Avista's 2016 Natural Gas IRP

Washington State Utilities and Transportation Commission

Olympia, WA

November 3, 2016

Agenda

- Introduction
- Demand Forecasts
- DSM
- Supply Side Resources
- Market Fundamentals
- Prices
- Integrated Resource Scenarios and Action Plan

2016 IRP Timeline

- **August 31, 2015** – Work Plan filed with WUTC
- **January through April 2016** – Technical Advisory Committee meetings. Meeting topics will include:
  - Demand Forecast and Demand Side Management – January 21
  - Supply/Infrastructure, Natural Gas Pricing, and Potential Case Discussion– *February 18*
  - Distribution Planning, SENDOUT® Preliminary Output Results and Further Case Discussion – *March 16*
  - SENDOUT® results – *April 21*
- **May 30, 2016 –** Draft of IRP document to TAC
- **June 30, 2016 –** Comments on draft due back to Avista
- **July 2016 –** TAC final review meeting (if necessary)
- **August 31, 2016 –** File finalized IRP document

Avista Facts

STATISTICS

State	Total Customers	% of Total
WA	156,000	46%
OR	99,000	30%
ID	79,000	24%
Total	334,000	100%

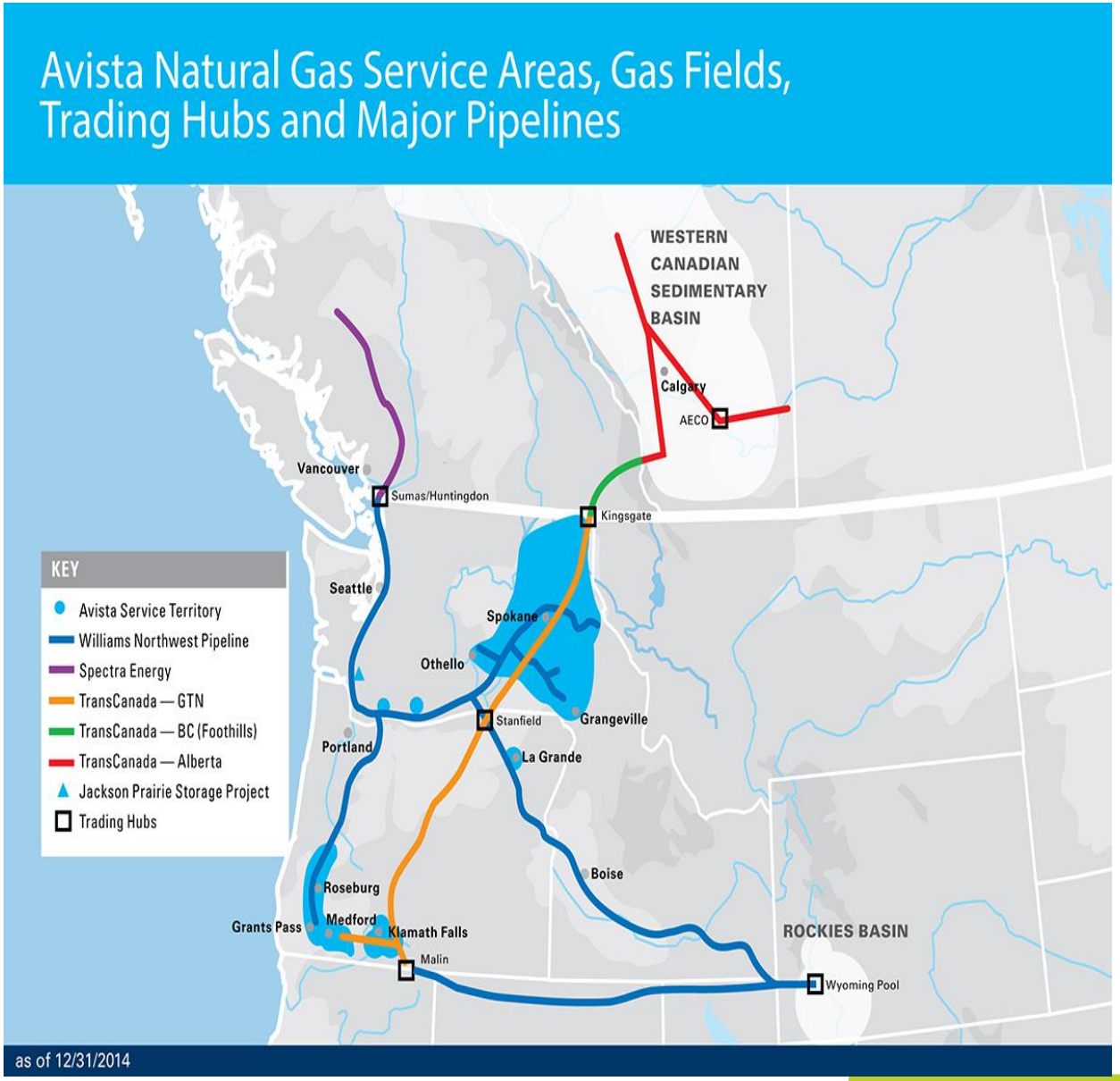
PIPELINES

- **Williams Northwest Pipeline (NWP)**
- **TransCanada Gas Transmission Northwest (GTN)**
- **TransCanada Foothills**
- **TransCanada Alberta**
- **Spectra Energy (Westcoast)**

STORAGE

- **Jackson Prairie Storage**

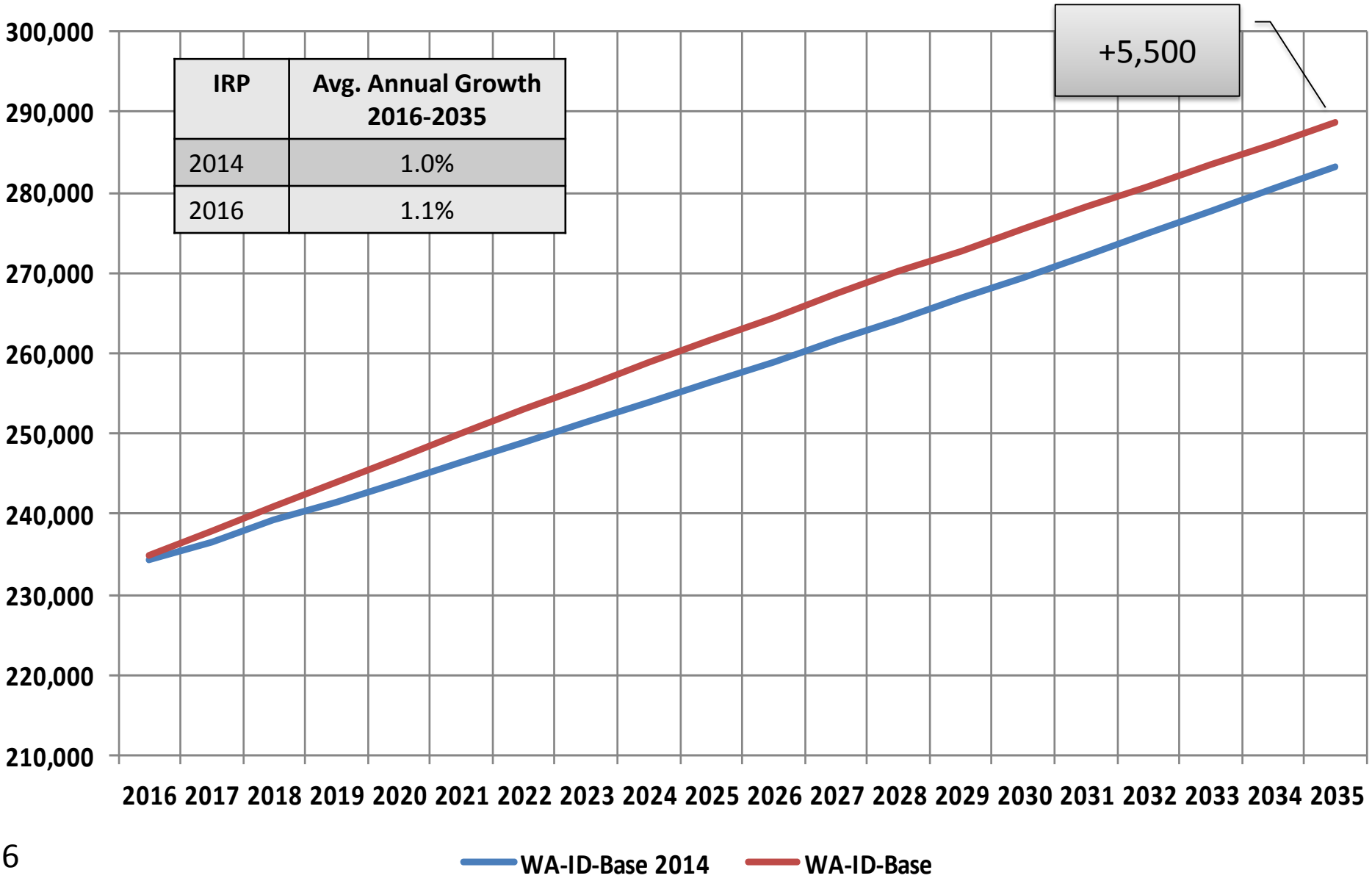
  One third owner with Puget Sound Energy and Williams Pipeline.



