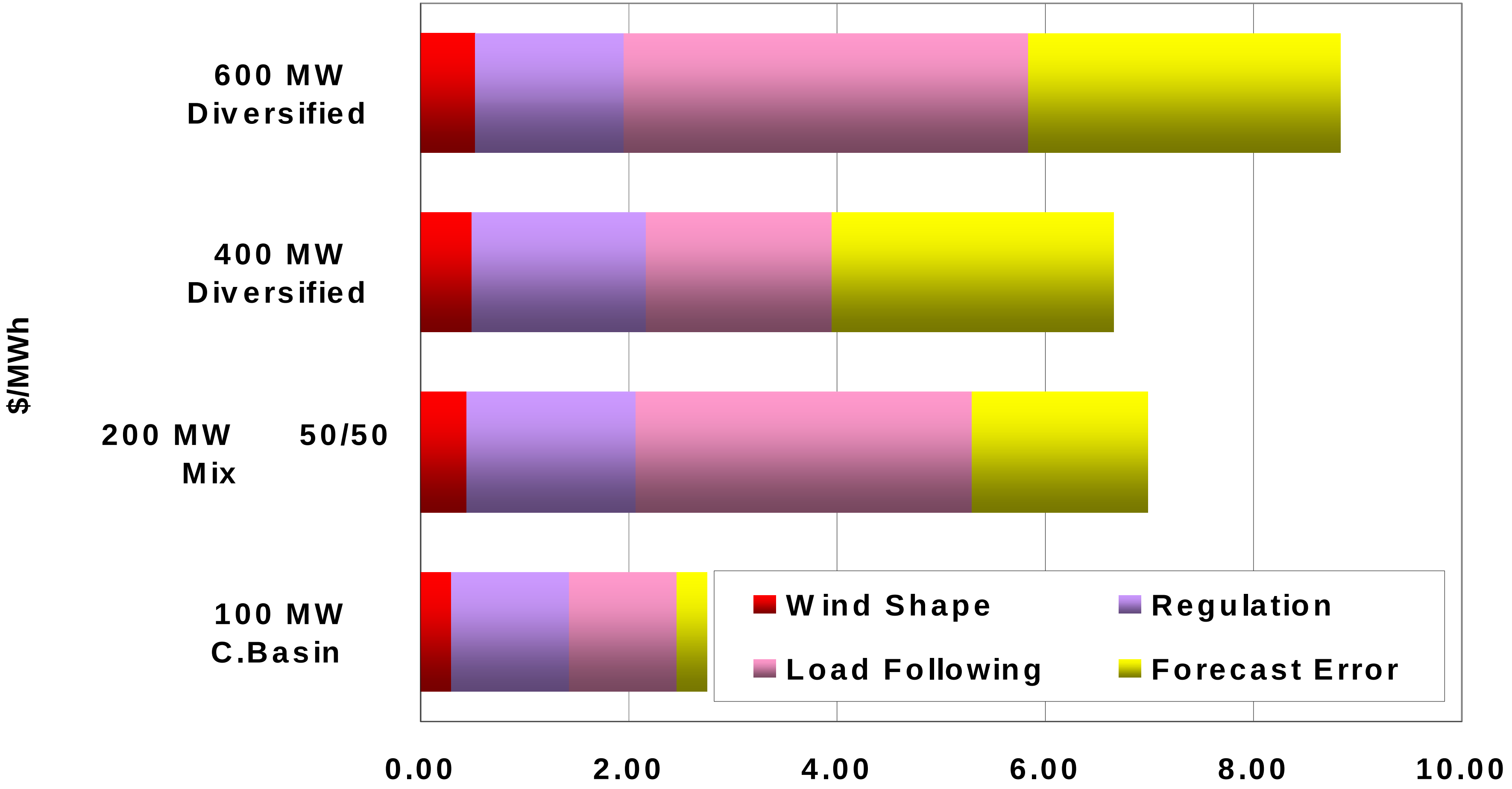


10-second Variation				
Level	Wind	Load	Net	Net Chng
90.0%	3.4	0.6	3.3	444%
95.0%	5.7	0.8	5.7	634%
97.5%	8.4	0.9	8.4	784%
99.0%	12.5	1.2	11.9	919%
99.5%	15.7	1.3	14.4	974%

1-Minute Variation				
Level	Wind	Load	Net	Net Chng
90.0%	7.4	2.5	8.2	226%
95.0%	14.3	3.3	14.6	344%
97.5%	22.1	4.0	22.0	457%
99.0%	34.9	5.0	33.6	575%
99.5%	50.8	5.9	44.9	661%

1-Hour Variation				
Level	Wind	Load	Net	Net Chng
90.0%	188.6	78.9	182.2	131%
95.0%	292.0	94.0	239.7	155%
97.5%	366.5	133.5	277.1	108%
99.0%	571.2	150.7	317.6	111%
99.5%	762.5	163.7	366.8	124%

Wind Integration Cost Components



AVISTA

PRiSM

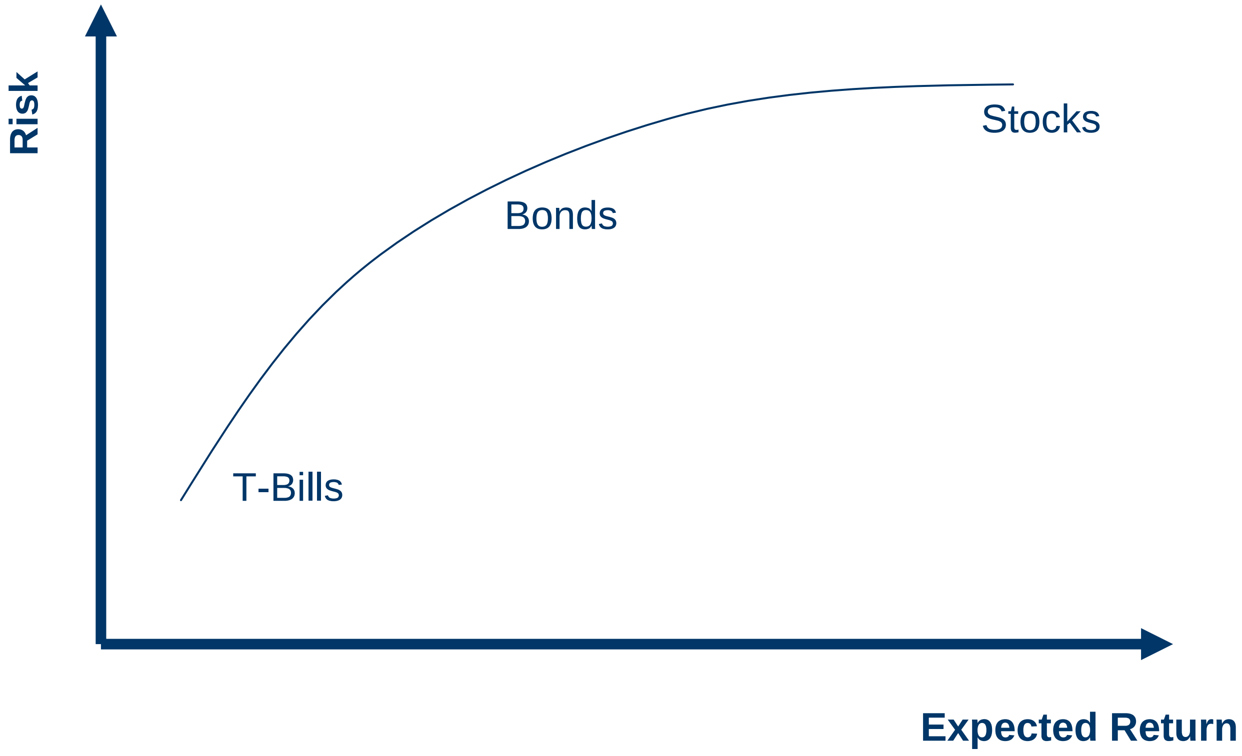
(*Preferred Resource Strategy Model*)

2009 Integrated Resource Plan

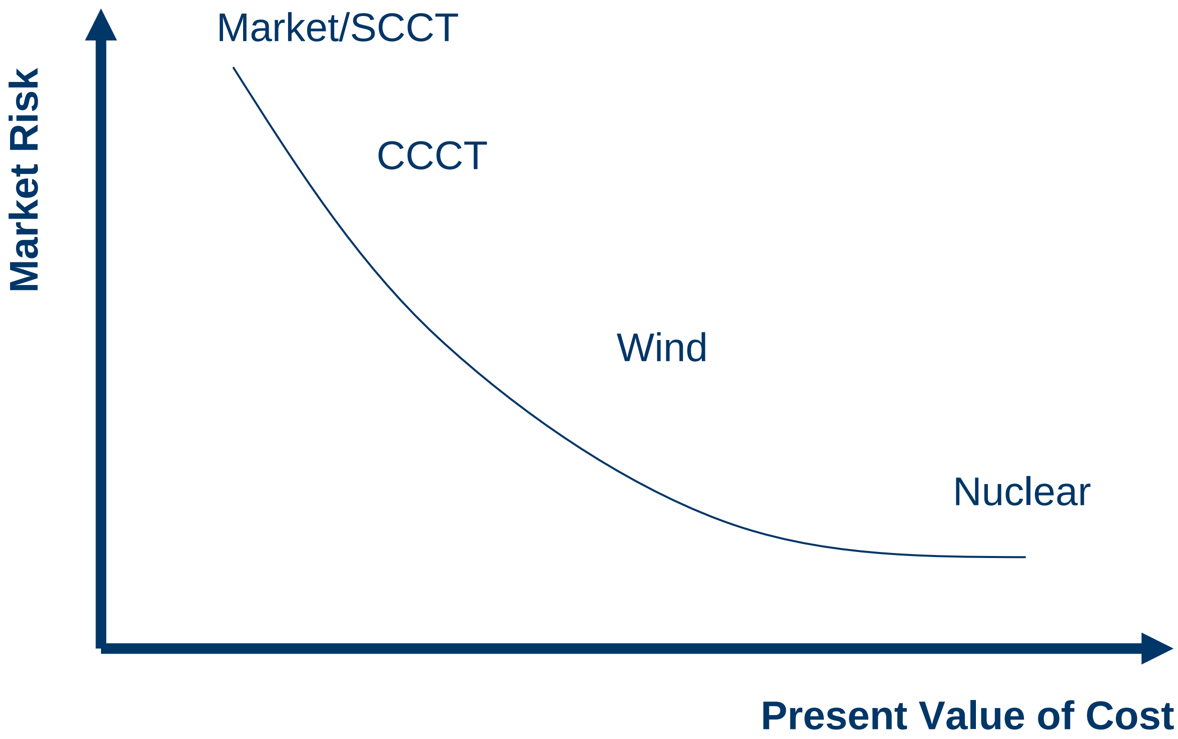
What is PRiSM?

- Preferred Resource Strategy Model
  - *Selects resource & conservation opportunities on an optimal cost and risk basis using a linear program (What's Best!)*
- Objective function is to either select resource strategies to meet our energy/capacity/market/RPS/CO_2 requirements on a least cost and/or least risk basis
- Cost is measured by the present value of incremental fuel & O&M expenses and new capital investment
- Risk is measured by the variation in fuel, emissions, load, wind, forced outages, and variable O&M expenses in years 2019/29

Efficient Frontier- An Introduction 1 (stock portfolios)



Efficient Frontier- An Introduction (Avista IRP)



Wind Modeling in 2009 IRP

- Various Wind Resource Options
  - *Small wind (DG)*
  - *Northwest Wind (Tier 1 and Tier 2)*
  - *Montana Wind*
  - *Reardan Wind Project*

Location	Capital 2009$ (includes AFUDC)	Fixed O&M ($ per kW/Yr)	Capacity Factor
Reardan	2,183	45	30.0%
Columbia Basin (tier 1)	2,262	50	33.0%
Columbia Basin (tier 2)	2,262	50	26.4%
Montana	2,262	50	37.0%
Small Scale	3,343	50	20.0%
Off Shore	5,573	95	45.0%

- Wind Integration Cost of $3.50 per MWh (2009$)
  - *Reflective of low penetration rate presently on system*
  - *Rates will rise as penetration increases*

New Enhancements

- Conservation measures are selected in model rather than an input (only measures that are between $xx/MWh & $xxx/MWh)
- Resources are now added in increments rather than any amount
- Use more precise method to estimate frontier curve
- Meets both summer & winter capacity requirements
- Ability to retire resources
- Ability to account for greenhouse gas caps
- More accurate ability to take into account post IRP time period

Questions/Open Discussion

2009

Electric
Integrated Resource Plan

Appendix B – 2009 Integrated Resource Planning Work Plan

August 31, 2009

2009 Integrated Resource Planning Work Plan

This Work Plan is provided in response to the WUTC's Integrated Resource Planning (IRP) rules (WAC 480-100-238). It outlines the process Avista will follow to develop its 2009 Integrated Resource Plan to be filed with Washington and Idaho Commissions by August 31, 2009. Avista uses a public process to obtain technical expertise and guidance throughout the planning period through a series of public Technical Advisory Committee (TAC) meetings. The first of these meetings was held on May 14, 2008.

The 2009 Integrated Resource Plan process will be similar to those used to produce the previous three published plans. Avista will be using AURORA^{xmp} for electric market forecasting, resource valuation, and for conducting Monte-Carlo style risk analyses. Results from AURORA^{xmp} will be used to select the Preferred Resource Strategy using the proprietary PRiSM 2.0 model. This tool fills future capacity and energy deficits using an efficient frontier approach to evaluate quantitative portfolio risk versus portfolio cost while accounting for environmental legislation. Qualitative risk will be evaluated in a separate analysis. The process to identify the Preferred Resource Strategy is shown in Exhibit 1 and the process time line is shown in Exhibit 2.

For this plan, Avista intends to use more detailed and site-specific resource assumptions to be determined by an ongoing process to evaluate renewable, gas, and other supply-side resources. This plan will also study environmental costs, sustained peaking requirements, and detailed analyses of demand-side management programs. This IRP will develop a strategy that meets or exceeds renewable portfolio standards and greenhouse gas emissions legislation.

It is Avista's intention to "stress" or test the Preferred Resource Strategy against a variety of scenarios and stochastic futures. The TAC will be an important factor to determine the underlying assumptions used in the scenarios and futures. The IRP process is a very technical and data intensive process; public comments are welcome and will require input in a timely manner for appropriate inclusion into the process so the plan can be submitted according to the contemplated schedule.

Tentative timeline for public Technical Advisory Committee meetings:

- **May 14, 2008 –** Load & resource balance, climate change, loss of load probability analysis, work plan, and analytical process changes
- **August 27, 2008 –** Risk and resource assumptions, scenarios and futures, and demand side management
- **October 22, 2008 –** Load forecast, electric and gas price forecasts, load & resource forecast balance, and transmission cost studies
- **January 28, 2009 –** Review of final modeling and assumptions, and draft PRS
- **March 25, 2009 –** Review of scenarios and futures, and portfolio analysis
- **April 22, 2009 –** Review of final PRS and action items
- **June 24, 2009 –** Review of the 2009 IRP

2009 Electric IRP Draft Outline

This section provides a draft outline of the major sections in the 2009 Electric IRP. This outline will be updated as IRP studies are completed and input from the Technical Advisory Committee has been received.

1. Executive Summary
2. Introduction and Stakeholder Involvement
3. Loads and Resources
    a. Economic Conditions
    b. Load Forecast
    c. Forecast Scenarios
    d. Supply Side Resources
    e. Reserve Margins
    f. Resource Requirements
4. Demand Side Management
5. Environmental Issues
6. Transmission Planning
7. Modeling Approach
    a. Assumptions and Inputs
    b. Risk Modeling
    c. Resource Alternatives
    d. The PRiSM Model
8. Market Modeling Approach
    a. Futures
    b. Scenarios
    c. Avoided Costs
9. Preferred Resource Strategy & Stress Analysis
10. Action Items

Exhibit 1: Avista's 2009 IRP Modeling Process

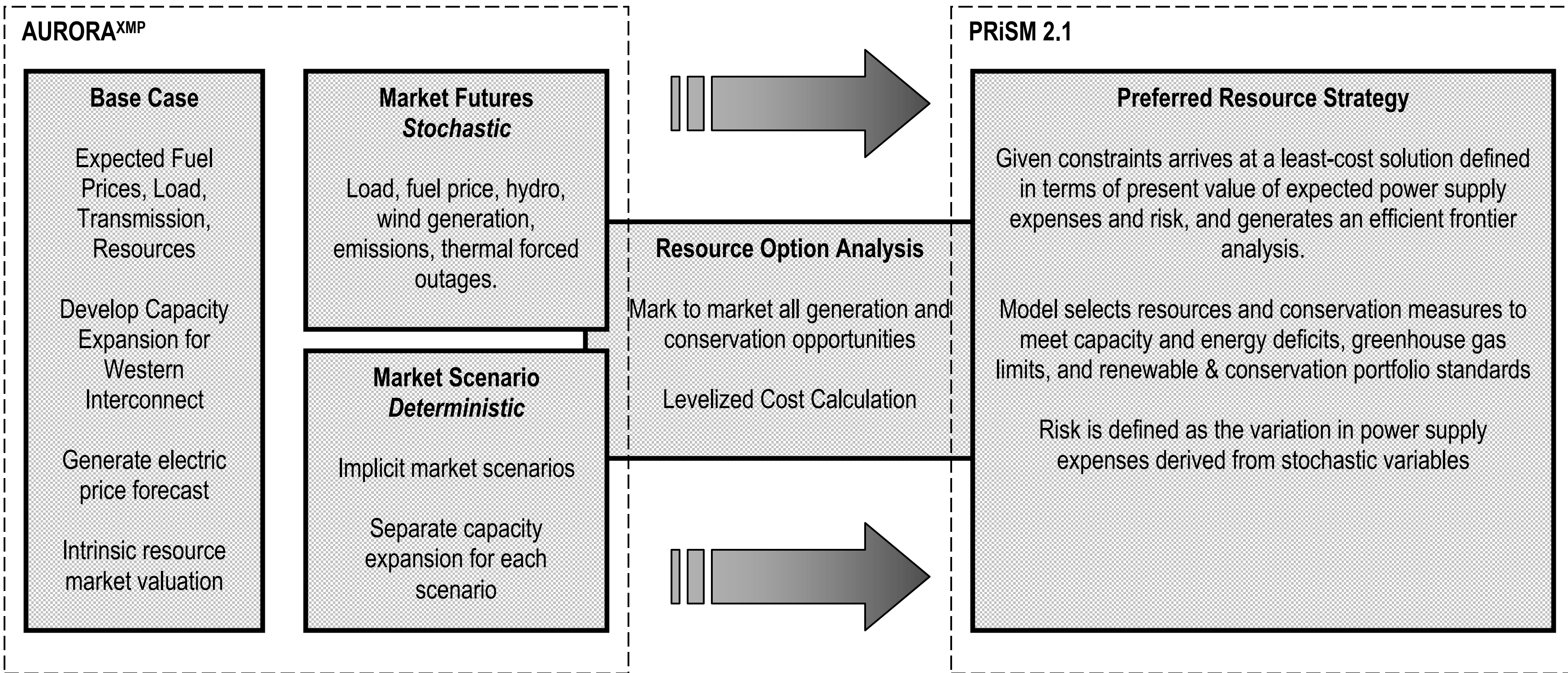


Exhibit 2: Avista's 2009 IRP Timeline

Task	Target Date
Preferred Resource Strategy (PRS)	
Finalize load forecast	7/31/2008
Identify regional resource options for electric market price forecast	8/15/2008
Identify Avista's supply & conservation resource options	8/31/2008
Update AURORA^{xmp} database for electric market price forecast	9/29/2008
Select natural gas price forecast	9/29/2008
Finalize deterministic base case	10/17/2008
Finalize datasets/statistics variables for risk studies	10/31/2008
Draft transmission study due	10/31/2008
Demand-side management load shapes input into AURORA	10/31/2008
Base case stochastic study complete	11/30/2008
Finalize PRiSM 2.1 model	12/19/2008
Final transmission study due	12/31/2008
Develop efficient frontier & PRS	1/30/2009
Simulation of risk studies "futures" complete	2/10/2009
Simulate market scenarios in AURORA^{xmp}	2/27/2009
Evaluate resource strategies against market futures & scenarios	3/20/2009
Present to TAC preliminary study and PRS	3/31/2009
Writing Tasks	
File 2009 integrated resource planning work plan	8/30/2008
Prepare report and appendix outline	9/15/2008
Prepare text drafts	4/15/2009
Prepare charts and tables	4/15/2009
Internal draft released	5/1/2009
External draft released	6/15/2009
Final editing and printing	8/1/2009
Final report distribution	8/30/2009

2009

Electric
Integrated Resource Plan

Appendix C – Residential and Non-residential Load Profiles

August 31, 2009

Load Shape	Description
1	Res Space Heat
2	Res AC
3	Res Lighting
4	Res Refrigeration
5	Res Water Heating
6	Res Dishwasher
7	Res Washer Dryer
8	Res Misc
9	Res Furnace Fan
10	NonRes Comp Air
11	NonRes Cooking
12	NonRes Space Cooling
13	NonRes Ext Lighting
14	NonRes Space Heating
15	NonRes Water Heating
16	NonRes Int Lighting
17	NonRes Misc
18	NonRes Motors
19	NonRes Office Equipment
20	NonRes Process
21	NonRes Refrigeration
22	NonRes Ventillation
23	Flat
24	NonRes Space Heat/Cool
25	NonRes Space Heat/Cool/Vent
26	NonRes LEED
27	NonRes Refrigerated Warehouses
28	Traffic Signal Red
29	Traffic Signal Green
30	Renewables
31	Multifamily Market Transformation
32	Res Heat/Cool
33	Res Energy Star Homes