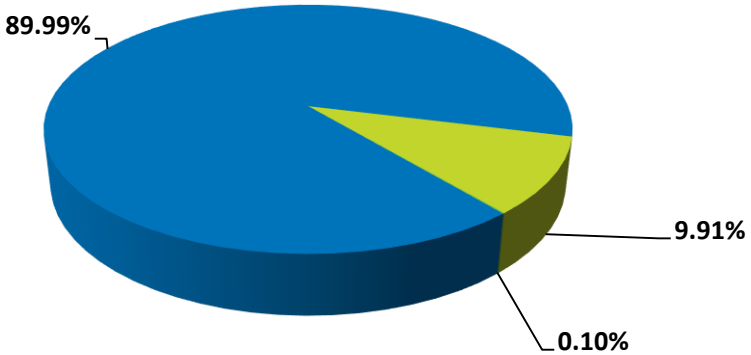
Demand Forecasts

WA-ID Region Firm Customers: 2016 IRP and 2014 IRP

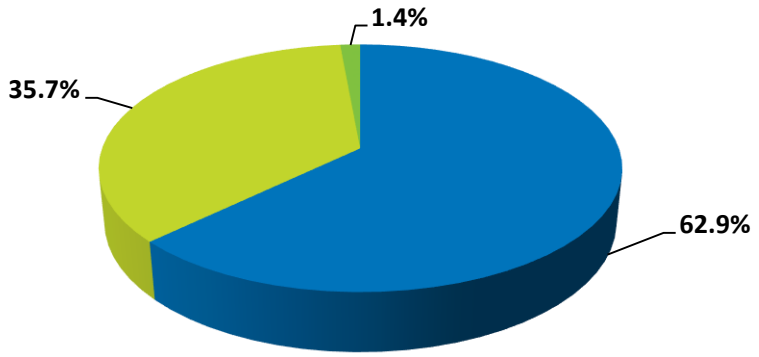
IRP	Avg. Annual Growth 2016-2035
2014	1.0%
2016	1.1%