2009

Electric
Integrated Resource Plan

Appendix D – DSM Concepts Reaching the Evaluation Stage

August 31, 2009

Segment	Measure
Non-Res	Anti-Sweat Heat Controls
Non-Res	Auto-Closers for Coolers and Freezers
Non-Res	Built-Up HVAC Controls Optimization-Anchor-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Anchor-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Anchor-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Big Box-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Big Box-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Big Box-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-High End-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-High End-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-High End-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Hospital-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Hospital-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Hospital-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-K-12-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-K-12-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-K-12-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Large Off-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Large Off-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Large Off-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Lodging-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Lodging-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Lodging-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Medium Off-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Medium Off-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Medium Off-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-MIniMart-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-MIniMart-GasHt-Retro

Non-Res	Built-Up HVAC Controls Optimization-Other-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Other-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-OtherHealth-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-OtherHealth-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-OtherHealth-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Other-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Restaurant-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Restaurant-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Restaurant-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Small Box-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Small Box-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Small Box-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Small Off-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Small Off-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Small Off-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Supermarket-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Supermarket-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Supermarket-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-University-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-University-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-University-HtPmpHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Warehouse-ElecHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Warehouse-GasHt-Retro
Non-Res	Built-Up HVAC Controls Optimization-Warehouse-HtPmpHt-Retro
Non-Res	Controls Commission-New
Non-Res	EE Ice Maker from FEMP Baseline
Non-Res	EE Reach-In Freezer from E-Star Baseline
Non-Res	EE Reach-In Refrigerator from E-Star Baseline
Non-Res	EE Vending Machine from Average Baseline
Non-Res	EE Vending Machine from E-Star Baseline
Non-Res	Evaporative fan controller on walk-in
Non-Res	F96T12 to T8HP-Anchor-New-GasHt

Non-Res	F96T12 to T8HP-Anchor-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Anchor-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Anchor-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Anchor-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Anchor-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Anchor-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Anchor-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Anchor-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Anchor-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Big Box-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Big Box-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Big Box-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Big Box-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Big Box-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Big Box-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-High End-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-High End-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-High End-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Hospital-New-GasHt
Non-Res	F96T12 to T8HP-Hospital-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Hospital-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Hospital-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Hospital-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Hospital-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Hospital-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Hospital-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Hospital-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Hospital-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-K-12-Retro-ElecHt-V1995_2001

Non-Res	F96T12 to T8HP-K-12-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-K-12-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Large Off-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Large Off-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Large Off-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Large Off-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Large Off-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Large Off-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Lodging-New-GasHt
Non-Res	F96T12 to T8HP-Lodging-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Lodging-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Lodging-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Lodging-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Lodging-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Lodging-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Lodging-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Lodging-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Lodging-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Medium Off-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Medium Off-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Medium Off-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-MIniMart-New-GasHt
Non-Res	F96T12 to T8HP-MIniMart-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-MIniMart-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-MIniMart-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-OtherHealth-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-OtherHealth-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-OtherHealth-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Other-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Other-Retro-ElecHt-V1987_1994

Non-Res	F96T12 to T8HP-Other-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Other-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Other-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Other-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Other-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Other-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Other-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Restaurant-New-GasHt
Non-Res	F96T12 to T8HP-Restaurant-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Restaurant-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Restaurant-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Small Box-New-GasHt
Non-Res	F96T12 to T8HP-Small Box-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Small Box-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Small Box-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Small Box-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Small Box-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Small Box-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Small Box-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Small Box-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Small Box-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Small Off-New-GasHt
Non-Res	F96T12 to T8HP-Small Off-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Small Off-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Small Off-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Supermarket-New-GasHt
Non-Res	F96T12 to T8HP-Supermarket-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Supermarket-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Supermarket-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-University-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-University-Retro-ElecHt-V1995_2001

Non-Res	F96T12 to T8HP-University-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-University-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-University-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-University-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12 to T8HP-Warehouse-New-GasHt
Non-Res	F96T12 to T8HP-Warehouse-Retro-ElecHt-PRE1987
Non-Res	F96T12 to T8HP-Warehouse-Retro-ElecHt-V1987_1994
Non-Res	F96T12 to T8HP-Warehouse-Retro-ElecHt-V1995_2001
Non-Res	F96T12 to T8HP-Warehouse-Retro-GasHt-PRE1987
Non-Res	F96T12 to T8HP-Warehouse-Retro-GasHt-V1987_1994
Non-Res	F96T12 to T8HP-Warehouse-Retro-GasHt-V1995_2001
Non-Res	F96T12 to T8HP-Warehouse-Retro-HtPmpHt-PRE1987
Non-Res	F96T12 to T8HP-Warehouse-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12 to T8HP-Warehouse-Retro-HtPmpHt-V1995_2001
Non-Res	F96T12VHO to T8HP-4-K-12-Retro-ElecHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-K-12-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-K-12-Retro-GasHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-K-12-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-K-12-Retro-HtPmpHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-K-12-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Large Off-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Large Off-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Large Off-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Medium Off-Retro-ElecHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Medium Off-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Medium Off-Retro-GasHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Medium Off-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Medium Off-Retro-HtPmpHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Medium Off-Retro-HtPmpHt-V1987_1994

Non-Res	F96T12VHO to T8HP-4-MIniMart-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-MIniMart-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-MIniMart-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Small Off-Retro-ElecHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Small Off-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Small Off-Retro-GasHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Small Off-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Small Off-Retro-HtPmpHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Small Off-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Supermarket-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Supermarket-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Supermarket-Retro-HtPmpHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Warehouse-Retro-ElecHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Warehouse-Retro-ElecHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Warehouse-Retro-GasHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Warehouse-Retro-GasHt-V1987_1994
Non-Res	F96T12VHO to T8HP-4-Warehouse-Retro-HtPmpHt-PRE1987
Non-Res	F96T12VHO to T8HP-4-Warehouse-Retro-HtPmpHt-V1987_1994
Non-Res	Floating Head Pressure Controller
Non-Res	Glass Doors on Open Display Cases (LT)
Non-Res	Glass Doors on Open Display Cases (MT)
Non-Res	INC to CFL-Hospital-New-ElecHt
Non-Res	INC to CFL-Hospital-New-GasHt
Non-Res	INC to CFL-Hospital-New-HtPmpHt
Non-Res	INC to CFL-Hospital-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Hospital-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-Hospital-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Hospital-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Hospital-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-Hospital-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Hospital-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Hospital-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-Hospital-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-K-12-New-ElecHt
Non-Res	INC to CFL-K-12-New-GasHt
Non-Res	INC to CFL-K-12-New-HtPmpHt
Non-Res	INC to CFL-K-12-Retro-ElecHt-PRE1987

Non-Res	INC to CFL-K-12-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-K-12-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-K-12-Retro-GasHt-PRE1987
Non-Res	INC to CFL-K-12-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-K-12-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-K-12-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-K-12-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-K-12-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Large Off-New-ElecHt
Non-Res	INC to CFL-Large Off-New-GasHt
Non-Res	INC to CFL-Large Off-New-HtPmpHt
Non-Res	INC to CFL-Large Off-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Large Off-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-Large Off-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Large Off-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Large Off-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-Large Off-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Large Off-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Large Off-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-Large Off-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Lodging-New-ElecHt
Non-Res	INC to CFL-Lodging-New-GasHt
Non-Res	INC to CFL-Lodging-New-HtPmpHt
Non-Res	INC to CFL-Lodging-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Lodging-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-Lodging-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Lodging-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Lodging-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-Lodging-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Lodging-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Lodging-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-Lodging-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Medium Off-New-ElecHt
Non-Res	INC to CFL-Medium Off-New-GasHt
Non-Res	INC to CFL-Medium Off-New-HtPmpHt
Non-Res	INC to CFL-Medium Off-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Medium Off-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-Medium Off-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Medium Off-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Medium Off-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-Medium Off-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Medium Off-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Medium Off-Retro-HtPmpHt-V1987_1994

Non-Res	INC to CFL-Medium Off-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-OtherHealth-New-ElecHt
Non-Res	INC to CFL-OtherHealth-New-GasHt
Non-Res	INC to CFL-OtherHealth-New-HtPmpHt
Non-Res	INC to CFL-OtherHealth-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-OtherHealth-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-OtherHealth-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-OtherHealth-Retro-GasHt-PRE1987
Non-Res	INC to CFL-OtherHealth-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-OtherHealth-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-OtherHealth-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-OtherHealth-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-OtherHealth-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Other-New-ElecHt
Non-Res	INC to CFL-Other-New-GasHt
Non-Res	INC to CFL-Other-New-HtPmpHt
Non-Res	INC to CFL-Other-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Other-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Other-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Other-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Other-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Other-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Restaurant-New-ElecHt
Non-Res	INC to CFL-Restaurant-New-GasHt
Non-Res	INC to CFL-Restaurant-New-HtPmpHt
Non-Res	INC to CFL-Restaurant-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Restaurant-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-Restaurant-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Restaurant-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Restaurant-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-Restaurant-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Restaurant-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Restaurant-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-Restaurant-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Small Off-New-ElecHt
Non-Res	INC to CFL-Small Off-New-GasHt
Non-Res	INC to CFL-Small Off-New-HtPmpHt
Non-Res	INC to CFL-Small Off-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-Small Off-Retro-ElecHt-V1987_1994
Non-Res	INC to CFL-Small Off-Retro-ElecHt-V1995_2001

Non-Res	INC to CFL-Small Off-Retro-GasHt-PRE1987
Non-Res	INC to CFL-Small Off-Retro-GasHt-V1987_1994
Non-Res	INC to CFL-Small Off-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Small Off-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-Small Off-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CFL-Small Off-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-University-Retro-ElecHt-PRE1987
Non-Res	INC to CFL-University-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-University-Retro-GasHt-PRE1987
Non-Res	INC to CFL-University-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-University-Retro-HtPmpHt-PRE1987
Non-Res	INC to CFL-University-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CFL-Warehouse-New-ElecHt
Non-Res	INC to CFL-Warehouse-New-GasHt
Non-Res	INC to CFL-Warehouse-New-HtPmpHt
Non-Res	INC to CFL-Warehouse-Retro-ElecHt-V1995_2001
Non-Res	INC to CFL-Warehouse-Retro-GasHt-V1995_2001
Non-Res	INC to CFL-Warehouse-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CMH-Anchor-Retro-ElecHt-V1987_1994
Non-Res	INC to CMH-Anchor-Retro-GasHt-V1987_1994
Non-Res	INC to CMH-Anchor-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CMH-Big Box-New-ElecHt
Non-Res	INC to CMH-Big Box-New-GasHt
Non-Res	INC to CMH-Big Box-New-HtPmpHt
Non-Res	INC to CMH-Big Box-Retro-ElecHt-V1995_2001
Non-Res	INC to CMH-Big Box-Retro-GasHt-V1995_2001
Non-Res	INC to CMH-Big Box-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CMH-High End-New-ElecHt
Non-Res	INC to CMH-High End-New-GasHt
Non-Res	INC to CMH-High End-New-HtPmpHt
Non-Res	INC to CMH-High End-Retro-ElecHt-PRE1987
Non-Res	INC to CMH-High End-Retro-ElecHt-V1987_1994
Non-Res	INC to CMH-High End-Retro-ElecHt-V1995_2001
Non-Res	INC to CMH-High End-Retro-GasHt-PRE1987
Non-Res	INC to CMH-High End-Retro-GasHt-V1987_1994
Non-Res	INC to CMH-High End-Retro-GasHt-V1995_2001
Non-Res	INC to CMH-High End-Retro-HtPmpHt-PRE1987
Non-Res	INC to CMH-High End-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CMH-High End-Retro-HtPmpHt-V1995_2001

Non-Res	INC to CMH-MIniMart-New-ElecHt
Non-Res	INC to CMH-MIniMart-New-GasHt
Non-Res	INC to CMH-MIniMart-New-HtPmpHt
Non-Res	INC to CMH-MIniMart-Retro-ElecHt-PRE1987
Non-Res	INC to CMH-MIniMart-Retro-ElecHt-V1987_1994
Non-Res	INC to CMH-MIniMart-Retro-ElecHt-V1995_2001
Non-Res	INC to CMH-MIniMart-Retro-GasHt-PRE1987
Non-Res	INC to CMH-MIniMart-Retro-GasHt-V1987_1994
Non-Res	INC to CMH-MIniMart-Retro-GasHt-V1995_2001
Non-Res	INC to CMH-MIniMart-Retro-HtPmpHt-PRE1987
Non-Res	INC to CMH-MIniMart-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CMH-MIniMart-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CMH-Small Box-New-ElecHt
Non-Res	INC to CMH-Small Box-New-GasHt
Non-Res	INC to CMH-Small Box-New-HtPmpHt
Non-Res	INC to CMH-Small Box-Retro-ElecHt-V1987_1994
Non-Res	INC to CMH-Small Box-Retro-ElecHt-V1995_2001
Non-Res	INC to CMH-Small Box-Retro-GasHt-V1987_1994
Non-Res	INC to CMH-Small Box-Retro-GasHt-V1995_2001
Non-Res	INC to CMH-Small Box-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CMH-Small Box-Retro-HtPmpHt-V1995_2001
Non-Res	INC to CMH-Supermarket-Retro-ElecHt-PRE1987
Non-Res	INC to CMH-Supermarket-Retro-ElecHt-V1987_1994
Non-Res	INC to CMH-Supermarket-Retro-GasHt-PRE1987
Non-Res	INC to CMH-Supermarket-Retro-GasHt-V1987_1994
Non-Res	INC to CMH-Supermarket-Retro-HtPmpHt-PRE1987
Non-Res	INC to CMH-Supermarket-Retro-HtPmpHt-V1987_1994
Non-Res	INC to CMH-University-New-ElecHt
Non-Res	INC to CMH-University-New-GasHt
Non-Res	INC to CMH-University-New-HtPmpHt
Non-Res	Large MH to T5HO-Big Box-New-ElecHt
Non-Res	Large MH to T5HO-Big Box-New-GasHt
Non-Res	Large MH to T5HO-Big Box-New-HtPmpHt
Non-Res	Large MH to T5HO-Big Box-Retro-ElecHt-PRE1987
Non-Res	Large MH to T5HO-Big Box-Retro-ElecHt-V1987_1994
Non-Res	Large MH to T5HO-Big Box-Retro-ElecHt-V1995_2001
Non-Res	Large MH to T5HO-Big Box-Retro-GasHt-PRE1987
Non-Res	Large MH to T5HO-Big Box-Retro-GasHt-V1987_1994

Non-Res	Large MH to T5HO-Big Box-Retro-GasHt-V1995_2001
Non-Res	Large MH to T5HO-Big Box-Retro-HtPmpHt-PRE1987
Non-Res	Large MH to T5HO-Big Box-Retro-HtPmpHt-V1987_1994
Non-Res	Large MH to T5HO-Big Box-Retro-HtPmpHt-V1995_2001
Non-Res	Large MH to T5HO-Other-New-ElecHt
Non-Res	Large MH to T5HO-Other-New-GasHt
Non-Res	Large MH to T5HO-Other-New-HtPmpHt
Non-Res	Large MH to T5HO-Other-Retro-ElecHt-PRE1987
Non-Res	Large MH to T5HO-Other-Retro-ElecHt-V1987_1994
Non-Res	Large MH to T5HO-Other-Retro-GasHt-PRE1987
Non-Res	Large MH to T5HO-Other-Retro-GasHt-V1987_1994
Non-Res	Large MH to T5HO-Other-Retro-HtPmpHt-PRE1987
Non-Res	Large MH to T5HO-Other-Retro-HtPmpHt-V1987_1994
Non-Res	Large MH to T5HO-Warehouse-New-ElecHt
Non-Res	Large MH to T5HO-Warehouse-New-GasHt
Non-Res	Large MH to T5HO-Warehouse-New-HtPmpHt
Non-Res	Large MH to T5HO-Warehouse-Retro-ElecHt-PRE1987
Non-Res	Large MH to T5HO-Warehouse-Retro-ElecHt-V1987_1994
Non-Res	Large MH to T5HO-Warehouse-Retro-ElecHt-V1995_2001
Non-Res	Large MH to T5HO-Warehouse-Retro-GasHt-PRE1987
Non-Res	Large MH to T5HO-Warehouse-Retro-GasHt-V1987_1994
Non-Res	Large MH to T5HO-Warehouse-Retro-GasHt-V1995_2001
Non-Res	Large MH to T5HO-Warehouse-Retro-HtPmpHt-PRE1987
Non-Res	Large MH to T5HO-Warehouse-Retro-HtPmpHt-V1987_1994
Non-Res	Large MH to T5HO-Warehouse-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T5HO-Other-New-ElecHt
Non-Res	Med MH to T5HO-Other-New-GasHt
Non-Res	Med MH to T5HO-Other-New-HtPmpHt
Non-Res	Med MH to T5HO-Supermarket-New-ElecHt
Non-Res	Med MH to T5HO-Supermarket-New-GasHt
Non-Res	Med MH to T5HO-Supermarket-New-HtPmpHt
Non-Res	Med MH to T8HP-Anchor-New-GasHt
Non-Res	Med MH to T8HP-Anchor-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-Anchor-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Anchor-Retro-GasHt-V1987_1994

Non-Res	Med MH to T8HP-Anchor-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Anchor-Retro-HtPmpHt-V1987_1994
Non-Res	Med MH to T8HP-Anchor-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-High End-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-High End-Retro-GasHt-V1987_1994
Non-Res	Med MH to T8HP-High End-Retro-HtPmpHt-V1987_1994
Non-Res	Med MH to T8HP-Hospital-New-GasHt
Non-Res	Med MH to T8HP-Hospital-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Hospital-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Hospital-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-K-12-Retro-ElecHt-PRE1987
Non-Res	Med MH to T8HP-K-12-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-K-12-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-K-12-Retro-GasHt-PRE1987
Non-Res	Med MH to T8HP-K-12-Retro-GasHt-V1987_1994
Non-Res	Med MH to T8HP-K-12-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-K-12-Retro-HtPmpHt-PRE1987
Non-Res	Med MH to T8HP-K-12-Retro-HtPmpHt-V1987_1994
Non-Res	Med MH to T8HP-K-12-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-Large Off-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-Large Off-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Large Off-Retro-GasHt-V1987_1994
Non-Res	Med MH to T8HP-Large Off-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Large Off-Retro-HtPmpHt-V1987_1994
Non-Res	Med MH to T8HP-Large Off-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-Medium Off-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-Medium Off-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Medium Off-Retro-GasHt-V1987_1994
Non-Res	Med MH to T8HP-Medium Off-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Medium Off-Retro-HtPmpHt-V1987_1994

Non-Res	Med MH to T8HP-Medium Off-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-MIniMart-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-MIniMart-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-MIniMart-Retro-GasHt-V1987_1994
Non-Res	Med MH to T8HP-MIniMart-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-MIniMart-Retro-HtPmpHt-V1987_1994
Non-Res	Med MH to T8HP-MIniMart-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-OtherHealth-New-GasHt
Non-Res	Med MH to T8HP-OtherHealth-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-OtherHealth-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-OtherHealth-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-Other-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Other-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Other-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-Small Box-New-GasHt
Non-Res	Med MH to T8HP-Small Box-Retro-ElecHt-PRE1987
Non-Res	Med MH to T8HP-Small Box-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-Small Box-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Small Box-Retro-GasHt-PRE1987
Non-Res	Med MH to T8HP-Small Box-Retro-GasHt-V1987_1994
Non-Res	Med MH to T8HP-Small Box-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Small Box-Retro-HtPmpHt-PRE1987
Non-Res	Med MH to T8HP-Small Box-Retro-HtPmpHt-V1987_1994
Non-Res	Med MH to T8HP-Small Box-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-Supermarket-Retro-ElecHt-V1995_2001
Non-Res	Med MH to T8HP-Supermarket-Retro-GasHt-V1995_2001
Non-Res	Med MH to T8HP-Supermarket-Retro-HtPmpHt-V1995_2001
Non-Res	Med MH to T8HP-University-Retro-ElecHt-V1987_1994
Non-Res	Med MH to T8HP-University-Retro-GasHt-V1987_1994

Non-Res	Med MH to T8HP-University-Retro-HtPmpHt-V1987_1994
Non-Res	Night Covers for Display Cases - Horizontal
Non-Res	Night Covers for Display Cases - Vertical
Non-Res	Outdoor Sign Ballast - 24
Non-Res	Outdoor Sign Ballast - 24 - Retro
Non-Res	Outdoor Sign Ballast - Night
Non-Res	Outdoor Sign Ballast - Night - Retro
Non-Res	Perimeter Day lighting Controls (Advanced)-New-K-12-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-K-12-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-K-12-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Large Off-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Large Off-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Large Off-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Medium Off-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Medium Off-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Medium Off-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-OtherHealth-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-OtherHealth-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-OtherHealth-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Small Off-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Small Off-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-Small Off-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-University-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-University-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-New-University-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-K-12-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-K-12-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-K-12-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Large Off-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Large Off-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Large Off-HtPmpHt

Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Medium Off-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Medium Off-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Medium Off-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-OtherHealth-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-OtherHealth-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-OtherHealth-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Small Off-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Small Off-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-Small Off-HtPmpHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-University-ElecHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-University-GasHt
Non-Res	Perimeter Day lighting Controls (Advanced)-NR-University-HtPmpHt
Non-Res	Replace 12 inch Green Incandescent Left Turn Bay with 12 inchGreen LED module
Non-Res	Replace 12 inch Green Incandescent Thru Lane with 12 inch Green LED module
Non-Res	Replace 12 inch Red Incandescent Left Turn Bay with 12 inch Red LED module
Non-Res	Replace 12 inch Red Incandescent Thru Lane with 12 inch Red LED module
Non-Res	Replace 8 inch Red Incandescent Left Turn Bay with 8 inch Red LED module
Non-Res	Replace 8 inch Red Incandescent Thru Lane with 8 inch Red LED module
Non-Res	Special Doors with Low/No Anti-Sweat Heat
Non-Res	Strip Curtains for Walk-in Boxes
Non-Res	T12-2 to T8HP-1-Other-Retro-ElecHt-PRE1987
Non-Res	T12-2 to T8HP-1-Other-Retro-GasHt-PRE1987
Non-Res	T12-2 to T8HP-1-Other-Retro-HtPmpHt-PRE1987
Non-Res	T12-3 to T8HP-2-High End-New-GasHt
Non-Res	T12-3 to T8HP-2-High End-Retro-ElecHt-V1995_2001
Non-Res	T12-3 to T8HP-2-High End-Retro-GasHt-V1995_2001
Non-Res	T12-3 to T8HP-2-High End-Retro-HtPmpHt-V1995_2001
Non-Res	T12-3 to T8HP-2-K-12-Retro-ElecHt-V1987_1994
Non-Res	T12-3 to T8HP-2-K-12-Retro-GasHt-V1987_1994
Non-Res	T12-3 to T8HP-2-K-12-Retro-HtPmpHt-V1987_1994
Non-Res	T12-3 to T8HP-2-Small Off-Retro-ElecHt-V1995_2001

Non-Res	T12-3 to T8HP-2-Small Off-Retro-GasHt-V1995_2001
Non-Res	T12-3 to T8HP-2-Small Off-Retro-HtPmpHt-V1995_2001
Non-Res	T12-3 to T8HP-3-Anchor-Retro-ElecHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Anchor-Retro-GasHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Anchor-Retro-HtPmpHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Big Box-Retro-ElecHt-PRE1987
Non-Res	T12-3 to T8HP-3-Big Box-Retro-GasHt-PRE1987
Non-Res	T12-3 to T8HP-3-Big Box-Retro-HtPmpHt-PRE1987
Non-Res	T12-3 to T8HP-3-High End-Retro-ElecHt-PRE1987
Non-Res	T12-3 to T8HP-3-High End-Retro-ElecHt-V1987_1994
Non-Res	T12-3 to T8HP-3-High End-Retro-GasHt-PRE1987
Non-Res	T12-3 to T8HP-3-High End-Retro-GasHt-V1987_1994
Non-Res	T12-3 to T8HP-3-High End-Retro-HtPmpHt-PRE1987
Non-Res	T12-3 to T8HP-3-High End-Retro-HtPmpHt-V1987_1994
Non-Res	T12-3 to T8HP-3-MIniMart-Retro-ElecHt-PRE1987
Non-Res	T12-3 to T8HP-3-MIniMart-Retro-GasHt-PRE1987
Non-Res	T12-3 to T8HP-3-MIniMart-Retro-HtPmpHt-PRE1987
Non-Res	T12-3 to T8HP-3-OtherHealth-Retro-ElecHt-PRE1987
Non-Res	T12-3 to T8HP-3-OtherHealth-Retro-ElecHt-V1987_1994
Non-Res	T12-3 to T8HP-3-OtherHealth-Retro-GasHt-PRE1987
Non-Res	T12-3 to T8HP-3-OtherHealth-Retro-GasHt-V1987_1994
Non-Res	T12-3 to T8HP-3-OtherHealth-Retro-HtPmpHt-PRE1987
Non-Res	T12-3 to T8HP-3-OtherHealth-Retro-HtPmpHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Restaurant-Retro-ElecHt-PRE1987
Non-Res	T12-3 to T8HP-3-Restaurant-Retro-ElecHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Restaurant-Retro-GasHt-PRE1987
Non-Res	T12-3 to T8HP-3-Restaurant-Retro-GasHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Restaurant-Retro-HtPmpHt-PRE1987

Non-Res	T12-3 to T8HP-3-Restaurant-Retro-HtPmpHt-V1987_1994
Non-Res	T12-3 to T8HP-3-Supermarket-Retro-ElecHt-PRE1987
Non-Res	T12-3 to T8HP-3-Supermarket-Retro-GasHt-PRE1987
Non-Res	T12-3 to T8HP-3-Supermarket-Retro-HtPmpHt-PRE1987
Non-Res	T12-3 to T8HP-3-University-Retro-ElecHt-V1987_1994
Non-Res	T12-3 to T8HP-3-University-Retro-GasHt-V1987_1994
Non-Res	T12-3 to T8HP-3-University-Retro-HtPmpHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Large Off-Retro-ElecHt-PRE1987
Non-Res	T12-4 to T8HP-2-Large Off-Retro-ElecHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Large Off-Retro-GasHt-PRE1987
Non-Res	T12-4 to T8HP-2-Large Off-Retro-GasHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Large Off-Retro-HtPmpHt-PRE1987
Non-Res	T12-4 to T8HP-2-Large Off-Retro-HtPmpHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Medium Off-Retro-ElecHt-PRE1987
Non-Res	T12-4 to T8HP-2-Medium Off-Retro-ElecHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Medium Off-Retro-GasHt-PRE1987
Non-Res	T12-4 to T8HP-2-Medium Off-Retro-GasHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Medium Off-Retro-HtPmpHt-PRE1987
Non-Res	T12-4 to T8HP-2-Medium Off-Retro-HtPmpHt-V1987_1994
Non-Res	T12-4 to T8HP-2-MIniMart-Retro-ElecHt-V1987_1994
Non-Res	T12-4 to T8HP-2-MIniMart-Retro-GasHt-V1987_1994
Non-Res	T12-4 to T8HP-2-MIniMart-Retro-HtPmpHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Small Off-Retro-ElecHt-PRE1987
Non-Res	T12-4 to T8HP-2-Small Off-Retro-ElecHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Small Off-Retro-GasHt-PRE1987
Non-Res	T12-4 to T8HP-2-Small Off-Retro-GasHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Small Off-Retro-HtPmpHt-PRE1987
Non-Res	T12-4 to T8HP-2-Small Off-Retro-HtPmpHt-V1987_1994

Non-Res	T12-4 to T8HP-2-Supermarket-Retro-ElecHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Supermarket-Retro-GasHt-V1987_1994
Non-Res	T12-4 to T8HP-2-Supermarket-Retro-HtPmpHt-V1987_1994
Non-Res	T12-4 to T8HP-3-Anchor-Retro-ElecHt-PRE1987
Non-Res	T12-4 to T8HP-3-Anchor-Retro-GasHt-PRE1987
Non-Res	T12-4 to T8HP-3-Anchor-Retro-HtPmpHt-PRE1987
Non-Res	T12-4 to T8HP-3-Big Box-Retro-ElecHt-V1987_1994
Non-Res	T12-4 to T8HP-3-Big Box-Retro-GasHt-V1987_1994
Non-Res	T12-4 to T8HP-3-Big Box-Retro-HtPmpHt-V1987_1994
Non-Res	T12-4 to T8HP-3-Small Box-Retro-ElecHt-PRE1987
Non-Res	T12-4 to T8HP-3-Small Box-Retro-GasHt-PRE1987
Non-Res	T12-4 to T8HP-3-Small Box-Retro-HtPmpHt-PRE1987
Non-Res	Vending Machine Controller-Large Machine w/Illuminated Front
Non-Res	Vending Machine Controller-Small Machine or Machine without Illuminated Front
Non-Res	VSD Large Fan
Non-Res	VSD Medium fan
Non-Res	VSD Pump
Non-Res	VSD Small Fan
Res	Biradiant Oven
Res	Bottom Freezer - No Ice
Res	Energy Conservation School Program
Res	Energy Star Dishwasher (EF 68) - PNW DHW Fuel Average + NEB Waste Water Treatment Savings
Res	Energy Star Dishwasher (EF58) - PNW DHW Fuel Average + NEB of Waste Water Treatment Savings
Res	Energy Star Dishwasher (EF76) - PNW DHW Fuel Average + NEB Waste Water Treatment Savings
Res	Energy Star Dishwasher (EF85) - PNW DHW Fuel Average + NEB Waste Water Treatment Savings
Res	Heat Traps + Increased Insulation (3 1/2" foam) + Insulated Tank Bottom & Plastic Tank w/minimum 10 yr warranty
Res	Heat Traps + Increased Insulation (3" foam) + Insulated Tank Bottom w/minimum 10 year Warranty
Res	Heating System Maintenance (tune-up/filter)
Res	Improved Oven Insulation
Res	Improved Oven Seals

Res	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 1
Res	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 2
Res	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 1
Res	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 2
Res	Manufactured Home NonSGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 1
Res	Manufactured Home NonSGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 2
Res	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 1
Res	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 2
Res	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing Heat Zone 1
Res	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing Heat Zone 2
Res	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 1
Res	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 2
Res	Manufactured Home NonSGC Heat Pump - PTCS System Commissioning Heat Zone 1
Res	Manufactured Home NonSGC Heat Pump - PTCS System Commissioning Heat Zone 2
Res	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 1
Res	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 2
Res	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 1
Res	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 2
Res	Manufactured Home SGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 1
Res	Manufactured Home SGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 2
Res	Manufactured Home SGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 1

Res	Manufactured Home SGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 2
Res	Manufactured Home SGC Heat Pump - PTCS Duct Sealing Heat Zone 1
Res	Manufactured Home SGC Heat Pump - PTCS Duct Sealing Heat Zone 2
Res	Manufactured Home SGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 1
Res	Manufactured Home SGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 2
Res	Manufactured Home SGC Heat Pump - PTCS System Commissioning Heat Zone 1
Res	Manufactured Home SGC Heat Pump - PTCS System Commissioning Heat Zone 2
Res	Manufactured Home Weatherization - Heating Zone 1
Res	Manufactured Home Weatherization - Heating Zone 2
Res	Multifamily Weatherization - Heating Zone 1
Res	Multifamily Weatherization - Heating Zone 2
Res	New MultiFamily Construction, DHW & Shower Preheat, Electric Resistance
Res	New MultiFamily Construction, DHW Preheat, Electric Resistance
Res	New MultiFamily Construction, Shower Preheat, Electric Resistance
Res	New Single Family Construction, DHW & Shower Preheat, Electric Resistance
Res	New Single Family Construction, DHW Preheat, Electric Resistance
Res	New Single Family Construction, Shower Preheat, Electric Resistance
Res	Post79/Pre93 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Post79/Pre93 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Post79/Pre93 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating

Res	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Convert Zonal Heating w/o CAC to HP HSPF 8/SEER 13 - Heat
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2

Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2
Res	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2

Res	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Post92 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Post92 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Post92 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat

Res	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs Air Source Heat Pump - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs Air Source Heat Pump - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs Air Source Heat Pump - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 1
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs Zonal Heating - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs Zonal Heating - Zone 2
Res	Post92 Single Family Contruction Geothermal Heat Pump vs Zonal Heating - Zone 2
Res	Post93 Manufactured Home NonSGC CAC Upgrade SEER w/PTCS - Cooling Zone 3
Res	Post93 Manufactured Home NonSGC Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating
Res	Post93 Manufactured Home NonSGC Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating
Res	Post93 Manufactured Home NonSGC Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating

Res	Post93 Manufactured Home NonSGC Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating
Res	Post93 Manufactured Home NonSGC HP Upgrade HSPF 8 w/PTCS - Cooling Zone 1
Res	Post93 Manufactured Home NonSGC HP Upgrade HSPF 8 w/PTCS - Cooling Zone 2
Res	Post93 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1
Res	Post93 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2
Res	Post93 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1
Res	Post93 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2
Res	Pre80 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Pre80 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Pre80 Single Family Construction CAC Upgrade SEER - Cooling Zone 3
Res	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating
Res	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat

Res	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1

Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2
Res	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2
Res	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1
Res	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2
Res	Pre94 Manufactured Home CAC Upgrade SEER w/PTCS - Cooling Zone 3
Res	Pre94 Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating
Res	Pre94 Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating
Res	Pre94 Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating
Res	Pre94 Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating
Res	Pre94 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1
Res	Pre94 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2
Res	Pre94 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1
Res	Pre94 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2
Res	Reduced Oven Ventilation Rate
Res	SGC - Heating Zone 1
Res	SGC - Heating Zone 2
Res	SGC - Zone 1
Res	SGC - Zone 2
Res	SGC Manufactured Home CAC Upgrade SEER w/PTCS - Cooling Zone 3

Res	SGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2
Res	SGC Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating
Res	SGC Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating
Res	SGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2
Res	SGC Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating
Res	SGC Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating
Res	SGCSF - Heating Zone 1
Res	SGCSF - Heating Zone 2
Res	Side-by-Side Model - Ice
Res	Side-by-Side Model - No Ice
Res	Single Family Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 1
Res	Single Family Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 2
Res	Single Family Heat Pump - PTCS System Commissioning Heat Zone 1
Res	Single Family Heat Pump - PTCS System Commissioning Heat Zone 2
Res	Single Family Weatherization - Zone 1
Res	Single Family Weatherization - Zone 2
Res	Top Freezer - Ice
Res	Top Freezer - No Ice
Res	Weighted Average - Interior & Exterior Wattage - 92 Watt

2009

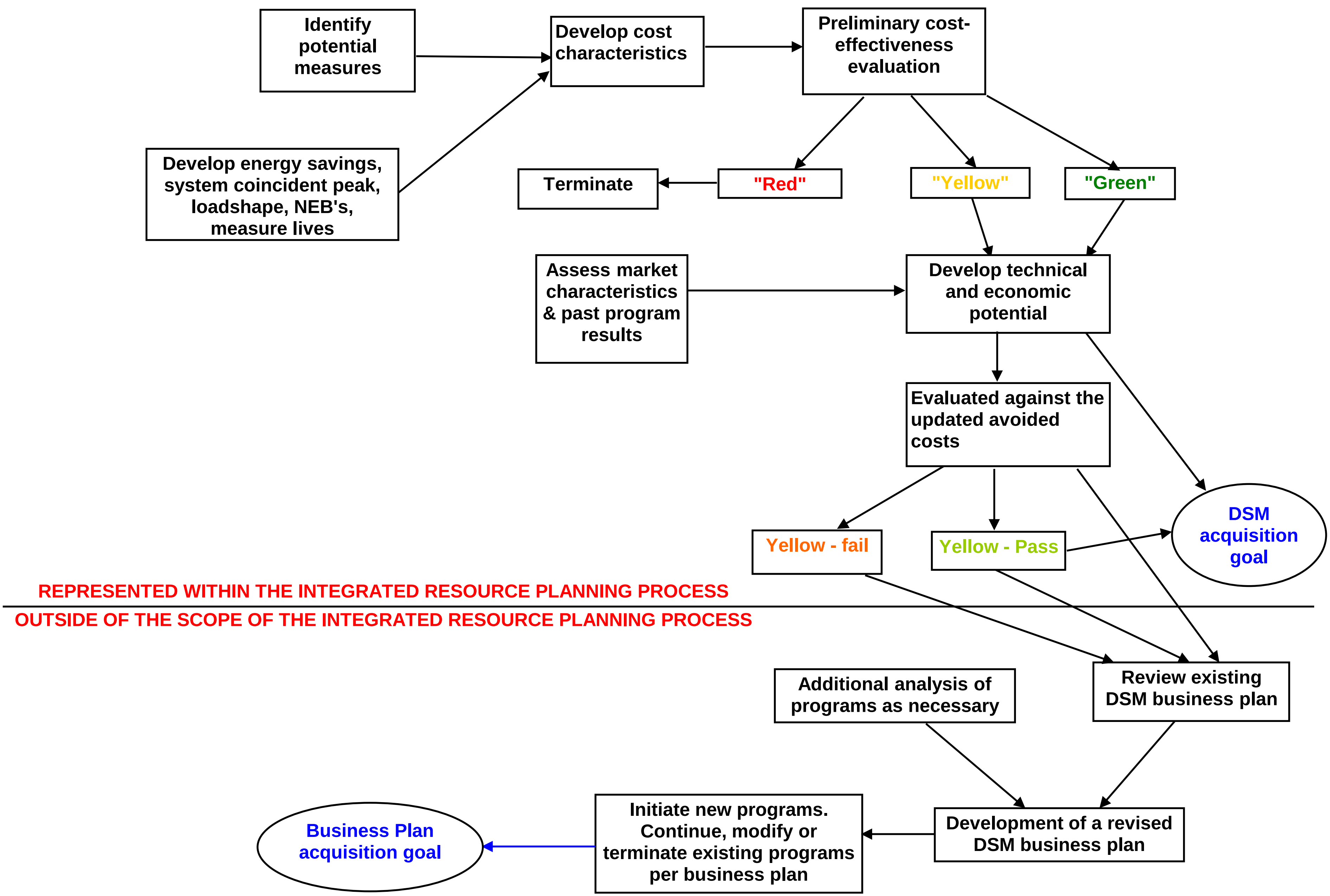
Electric
Integrated Resource Plan

Appendix E – Integration of DSM within the 2009 Electric IRP

AVISTA®

August 31, 2009

Integration of DSM within the 2009 Electric IRP



2009

Electric
Integrated Resource Plan

Appendix F – Achievable 20-Year Potential for Residential and Non-Residential DSM Programs

AVISTA®

August 31, 2009

Acheiveable Potential (20-yr) for Res and Non-Res (excludes low-income/non-res site specific)

(in 2009 $s)

Meas #	Segment	Category	Measure	achievable potential (20 yr)	levelized trc cost 2009	Life
46.5	Res	Dishwash	Energy Star Dishwasher (EF58) - PNW DHW Fuel Average + NEB of Waste Water Treatment Savings	835,250	0.00	9
52.5	Res	Dishwash	Energy Star Dishwasher (EF 68) - PNW DHW Fuel Average + NEB Waste Water Treatment Savings	835,250	0.01	9
58.5	Res	Dishwash	Energy Star Dishwasher (EF76) - PNW DHW Fuel Average + NEB Waste Water Treatment Savings	835,250	0.61	9
64.5	Res	Dishwash	Energy Star Dishwasher (EF85) - PNW DHW Fuel Average + NEB Waste Water Treatment Savings	835,250	1.98	9
104	Res	Lighting	Weighted Average - Interior & Exterior Wattage - 92 Watt	250,452,883	0.03	9
106	Res	Appliance	Bottom Freezer - No Ice	659,410	0.04	19
107	Res	Appliance	Side-by-Side Model - No Ice	659,410	0.03	19
108	Res	Appliance	Side-by-Side Model - Ice	659,410	0.52	19
109	Res	Appliance	Top Freezer - No Ice	659,410	0.24	19
110	Res	Appliance	Top Freezer - Ice	659,410	0.13	19
111	Res	DHW	New Single Family Construction, Shower Preheat, Electric Resistance	44,117	0.11	40
113	Res	DHW	New Single Family Construction, DHW & Shower Preheat, Electric Resistance	126,027	0.08	40
115	Res	DHW	New Single Family Construction, DHW Preheat, Electric Resistance	50,419	0.10	40
117	Res	DHW	New MultiFamily Construction, Shower Preheat, Electric Resistance	17,638	0.09	40
119	Res	DHW	New MultiFamily Construction, DHW & Shower Preheat, Electric Resistance	50,419	0.07	40
121	Res	DHW	New MultiFamily Construction, DHW Preheat, Electric Resistance	20,155	0.08	40
129	Res	Cooking	Reduced Oven Ventilation Rate	24,336	0.03	20
130	Res	Cooking	Improved Oven Insulation	23,712	0.11	20
131	Res	Cooking	Improved Oven Seals	7,904	0.86	20
132	Res	Cooking	Biradiant Oven	163,072	0.26	20
133	Res	DHW	Heat Traps + Increased Insulation (3" foam) + Insulated Tank Bottom w/minimum 10 year Warranty	92,976	0.03	12
134	Res	DHW	Heat Traps + Increased Insulation (3 1/2" foam) + Insulated Tank Bottom & Plastic Tank w/minimum 10 yr warranty	29,370	0.04	12
172	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1	892,459	0.18	30
175	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2	892,459	0.13	30
178	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1	892,459	0.09	30

181	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2	892,459	0.07	30
184	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1	892,459	0.09	30
187	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2	892,459	0.06	30
190	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1	892,459	0.09	30
193	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2	892,459	0.06	30
196	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1	892,459	0.15	30
199	Res	HP Upgrade	Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2	892,459	0.11	30
202	Res	HP Upgrade	Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1	892,459	0.08	30
205	Res	HP Upgrade	Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2	892,459	0.06	30
208	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1	892,459	0.06	30
211	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2	892,459	0.04	30
214	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1	892,459	0.06	30
217	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2	892,459	0.04	30
223	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs Zonal Heating - Zone 2	892,459	0.18	30
226	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 1	892,459	0.11	30
229	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 2	892,459	0.07	30
232	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 1	892,459	0.11	30
235	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 2	892,459	0.07	30
238	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs Air Source Heat Pump - Zone 1	892,459	0.14	30
241	Res	HP Upgrade	Post92 Single Family Contruction Geothermal Heat Pump vs Air Source Heat Pump - Zone 2	892,459	0.10	30
244	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1	892,459	0.17	30
247	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2	892,459	0.12	30
250	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1	892,459	0.17	30