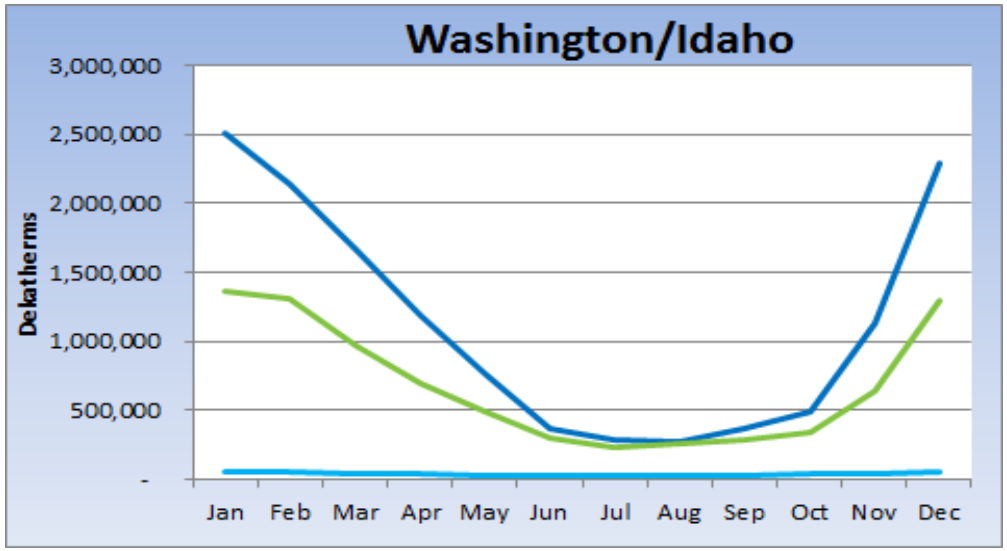
Washington Demand Profile



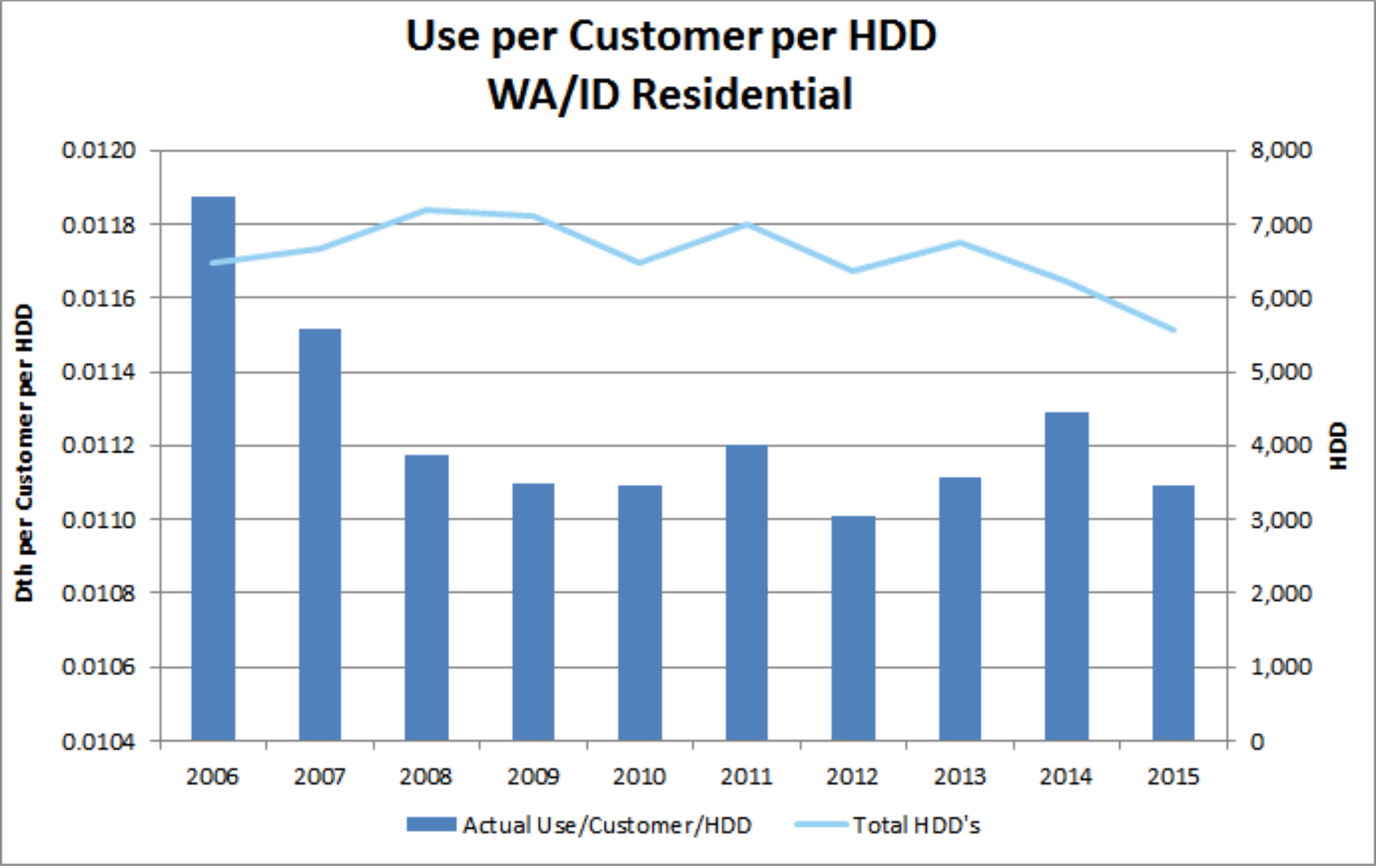
Customers



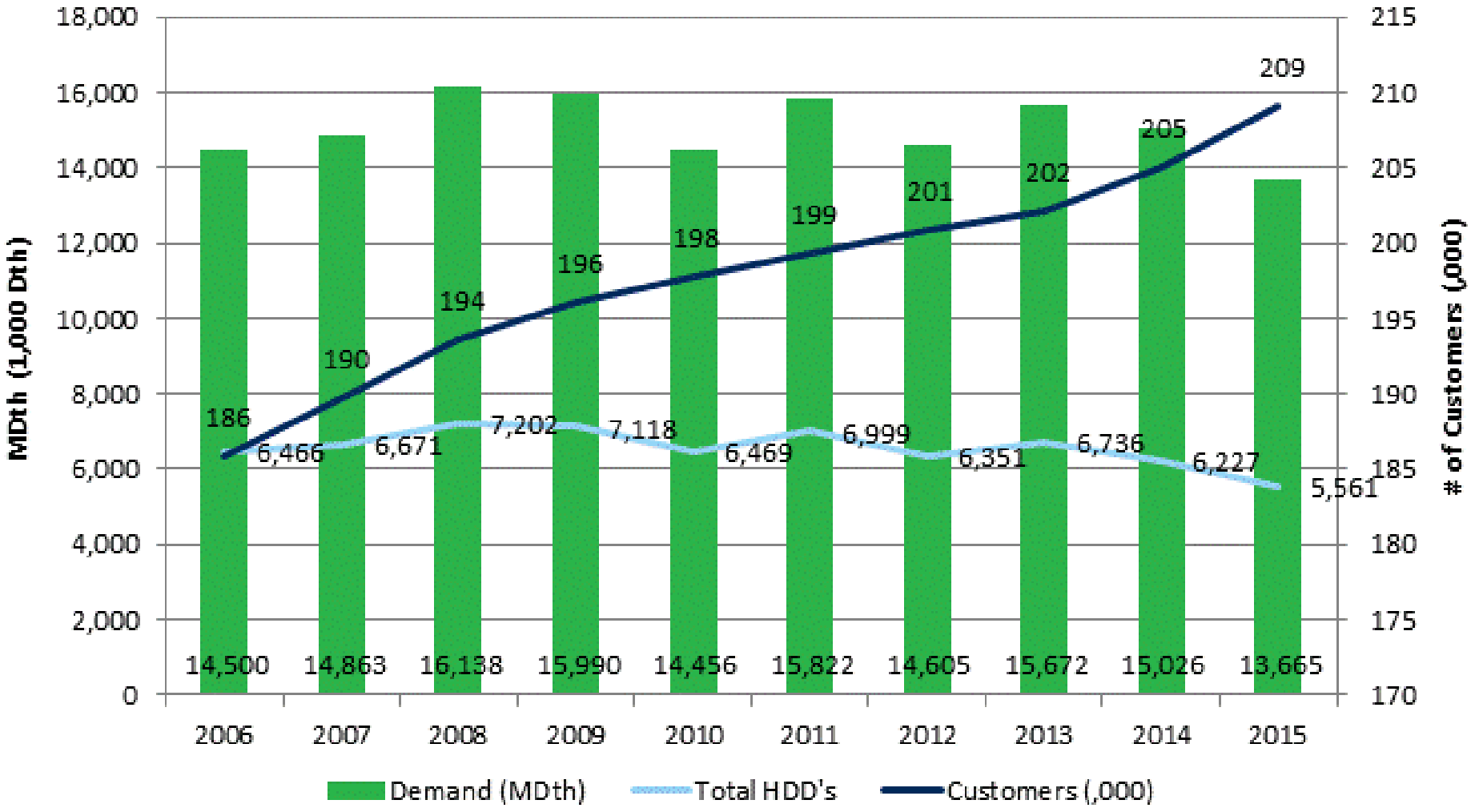
Dekatherms



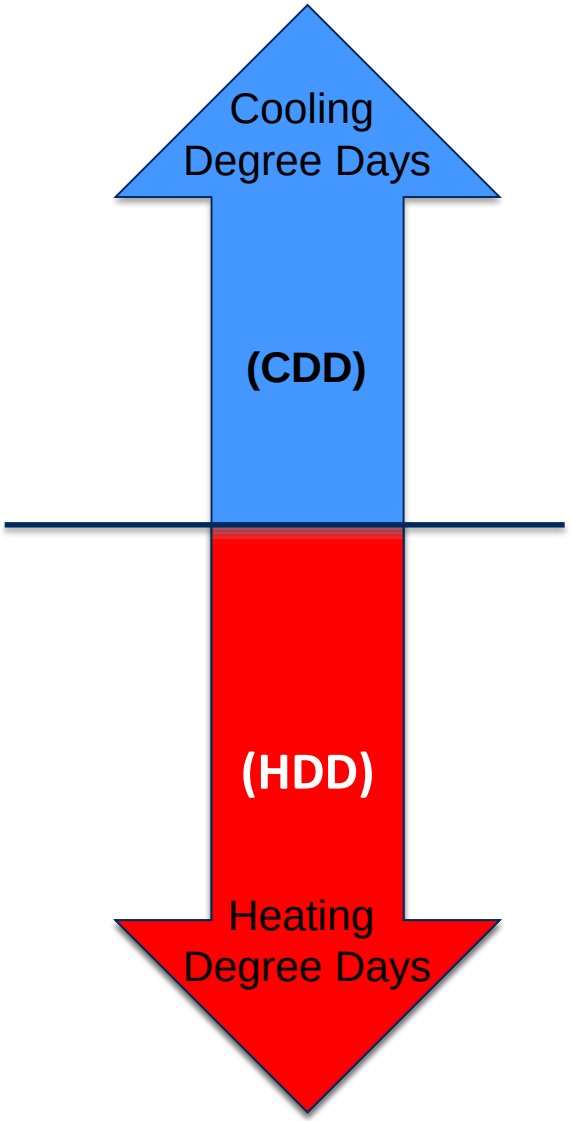
Use per Customer per HDD
WA/ID Residential



WA/ID Demand


MDth (1,000 Dth)
# of Customers (,000)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
215
210
205
200
195
190
185
180
175
170
14,500
14,863
16,138
15,990
14,456
15,822
14,605
15,672
15,026
13,665
186
190
194
196
198
199
201
202
205
209
6,466
6,671
7,202
7,118
6,469
6,999
6,351
6,736
6,227
5,561
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Demand (MDth)
Total HDD's
Customers (,000)

Temperature & Degree Days



Temp (°F)		Degree Days
100	=	35
90	=	25
80	=	15
70	=	5
65	=	0
60	=	5
50	=	15
40	=	25
30	=	35
20	=	45
10	=	55
0	=	65
-10	=	75
-20	=	85

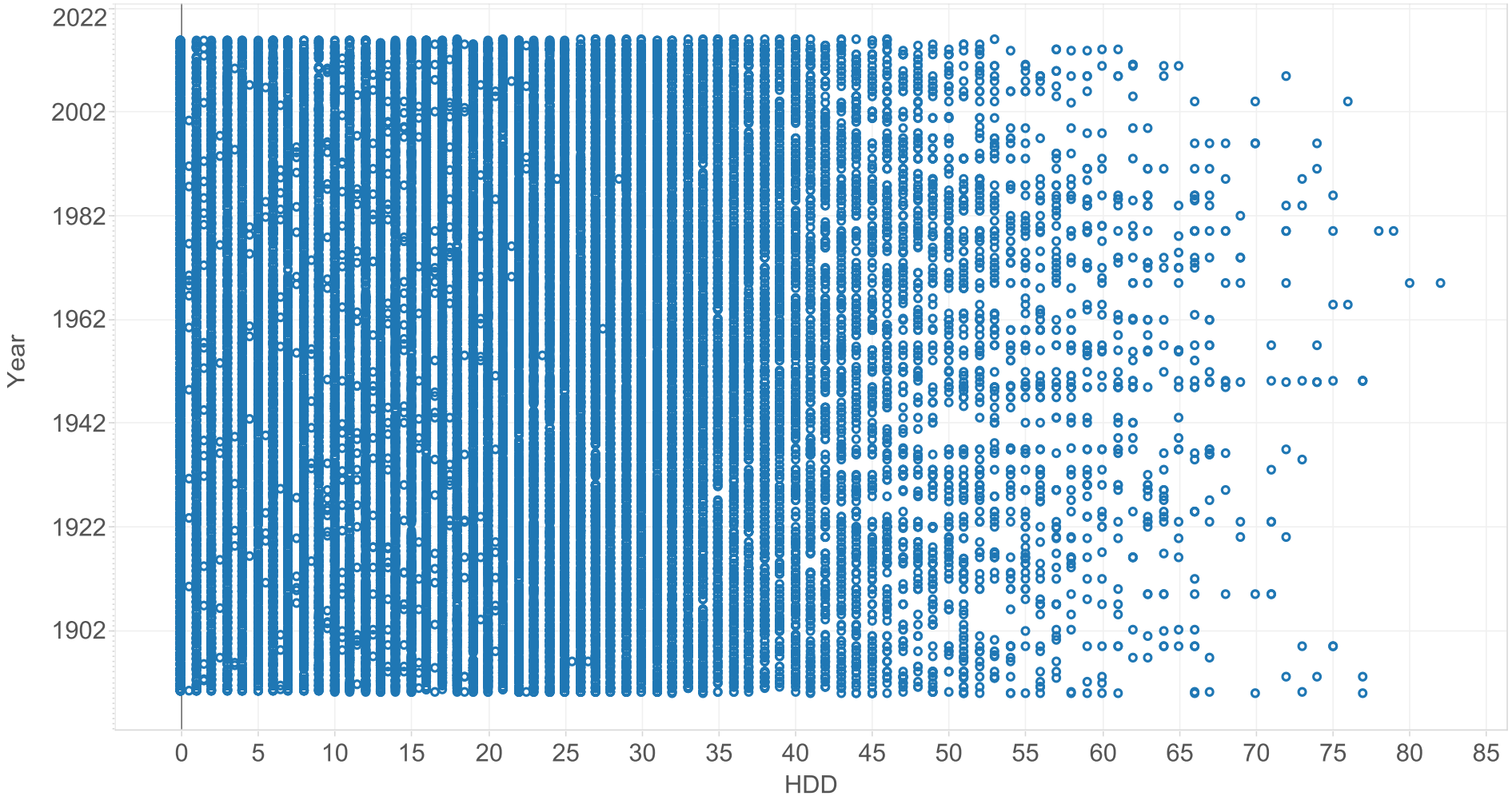
Weather Planning Assumptions

Area	Coldest in 20 Year HDD	Coldest on Record HDD
WA-ID	76	82
Klamath Falls	72	72
La Grande	74	74
Medford	54	61
Roseburg	48	55

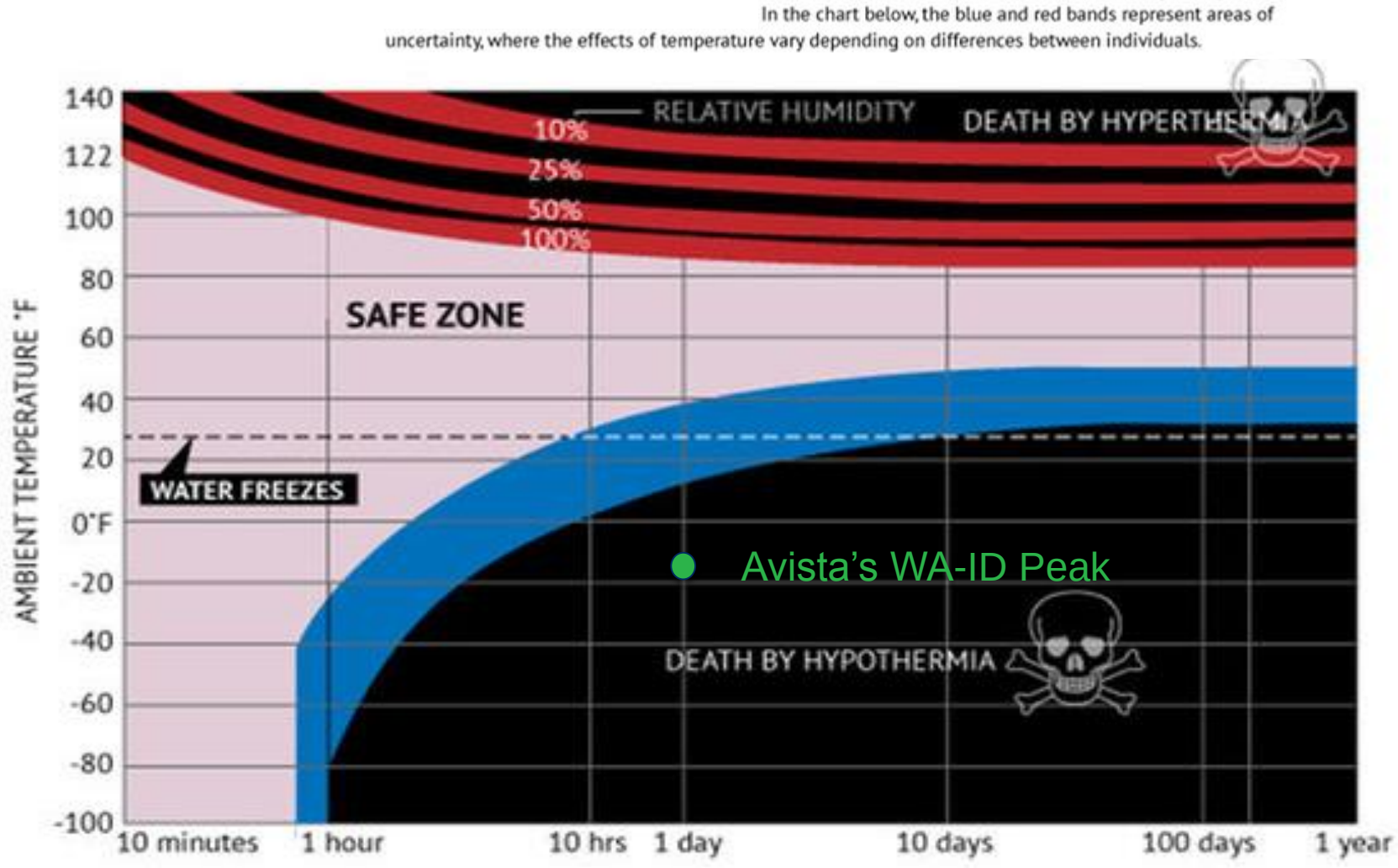
Coldest on Record Dates

WA/ID – December 30, 1968
Medford – December 9, 1972
Roseburg – December 22, 1990
Klamath Falls – December 21,1990
LaGrande – December 23,1983

Spokane HDD's (1890-2015)