256	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1	892,459	0.11	30
259	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2	892,459	0.08	30
262	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1	892,459	0.11	30
265	Res	HP Upgrade	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2	892,459	0.08	30
268	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1	892,459	0.15	30
271	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2	892,459	0.11	30
274	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1	892,459	0.14	30
277	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2	892,459	0.11	30
280	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1	892,459	0.08	30
283	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2	892,459	0.06	30
286	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1	892,459	0.08	30
289	Res	HP Upgrade	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2	892,459	0.06	30
295	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs Zonal Heating - Zone 2	484,272	0.17	30
298	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 1	484,272	0.14	30
301	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 2	484,272	0.10	30
304	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 1	484,272	0.14	30
307	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 2	484,272	0.10	30
313	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs Air Source Heat Pump - Zone 2	484,272	0.18	30
316	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1	484,272	0.17	30
319	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2	484,272	0.12	30
322	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1	484,272	0.22	30

325	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2	484,272	0.17	30
328	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1	484,272	0.13	30
331	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2	484,272	0.09	30
334	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1	484,272	0.13	30
337	Res	HP Conv	Pre80 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2	484,272	0.09	30
340	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 1	484,272	0.14	30
343	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Zonal Heating - Zone 2	484,272	0.10	30
346	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 1	484,272	0.18	30
349	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on Air Source HP - Zone 2	484,272	0.14	30
352	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 1	484,272	0.09	30
355	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/oCAC - Zone 2	484,272	0.07	30
358	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 1	484,272	0.09	30
361	Res	HP Conv	Post79/Pre93 Single Family Construction Geothermal Heat Pump Retrofit w/PTCS on FAF w/CAC - Zone 2	484,272	0.07	30
367	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs Zonal Heating - Zone 2	484,272	0.17	30
370	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 1	484,272	0.16	30
373	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/oCAC - Zone 2	484,272	0.11	30
376	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 1	484,272	0.16	30
379	Res	HP Conv	Post92 Single Family Contruction Geothermal Heat Pump vs FAF w/CAC - Zone 2	484,272	0.11	30
388	Res	MH HP Conv	Pre94 Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating	410,091	0.09	18
390	Res	MH HP Conv	Pre94 Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating	527,124	0.07	18
392	Res	MH HP Conv	Post93 Manufactured Home NonSGC Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating	341,756	0.10	18
394	Res	MH HP Conv	Post93 Manufactured Home NonSGC Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating	450,441	0.08	18
396	Res	MH HP Conv	SGC Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating	217,385	0.14	18

398	Res	MH HP Conv	SGC Manufactured Home Convert FAF w/o CAC to HP HSPF 8/SEER 12 - Heating	300,697	0.10	18
400	Res	MH HP Conv	Pre94 Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating	410,091	0.08	18
402	Res	MH HP Conv	Pre94 Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating	527,124	0.07	18
404	Res	MH HP Conv	Post93 Manufactured Home NonSGC Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating	341,756	0.10	18
406	Res	MH HP Conv	Post93 Manufactured Home NonSGC Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating	450,441	0.08	18
408	Res	MH HP Conv	SGC Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating	217,385	0.13	18
410	Res	MH HP Conv	SGC Manufactured Home Convert FAF w/CAC to HP HSPF 8/SEER 12 - Heating	300,697	0.10	18
412	Res	Shell	SGC - Heating Zone 1	31,387	0.05	70
413	Res	Shell	SGC - Heating Zone 2	92,577	0.05	70
414	Res	Shell	Single Family Weatherization - Zone 1	2,263,516	0.04	45
415	Res	Shell	Single Family Weatherization - Zone 2	4,334,121	0.03	45
416	Res	Shell	Multifamily Weatherization - Heating Zone 1	1,060,596	0.05	45
417	Res	Shell	Multifamily Weatherization - Heating Zone 2	1,394,411	0.04	45
418	Res	Shell	SGCSF - Heating Zone 1	2,416,877	0.06	70
419	Res	Shell	SGCSF - Heating Zone 2	3,931,820	0.05	70
420	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.12	18
422	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.10	18
424	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.07	18
426	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.06	18
428	Res	HP Conv	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.11	18
430	Res	HP Conv	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.09	18
432	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.12	18
434	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.10	18
436	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.07	18
438	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.06	18
440	Res	HP Conv	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.11	18
442	Res	HP Conv	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.09	18
444	Res	HP Conv	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.15	18
446	Res	HP Conv	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.13	18
448	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.09	18

450	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.08	18
452	Res	HP Conv	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.13	18
454	Res	HP Conv	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.11	18
468	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.14	18
470	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.12	18
472	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.08	18
474	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.07	18
476	Res	HP Conv	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.13	18
478	Res	HP Conv	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.10	18
480	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.14	18
482	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.12	18
484	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.08	18
486	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.07	18
488	Res	HP Conv	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.13	18
490	Res	HP Conv	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.10	18
492	Res	HP Conv	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.14	18
494	Res	HP Conv	Pre80 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.12	18
496	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.08	18
498	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.07	18
500	Res	HP Conv	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.13	18
502	Res	HP Conv	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.10	18
510	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/o CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.13	18

516	Res	Shell	Manufactured Home Weatherization - Heating Zone 1	6,151,873	0.07	25
517	Res	Shell	Manufactured Home Weatherization - Heating Zone 2	7,870,990	0.06	25
529	Res	MF Duc Seal	Manufactured Home NonSGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 1	60,322	0.05	20
530	Res	MF Duc Seal	Manufactured Home NonSGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 2	89,539	0.04	20
531	Res	MF Duc Seal	Manufactured Home SGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 1	32,672	0.10	20
532	Res	MF Duc Seal	Manufactured Home SGC Forced Air Furnace w/o CAC - PTCS Duct Sealing Heat Zone 2	52,508	0.06	20
537	Res	SF Com	Single Family Heat Pump - PTCS System Commissioning Heat Zone 1	222,025	0.26	5
539	Res	SF Com	Single Family Heat Pump - PTCS System Commissioning Heat Zone 2	383,505	0.15	5
541	Res	SF Com	Single Family Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 1	1,183,530	0.05	20
543	Res	SF Com	Single Family Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 2	2,038,711	0.03	20
549	Res	MH Duct Seal	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing Heat Zone 1	37,507	0.09	20
551	Res	MH Duct Seal	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing Heat Zone 2	65,568	0.05	20
553	Res	MH Com	Manufactured Home NonSGC Heat Pump - PTCS System Commissioning Heat Zone 1	17,514	0.28	5
555	Res	MH Com	Manufactured Home NonSGC Heat Pump - PTCS System Commissioning Heat Zone 2	30,317	0.16	5
557	Res	MH Duct Seal	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 1	55,020	0.09	20
559	Res	MH Duct Seal	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 2	95,885	0.05	20
561	Res	MH Duct Seal	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 1	62,104	0.10	20
563	Res	MH Duct Seal	Manufactured Home NonSGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 2	92,314	0.06	20
565	Res	MH Duct Seal	Manufactured Home SGC Heat Pump - PTCS Duct Sealing Heat Zone 1	20,752	0.15	20
567	Res	MH Duct Seal	Manufactured Home SGC Heat Pump - PTCS Duct Sealing Heat Zone 2	39,129	0.08	20
569	Res	MH Com	Manufactured Home SGC Heat Pump - PTCS System Commissioning Heat Zone 1	9,692	0.51	5
571	Res	MH Com	Manufactured Home SGC Heat Pump - PTCS System Commissioning Heat Zone 2	18,094	0.27	5
573	Res	MH Duct Seal	Manufactured Home SGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 1	30,444	0.17	20
575	Res	MH Duct Seal	Manufactured Home SGC Heat Pump - PTCS Duct Sealing and System Commissioning Heat Zone 2	57,223	0.09	20
577	Res	MH Duct Seal	Manufactured Home SGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 1	34,399	0.17	20

579	Res	MH Duct Seal	Manufactured Home SGC Heat Pump - PTCS Duct Sealing, Commissioning and Controls Heat Zone 2	55,088	0.11	20
593	Res	MH Duct Seal	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 1	60,322	0.05	20
595	Res	MH Duct Seal	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 2	89,539	0.04	20
601	Res	MH Duct Seal	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 1	60,322	0.05	20
603	Res	MH Duct Seal	Manufactured Home NonSGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 2	89,539	0.04	20
605	Res	MH Duct Seal	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 1	32,672	0.10	20
607	Res	MH Duct Seal	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing Heat Zone 2	52,508	0.06	20
613	Res	MH Duct Seal	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 1	32,672	0.10	20
615	Res	MH Duct Seal	Manufactured Home SGC Forced Air Furnace w/CAC - PTCS Duct Sealing and System Commissioning Heat Zone 2	52,508	0.06	20
617	Res	Shell	SGC - Zone 1	538,582	0.05	45
618	Res	Shell	SGC - Zone 2	1,089,896	0.04	45
625	Res	HP Conv	Pre94 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1	484,272	0.09	30
628	Res	HP Conv	Pre94 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2	484,272	0.07	30
631	Res	HP Conv	Pre94 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1	484,272	0.09	30
634	Res	HP Conv	Pre94 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2	484,272	0.07	30
643	Res	HP Conv	Post93 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1	484,272	0.13	30
646	Res	HP Conv	Post93 NonSGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2	484,272	0.09	30
649	Res	HP Conv	Post93 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 1	484,272	0.13	30
652	Res	HP Conv	Post93 NonSGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2	484,272	0.09	30
658	Res	HP Conv	SGC Manufactured Home Convert FAF w/o CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2	484,272	0.13	30
664	Res	HP Conv	SGC Manufactured Home Convert FAF w/CAC to Energy Star Geothermal Heat Pump w/PTCS Specifications - Heating Zone 2	484,272	0.13	30
673	Res	AC Upgrade	Pre80 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.56	18

674	Res	AC Upgrade	Post79/Pre93 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.36	18
675	Res	AC Upgrade	Post92 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.47	18
676	Res	HP Upgrade	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.17	18
678	Res	HP Upgrade	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.10	18
680	Res	HP Upgrade	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.10	18
682	Res	HP Upgrade	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.06	18
684	Res	HP Upgrade	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.16	18
686	Res	HP Upgrade	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.09	18
688	Res	AC Upgrade	Pre80 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.33	18
689	Res	AC Upgrade	Post79/Pre93 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.21	18
690	Res	AC Upgrade	Post92 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.28	18
691	Res	HP Upgrade	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.06	18
693	Res	HP Upgrade	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.04	18
695	Res	HP Upgrade	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.04	18
697	Res	HP Upgrade	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.02	18
699	Res	HP Upgrade	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.06	18
701	Res	HP Upgrade	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.03	18
703	Res	AC Upgrade	Pre94 Manufactured Home CAC Upgrade SEER w/PTCS - Cooling Zone 3	224,848	0.28	18
704	Res	AC Upgrade	Post93 Manufactured Home NonSGC CAC Upgrade SEER w/PTCS - Cooling Zone 3	224,848	0.29	18
705	Res	AC Upgrade	SGC Manufactured Home CAC Upgrade SEER w/PTCS - Cooling Zone 3	224,848	0.39	18
710	Res	HP Upgrade	Post93 Manufactured Home NonSGC HP Upgrade HSPF 8 w/PTCS - Cooling Zone 1	892,459	0.09	18
712	Res	HP Upgrade	Post93 Manufactured Home NonSGC HP Upgrade HSPF 8 w/PTCS - Cooling Zone 2	892,459	0.04	18
718	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.10	18
720	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.08	18
722	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.06	18
724	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.05	18
726	Res	HP Conv	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.09	18
728	Res	HP Conv	Post92 Single Family Construction Convert FAF w/o CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.07	18

730	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.10	18
732	Res	HP Conv	Pre80 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.08	18
734	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.06	18
736	Res	HP Conv	Post79/Pre93 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.05	18
738	Res	HP Conv	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.09	18
740	Res	HP Conv	Post92 Single Family Construction Convert FAF w/CAC to HP HSPF 8/SEER 13 - Heating	484,272	0.07	18
746	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.11	18
748	Res	HP Conv	Post79/Pre93 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.10	18
752	Res	HP Conv	Post92 Single Family Construction Convert Zonal Heating w/CAC to HP HSPF 8/SEER 13 - Heat	484,272	0.15	18
766	Res	AC Upgrade	Pre80 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.41	18
767	Res	AC Upgrade	Post79/Pre93 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.26	18
768	Res	AC Upgrade	Post92 Single Family Construction CAC Upgrade SEER - Cooling Zone 3	224,848	0.34	18
769	Res	HP Upgrade	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.12	18
771	Res	HP Upgrade	Pre80 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.07	18
773	Res	HP Upgrade	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.07	18
775	Res	HP Upgrade	Post79/Pre93 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.04	18
777	Res	HP Upgrade	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 1	892,459	0.11	18
779	Res	HP Upgrade	Post92 Single Family Construction HP Upgrade HSPF 8 - Heating Zone 2	892,459	0.06	18
783	Res	Lighting	Energy Conservation School Program	13,728,000	0.02	7
785	Res	HVAC	Heating System Maintenance (tune-up/filter)	416,000	0.00	12
21	Non-Res	HVAC	VSD Small Fan	13,000,000	0.16	15
22	Non-Res	HVAC	VSD Medium fan	13,000,000	0.10	15
23	Non-Res	HVAC	VSD Large Fan	13,000,000	0.07	15
24	Non-Res	HVAC	VSD Pump	13,000,000	0.11	15
27	Non-Res	Energy Smart	Night Covers for Display Cases - Vertical	9,464,000	0.02	5
28	Non-Res	Energy Smart	Night Covers for Display Cases - Horizontal	9,464,000	0.04	5
29	Non-Res	Energy Smart	Strip Curtains for Walk-in Boxes	9,464,000	0.00	4
30	Non-Res	Energy Smart	Glass Doors on Open Display Cases (LT)	9,464,000	0.03	12
31	Non-Res	Energy Smart	Glass Doors on Open Display Cases (MT)	9,464,000	0.08	12
34	Non-Res	Energy Smart	Special Doors with Low/No Anti-Sweat Heat	9,464,000	0.05	12
35	Non-Res	Energy Smart	Anti-Sweat Heat Controls	9,464,000	0.03	11
36	Non-Res	Energy Smart	Auto-Closers for Coolers and Freezers	9,464,000	0.01	8
37	Non-Res	Energy Smart	Evaporative fan controller on walk-in	9,464,000	0.07	5
40	Non-Res	Energy Smart	Floating Head Pressure Controller	9,464,000	0.04	12
44	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Large Off-GasHt-Retro	260,000	0.07	8

45	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Medium Off-GasHt-Retro	260,000	0.08	8
46	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Small Off-GasHt-Retro	260,000	0.25	8
47	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Big Box-GasHt-Retro	260,000	0.10	8
48	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Small Box-GasHt-Retro	260,000	0.23	8
49	Non-Res	HVAC	Built-Up HVAC Controls Optimization-High End-GasHt-Retro	260,000	0.17	8
50	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Anchor-GasHt-Retro	260,000	0.06	8
51	Non-Res	HVAC	Built-Up HVAC Controls Optimization-K-12-GasHt-Retro	260,000	0.29	8
52	Non-Res	HVAC	Built-Up HVAC Controls Optimization-University-GasHt-Retro	260,000	0.10	8
53	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Warehouse-GasHt-Retro	260,000	0.28	8
54	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Supermarket-GasHt-Retro	260,000	0.08	8
55	Non-Res	HVAC	Built-Up HVAC Controls Optimization-MIniMart-GasHt-Retro	260,000	0.11	8
56	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Restaurant-GasHt-Retro	260,000	0.10	8
57	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Lodging-GasHt-Retro	260,000	0.08	8
58	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Hospital-GasHt-Retro	260,000	0.06	8
59	Non-Res	HVAC	Built-Up HVAC Controls Optimization-OtherHealth-GasHt-Retro	260,000	0.07	8
60	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Other-GasHt-Retro	260,000	0.23	8
61	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Large Off-ElecHt-Retro	260,000	0.05	8
62	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Medium Off-ElecHt-Retro	260,000	0.05	8
63	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Small Off-ElecHt-Retro	260,000	0.15	8
64	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Big Box-ElecHt-Retro	260,000	0.09	8
65	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Small Box-ElecHt-Retro	260,000	0.17	8
66	Non-Res	HVAC	Built-Up HVAC Controls Optimization-High End-ElecHt-Retro	260,000	0.14	8
67	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Anchor-ElecHt-Retro	260,000	0.05	8
68	Non-Res	HVAC	Built-Up HVAC Controls Optimization-K-12-ElecHt-Retro	260,000	0.05	8
69	Non-Res	HVAC	Built-Up HVAC Controls Optimization-University-ElecHt-Retro	260,000	0.06	8
70	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Warehouse-ElecHt-Retro	260,000	0.11	8
71	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Supermarket-ElecHt-Retro	260,000	0.05	8
72	Non-Res	HVAC	Built-Up HVAC Controls Optimization-MIniMart-ElecHt-Retro	260,000	0.09	8
73	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Restaurant-ElecHt-Retro	260,000	0.08	8

74	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Lodging-ElecHt-Retro	260,000	0.05	8
75	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Hospital-ElecHt-Retro	260,000	0.04	8
76	Non-Res	HVAC	Built-Up HVAC Controls Optimization-OtherHealth-ElecHt-Retro	260,000	0.04	8
77	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Other-ElecHt-Retro	260,000	0.13	8
78	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Large Off-HtPmpHt-Retro	260,000	0.06	8
79	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Medium Off-HtPmpHt-Retro	260,000	0.07	8
80	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Small Off-HtPmpHt-Retro	260,000	0.19	8
81	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Big Box-HtPmpHt-Retro	260,000	0.09	8
82	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Small Box-HtPmpHt-Retro	260,000	0.20	8
83	Non-Res	HVAC	Built-Up HVAC Controls Optimization-High End-HtPmpHt-Retro	260,000	0.17	8
84	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Anchor-HtPmpHt-Retro	260,000	0.06	8
85	Non-Res	HVAC	Built-Up HVAC Controls Optimization-K-12-HtPmpHt-Retro	260,000	0.08	8
86	Non-Res	HVAC	Built-Up HVAC Controls Optimization-University-HtPmpHt-Retro	260,000	0.08	8
87	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Warehouse-HtPmpHt-Retro	260,000	0.17	8
88	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Supermarket-HtPmpHt-Retro	260,000	0.07	8
90	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Restaurant-HtPmpHt-Retro	260,000	0.10	8
91	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Lodging-HtPmpHt-Retro	260,000	0.06	8
92	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Hospital-HtPmpHt-Retro	260,000	0.05	8
93	Non-Res	HVAC	Built-Up HVAC Controls Optimization-OtherHealth-HtPmpHt-Retro	260,000	0.05	8
94	Non-Res	HVAC	Built-Up HVAC Controls Optimization-Other-HtPmpHt-Retro	260,000	0.17	8
115	Non-Res		Controls Commission-New	21,960	0.07	12
117	Non-Res	Traffic Lights	Replace 12 inch Red Incandescent Left Turn Bay with 12 inch Red LED module	208,000	0.02	5
118	Non-Res	Traffic Lights	Replace 12 inch Green Incandescent Left Turn Bay with 12 inchGreen LED module	208,000	0.06	16
119	Non-Res	Traffic Lights	Replace 12 inch Red Incandescent Thru Lane with 12 inch Red LED module	208,000	0.02	6
120	Non-Res	Traffic Lights	Replace 12 inch Green Incandescent Thru Lane with 12 inch Green LED module	208,000	0.05	7
121	Non-Res	Traffic Lights	Replace 8 inch Red Incandescent Left Turn Bay with 8 inch Red LED module	208,000	0.04	5
123	Non-Res	Traffic Lights	Replace 8 inch Red Incandescent Thru Lane with 8 inch Red LED module	208,000	0.04	6
129	Non-Res	Lighting-CFL	INC to CFL-Large Off-New-ElecHt	163,800	0.01	15
132	Non-Res	Lighting-CFL	INC to CFL-Large Off-New-HtPmpHt	163,800	0.01	15
135	Non-Res	Lighting-CFL	INC to CFL-Large Off-New-GasHt	163,800	0.01	15
138	Non-Res	Lighting-CFL	INC to CFL-Medium Off-New-ElecHt	163,800	0.01	15
141	Non-Res	Lighting-CFL	INC to CFL-Medium Off-New-HtPmpHt	163,800	0.01	15

144	Non-Res	Lighting-CFL	INC to CFL-Medium Off-New-GasHt	163,800	0.01	15
148	Non-Res	Lighting-CFL	INC to CFL-Small Off-New-ElecHt	163,800	0.01	15
152	Non-Res	Lighting-CFL	INC to CFL-Small Off-New-HtPmpHt	163,800	0.01	15
154	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Off-New-GasHt	602,173	0.01	15
156	Non-Res	Lighting-CFL	INC to CFL-Small Off-New-GasHt	163,800	0.02	15
159	Non-Res	Lighting-CFL	INC to CMH-Big Box-New-ElecHt	81,900	0.04	15
161	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-New-ElecHt	441,447	0.00	15
163	Non-Res	Lighting-CFL	INC to CMH-Big Box-New-HtPmpHt	81,900	0.03	15
165	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-New-HtPmpHt	441,447	0.00	15
167	Non-Res	Lighting-CFL	INC to CMH-Big Box-New-GasHt	81,900	0.04	15
169	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-New-GasHt	441,447	0.01	15
173	Non-Res	Lighting-CFL	INC to CMH-Small Box-New-ElecHt	81,900	0.06	15
178	Non-Res	Lighting-CFL	INC to CMH-Small Box-New-HtPmpHt	81,900	0.04	15
180	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-New-GasHt	602,173	0.01	15
183	Non-Res	Lighting-CFL	INC to CMH-Small Box-New-GasHt	81,900	0.05	15
184	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-New-GasHt	441,447	0.01	15
187	Non-Res	Lighting-CFL	INC to CMH-High End-New-ElecHt	81,900	0.06	15
192	Non-Res	Lighting-CFL	INC to CMH-High End-New-HtPmpHt	81,900	0.05	15
195	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-High End-New-GasHt	602,173	0.00	15
197	Non-Res	Lighting-CFL	INC to CMH-High End-New-GasHt	81,900	0.05	15
208	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-New-GasHt	602,173	0.01	15
211	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-New-GasHt	441,447	0.01	15
214	Non-Res	Lighting-CFL	INC to CFL-K-12-New-ElecHt	145,600	0.02	15
218	Non-Res	Lighting-CFL	INC to CFL-K-12-New-HtPmpHt	145,600	0.01	15
222	Non-Res	Lighting-CFL	INC to CFL-K-12-New-GasHt	145,600	0.03	15
225	Non-Res	Lighting-CFL	INC to CMH-University-New-ElecHt	145,600	0.08	15
228	Non-Res	Lighting-CFL	INC to CMH-University-New-HtPmpHt	145,600	0.06	15
231	Non-Res	Lighting-CFL	INC to CMH-University-New-GasHt	145,600	0.06	15
235	Non-Res	Lighting-CFL	INC to CFL-Warehouse-New-ElecHt	655,200	0.01	15
237	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-New-ElecHt	441,447	0.00	15
240	Non-Res	Lighting-CFL	INC to CFL-Warehouse-New-HtPmpHt	655,200	0.01	15
242	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-New-HtPmpHt	441,447	0.00	15
243	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-New-GasHt	602,173	0.00	15
245	Non-Res	Lighting-CFL	INC to CFL-Warehouse-New-GasHt	655,200	0.02	15
247	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-New-GasHt	441,447	0.01	15
252	Non-Res	Lighting-HID	Med MH to T5HO-Supermarket-New-ElecHt	441,447	0.01	15
257	Non-Res	Lighting-HID	Med MH to T5HO-Supermarket-New-HtPmpHt	441,447	0.01	15
258	Non-Res	Lighting-T12T8	F96T12 to T8HP-Supermarket-New-GasHt	602,173	0.00	15
262	Non-Res	Lighting-HID	Med MH to T5HO-Supermarket-New-GasHt	441,447	0.01	15
265	Non-Res	Lighting-CFL	INC to CMH-MIniMart-New-ElecHt	81,900	0.03	15
269	Non-Res	Lighting-CFL	INC to CMH-MIniMart-New-HtPmpHt	81,900	0.03	15
271	Non-Res	Lighting-T12T8	F96T12 to T8HP-MIniMart-New-GasHt	602,173	0.01	15
273	Non-Res	Lighting-CFL	INC to CMH-MIniMart-New-GasHt	81,900	0.04	15
278	Non-Res	Lighting-CFL	INC to CFL-Restaurant-New-ElecHt	72,800	0.01	15
283	Non-Res	Lighting-CFL	INC to CFL-Restaurant-New-HtPmpHt	72,800	0.01	15
285	Non-Res	Lighting-T12T8	F96T12 to T8HP-Restaurant-New-GasHt	602,173	0.01	15
288	Non-Res	Lighting-CFL	INC to CFL-Restaurant-New-GasHt	72,800	0.03	15
292	Non-Res	Lighting-CFL	INC to CFL-Lodging-New-ElecHt	218,400	0.01	15
297	Non-Res	Lighting-CFL	INC to CFL-Lodging-New-HtPmpHt	218,400	0.01	15
300	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-New-GasHt	602,173	0.01	15
302	Non-Res	Lighting-CFL	INC to CFL-Lodging-New-GasHt	218,400	0.02	15
307	Non-Res	Lighting-CFL	INC to CFL-Hospital-New-ElecHt	9,100	0.02	15
311	Non-Res	Lighting-CFL	INC to CFL-Hospital-New-HtPmpHt	9,100	0.01	15
313	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-New-GasHt	602,173	0.02	15
315	Non-Res	Lighting-CFL	INC to CFL-Hospital-New-GasHt	9,100	0.03	15
316	Non-Res	Lighting-HID	Med MH to T8HP-Hospital-New-GasHt	441,447	0.02	15

319	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-New-ElecHt	9,100	0.01	15
324	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-New-HtPmpHt	9,100	0.01	15
329	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-New-GasHt	9,100	0.01	15
331	Non-Res	Lighting-HID	Med MH to T8HP-OtherHealth-New-GasHt	441,447	0.00	15
334	Non-Res	Lighting-CFL	INC to CFL-Other-New-ElecHt	145,600	0.01	15
335	Non-Res	Lighting-HID	Med MH to T5HO-Other-New-ElecHt	441,447	0.01	15
336	Non-Res	Lighting-HID	Large MH to T5HO-Other-New-ElecHt	441,447	0.00	15
339	Non-Res	Lighting-CFL	INC to CFL-Other-New-HtPmpHt	145,600	0.01	15
340	Non-Res	Lighting-HID	Med MH to T5HO-Other-New-HtPmpHt	441,447	0.01	15
341	Non-Res	Lighting-HID	Large MH to T5HO-Other-New-HtPmpHt	441,447	0.00	15
344	Non-Res	Lighting-CFL	INC to CFL-Other-New-GasHt	145,600	0.01	15
345	Non-Res	Lighting-HID	Med MH to T5HO-Other-New-GasHt	441,447	0.02	15
346	Non-Res	Lighting-HID	Large MH to T5HO-Other-New-GasHt	441,447	0.01	15
347	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Large Off-Retro-ElecHt-PRE1987	602,173	0.02	15
350	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-ElecHt-PRE1987	163,800	0.03	15
351	Non-Res	Lighting-T12T8	F96T12 to T8HP-Large Off-Retro-ElecHt-PRE1987	602,173	0.08	15
352	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Large Off-Retro-HtPmpHt-PRE1987	602,173	0.01	15
355	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-HtPmpHt-PRE1987	163,800	0.03	15
356	Non-Res	Lighting-T12T8	F96T12 to T8HP-Large Off-Retro-HtPmpHt-PRE1987	602,173	0.07	15
357	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Large Off-Retro-GasHt-PRE1987	602,173	0.02	15
360	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-GasHt-PRE1987	163,800	0.03	15
361	Non-Res	Lighting-T12T8	F96T12 to T8HP-Large Off-Retro-GasHt-PRE1987	602,173	0.07	15
362	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Medium Off-Retro-ElecHt-PRE1987	602,173	0.02	15
365	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-ElecHt-PRE1987	163,800	0.04	15
366	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Medium Off-Retro-ElecHt-PRE1987	602,173	0.01	15
368	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Medium Off-Retro-HtPmpHt-PRE1987	602,173	0.02	15
371	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-HtPmpHt-PRE1987	163,800	0.03	15
372	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Medium Off-Retro-HtPmpHt-PRE1987	602,173	0.01	15
374	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Medium Off-Retro-GasHt-PRE1987	602,173	0.02	15
377	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-GasHt-PRE1987	163,800	0.04	15
378	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Medium Off-Retro-GasHt-PRE1987	602,173	0.02	15
380	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Small Off-Retro-ElecHt-PRE1987	602,173	0.03	15
383	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-ElecHt-PRE1987	163,800	0.06	15
384	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Small Off-Retro-ElecHt-PRE1987	602,173	0.02	15
386	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Small Off-Retro-HtPmpHt-PRE1987	602,173	0.02	15
389	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-HtPmpHt-PRE1987	163,800	0.04	15
390	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Small Off-Retro-HtPmpHt-PRE1987	602,173	0.02	15
392	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Small Off-Retro-GasHt-PRE1987	602,173	0.03	15

395	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-GasHt-PRE1987	163,800	0.05	15
396	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Small Off-Retro-GasHt-PRE1987	602,173	0.03	15
398	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Big Box-Retro-ElecHt-PRE1987	602,173	0.04	15
401	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-ElecHt-PRE1987	441,447	0.05	15
402	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Big Box-Retro-HtPmpHt-PRE1987	602,173	0.03	15
405	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-HtPmpHt-PRE1987	441,447	0.04	15
406	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Big Box-Retro-GasHt-PRE1987	602,173	0.04	15
409	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-GasHt-PRE1987	441,447	0.05	15
410	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Small Box-Retro-ElecHt-PRE1987	602,173	0.03	15
412	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-ElecHt-PRE1987	602,173	0.12	15
414	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-ElecHt-PRE1987	441,447	0.13	15
415	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Small Box-Retro-HtPmpHt-PRE1987	602,173	0.02	15
417	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-HtPmpHt-PRE1987	602,173	0.09	15
419	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-HtPmpHt-PRE1987	441,447	0.09	15
420	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Small Box-Retro-GasHt-PRE1987	602,173	0.03	15
422	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-GasHt-PRE1987	602,173	0.09	15
424	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-GasHt-PRE1987	441,447	0.10	15
425	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-High End-Retro-ElecHt-PRE1987	602,173	0.05	15
427	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-ElecHt-PRE1987	81,900	0.09	15
430	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-High End-Retro-HtPmpHt-PRE1987	602,173	0.04	15
432	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-HtPmpHt-PRE1987	81,900	0.07	15
435	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-High End-Retro-GasHt-PRE1987	602,173	0.05	15
437	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-GasHt-PRE1987	81,900	0.08	15
440	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Anchor-Retro-ElecHt-PRE1987	602,173	0.03	15
442	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-ElecHt-PRE1987	602,173	0.11	15
445	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Anchor-Retro-HtPmpHt-PRE1987	602,173	0.02	15
447	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-HtPmpHt-PRE1987	602,173	0.08	15
450	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Anchor-Retro-GasHt-PRE1987	602,173	0.03	15
452	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-GasHt-PRE1987	602,173	0.08	15
455	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-K-12-Retro-ElecHt-PRE1987	602,173	0.03	15
458	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-ElecHt-PRE1987	145,600	0.09	15
459	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-ElecHt-PRE1987	441,447	0.25	15

460	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-K-12-Retro-HtPmpHt-PRE1987	602,173	0.02	15
463	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-HtPmpHt-PRE1987	145,600	0.06	15
464	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-HtPmpHt-PRE1987	441,447	0.16	15
465	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-K-12-Retro-GasHt-PRE1987	602,173	0.03	15
468	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-GasHt-PRE1987	145,600	0.07	15
469	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-GasHt-PRE1987	441,447	0.16	15
470	Non-Res	Lighting-T12T8	F96T12 to T8HP-University-Retro-ElecHt-PRE1987	602,173	0.15	15
473	Non-Res	Lighting-CFL	INC to CFL-University-Retro-ElecHt-PRE1987	145,600	0.06	15
475	Non-Res	Lighting-T12T8	F96T12 to T8HP-University-Retro-HtPmpHt-PRE1987	602,173	0.11	15
478	Non-Res	Lighting-CFL	INC to CFL-University-Retro-HtPmpHt-PRE1987	145,600	0.04	15
480	Non-Res	Lighting-T12T8	F96T12 to T8HP-University-Retro-GasHt-PRE1987	602,173	0.11	15
483	Non-Res	Lighting-CFL	INC to CFL-University-Retro-GasHt-PRE1987	145,600	0.05	15
485	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-ElecHt-PRE1987	602,173	0.14	15
487	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Warehouse-Retro-ElecHt-PRE1987	602,173	0.02	15
489	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-ElecHt-PRE1987	441,447	0.09	15
490	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-HtPmpHt-PRE1987	602,173	0.11	15
492	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Warehouse-Retro-HtPmpHt-PRE1987	602,173	0.02	15
494	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-HtPmpHt-PRE1987	441,447	0.07	15
495	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-GasHt-PRE1987	602,173	0.10	15
497	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Warehouse-Retro-GasHt-PRE1987	602,173	0.03	15
499	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-GasHt-PRE1987	441,447	0.07	15
500	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Supermarket-Retro-ElecHt-PRE1987	602,173	0.03	15
502	Non-Res	Lighting-CFL	INC to CMH-Supermarket-Retro-ElecHt-PRE1987	81,900	0.04	15
504	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Supermarket-Retro-HtPmpHt-PRE1987	602,173	0.02	15
506	Non-Res	Lighting-CFL	INC to CMH-Supermarket-Retro-HtPmpHt-PRE1987	81,900	0.04	15
508	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Supermarket-Retro-GasHt-PRE1987	602,173	0.03	15
510	Non-Res	Lighting-CFL	INC to CMH-Supermarket-Retro-GasHt-PRE1987	81,900	0.04	15
512	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-MIniMart-Retro-ElecHt-PRE1987	602,173	0.03	15
514	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-ElecHt-PRE1987	81,900	0.05	15
515	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-MIniMart-Retro-HtPmpHt-PRE1987	602,173	0.02	15
517	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-HtPmpHt-PRE1987	81,900	0.04	15
518	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-MIniMart-Retro-GasHt-PRE1987	602,173	0.04	15
520	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-GasHt-PRE1987	81,900	0.05	15
521	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Restaurant-Retro-ElecHt-PRE1987	602,173	0.07	15
522	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-ElecHt-PRE1987	72,800	0.06	15

523	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Restaurant-Retro-HtPmpHt-PRE1987	602,173	0.04	15
524	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-HtPmpHt-PRE1987	72,800	0.03	15
525	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Restaurant-Retro-GasHt-PRE1987	602,173	0.05	15
526	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-GasHt-PRE1987	72,800	0.05	15
527	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-ElecHt-PRE1987	602,173	0.12	15
529	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-ElecHt-PRE1987	218,400	0.05	15
530	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-HtPmpHt-PRE1987	602,173	0.10	15
532	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-HtPmpHt-PRE1987	218,400	0.04	15
533	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-GasHt-PRE1987	602,173	0.09	15
535	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-GasHt-PRE1987	218,400	0.05	15
536	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-ElecHt-PRE1987	602,173	0.18	15
538	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-ElecHt-PRE1987	9,100	0.07	15
539	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-HtPmpHt-PRE1987	602,173	0.08	15
541	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-HtPmpHt-PRE1987	9,100	0.03	15
542	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-GasHt-PRE1987	602,173	0.08	15
544	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-GasHt-PRE1987	9,100	0.05	15
545	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-OtherHealth-Retro-ElecHt-PRE1987	602,173	0.04	15
547	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-ElecHt-PRE1987	9,100	0.04	15
548	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-OtherHealth-Retro-HtPmpHt-PRE1987	602,173	0.04	15
550	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-HtPmpHt-PRE1987	9,100	0.03	15
551	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-OtherHealth-Retro-GasHt-PRE1987	602,173	0.04	15
553	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-GasHt-PRE1987	9,100	0.04	15
554	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-ElecHt-PRE1987	602,173	0.09	15
556	Non-Res	Lighting-T12T8	T12-2 to T8HP-1-Other-Retro-ElecHt-PRE1987	602,173	0.03	15
557	Non-Res	Lighting-CFL	INC to CFL-Other-Retro-ElecHt-PRE1987	145,600	0.04	15
558	Non-Res	Lighting-HID	Large MH to T5HO-Other-Retro-ElecHt-PRE1987	441,447	0.06	15
559	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-HtPmpHt-PRE1987	602,173	0.08	15
561	Non-Res	Lighting-T12T8	T12-2 to T8HP-1-Other-Retro-HtPmpHt-PRE1987	602,173	0.02	15
562	Non-Res	Lighting-CFL	INC to CFL-Other-Retro-HtPmpHt-PRE1987	145,600	0.03	15
563	Non-Res	Lighting-HID	Large MH to T5HO-Other-Retro-HtPmpHt-PRE1987	441,447	0.05	15
564	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-GasHt-PRE1987	602,173	0.08	15
566	Non-Res	Lighting-T12T8	T12-2 to T8HP-1-Other-Retro-GasHt-PRE1987	602,173	0.03	15
567	Non-Res	Lighting-CFL	INC to CFL-Other-Retro-GasHt-PRE1987	145,600	0.04	15
568	Non-Res	Lighting-HID	Large MH to T5HO-Other-Retro-GasHt-PRE1987	441,447	0.05	15
569	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Large Off-Retro-ElecHt-V1987_1994	602,173	0.02	15
572	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-ElecHt-V1987_1994	163,800	0.03	15
573	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Large Off-Retro-ElecHt-V1987_1994	602,173	0.01	15

574	Non-Res	Lighting-HID	Med MH to T8HP-Large Off-Retro-ElecHt-V1987_1994	441,447	0.08	15
575	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Large Off-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
578	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-HtPmpHt-V1987_1994	163,800	0.03	15
579	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Large Off-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
580	Non-Res	Lighting-HID	Med MH to T8HP-Large Off-Retro-HtPmpHt-V1987_1994	441,447	0.08	15
581	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Large Off-Retro-GasHt-V1987_1994	602,173	0.02	15
584	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-GasHt-V1987_1994	163,800	0.03	15
585	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Large Off-Retro-GasHt-V1987_1994	602,173	0.02	15
586	Non-Res	Lighting-HID	Med MH to T8HP-Large Off-Retro-GasHt-V1987_1994	441,447	0.08	15
587	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Medium Off-Retro-ElecHt-V1987_1994	602,173	0.02	15
589	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Medium Off-Retro-ElecHt-V1987_1994	602,173	0.01	15
590	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-ElecHt-V1987_1994	163,800	0.04	15
591	Non-Res	Lighting-HID	Med MH to T8HP-Medium Off-Retro-ElecHt-V1987_1994	441,447	0.10	15
592	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Medium Off-Retro-HtPmpHt-V1987_1994	602,173	0.02	15
594	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Medium Off-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
595	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-HtPmpHt-V1987_1994	163,800	0.03	15
596	Non-Res	Lighting-HID	Med MH to T8HP-Medium Off-Retro-HtPmpHt-V1987_1994	441,447	0.09	15
597	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Medium Off-Retro-GasHt-V1987_1994	602,173	0.02	15
599	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Medium Off-Retro-GasHt-V1987_1994	602,173	0.02	15
600	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-GasHt-V1987_1994	163,800	0.04	15
601	Non-Res	Lighting-HID	Med MH to T8HP-Medium Off-Retro-GasHt-V1987_1994	441,447	0.09	15
602	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Small Off-Retro-ElecHt-V1987_1994	602,173	0.03	15
604	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Small Off-Retro-ElecHt-V1987_1994	602,173	0.02	15
605	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-ElecHt-V1987_1994	163,800	0.06	15
606	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Off-Retro-ElecHt-V1987_1994	602,173	0.14	15
608	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Small Off-Retro-HtPmpHt-V1987_1994	602,173	0.02	15
610	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Small Off-Retro-HtPmpHt-V1987_1994	602,173	0.02	15
611	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-HtPmpHt-V1987_1994	163,800	0.04	15
612	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Off-Retro-HtPmpHt-V1987_1994	602,173	0.10	15

614	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Small Off-Retro-GasHt-V1987_1994	602,173	0.03	15
616	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Small Off-Retro-GasHt-V1987_1994	602,173	0.03	15
617	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-GasHt-V1987_1994	163,800	0.05	15
618	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Off-Retro-GasHt-V1987_1994	602,173	0.10	15
620	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Big Box-Retro-ElecHt-V1987_1994	602,173	0.02	15
622	Non-Res	Lighting-T12T8	F96T12 to T8HP-Big Box-Retro-ElecHt-V1987_1994	602,173	0.07	15
624	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-ElecHt-V1987_1994	441,447	0.05	15
625	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Big Box-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
627	Non-Res	Lighting-T12T8	F96T12 to T8HP-Big Box-Retro-HtPmpHt-V1987_1994	602,173	0.06	15
629	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-HtPmpHt-V1987_1994	441,447	0.04	15
630	Non-Res	Lighting-T12T8	T12-4 to T8HP-3-Big Box-Retro-GasHt-V1987_1994	602,173	0.02	15
632	Non-Res	Lighting-T12T8	F96T12 to T8HP-Big Box-Retro-GasHt-V1987_1994	602,173	0.06	15
634	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-GasHt-V1987_1994	441,447	0.04	15
635	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-ElecHt-V1987_1994	602,173	0.11	15
637	Non-Res	Lighting-CFL	INC to CMH-Small Box-Retro-ElecHt-V1987_1994	81,900	0.09	15
638	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-ElecHt-V1987_1994	441,447	0.12	15
639	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-HtPmpHt-V1987_1994	602,173	0.08	15
641	Non-Res	Lighting-CFL	INC to CMH-Small Box-Retro-HtPmpHt-V1987_1994	81,900	0.06	15
642	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-HtPmpHt-V1987_1994	441,447	0.09	15
643	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-GasHt-V1987_1994	602,173	0.09	15
645	Non-Res	Lighting-CFL	INC to CMH-Small Box-Retro-GasHt-V1987_1994	81,900	0.07	15
646	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-GasHt-V1987_1994	441,447	0.09	15
647	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-High End-Retro-ElecHt-V1987_1994	602,173	0.05	15
649	Non-Res	Lighting-T12T8	F96T12 to T8HP-High End-Retro-ElecHt-V1987_1994	602,173	0.11	15
650	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-ElecHt-V1987_1994	81,900	0.09	15
652	Non-Res	Lighting-HID	Med MH to T8HP-High End-Retro-ElecHt-V1987_1994	441,447	0.12	15
653	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-High End-Retro-HtPmpHt-V1987_1994	602,173	0.04	15
655	Non-Res	Lighting-T12T8	F96T12 to T8HP-High End-Retro-HtPmpHt-V1987_1994	602,173	0.09	15
656	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-HtPmpHt-V1987_1994	81,900	0.07	15