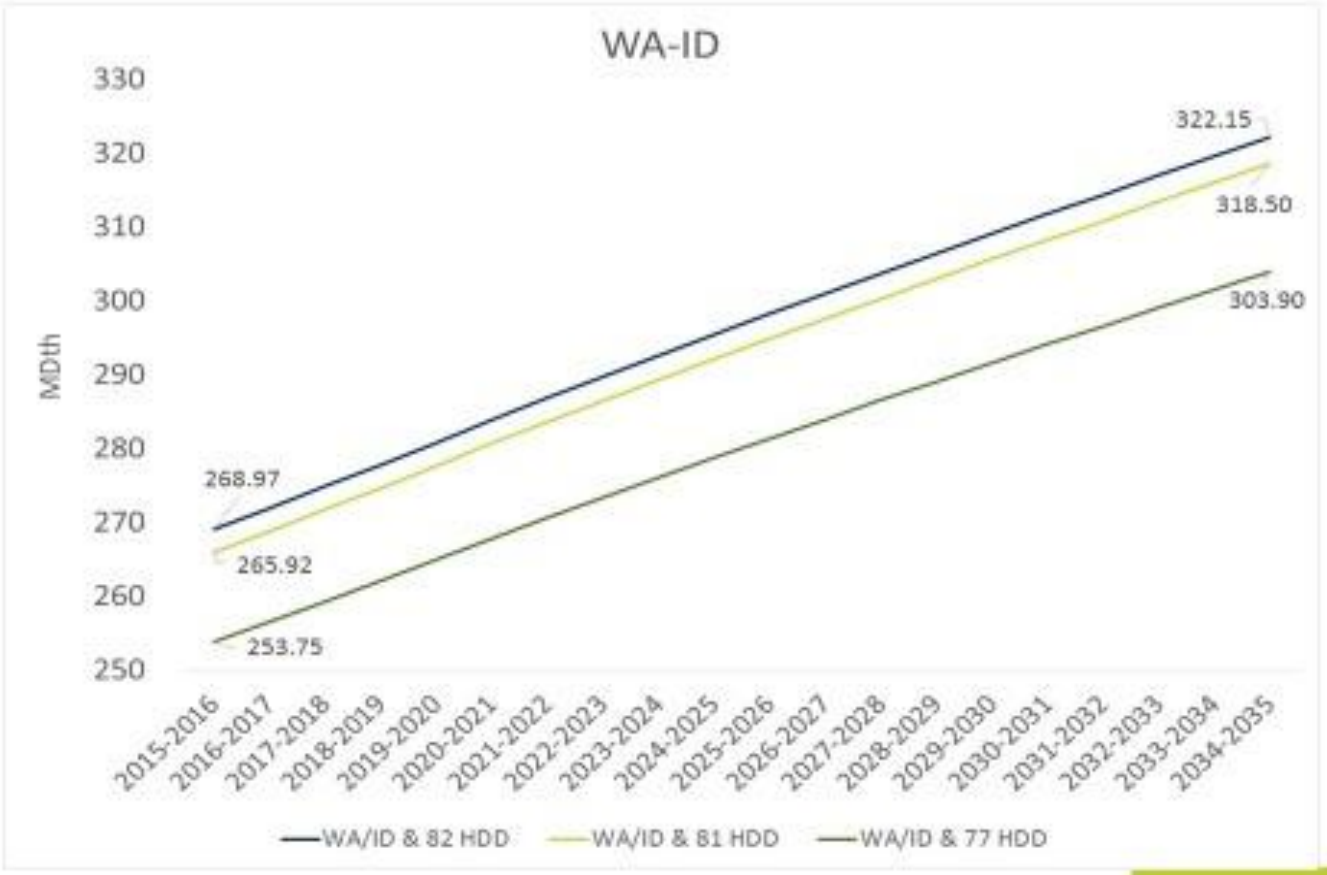


1-572 peak planning



http://www.livescience.com/34128-limits-human-survival.html

WA-ID Peak Day Planning



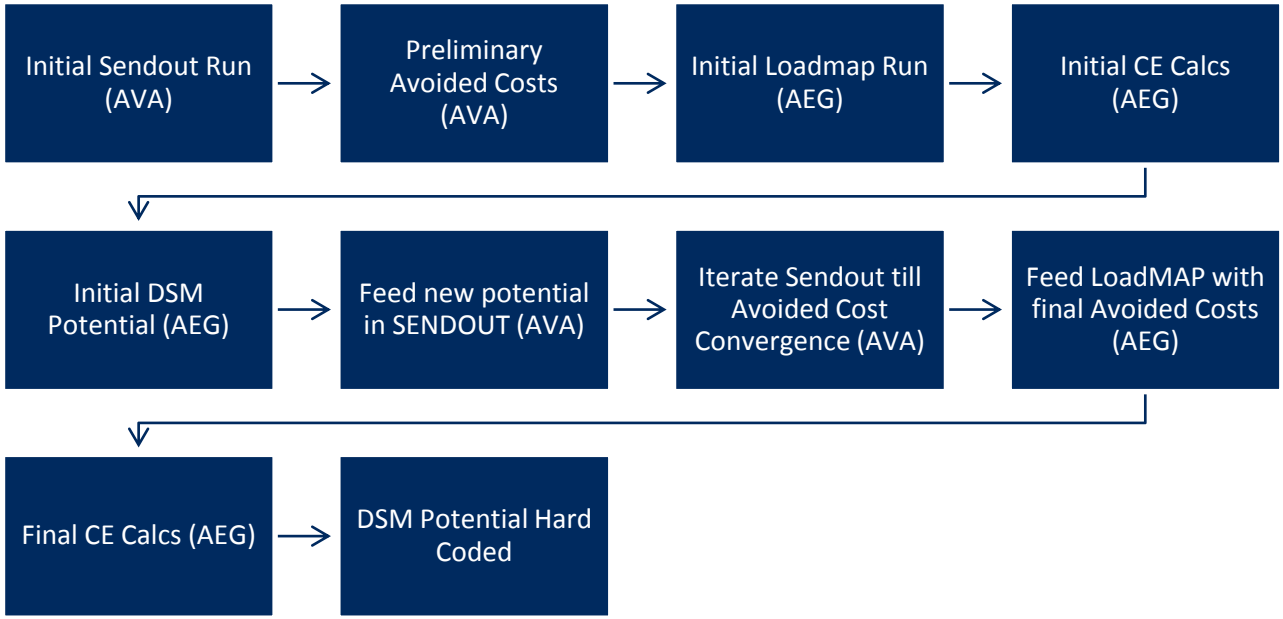
Since 1890

>= 70 HDD	50
>=75 HDD	17
>=80 HDD	2

*2016 Reference Plus " " sensitivity

Demand Side Management

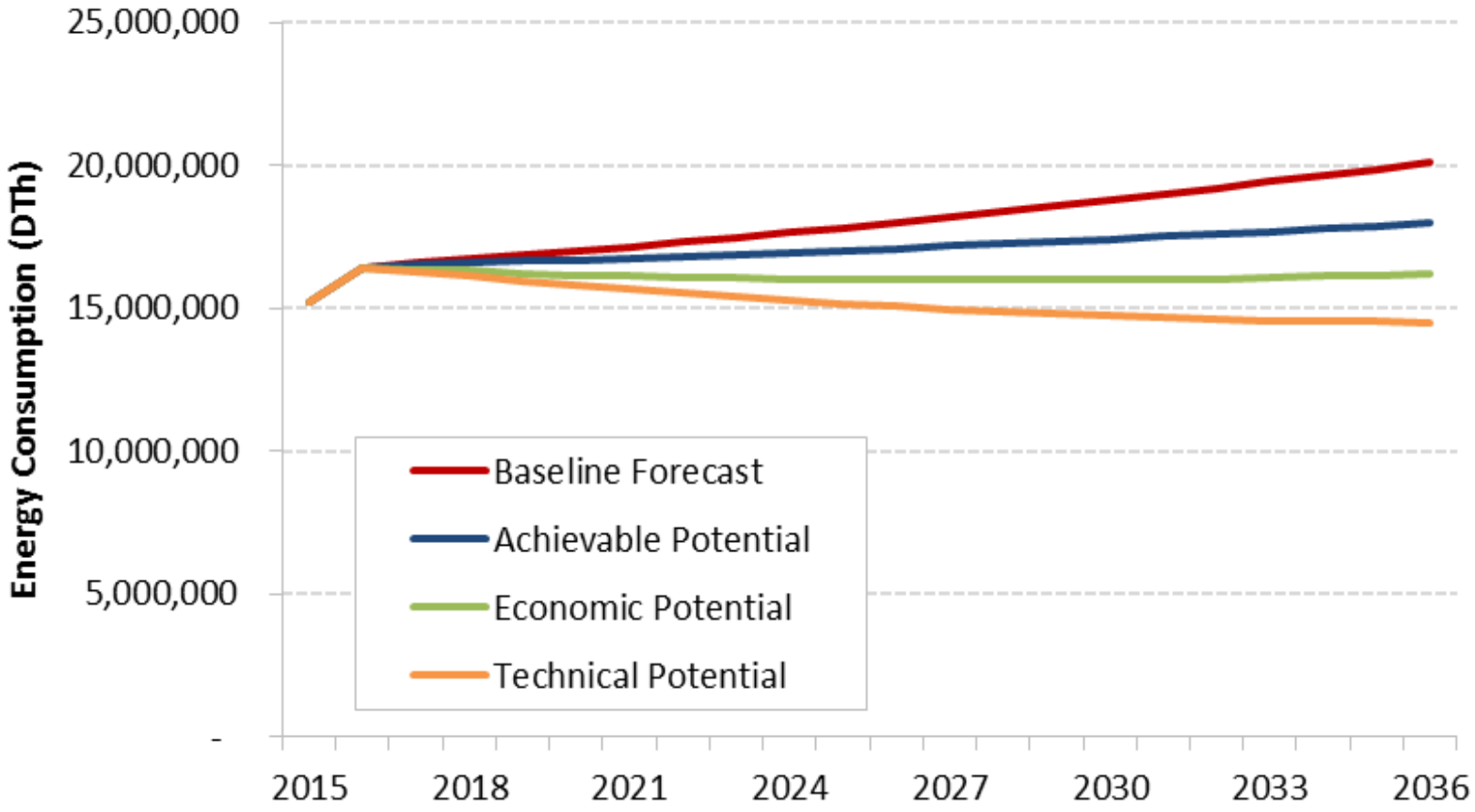
2016 DSM Modeling Methodology



WA Cumulative, Achievable, Economic and Technical Conservation Potential

	2017	2018	2021	2026	2036
Baseline projection (DTh)	16,571,868	16,714,623	17,138,164	18,008,011	20,090,687
Cumulative Savings (DTh)					
Achievable Potential	48,911	110,194	363,259	879,075	2,057,559
Economic Potential	195,247	390,263	979,438	1,971,461	3,789,348
Technical Potential	298,959	597,600	1,485,318	2,945,852	5,585,883
Cumulative Savings as a % of Baseline					
Achievable Potential	0.3%	0.7%	2.1%	4.9%	10.2%
Economic Potential	1.2%	2.3%	5.7%	10.9%	18.9%
Technical Potential	1.8%	3.6%	8.7%	16.4%	27.8%

WA Conservation Potential Forecasts



Top WA Residential Measures (2018)

Rank	Residential Measure	2018 Cumulative Energy Savings (DTh)	% of Total
1	Windows - High Efficiency	20,516	32.8%
2	Heating – Furnace EF 0.98	19,873	31.8%
3	Furnace - Maintenance	4,025	6.4%
4	Water Heater - Low-Flow Showerheads	3,270	5.2%
5	Water Heater - Temperature Setback	2,983	4.8%
6	Insulation - Ceiling	2,914	4.7%
7	Water Heating - Water Heater EF 0.67	2,243	3.6%
8	Thermostat - Programmable/Interactive	1,831	2.9%
9	Water Heater - Pipe Insulation	1,797	2.9%
10	Heating – Boiler EF 0.98	1,582	2.5%
11	Water Heater - Faucet Aerators	527	0.8%
12	Boiler - Maintenance	484	0.8%
13	Boiler - Pipe Insulation	248	0.4%
14	Insulation - Wall Sheathing	199	0.3%
	Total	**62,491**	**100%**