658	Non-Res	Lighting-HID	Med MH to T8HP-High End-Retro-HtPmpHt-V1987_1994	441,447	0.10	15
659	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-High End-Retro-GasHt-V1987_1994	602,173	0.06	15
661	Non-Res	Lighting-T12T8	F96T12 to T8HP-High End-Retro-GasHt-V1987_1994	602,173	0.10	15
662	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-GasHt-V1987_1994	81,900	0.08	15
664	Non-Res	Lighting-HID	Med MH to T8HP-High End-Retro-GasHt-V1987_1994	441,447	0.11	15
665	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Anchor-Retro-ElecHt-V1987_1994	602,173	0.05	15
667	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-ElecHt-V1987_1994	602,173	0.10	15
668	Non-Res	Lighting-CFL	INC to CMH-Anchor-Retro-ElecHt-V1987_1994	81,900	0.08	15
670	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-Retro-ElecHt-V1987_1994	441,447	0.11	15
671	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Anchor-Retro-HtPmpHt-V1987_1994	602,173	0.03	15
673	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-HtPmpHt-V1987_1994	602,173	0.08	15
674	Non-Res	Lighting-CFL	INC to CMH-Anchor-Retro-HtPmpHt-V1987_1994	81,900	0.06	15
676	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-Retro-HtPmpHt-V1987_1994	441,447	0.08	15
677	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Anchor-Retro-GasHt-V1987_1994	602,173	0.06	15
679	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-GasHt-V1987_1994	602,173	0.09	15
680	Non-Res	Lighting-CFL	INC to CMH-Anchor-Retro-GasHt-V1987_1994	81,900	0.07	15
682	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-Retro-GasHt-V1987_1994	441,447	0.10	15
683	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-K-12-Retro-ElecHt-V1987_1994	602,173	0.05	15
686	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-ElecHt-V1987_1994	145,600	0.09	15
687	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-K-12-Retro-ElecHt-V1987_1994	602,173	0.03	15
688	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-ElecHt-V1987_1994	441,447	0.24	15
689	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-K-12-Retro-HtPmpHt-V1987_1994	602,173	0.04	15
692	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-HtPmpHt-V1987_1994	145,600	0.06	15
693	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-K-12-Retro-HtPmpHt-V1987_1994	602,173	0.02	15
694	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-HtPmpHt-V1987_1994	441,447	0.16	15
695	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-K-12-Retro-GasHt-V1987_1994	602,173	0.05	15
698	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-GasHt-V1987_1994	145,600	0.07	15
699	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-K-12-Retro-GasHt-V1987_1994	602,173	0.04	15
700	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-GasHt-V1987_1994	441,447	0.15	15
701	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-University-Retro-ElecHt-V1987_1994	602,173	0.07	15
705	Non-Res	Lighting-HID	Med MH to T8HP-University-Retro-ElecHt-V1987_1994	441,447	0.16	15
706	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-University-Retro-HtPmpHt-V1987_1994	602,173	0.05	15

710	Non-Res	Lighting-HID	Med MH to T8HP-University-Retro-HtPmpHt-V1987_1994	441,447	0.11	15
711	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-University-Retro-GasHt-V1987_1994	602,173	0.06	15
715	Non-Res	Lighting-HID	Med MH to T8HP-University-Retro-GasHt-V1987_1994	441,447	0.11	15
716	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-ElecHt-V1987_1994	602,173	0.14	15
718	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Warehouse-Retro-ElecHt-V1987_1994	602,173	0.02	15
720	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-ElecHt-V1987_1994	441,447	0.09	15
721	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-HtPmpHt-V1987_1994	602,173	0.10	15
723	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Warehouse-Retro-HtPmpHt-V1987_1994	602,173	0.02	15
725	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-HtPmpHt-V1987_1994	441,447	0.07	15
726	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-GasHt-V1987_1994	602,173	0.10	15
728	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Warehouse-Retro-GasHt-V1987_1994	602,173	0.03	15
730	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-GasHt-V1987_1994	441,447	0.07	15
731	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Supermarket-Retro-ElecHt-V1987_1994	602,173	0.01	15
733	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Supermarket-Retro-ElecHt-V1987_1994	602,173	0.01	15
734	Non-Res	Lighting-CFL	INC to CMH-Supermarket-Retro-ElecHt-V1987_1994	81,900	0.04	15
737	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Supermarket-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
739	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Supermarket-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
740	Non-Res	Lighting-CFL	INC to CMH-Supermarket-Retro-HtPmpHt-V1987_1994	81,900	0.04	15
743	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-Supermarket-Retro-GasHt-V1987_1994	602,173	0.03	15
745	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-Supermarket-Retro-GasHt-V1987_1994	602,173	0.02	15
746	Non-Res	Lighting-CFL	INC to CMH-Supermarket-Retro-GasHt-V1987_1994	81,900	0.05	15
749	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-MIniMart-Retro-ElecHt-V1987_1994	602,173	0.01	15
751	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-MIniMart-Retro-ElecHt-V1987_1994	602,173	0.01	15
752	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-ElecHt-V1987_1994	81,900	0.05	15
754	Non-Res	Lighting-HID	Med MH to T8HP-MIniMart-Retro-ElecHt-V1987_1994	441,447	0.07	15
755	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-MIniMart-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
757	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-MIniMart-Retro-HtPmpHt-V1987_1994	602,173	0.01	15
758	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-HtPmpHt-V1987_1994	81,900	0.04	15
760	Non-Res	Lighting-HID	Med MH to T8HP-MIniMart-Retro-HtPmpHt-V1987_1994	441,447	0.05	15
761	Non-Res	Lighting-T12T8	T12-4 to T8HP-2-MIniMart-Retro-GasHt-V1987_1994	602,173	0.03	15

763	Non-Res	Lighting-T12T8	F96T12VHO to T8HP-4-MIniMart-Retro-GasHt-V1987_1994	602,173	0.03	15
764	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-GasHt-V1987_1994	81,900	0.05	15
766	Non-Res	Lighting-HID	Med MH to T8HP-MIniMart-Retro-GasHt-V1987_1994	441,447	0.07	15
767	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Restaurant-Retro-ElecHt-V1987_1994	602,173	0.06	15
768	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-ElecHt-V1987_1994	72,800	0.06	15
770	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Restaurant-Retro-HtPmpHt-V1987_1994	602,173	0.04	15
771	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-HtPmpHt-V1987_1994	72,800	0.03	15
773	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-Restaurant-Retro-GasHt-V1987_1994	602,173	0.06	15
774	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-GasHt-V1987_1994	72,800	0.05	15
776	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-ElecHt-V1987_1994	602,173	0.12	15
778	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-ElecHt-V1987_1994	218,400	0.05	15
779	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-HtPmpHt-V1987_1994	602,173	0.09	15
781	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-HtPmpHt-V1987_1994	218,400	0.04	15
782	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-GasHt-V1987_1994	602,173	0.09	15
784	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-GasHt-V1987_1994	218,400	0.05	15
785	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-ElecHt-V1987_1994	602,173	0.17	15
787	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-ElecHt-V1987_1994	9,100	0.07	15
788	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-HtPmpHt-V1987_1994	602,173	0.08	15
790	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-HtPmpHt-V1987_1994	9,100	0.03	15
791	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-GasHt-V1987_1994	602,173	0.08	15
793	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-GasHt-V1987_1994	9,100	0.05	15
794	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-OtherHealth-Retro-ElecHt-V1987_1994	602,173	0.04	15
796	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-ElecHt-V1987_1994	9,100	0.04	15
797	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-OtherHealth-Retro-HtPmpHt-V1987_1994	602,173	0.04	15
799	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-HtPmpHt-V1987_1994	9,100	0.03	15
800	Non-Res	Lighting-T12T8	T12-3 to T8HP-3-OtherHealth-Retro-GasHt-V1987_1994	602,173	0.04	15
802	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-GasHt-V1987_1994	9,100	0.04	15
803	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-ElecHt-V1987_1994	602,173	0.08	15
807	Non-Res	Lighting-HID	Large MH to T5HO-Other-Retro-ElecHt-V1987_1994	441,447	0.05	15
808	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-HtPmpHt-V1987_1994	602,173	0.07	15
812	Non-Res	Lighting-HID	Large MH to T5HO-Other-Retro-HtPmpHt-V1987_1994	441,447	0.05	15
813	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-GasHt-V1987_1994	602,173	0.08	15

817	Non-Res	Lighting-HID	Large MH to T5HO-Other-Retro-GasHt-V1987_1994	441,447	0.05	15
818	Non-Res	Lighting-T12T8	F96T12 to T8HP-Large Off-Retro-ElecHt-V1995_2001	602,173	0.07	15
821	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-ElecHt-V1995_2001	163,800	0.03	15
822	Non-Res	Lighting-HID	Med MH to T8HP-Large Off-Retro-ElecHt-V1995_2001	441,447	0.08	15
823	Non-Res	Lighting-T12T8	F96T12 to T8HP-Large Off-Retro-HtPmpHt-V1995_2001	602,173	0.07	15
826	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-HtPmpHt-V1995_2001	163,800	0.03	15
827	Non-Res	Lighting-HID	Med MH to T8HP-Large Off-Retro-HtPmpHt-V1995_2001	441,447	0.08	15
828	Non-Res	Lighting-T12T8	F96T12 to T8HP-Large Off-Retro-GasHt-V1995_2001	602,173	0.07	15
831	Non-Res	Lighting-CFL	INC to CFL-Large Off-Retro-GasHt-V1995_2001	163,800	0.03	15
832	Non-Res	Lighting-HID	Med MH to T8HP-Large Off-Retro-GasHt-V1995_2001	441,447	0.08	15
833	Non-Res	Lighting-T12T8	F96T12 to T8HP-Medium Off-Retro-ElecHt-V1995_2001	602,173	0.09	15
836	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-ElecHt-V1995_2001	163,800	0.04	15
837	Non-Res	Lighting-HID	Med MH to T8HP-Medium Off-Retro-ElecHt-V1995_2001	441,447	0.10	15
838	Non-Res	Lighting-T12T8	F96T12 to T8HP-Medium Off-Retro-HtPmpHt-V1995_2001	602,173	0.08	15
841	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-HtPmpHt-V1995_2001	163,800	0.03	15
842	Non-Res	Lighting-HID	Med MH to T8HP-Medium Off-Retro-HtPmpHt-V1995_2001	441,447	0.09	15
843	Non-Res	Lighting-T12T8	F96T12 to T8HP-Medium Off-Retro-GasHt-V1995_2001	602,173	0.08	15
846	Non-Res	Lighting-CFL	INC to CFL-Medium Off-Retro-GasHt-V1995_2001	163,800	0.04	15
847	Non-Res	Lighting-HID	Med MH to T8HP-Medium Off-Retro-GasHt-V1995_2001	441,447	0.09	15
848	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-Small Off-Retro-ElecHt-V1995_2001	602,173	0.03	15
851	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-ElecHt-V1995_2001	163,800	0.06	15
853	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-Small Off-Retro-HtPmpHt-V1995_2001	602,173	0.03	15
856	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-HtPmpHt-V1995_2001	163,800	0.04	15
858	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-Small Off-Retro-GasHt-V1995_2001	602,173	0.04	15
861	Non-Res	Lighting-CFL	INC to CFL-Small Off-Retro-GasHt-V1995_2001	163,800	0.05	15
863	Non-Res	Lighting-T12T8	F96T12 to T8HP-Big Box-Retro-ElecHt-V1995_2001	602,173	0.07	15
865	Non-Res	Lighting-CFL	INC to CMH-Big Box-Retro-ElecHt-V1995_2001	81,900	0.06	15
867	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-ElecHt-V1995_2001	441,447	0.05	15
868	Non-Res	Lighting-T12T8	F96T12 to T8HP-Big Box-Retro-HtPmpHt-V1995_2001	602,173	0.06	15
870	Non-Res	Lighting-CFL	INC to CMH-Big Box-Retro-HtPmpHt-V1995_2001	81,900	0.05	15

872	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-HtPmpHt-V1995_2001	441,447	0.04	15
873	Non-Res	Lighting-T12T8	F96T12 to T8HP-Big Box-Retro-GasHt-V1995_2001	602,173	0.06	15
875	Non-Res	Lighting-CFL	INC to CMH-Big Box-Retro-GasHt-V1995_2001	81,900	0.05	15
877	Non-Res	Lighting-HID	Large MH to T5HO-Big Box-Retro-GasHt-V1995_2001	441,447	0.04	15
878	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-ElecHt-V1995_2001	602,173	0.10	15
881	Non-Res	Lighting-CFL	INC to CMH-Small Box-Retro-ElecHt-V1995_2001	81,900	0.08	15
882	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-ElecHt-V1995_2001	441,447	0.12	15
883	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-HtPmpHt-V1995_2001	602,173	0.08	15
886	Non-Res	Lighting-CFL	INC to CMH-Small Box-Retro-HtPmpHt-V1995_2001	81,900	0.06	15
887	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-HtPmpHt-V1995_2001	441,447	0.09	15
888	Non-Res	Lighting-T12T8	F96T12 to T8HP-Small Box-Retro-GasHt-V1995_2001	602,173	0.08	15
891	Non-Res	Lighting-CFL	INC to CMH-Small Box-Retro-GasHt-V1995_2001	81,900	0.07	15
892	Non-Res	Lighting-HID	Med MH to T8HP-Small Box-Retro-GasHt-V1995_2001	441,447	0.09	15
893	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-High End-Retro-ElecHt-V1995_2001	602,173	0.03	15
895	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-ElecHt-V1995_2001	81,900	0.08	15
898	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-High End-Retro-HtPmpHt-V1995_2001	602,173	0.02	15
900	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-HtPmpHt-V1995_2001	81,900	0.07	15
903	Non-Res	Lighting-T12T8	T12-3 to T8HP-2-High End-Retro-GasHt-V1995_2001	602,173	0.04	15
905	Non-Res	Lighting-CFL	INC to CMH-High End-Retro-GasHt-V1995_2001	81,900	0.08	15
908	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-ElecHt-V1995_2001	602,173	0.10	15
911	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-Retro-ElecHt-V1995_2001	441,447	0.11	15
912	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-HtPmpHt-V1995_2001	602,173	0.08	15
915	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-Retro-HtPmpHt-V1995_2001	441,447	0.08	15
916	Non-Res	Lighting-T12T8	F96T12 to T8HP-Anchor-Retro-GasHt-V1995_2001	602,173	0.09	15
919	Non-Res	Lighting-HID	Med MH to T8HP-Anchor-Retro-GasHt-V1995_2001	441,447	0.10	15
920	Non-Res	Lighting-T12T8	F96T12 to T8HP-K-12-Retro-ElecHt-V1995_2001	602,173	0.21	15
923	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-ElecHt-V1995_2001	145,600	0.08	15
924	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-ElecHt-V1995_2001	441,447	0.23	15
925	Non-Res	Lighting-T12T8	F96T12 to T8HP-K-12-Retro-HtPmpHt-V1995_2001	602,173	0.14	15
928	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-HtPmpHt-V1995_2001	145,600	0.06	15
929	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-HtPmpHt-V1995_2001	441,447	0.16	15

930	Non-Res	Lighting-T12T8	F96T12 to T8HP-K-12-Retro-GasHt-V1995_2001	602,173	0.14	15
933	Non-Res	Lighting-CFL	INC to CFL-K-12-Retro-GasHt-V1995_2001	145,600	0.06	15
934	Non-Res	Lighting-HID	Med MH to T8HP-K-12-Retro-GasHt-V1995_2001	441,447	0.15	15
935	Non-Res	Lighting-T12T8	F96T12 to T8HP-University-Retro-ElecHt-V1995_2001	602,173	0.14	15
937	Non-Res	Lighting-CFL	INC to CFL-University-Retro-ElecHt-V1995_2001	145,600	0.06	15
939	Non-Res	Lighting-T12T8	F96T12 to T8HP-University-Retro-HtPmpHt-V1995_2001	602,173	0.10	15
941	Non-Res	Lighting-CFL	INC to CFL-University-Retro-HtPmpHt-V1995_2001	145,600	0.04	15
943	Non-Res	Lighting-T12T8	F96T12 to T8HP-University-Retro-GasHt-V1995_2001	602,173	0.10	15
945	Non-Res	Lighting-CFL	INC to CFL-University-Retro-GasHt-V1995_2001	145,600	0.05	15
947	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-ElecHt-V1995_2001	602,173	0.14	15
949	Non-Res	Lighting-CFL	INC to CFL-Warehouse-Retro-ElecHt-V1995_2001	655,200	0.06	15
951	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-ElecHt-V1995_2001	441,447	0.09	15
952	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-HtPmpHt-V1995_2001	602,173	0.10	15
954	Non-Res	Lighting-CFL	INC to CFL-Warehouse-Retro-HtPmpHt-V1995_2001	655,200	0.04	15
956	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-HtPmpHt-V1995_2001	441,447	0.07	15
957	Non-Res	Lighting-T12T8	F96T12 to T8HP-Warehouse-Retro-GasHt-V1995_2001	602,173	0.10	15
959	Non-Res	Lighting-CFL	INC to CFL-Warehouse-Retro-GasHt-V1995_2001	655,200	0.05	15
961	Non-Res	Lighting-HID	Large MH to T5HO-Warehouse-Retro-GasHt-V1995_2001	441,447	0.07	15
962	Non-Res	Lighting-T12T8	F96T12 to T8HP-Supermarket-Retro-ElecHt-V1995_2001	602,173	0.05	15
966	Non-Res	Lighting-HID	Med MH to T8HP-Supermarket-Retro-ElecHt-V1995_2001	441,447	0.06	15
967	Non-Res	Lighting-T12T8	F96T12 to T8HP-Supermarket-Retro-HtPmpHt-V1995_2001	602,173	0.05	15
971	Non-Res	Lighting-HID	Med MH to T8HP-Supermarket-Retro-HtPmpHt-V1995_2001	441,447	0.05	15
972	Non-Res	Lighting-T12T8	F96T12 to T8HP-Supermarket-Retro-GasHt-V1995_2001	602,173	0.06	15
976	Non-Res	Lighting-HID	Med MH to T8HP-Supermarket-Retro-GasHt-V1995_2001	441,447	0.06	15
977	Non-Res	Lighting-T12T8	F96T12 to T8HP-MIniMart-Retro-ElecHt-V1995_2001	602,173	0.06	15
979	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-ElecHt-V1995_2001	81,900	0.05	15
980	Non-Res	Lighting-HID	Med MH to T8HP-MIniMart-Retro-ElecHt-V1995_2001	441,447	0.07	15
981	Non-Res	Lighting-T12T8	F96T12 to T8HP-MIniMart-Retro-HtPmpHt-V1995_2001	602,173	0.05	15
983	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-HtPmpHt-V1995_2001	81,900	0.04	15
984	Non-Res	Lighting-HID	Med MH to T8HP-MIniMart-Retro-HtPmpHt-V1995_2001	441,447	0.05	15

985	Non-Res	Lighting-T12T8	F96T12 to T8HP-MIniMart-Retro-GasHt-V1995_2001	602,173	0.07	15
987	Non-Res	Lighting-CFL	INC to CMH-MIniMart-Retro-GasHt-V1995_2001	81,900	0.05	15
988	Non-Res	Lighting-HID	Med MH to T8HP-MIniMart-Retro-GasHt-V1995_2001	441,447	0.07	15
989	Non-Res	Lighting-T12T8	F96T12 to T8HP-Restaurant-Retro-ElecHt-V1995_2001	602,173	0.14	15
992	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-ElecHt-V1995_2001	72,800	0.06	15
994	Non-Res	Lighting-T12T8	F96T12 to T8HP-Restaurant-Retro-HtPmpHt-V1995_2001	602,173	0.08	15
997	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-HtPmpHt-V1995_2001	72,800	0.03	15
999	Non-Res	Lighting-T12T8	F96T12 to T8HP-Restaurant-Retro-GasHt-V1995_2001	602,173	0.09	15
1002	Non-Res	Lighting-CFL	INC to CFL-Restaurant-Retro-GasHt-V1995_2001	72,800	0.05	15
1004	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-ElecHt-V1995_2001	602,173	0.12	15
1006	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-ElecHt-V1995_2001	218,400	0.05	15
1008	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-HtPmpHt-V1995_2001	602,173	0.09	15
1010	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-HtPmpHt-V1995_2001	218,400	0.04	15
1012	Non-Res	Lighting-T12T8	F96T12 to T8HP-Lodging-Retro-GasHt-V1995_2001	602,173	0.09	15
1014	Non-Res	Lighting-CFL	INC to CFL-Lodging-Retro-GasHt-V1995_2001	218,400	0.05	15
1016	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-ElecHt-V1995_2001	602,173	0.17	15
1018	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-ElecHt-V1995_2001	9,100	0.07	15
1019	Non-Res	Lighting-HID	Med MH to T8HP-Hospital-Retro-ElecHt-V1995_2001	441,447	0.19	15
1020	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-HtPmpHt-V1995_2001	602,173	0.08	15
1022	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-HtPmpHt-V1995_2001	9,100	0.03	15
1023	Non-Res	Lighting-HID	Med MH to T8HP-Hospital-Retro-HtPmpHt-V1995_2001	441,447	0.08	15
1024	Non-Res	Lighting-T12T8	F96T12 to T8HP-Hospital-Retro-GasHt-V1995_2001	602,173	0.08	15
1026	Non-Res	Lighting-CFL	INC to CFL-Hospital-Retro-GasHt-V1995_2001	9,100	0.05	15
1027	Non-Res	Lighting-HID	Med MH to T8HP-Hospital-Retro-GasHt-V1995_2001	441,447	0.09	15
1028	Non-Res	Lighting-T12T8	F96T12 to T8HP-OtherHealth-Retro-ElecHt-V1995_2001	602,173	0.09	15
1030	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-ElecHt-V1995_2001	9,100	0.04	15
1031	Non-Res	Lighting-HID	Med MH to T8HP-OtherHealth-Retro-ElecHt-V1995_2001	441,447	0.10	15
1032	Non-Res	Lighting-T12T8	F96T12 to T8HP-OtherHealth-Retro-HtPmpHt-V1995_2001	602,173	0.08	15
1034	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-HtPmpHt-V1995_2001	9,100	0.03	15
1035	Non-Res	Lighting-HID	Med MH to T8HP-OtherHealth-Retro-HtPmpHt-V1995_2001	441,447	0.09	15
1036	Non-Res	Lighting-T12T8	F96T12 to T8HP-OtherHealth-Retro-GasHt-V1995_2001	602,173	0.08	15
1038	Non-Res	Lighting-CFL	INC to CFL-OtherHealth-Retro-GasHt-V1995_2001	9,100	0.04	15

1039	Non-Res	Lighting-HID	Med MH to T8HP-OtherHealth-Retro-GasHt-V1995_2001	441,447	0.09	15
1040	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-ElecHt-V1995_2001	602,173	0.08	15
1042	Non-Res	Lighting-CFL	INC to CFL-Other-Retro-ElecHt-V1995_2001	145,600	0.03	15
1043	Non-Res	Lighting-HID	Med MH to T8HP-Other-Retro-ElecHt-V1995_2001	441,447	0.09	15
1044	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-HtPmpHt-V1995_2001	602,173	0.07	15
1046	Non-Res	Lighting-CFL	INC to CFL-Other-Retro-HtPmpHt-V1995_2001	145,600	0.03	15
1047	Non-Res	Lighting-HID	Med MH to T8HP-Other-Retro-HtPmpHt-V1995_2001	441,447	0.08	15
1048	Non-Res	Lighting-T12T8	F96T12 to T8HP-Other-Retro-GasHt-V1995_2001	602,173	0.07	15
1050	Non-Res	Lighting-CFL	INC to CFL-Other-Retro-GasHt-V1995_2001	145,600	0.03	15
1051	Non-Res	Lighting-HID	Med MH to T8HP-Other-Retro-GasHt-V1995_2001	441,447	0.08	15
1058	Non-Res	Lighting-Signs	Outdoor Sign Ballast - Night	546,000	0.01	13
1059	Non-Res	Lighting-Signs	Outdoor Sign Ballast - 24	546,000	0.01	7
1060	Non-Res	Lighting-Signs	Outdoor Sign Ballast - Night - Retro	546,000	0.11	13
1061	Non-Res	Lighting-Signs	Outdoor Sign Ballast - 24 - Retro	546,000	0.09	7
1065	Non-Res		EE Reach-In Refrigerator from E-Star Baseline	189,800	0.03	9
1067	Non-Res		EE Reach-In Freezer from E-Star Baseline	351,800	0.01	9
1070	Non-Res		EE Ice Maker from FEMP Baseline	82,043	0.07	9
1071	Non-Res		EE Vending Machine from Average Baseline	147,056	0.04	9
1072	Non-Res		EE Vending Machine from E-Star Baseline	115,544	0.02	9
1146	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Large Off-ElecHt	60,667	0.09	21
1147	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Large Off-HtPmpHt	60,667	0.08	21
1148	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Large Off-GasHt	60,667	0.08	21
1149	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Medium Off-ElecHt	60,667	0.13	21
1150	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Medium Off-HtPmpHt	60,667	0.12	21
1151	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Medium Off-GasHt	60,667	0.11	21
1152	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Small Off-ElecHt	60,667	0.18	21
1153	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Small Off-HtPmpHt	60,667	0.13	21
1154	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-Small Off-GasHt	60,667	0.11	21
1155	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-K-12-ElecHt	60,667	0.22	21
1156	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-K-12-HtPmpHt	60,667	0.15	21
1157	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-K-12-GasHt	60,667	0.13	21
1158	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-University-ElecHt	60,667	0.17	21
1159	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-University-HtPmpHt	60,667	0.13	21
1160	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-University-GasHt	60,667	0.11	21
1161	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-OtherHealth-ElecHt	60,667	0.11	21

1162	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-OtherHealth-HtPmpHt	60,667	0.10	21
1163	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-New-OtherHealth-GasHt	60,667	0.10	21
1164	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Large Off-ElecHt	60,667	0.09	21
1165	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Large Off-HtPmpHt	60,667	0.08	21
1166	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Large Off-GasHt	60,667	0.08	21
1167	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Medium Off-ElecHt	60,667	0.13	21
1168	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Medium Off-HtPmpHt	60,667	0.12	21
1169	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Medium Off-GasHt	60,667	0.11	21
1170	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Small Off-ElecHt	60,667	0.18	21
1171	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Small Off-HtPmpHt	60,667	0.13	21
1172	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-Small Off-GasHt	60,667	0.11	21
1173	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-K-12-ElecHt	60,667	0.23	21
1174	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-K-12-HtPmpHt	60,667	0.15	21
1175	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-K-12-GasHt	60,667	0.13	21
1176	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-University-ElecHt	60,667	0.18	21
1177	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-University-HtPmpHt	60,667	0.13	21
1178	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-University-GasHt	60,667	0.11	21
1179	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-OtherHealth-ElecHt	60,667	0.11	21
1180	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-OtherHealth-HtPmpHt	60,667	0.10	21
1181	Non-Res	Lighting-Daylig	Perimeter Day lighting Controls (Advanced)-NR-OtherHealth-GasHt	60,667	0.10	21
1290	Non-Res	Appliances	Vending Machine Controller-Large Machine w/Illuminated Front	49,920	0.02	10
1291	Non-Res	Appliances	Vending Machine Controller-Small Machine or Machine without Illuminated Front	33,280	0.03	10

2009

Electric
Integrated Resource Plan

Appendix G – Avista Distribution System Efficiencies Program

AVISTA®

August 31, 2009

Avista Distribution System Efficiencies Program

Programs to Reduce Energy Loss across Avista's Distribution System

System Efficiencies Team ***Date 4/21/2009***

Heather Cummins
Mark Weiss
Rodney Pickett
Dave Defelice
Curt Kirkeby
Ross Taylor
Greg Smith
Jill Ham
Will Stone
John McClain

Authored by:
John Gibson

Executive Summary

Avista's Distribution System consists of approximately three hundred and thirty feeders covering a geographical area of 30,000 square miles. The distribution feeders range in distribution voltage from 4.16 kV to 34.5 kV phase to phase and are typically rated to meet 10 MVA load for the typical 13.2 kV feeder. The distribution feeders reside in urban, suburban and rural areas and can range in length from 3 to 73 miles. The distribution feeders are typically designed to provide service for approximately one to two thousand residential customers.

The engineering analysis summarized in this report determines losses across the distribution system for the following program areas: 1) Conductor losses, 2) Distribution Transformers, 3) Secondary Districts and 4) VAr compensation. Although additional programs like phase balancing and Conservation Voltage Reduction (CVR) could have been included in the analysis, they were intentionally left out since daily operational activity may negate the energy savings. The energy loss, capital investment and reduction in O&M costs resulting from the individual efficiencies programs were combined on a per feeder basis. This approach provided a means to rank and compare energy savings and net resource cost for each feeder.

The efficiency analysis of the distribution feeders evaluated the existing energy losses and energy savings resulting from implementing the program upgrades. The study identified the existing distribution system losses to be approximately 3.6%. Assuming, all of the distribution feeders studied were economically viable to upgrade, the resulting system energy losses would be reduced by 2%. The total energy savings corresponding to the implementation of the upgrades would correspond to an energy savings of approximately 29.2 MW on peak and 13.5 MW on average.

Although it may not be prudent to upgrade all of the distribution feeders, this study ranks the feeders by diminishing economic return. The economic metric used to rank feeders was net resource cost. The net resource cost for each feeder was determined for O&M offsets forecasted on a five, ten and fifteen year time horizon. This variable O&M forecast provided a means to filter on or off the number of economically viable feeder upgrades. Other criteria used to reduce the number of viable feeder upgrade projects included capital investment greater then $0.5 million and net resource cost less then $100 per Mwh.

The feeder upgrade program by itself falls short of being a strategic vision. However, it can be used as a first step towards a broader strategic view to be included in programs like capital budgeting, energy efficiency, and O&M reduction. A more robust corporate strategic vision for aging infrastructure rehabilitation would need to incorporate the following elements: 1) Movement of bulk power across our transmission system, 2) Optimum distribution topologies, 3) Substation size, locations and architectures, and 4) Reliable forecasts of geographical centered load growth. Once these elements are incorporated into the existing feeder upgrade program, a long term plan for Avista's electric infrastructure can be developed to move infrastructure upgrades from a tactical or reactive approach to a planned replacement strategy.

Introduction

Objective

The objective of the system efficiency analysis was to obtain a first order of magnitude assessment of energy savings across Avista's electric distribution system. The analysis was constructed to address the following two questions: 1) How much energy savings is available across Avista's distribution system? 2) Which feeders provide the most cost-effective for the least investment across the system?

Concession

The analysis did not include operational or design options to assist in refining cost estimates or selecting feeders for upgrade. Also, this analysis focused solely on the distribution system and did not consider system changes which may incorporate the installation of substations or new transmission lines.

Background

Avista's electric distribution system consists of approximately three hundred and thirty feeders covering a geographical area of 30,000 square miles. The distribution feeders range in voltage from 4.16 kV to 34.5 kV phase to phase and are typically rated to meet 10 MVA load for a typical 13.2 kV feeder. The distribution feeders reside in urban, suburban and rural areas and can range in length from 3 to 73 miles. The distribution feeders are typically designed to provide service from one to two thousand residential customers.

Past efficiency studies on Avista's distribution system have typically focused on either individual reinforcement projects or specific equipment upgrades. This current analysis differs from past analysis by combining several efficiency programs across most of Avista's distribution feeders. The results of the analysis provided an overall assessment of the energy savings on a per feeder basis. Also, this analysis incorporated capital, operational and maintenance costs into the economic assessment in order to determine the net resource value.

Analysis Tool Set

To determine efficiency gains associated with upgrading the distribution feeders, an analysis framework was developed by combining complementary technologies existing at Avista. For example, the SynerGEE Electric tool and its corresponding analysis engine Solver was leveraged to perform power flow analysis. Avista's Facility Management (AFM) system and Major Equipment Tracking (MET) system were queried to obtain the number, age and sizes of transformers on the distribution feeders. In addition, Avista's Substation Control and Data Acquisition (SCADA) system provided annual peak load and VAr consumption at the substation buses. Finally, the economic analysis of the annual Operation and Maintenance (O&M) forecast was approximated by Asset Managements Isograph Availability Workbench.

Engineering Analysis Methodology

The engineering analysis evaluated losses across the distribution system for the following program areas: 1) Conductor losses, 2) Distribution Transformers, 3) Secondary Districts and 4) VAr compensation. The energy losses, capital investment and reduction in O&M costs resulting from the individual efficiencies programs were combined on a per feeder basis. This analysis approach provided a means to rank and compare energy savings, along with return on investment, for each feeder. The individual programs methodology and assumptions are summarized in the descriptions below.

Reconductoring

The Distribution Engineering Group builds and maintains the SynerGEE distribution databases. The SynerGEE databases require material size, type and network topology for Avista's distribution feeders as provided by the Avista Facilities Management (AFM) system. These databases provide a network model from which a power flow analysis can be performed to evaluate thermal and voltage performance of each feeder. The power flow analysis accuracy is dependent upon these SynerGEE databases being both current and accurate. The internal work processes used to maintain the SynerGEE models are summarized below.

- *Avista's AFM system is maintained by applications which support the design of new facilities, outages, operations and maintenance activities on the distribution system.*
- *An internally developed AFM application called Model Builder is used to upload the AFM data into a SynerGEE Model database*
- *Distribution Engineering reviews the SynerGEE Models and performs system calibration of the models.*
- *At the distribution feeder bus, a peak current meter read is recorded and inputted by Distribution Planning.*

In order to perform a power flow analysis for all three hundred plus feeders, in this system efficiency analysis, the process was automated by utilizing Advantica's Solver engine. By using Solver, a scripting tool was developed to run multiple power flow iterations utilizing the SynerGEE models. The first iteration evaluated the energy loss with existing conductor and flagged conductor which did not adhere to Distribution Engineering's new economic conductor standard summarized in Table 1. The second iteration updated the flagged conductor with the new conductor standard and evaluated the energy loss.

Table 1 Economic Conductor Standard

Ampacity Range	Selected Conductor
0 to 25 Amps	2ACSR
26 to 100 Amps	4/0AAC
101 to 250 Amps	556AAC
251 to 700 Amps	795AAC

The incremental energy savings resulting from reconductoring the feeder was determined by evaluating the peak loss of KW for the existing conductor versus the new conductor standards. Once the peak incremental loss was determined between the two runs, an average energy loss was calculated. The average energy loss was determined by multiplying the peak loss by a loss factor. The loss factor was determined by squaring the load factor. The assumptions used in the analysis are summarized in the list below.

- *The load factor for the distribution feeders were approximated by evaluating the load factor at several of the substation buses with hourly SCADA data*
- *The load factor used for the distribution analysis was 50 percent*
- *The loss factor used for the distribution analysis was 25 percent*

Overhead Transformers

Between 1986 and 1987, Distribution Engineering conducted a set of no-load tests on approximately two hundred overhead transformers of various sizes, types and vintages. From the tests, a set of curves were developed to approximate the no-load losses for a transformer rating and age class (see Appendix). As a result, the no-load curves showed the loss for a particular transformer could be categorized into the following three vintages of transformers: 1) Pre-1960, 2) 1960 – 1983, 3) Post 1983.

In 2008, Distribution Engineering implemented a new design standard for overhead transformers which is based on a life-cycle cost analysis and recently established an avoided cost of energy value of $66/MW. Consequently, the new transformer design standards specify transformers with no-load losses less then recently enacted Department of Energy (DOE) transformer efficiency standards. Upgrading the older overhead transformers accounted for a significant incremental energy savings in no-load losses.

A software script was developed within the AFM system to retrieve the number, size and vintage of transformers located on distribution feeders. The analysis assumed the overhead transformers would be replaced in-kind with the new lower no load loss overhead transformers. The difference between the no-load loss of the old and new transformer accounts for the incremental energy savings. The overhead transformer no-load loss occurs every hour of the year and is independent of the actual load. Therefore, the incremental energy savings are an average value. The transformer population for particular vintage classes is summarized in Table 2, for overhead transformers only.

Table 2 Overhead Transformer Vintages

Vintage	**Population Number**
Pre1963	10,416
1963 - 1983	32,788
Post 1983	43,204

Secondary Districts

Up to the late 1960's, Avista designed and constructed large secondary districts in residential neighborhoods. A secondary district is designed with a distribution transformer and a three wire secondary lines which provided service tie positions for up to thirty customers. At the time of construction, these districts were economically viable since they increased the customer to transformer ratio. Due to the increased cost of energy and associated operational O&M costs, the elimination or redesign of the secondary districts were evaluated for efficiency gains.

To determine the number of secondary districts on a feeder, an AFM script was written to identify the number of customers connected to a distribution transformer. To support the analysis, a secondary district was defined as an overhead transformer with twelve or more service premises. Using this classification, the ten feeders with the most secondary districts returned from the AFM query is summarized in Table 3.

Table 3 Feeder Secondary Districts

Feeder Name	Number of Secondary Districts
Ross Park 12F1	56
Ross Park 12F6	55
Ross Park 12F5	53
Sunset 12F3	52
Lyons & Standard 12F2	49
Francis & Cedar 12F1	47
Fort Wright 12F1	43
Beacon 12F5	40
Collage & Walnut 12F5	39
Third & Hatch 12F2	37

In order to evaluate the reduction in energy losses, a SynerGEE power flow analysis was performed on some typical secondary districts. To improve the efficiency of the secondary districts, two options were considered: 1) Reduce the district length by the addition of a transformer, 2) Reconductoring the district with insulated triplex conductor. The power flow analysis concluded districts with more then twenty two service premises should be reduced in length by the addition of an overhead transformer, while districts with less then twenty two service premises should be replaced using overhead triplex wire.

The secondary district analysis only reviewed the reduction of energy loss and did not consider other design considerations such as flicker and reliability. Although an operational case could be made to eliminate districts by the addition of transformers for every four services, the energy loss in the transformers exceed the energy savings in the elimination of the district. The average KW loss associated with the district types is summarized in Table 4 below.

Table 4 Secondary District Type

Secondary District Type	Average KW Loss
10-12	.234
12-22	.356
22 and up	1.03

VAr Compensation

Another efficiency program evaluated the reduction of current on the line by offsetting the reactive load with the installation of switched capacitors. A VAr controller operates the switched capacitor to respond to adverse reactive loading on a feeder. The amount of energy savings associated with the installation of switched capacitors depends upon the feeder power factor. To a large extent, motor loading required for air conditioning drives the reactive loading on a feeder. Consequently, the number of hours a switched capacitor operates is seasonal. The analysis methodology developed for evaluating the energy savings associated for a feeder is described below.

The Ninth and Central feeders were modeled to determine the size and type of switched capacitors as well as the annual hours of operation. A SCADA point located at Ninth and Central provided the amount of MVAr loading on a substation transformer on a per hour basis. A load duration curve developed from this data determined the capacitor size and hours of operation. Once sized, SynerGEE's capacitor placement application optimized both the peak power savings and the ideal placement of the capacitor. The energy savings obtained by installing the capacitor was determined by multiplying the number of hours of operation by the KW savings to MVAr ratio.

This analysis methodology was simplified for the rest of the feeders by assuming the KW to MVAr ratio for all distribution feeders. The capacitor size for the rest of the feeders was assumed to be a single 900 KVAr bank. The hours of operation for the 900 KVAr were based on the load duration curve.

Economic Analysis
The economic analysis for the feeder upgrade programs estimated the capital investment, calculated the energy savings and forecasted operational and maintenance expense and interim capital investments. The capital investment required to implement the efficiencies programs were obtained from engineering estimates described below. The energy savings for a feeder upgrade was determined by the efficiency programs described previously. Finally, Asset Management modeled the feeders using their tools and forecasted the reduction in operational and maintenance expense resulting from the feeder upgrade, also described below.

Engineering Estimate
Reconductoring
The material and labor estimate were performed by Distribution Engineering in conjunction with Planning and are based on 2008 material and labor costs. The reconductoring estimate was based on whether the conductor was being replaced or whether new construction was necessary to install the conductor. The assumptions made in the unit pricing for each case are summarized in the list below.

New Construction
- New Pole
- New Anchors
- New Cross Arms

Replacement
- 40 % replacement of the poles, cross arms and anchors

The conductor replacement unit price is summarized in the Table 5 below.

Table 5 Conductor Unit Price

CONDUCTOR_TYPE	Replacement $/Per Mile	New Construction $/Per Mile
795AAC	$60,000	$85,000
556AAC	$45,000	$71,000
4/0AAC	$35,000	$52,000
2ACSR	$30,000	$42,000

Distribution Transformers
The engineering estimates for distribution transformers were obtained from Purchasing and are based on 2008 material and labor costs. The overhead transformers met the new design requirements for no-load losses. The estimated unit prices for various sized overhead transformers are summarized in Table 6.

Table 6 Overhead Transformers

Overhead Transformers	Installed Cost
15 KVA	$1,014
25 KVA	$1,301
37.5 KVA	$1,952
75 KVA	$2,519
100 KVA	$3,278
150 KVA	$3,430
225 KVA	$3,936
300 KVA	$4,310

Secondary Districts

The engineering estimates to redesign secondary districts were determined for three distinct archetypes. The secondary district archetypes were based on the number of customers attached to overhead transformers. The labor and material costs to redesign the secondary districts for the distinct archetypes are listed in Table 7.