Top WA Commercial Measures (2018)

Rank	Commercial Measure	2018Cumulative Energy Savings (DTh)	% of Total
1	Retrocommissioning	13,476	25.3%
2	Heating – Boiler EF 0.98	11,887	22.3%
3	Gas Boiler - Hot Water Reset	5,159	9.7%
4	Heating – Furnace EF 0.98	4,102	7.7%
5	Insulation - Ceiling	3,360	6.3%
6	Water Heating - Water Heater EF 0.67	2,826	5.3%
7	Water Heater - Faucet Aerators/Low Flow Nozzles	2,150	4.0%
8	Water Heater - Central Controls	1,979	3.7%
9	Strategic Energy Management	1,784	3.4%
10	Water Heater - Pre-Rinse Spray Valve	1,564	2.9%
11	Gas Boiler - Parallel Positioning Control	1,540	2.9%
12	Food Preparation – ENERGY STAR Fryer	740	1.4%
13	Steam Trap Maintenance	657	1.2%
14	Food Preparation - ENERGY STAR Oven	386	0.7%
15	HVAC – Shut Off Damper	304	0.6%
16	Food Preparation - ENERGY STAR Griddle	235	0.4%
17	Windows - High Efficiency	223	0.4%
18	Water Heater - Pipe Insulation	204	0.4%
19	Food Preparation - ENERGY STAR Steamer	184	0.3%
20	Heating – Unit Heater (Condensing)	171	0.3%
	Total	**52,933**	**99.4%**

Top WA Commercial Measures (2018)

Rank	Industrial Measure	2018 Cumulative Energy Savings (DTh)	% of Total
1	Custom	415	53.5%
2	Boiler - Hot Water Reset	205	26.4%
3	Boiler - Parallel Positioning Control	97	12.5%
4	Boiler - Maintenance	46	5.9%
5	Steam Trap Maintenance	11	1.5%
6	Gas Furnace - Maintenance	2.	0.3%
	Total	**777**	**100.0%**

2018 Natural Gas IRP

- Avista's 2018 IRP will contain a dynamic DSM program structure in it analytics.
- Effects of Clean Air Rule, Carbon Taxes, etc.

Supply Side Resources

Avista's Storage Resources

Washington and Idaho
Owned Jackson Prairie

- 7.7 Bcf of Capacity with approximately 346,000 Dth/d of deliverability

Oregon

Owned Jackson Prairie

- 823,000 Dth of Capacity with approximately 52,000 Dth/d of deliverability

Leased Jackson Prairie

- 95,565 Dth of Capacity with approximately 2,654 Dth/d of deliverability

Optimization

op·ti·mize (ŏp'tə-mīz')

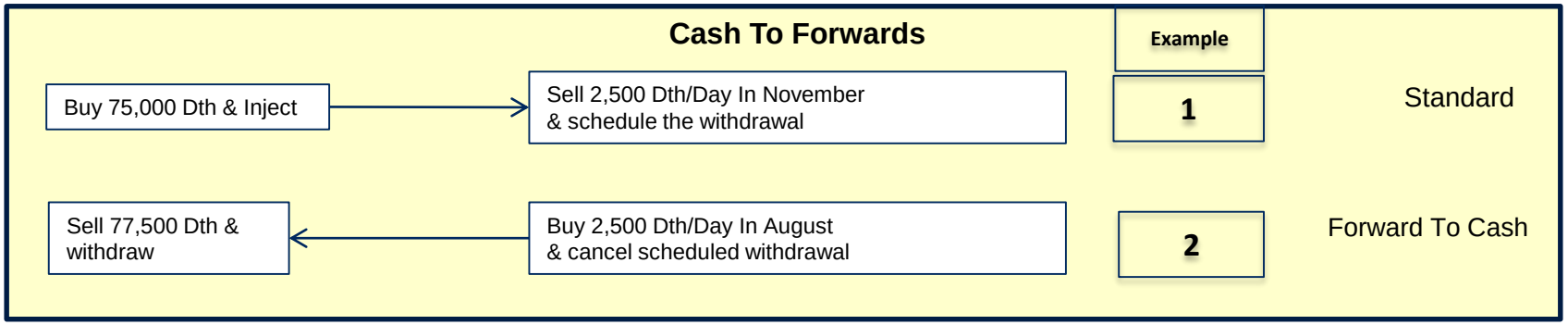
tr.v. **op·ti·mized**, **op·ti·miz·ing**, **op·ti·miz·es**

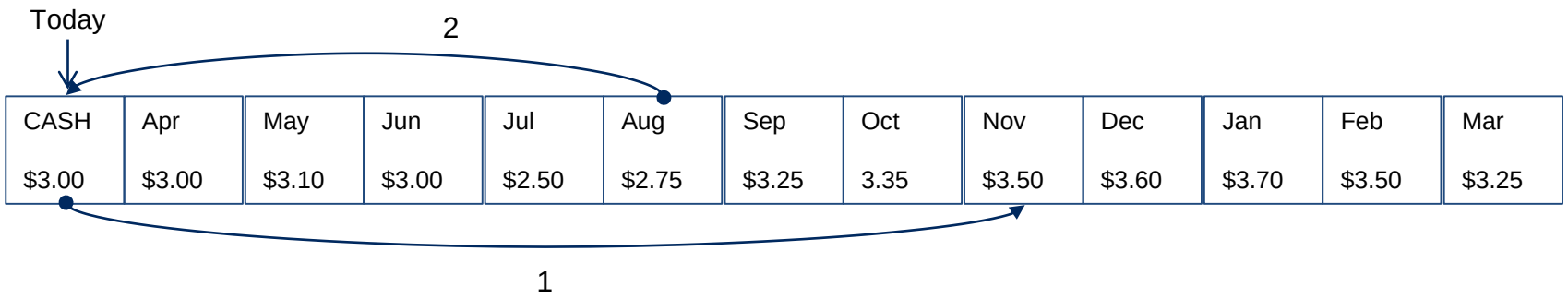
1. To make as perfect or effective as possible.
2. *Computers* To increase the computing speed and efficiency of (a program), as by rewriting instructions.
3. To make the most of.

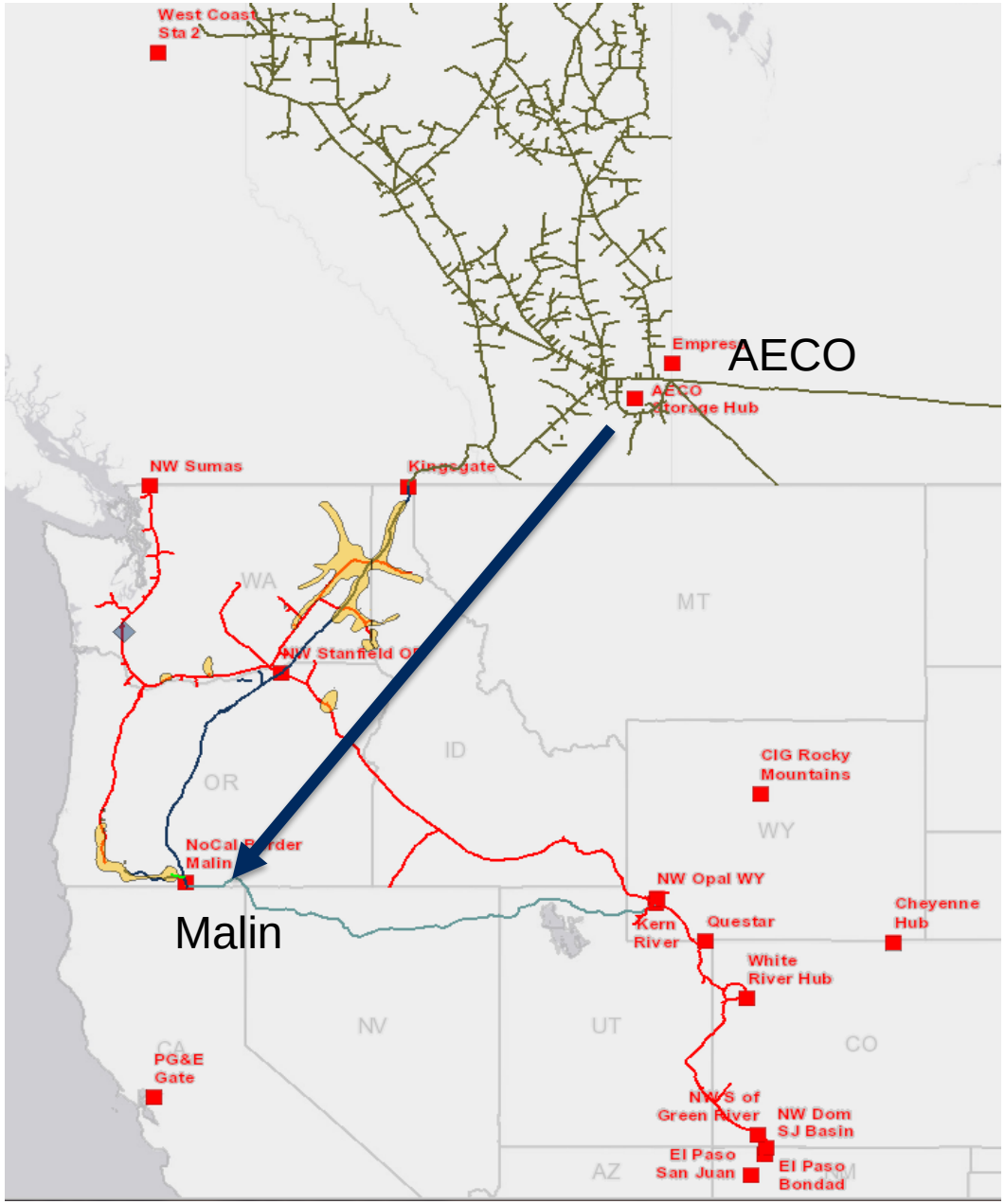
- Optimization helps Avista to recover costs, for our customers, on assets when not in use for load.

Storage Optimization

Example of Storage Opt Deals







Transportation Optimization Example

AECO to MALIN

Demand $.45
Cost to transport .10

*AECO = $1.45
MALIN = $2.00

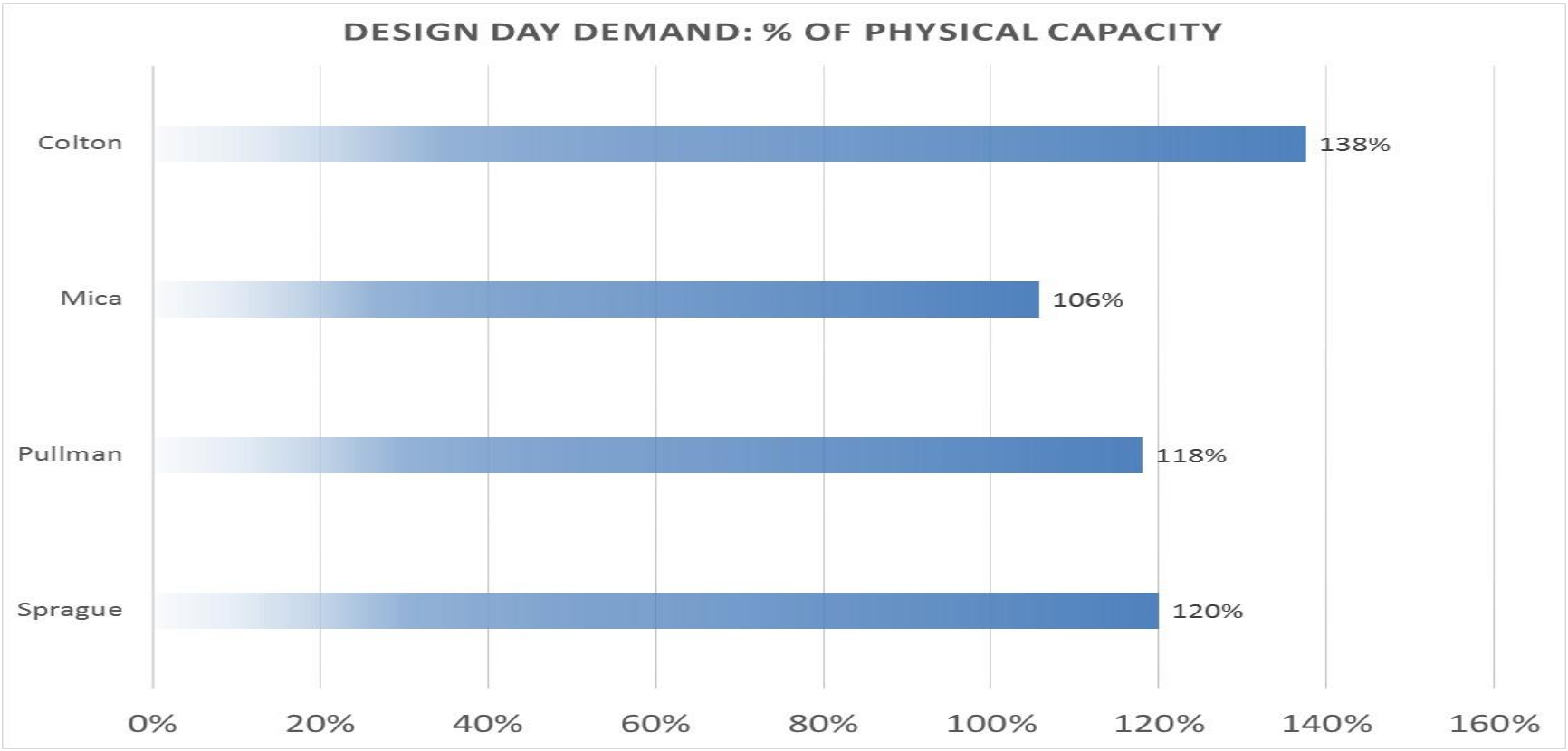
$.55 - $.10 = $.45

Lowered cost to ratepayers by $.45

This is referred to as a location spread.

*2/10/16

City Gate Analysis



City Gate Station	state	Design Day Demand	Physical Limitation	*Design Day Demand: % of Physical Capacity*
Mica	WA	1173	1110	*106%*
Colton	WA	11	8	*138%*
Pullman	WA	984	834	*118%*
Sprague	WA	12	10	*120%*