Table 7 Secondary Districts

Secondary District Archetypes	Cost
10-12 Customer Service Points	$5,728 - $8,687
13-22 Customer Service Points	$6,181 - $8,820
>22 Customer Service Points	$7,539 - $10,498

VAr Compensation

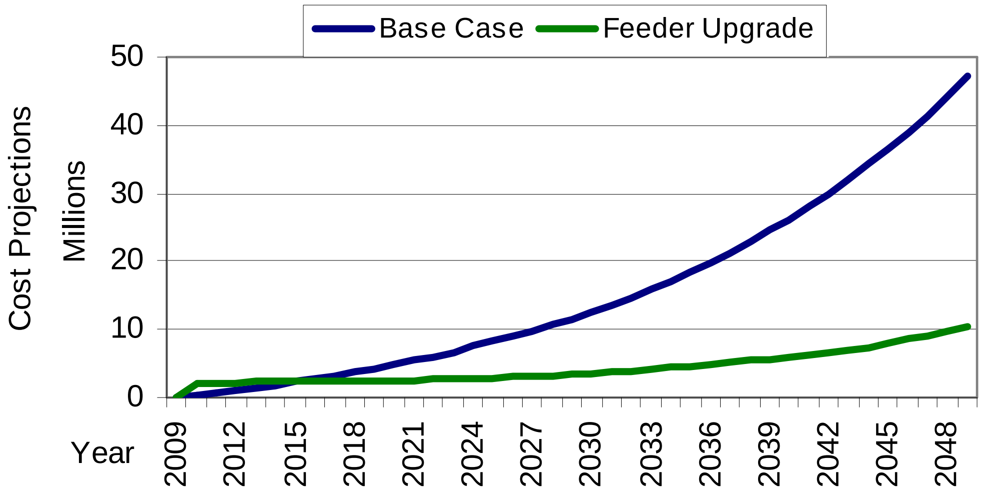
The labor and material estimate for switched capacitors were based on recently purchased and installed capacitors. The cost for the purchased and installed capacitors for a 900 KVAr bank was $11,000.

Asset Management

The Asset Management team developed the Availability Workbench Model for six distribution feeders. The Availability Workbench Model combines input from the following areas: 1) system performance, 2) facility data, 3) manager and crafts 4) industry data, and 5) key performance indicators. From these inputs, the workbench application generates a forecasted annualized O&M and Capital cost model. The cost model is generated by comparing O&M expense resulting after a feeder upgrade versus the O&M expense for a base case. Asset Managements base case assumes the equipment will be replaced upon failure.

The Asset Management analysis results indicated that upgrading the feeders reduces forecasted O&M expense when compared to the base case. The feeder upgrade program replaces aged equipment with new equipment to improve system efficiencies and reliability. The replacement of equipment reduces future O&M expenditures which is an economic benefit to the project and is included in the analysis. The reduction and avoidance of future increases in O&M expenditures are illustrated in Figure 1. The base case curve shows an exponential growth in O&M costs resulting from failure of the aging equipment failing. The feeder upgrade curve shows an initial increase in revenue requirement corresponding to the cost of the upgrade but shows how the revenue requirement rises slower due to the replacement of the aging facility.

Figure 1 O&M Cost Programs



The Asset Management program conducted an O&M analysis for the following six feeders: 1) 9CE12F4, 2) SUN12F3, 3) SUN12F1, 4) SUN12F2, 5) COL12F2, 6) KET12F2. The Asset Management team estimated the time to develop a Workbench model to determine the O&M expenditure was approximately thirty hours per feeder. To reduce the time to perform the analysis, the O&M expenditure curve determined for the six feeders was used to interpolate the expenditure for the other feeders. The linear interpolation was based on a strong correlation between the O&M expense and the length of the feeders analyzed.

In order to limit the interpolation, the O&M expense was generated only for feeders with lengths between 12.5 miles (SUN12F3) and149 miles (KET12F2). Consequently, feeders with lengths outside this range were not included in the net resource cost analysis. Although the feeders were not included in the analysis the may still be economically viable. One example is the ORI12F3 feeder which ranks first in energy savings as shown Table 12. However, the feeder was not included in the net resource cost analysis since its length of 170 miles exceeded the maximum mileage criteria used for the analysis.

Energy Results

The efficiency analysis of the distribution feeders evaluated the existing energy losses and energy savings resulting from implementing the program upgrades. The study identified the existing distribution system losses to be approximately 3.6%. Assuming, all of the distribution feeders studied were economically viable to upgrade, the resulting system energy losses would be reduced by 2%. The total energy savings corresponding to the implementation of the upgrades would correspond to an energy savings of approximately 29.2 MW on peak and 13.5 MW on average. The energy savings break down across each program is described below.

Reconductoring

The reconductoring program as mentioned previously used the SynerGEE application to determine the conductor losses across our feeders. The distribution conductor operating at twenty percent or greater of its rated ampacity was upgraded to the new distribution standard, if warranted. The analysis was run again to determine the incremental reduction in conductor losses corresponding to the conductor upgrade. The results of the analysis are summarized in Table 8.

Table 8 Reconductoring Power Savings

Number of Feeders	Peak Loss KW	Average Loss KW	Peak Loss Savings KW	Average Loss Savings KW
302	35,676	8,919	14,973	3,743

Overhead Transformers

The efficiency analysis evaluated the no-load losses across the existing transformer population to determine the average no-load transformer loss on Avista's distribution feeders. The incremental energy savings was determined by taking the difference between the no-load losses of the new transformer standard versus the older vintage transformers. The results of the analysis are summarized in Table 9.

Table 9 Overhead Transformer Power Savings

Vintage	Total number of Transformers	Average Loss KW	Average Loss Savings KW
Pre1963	10,416	4700	1,907
1963 To 1983	32,788	9470	5,710

Secondary Districts

The energy losses corresponding to the secondary districts were categorized by the number of service premises connected to the district. The incremental energy savings from the redesign of these districts was determined by taking the difference between the existing losses and the new designed district losses. The results of the analysis are summarized in Table 10.

Table 10 Secondary Districts Power Savings

Archetypes	Number of Districts	Peak Loss KW	Avg. Power Loss KW	Peak Loss Savings KW	Avg. Power Savings KW
10 - 12 Customer Service Points	3,414	5,516	1,379	3,196	799
13 - 22 Customer Service Points	1,302	3,156	789	1,856	464
> 22 Customer Service Points	32	196	49	132	33
TOTAL	4,748	8,868	2,217	5,184	1,296

VAr Compensation

A VAr duration curve across Avista's load was developed from the electric transmission SCADA data. This load duration curve helped to book mark the amount of reactive load on Avista's system. The analysis assumed approximately 100 MVAr of reactive load could be offset in the distribution system. It was also assumed that standard switched bank installation of 900 KVAr would be deployed for a single feeder. Therefore, approximately 112 feeders would have switched capacitors installed. Finally, as mentioned previously the ratio between kilowatts savings for megavar compensation was determined by evaluating several distribution feeders. The results of the savings are shown in Table 11.

Table 11 VAr Compensation Power Savings

Number of Feeders	Bank Size	KW Savings	Average Hours Operation	Peak Power Savings KW	Avg Power Savings KW
112	900 KVAr	13	5100	1456	847

In addition to reviewing the individual programs for energy savings, the programs were combined on a per feeder basis. This allowed the feeders to be ranked on the total amount of energy savings available on a per feeder basis. Table 12 provides the number of feeders which would provided power savings over one hundred kilowatts. The list of feeders and corresponding power savings is listed in Table 12.

Table 12 Top Feeder Power Savings

Feeder Name	Total Cost	Total Average kW
ORI12F3	$1,170,357	201
CHW12F3	$1,682,503	184
SPI12F1	$1,243,066	172
WIL12F2	$1,705,623	155
KET12F2	$968,669	143
STM631	$1,211,798	139
CLV34F1	$1,765,413	127
F&C12F1	$1,499,055	123
ROX751	$1,069,310	120
BEA12F2	$1,423,808	116
SUN12F3	$1,224,379	113
GIF34F2	$1,253,973	112
BEA12F1	$1,221,446	111
COB12F2	$822,727	109
RAT231	$1,111,882	108
ORO1281	$669,953	107
CLV12F4	$907,259	105
ROS12F1	$1,428,530	104
ROS12F6	$1,316,652	102
L&S12F2	$1,101,072	101
BEA12F5	$1,210,094	101

Economic Ranking

Although it may not be prudent to upgrade all of the distribution feeders, this study ranks the feeders by diminishing economic return. The economic metric used to rank feeders was net resource cost. The net resource cost for each feeder was determined for O&M offsets forecasted on a five, ten and fifteen year time horizon. This variable O&M forecast provided a means to filter on or off the number of economically viable feeder upgrades. Other criteria used to reduce the number of viable feeder upgrade projects included capital investment greater then $0.5 million and net resource cost less then $100 per MW.

The ranking of the most viable economic feeder upgrades are illustrated in the following three tables. Table 13, Table 14 and Table 15 is based on a five, ten and fifteen year O&M time horizon respectively.

Table 13 Net Resource Cost - Five Year O&M

Feeder	Net Resource Cost $/Mwh	Capital Investment	KW
KET12F2	$55.00	$968,669.0	142.99
SPI12F1	$67.73	$1,243,065.8	171.98
ORO1281	$68.58	$669,953.1	106.53
COL12F2	$74.92	$822,726.8	108.96
COB12F2	$74.92	$822,726.8	108.96
LF34F1	$76.29	$595,875.0	72.71
COB12F1	$82.87	$671,737.4	77.55
PVW241	$89.40	$528,985.4	53.68
CLV12F4	$89.83	$907,259.4	105.03
L&R512	$94.53	$546,237.7	55.02
OLD721	$94.87	$608,545.7	67.75
ARD12F2	$95.35	$817,711.5	82.33
STM631	$97.26	$1,211,797.7	139.36
ROX751	$99.44	$1,069,309.6	120.48

Table 14 Net Resource Cost – Ten Year O&M

Feeder	Net Resource Cost $/Mwh	Capital Investment	KW
KET12F2	$31.00	$968,669.0	142.99
SPI12F1	$49.19	$1,243,065.8	171.98
LF34F1	$51.54	$595,875.0	72.71
PVW241	$56.55	$528,985.4	53.68
ORO1281	$56.75	$669,953.1	106.53
COL12F2	$57.56	$822,726.8	108.96
COB12F2	$57.56	$822,726.8	108.96
COB12F1	$59.29	$671,737.4	77.55
CHW12F2	$60.29	$600,325.8	41.95
L&R512	$63.81	$546,237.7	55.02
ARD12F2	$70.17	$817,711.5	82.33

Feeder	Net Resource Cost $/Mwh	Capital Investment	KW
CLV12F4	$72.60	$907,259.4	105.03
GIF34F2	$72.61	$1,253,972.5	112.27
OLD721	$73.12	$608,545.7	67.75
MIS431	$79.16	$780,915.9	57.44
F&C12F2	$80.57	$610,746.1	65.07
RDN12F1	$81.47	$519,904.7	34.81
ORI12F1	$81.53	$832,306.2	75.82
FOR12F1	$81.55	$560,782.7	39.13
CKF711	$83.62	$912,659.4	88.03
STM631	$85.11	$1,211,797.7	139.36
PF213	$85.38	$579,843.8	55.23
PRA222	$85.48	$543,659.3	51.64
NE12F2	$85.54	$508,476.3	45.31
ROX751	$86.10	$1,069,309.6	120.48
RAT231	$86.36	$1,111,881.6	108.16
PUL112	$86.42	$528,311.9	44.24
SE12F2	$86.66	$714,903.4	69.83
TEN1256	$87.12	$789,201.9	85.49
GLN12F2	$88.33	$584,770.4	51.32
LIB12F3	$88.64	$529,971.6	46.50
CLV12F2	$88.87	$904,207.9	90.25
PUL116	$89.22	$537,639.7	45.27
CRG1261	$89.84	$561,702.8	44.85
APW112	$91.22	$522,196.7	45.53
WAK12F1	$93.01	$560,901.0	48.81
DEE12F2	$93.14	$743,960.8	69.63
GRV1274	$94.16	$671,626.1	66.96
PDL1202	$94.22	$581,246.6	55.32
SUN12F5	$95.38	$642,722.3	52.58
LIB12F2	$95.47	$726,778.1	58.98
DAL131	$97.14	$870,985.5	84.97
SAG741	$97.29	$634,916.4	44.82
BKR12F1	$98.20	$683,595.8	64.18
DEE12F1	$98.39	$996,523.0	67.68
M15515	$99.16	$540,077.6	44.53
SE12F4	$99.42	$686,532.3	59.34
M15512	$99.50	$531,004.8	43.84

Table 15 Net Resource Cost - Fifteen Year O&M

Feeder	Net Resource Cost $/Mwh	Capital Investment	KW
CHW12F2	$2.9	$600,325.8	41.95
KET12F2	$4.6	$968,669.0	142.99
PVW241	$23.3	$528,985.4	53.68

Feeder	Net Resource Cost $/Mwh	Capital Investment	KW
LF34F1	$26.4	$595,875.0	72.71
SPI12F1	$28.9	$1,243,065.8	171.98
RDN12F1	$29.4	$519,904.7	34.81
L&R512	$32.8	$546,237.7	55.02
FOR12F1	$34.0	$560,782.7	39.13
MIS431	$35.1	$780,915.9	57.44
COB12F1	$35.3	$671,737.4	77.55
GIF34F2	$39.5	$1,253,972.5	112.27
COL12F2	$39.9	$822,726.8	108.96
COB12F2	$39.9	$822,726.8	108.96
ARD12F2	$44.1	$817,711.5	82.33
ORO1281	$44.8	$669,953.1	106.53
AIR12F1	$48.7	$615,395.6	49.12
OLD721	$51.3	$608,545.7	67.75
PUL112	$51.6	$528,311.9	44.24
CRG1261	$54.0	$561,702.8	44.85
ORI12F1	$54.7	$832,306.2	75.82
CLV12F4	$55.1	$907,259.4	105.03
NE12F2	$55.5	$508,476.3	45.31
PUL116	$56.2	$537,639.7	45.27
DEE12F1	$56.5	$996,523.0	67.68
SAG741	$57.4	$634,916.4	44.82
GLN12F2	$58.3	$584,770.4	51.32
LIB12F3	$59.0	$529,971.6	46.50
PF213	$60.1	$579,843.8	55.23
PRA222	$60.3	$543,659.3	51.64
F&C12F2	$60.5	$610,746.1	65.07
CKF711	$61.5	$912,659.4	88.03
ODN731	$61.9	$627,946.4	44.01
APW112	$62.8	$522,196.7	45.53
SE12F2	$64.1	$714,903.4	69.83
SUN12F5	$64.6	$642,722.3	52.58
WAK12F1	$65.2	$560,901.0	48.81
LIB12F2	$65.8	$726,778.1	58.98
RAT231	$65.9	$1,111,881.6	108.16
CLV12F2	$70.0	$904,207.9	90.25
M15515	$70.7	$540,077.6	44.53
DEE12F2	$70.8	$743,960.8	69.63
M15512	$71.5	$531,004.8	43.84
TEN1256	$71.6	$789,201.9	85.49
ROX751	$72.7	$1,069,309.6	120.48
STM631	$72.8	$1,211,797.7	139.36
SE12F4	$74.2	$686,532.3	59.34
PDL1202	$74.6	$581,246.6	55.32
SPT4S30	$75.7	$541,420.5	44.99

Feeder	Net Resource Cost $/Mwh	Capital Investment	KW
CHE12F4	$76.2	$667,293.8	57.48
OGA611	$76.5	$780,992.8	58.08
GRV1274	$77.5	$671,626.1	66.96
SOT522	$77.7	$632,142.6	51.02
CFD1210	$78.0	$563,163.3	45.20
SOT521	$78.4	$538,938.7	46.10
BKR12F1	$79.3	$683,595.8	64.18
NE12F1	$79.6	$687,832.8	62.33
DAL131	$79.8	$870,985.5	84.97
PDL1203	$81.8	$559,682.9	45.75
CFD1211	$82.4	$734,775.9	65.51
MIL12F3	$82.8	$619,499.7	55.10
CDA123	$83.5	$672,854.8	56.29
9CE12F1	$83.5	$616,123.8	54.88
MEA12F2	$83.7	$750,315.2	63.99
SIP12F4	$84.3	$634,440.7	53.05
CHE12F1	$84.3	$629,576.6	54.28
SOT523	$84.9	$1,023,389.6	89.92
NW12F1	$85.1	$788,923.6	73.66
WIL12F2	$86.5	$1,705,622.8	155.22
TEN1254	$86.6	$582,980.2	48.35
ECL222	$86.7	$686,592.4	60.28
CDA124	$86.8	$641,838.7	55.52
M15513	$87.1	$736,558.1	67.36
F&C12F6	$88.2	$658,978.5	57.70
TEN1255	$89.2	$607,926.6	50.49
SLK12F1	$89.4	$854,712.8	72.56
MIL12F4	$89.6	$831,468.1	75.37
LOL1359	$90.7	$830,015.9	73.31
CHE12F2	$90.8	$642,694.9	54.26
SPU123	$91.2	$724,338.0	60.68
9CE12F2	$92.9	$764,865.0	66.97
CDA121	$92.9	$623,762.0	50.00
TEN1257	$93.0	$740,138.0	65.15
WAK12F2	$93.6	$765,628.4	67.80
9CE12F4	$93.7	$774,787.7	68.61
SLW1358	$93.7	$717,636.7	62.17
CDA125	$94.4	$863,793.5	70.73
EFM12F1	$95.0	$950,734.3	79.18
NW12F3	$96.7	$746,886.7	62.10
M23621	$97.1	$641,972.3	43.52
MIL12F1	$100.3	$798,146.0	68.01
SUN12F6	$101.5	$789,282.4	66.28

Conclusion

The intent of this system efficiency analysis was to develop and implement a methodology to identify and quantify remedies to reducing losses across Avista's distribution system. The results of this analysis can then be folded into a broader infrastructure strategy. A program to systematically refresh feeders can be combined with existing internal programs like asset management and capital budgeting to identify synergistic work alignments. For example, a project schedule could be developed to upgrade feeders based on energy, operational, reliability and maintenance priorities. Today, capital work is typically driven by system capacity constraints. With the results obtained in this analysis, capital projects could be aligned with corporate economic goals of reducing energy loss and offsetting O&M expenditures.

The benefits identified in the feeder upgrade program assumed the upgrades would be deployed in a comprehensive manner. The temptation to implement individual efficiency program components across the system may compromise the performance of a feeder as an energy delivery system. The efficient and reliable delivery of electrical energy across the Avista feeders is best met by incorporating all of the electrical components in the upgrade. This systemic approach may help guide how programs should be implemented across the organization.

Today, Avista implements projects in fairly discrete work silos influenced by departmental task structure and budget constraints. Examples of these type of programs are joint use, pole test and treat, failed equipment, new revenue and specific capital project budgeting. Consequently, the programs are dispersed across multiple feeders resulting in different crews working on the same feeder at different times over multiple years. The feeder upgrade program could be used not only to achieve energy savings but also be used as a springboard to consolidate and coordinate work efforts. Rather than referring to work groups by departmental names like Distribution Engineering, Operations or Asset Management, they may be better served by being aligned with actual work processes like capital and operational feeder programs.

The feeder upgrade program by itself falls short of being a strategic vision. However, it can be used as a first step towards a broader strategic view to be included in programs like capital budgeting, energy efficiency, and O&M cost reduction. A more robust corporate strategic vision for aging infrastructure rehabilitation would need to incorporate the following elements: 1) Movement of bulk power across our transmission system, 2) Optimum distribution topologies, 3) Substation size, locations and architectures, and 4) Reliable forecasts of geographical centered load growth. Once these elements are incorporated into the existing feeder upgrade program, a long term plan for Avista's electric infrastructure can be developed to move infrastructure upgrades from a tactical or reactive approach to a planned replacement strategy.

2009

Electric
Integrated Resource Plan

Appendix H – 2009 Electric IRP Avista New Resource Table

AVISTA®

August 31, 2009

2009 Avista IRP
New Resource Table

Resource	Resource Location	POR or Local Area	POD	Start	Stop	Capacity MW	Year Total
Lancaster CCCT	Rathdrum, ID	Bell/Westside	AVA System	1/1/2010	10/31/2026	125.0	
Lancaster CCCT	Rathdrum, ID	Mid-C	AVA System	1/1/2010	10/31/2026	150.0	275.0
Noxon 3 (incremental)	Noxon, MT	Noxon, MT	AVA System	1/1/2010	Indefinite	14.0	14.0
Noxon 2 (incremental)	Noxon, MT	Noxon, MT	AVA System	1/1/2011	Indefinite	14.0	14.0
Noxon 4 (incremental)	Noxon, MT	Noxon, MT	AVA System	1/1/2012	Indefinite	14.0	
Nine Mile (incremental)	Nine Mile, WA	Nine Mile, WA	AVA System	1/1/2012	Indefinite	8.8	
Wind	Reardan, WA	Reardan, WA	AVA System	1/1/2012	Indefinite	90.0	
Wind	TBD	TBD	AVA System	1/1/2012	Indefinite	60.0	172.8
Little Falls (incremental)	Ford, WA	Little Falls, WA	AVA System	1/1/2013	Indefinite	1.0	1.0
Little Falls (incremental)	Ford, WA	Little Falls, WA	AVA System	1/1/2014	Indefinite	1.0	1.0
Little Falls (incremental)	Ford, WA	Little Falls, WA	AVA System	1/1/2016	Indefinite	1.0	1.0
Wind	TBD	TBD	AVA System	1/1/2019	Indefinite	150.0	
CCCT	TBD	Bell/Westside	AVA System	1/1/2019	Indefinite	250.0	400.0
Upper Falls (incremental)	Spokane, WA	Spokane, WA	AVA System	1/1/2020	Indefinite	2.0	2.0
Wind	TBD	TBD	AVA System	1/1/2022	Indefinite	50.0	50.0
CCCT	TBD	TBD	AVA System	1/1/2024	Indefinite	250.0	250.0
CCCT	TBD	TBD	AVA System	1/1/2027	Indefinite	250.0	250.0
					Total	1431	1431

August 26, 2009