Market Fundamentals

The Short Term Fundamentals

Bulls

Dwindling rig counts

Economic recovery

LNG & Methanol Plants

Weather – Normal is now bullish

Power Demand

Bears

Demand is weak

Storage is full

Oil Prices are near 10+ year lows

Record Production

Increased drilling efficiency

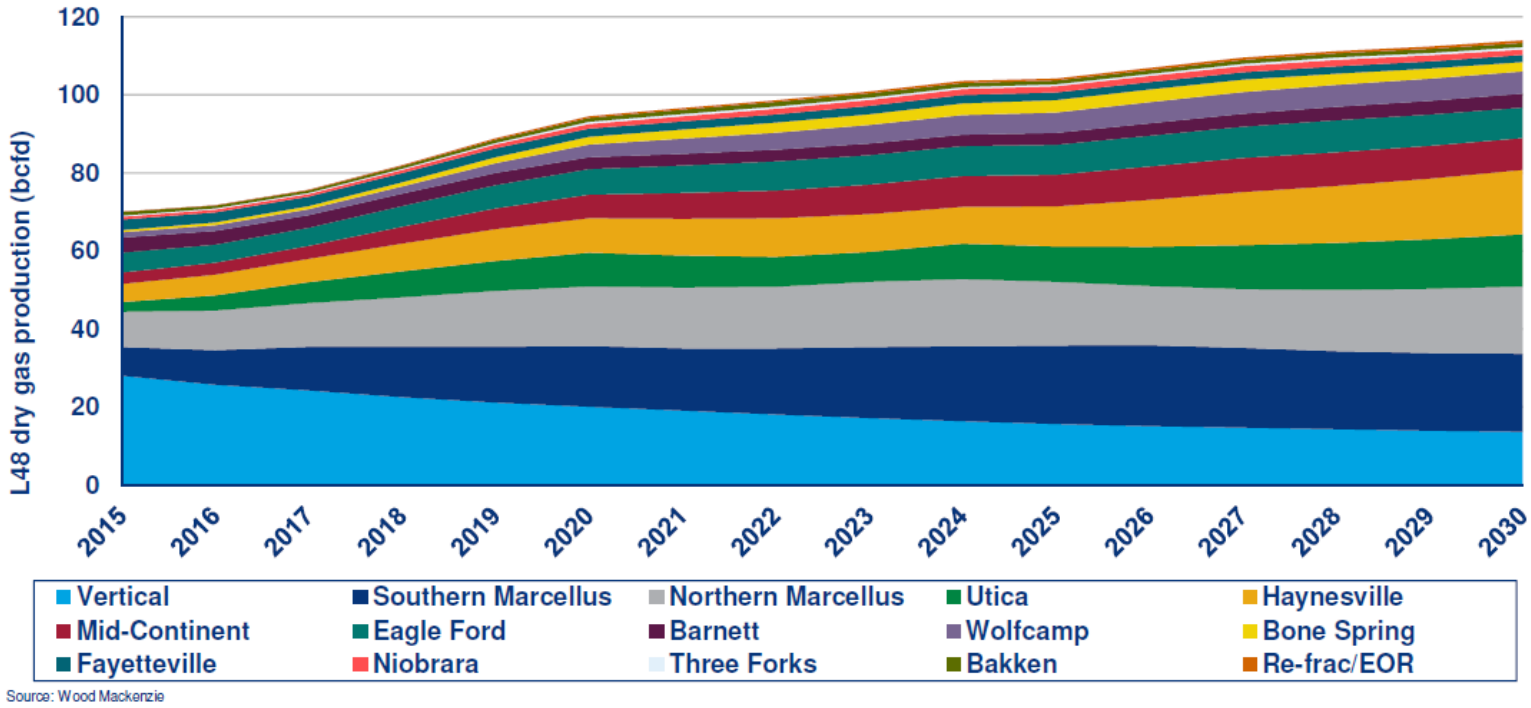
DUC Wells

Forecasted Natural Gas Production

Lower 48 supply outlook

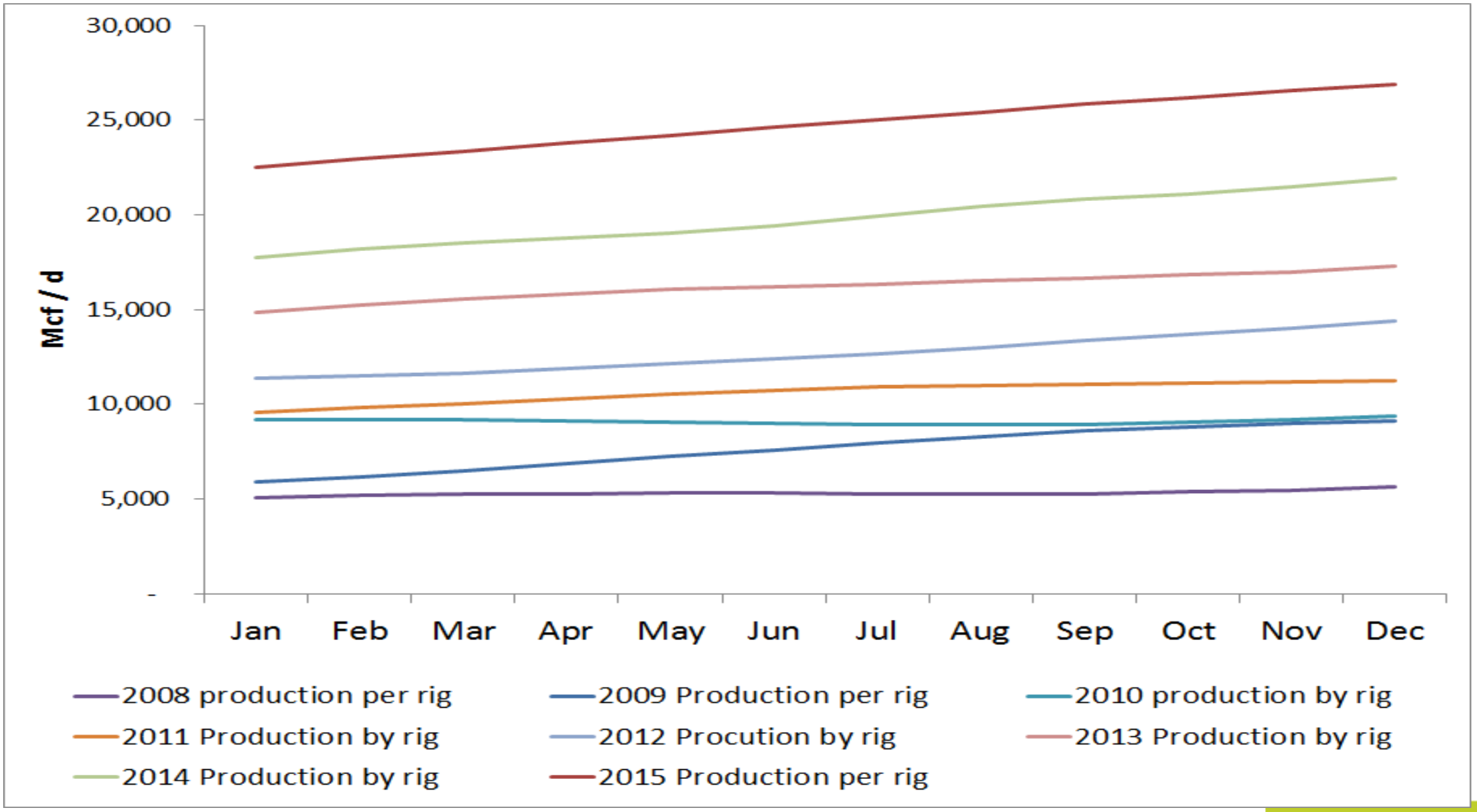
The Northeast will continue to fuel production growth through 2030

- The Marcellus and Utica will grow their share of US Lower 48 dry from 27% in 2015 to 44% by 2025 as infrastructure build-out allows for more resource to get to market.
- Additionally, associated gas fuels 10 bcfd of net growth between 2017 and 2024 once oil price recover late this decade



Source: Wood Mackenzie

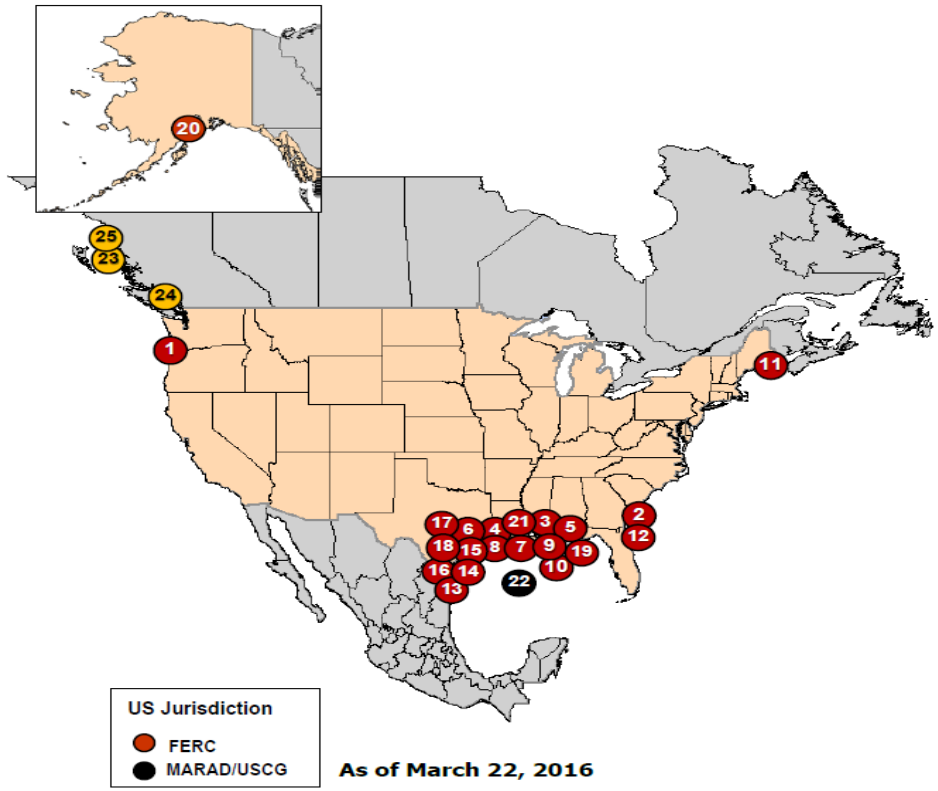
US – Drilling efficiency



- EIA DPR - 7 most prolific areas in the US, which account for all natural gas production growth during 2011 - 2014

LNG

North American LNG Export Terminals
Proposed



PROPOSED TO FERC
Pending Applications:

1. **Astoria, OR:** 1.25 Bcfd (Oregon LNG) (CP09-6)
2. **Elba Island, GA:** 0.35 Bcfd (Southern LNG Company) (CP14-103)
3. **Lake Charles, LA:** 1.07 Bcfd (Magnolia LNG) (CP14-347)
4. **Sabine Pass, TX:** 2.1 Bcfd (ExxonMobil – Golden Pass) (CP14-517)
5. **Pascagoula, MS:** 1.5 Bcfd (Gulf LNG Liquefaction) (CP15-521)
6. **Freeport, TX:** 0.34 Bcfd (Freeport LNG Dev) (CP15-518)
7. **Cameron Parish, LA:** 1.41 Bcfd (Venture Global Calcasieu Pass) (CP15-550)
8. **Hackberry, LA:** 1.41 Bcfd (Sempra - Cameron LNG) (CP15-560)

Projects in Pre-filing:

9. **Plaquemines Parish, LA:** 1.07 Bcfd (CE FLNG) (PF13-11)
10. **Plaquemines Parish, LA:** 0.30 Bcfd (Louisiana LNG) (PF14-17)
11. **Robbinston, ME:** 0.45 Bcfd (Kestrel Energy – Downeast LNG) (PF14-19)
12. **Jacksonville, FL:** 0.075 Bcf/d (Eagle LNG Partners) (PF15-7)
13. **Brownsville, TX:** 0.54 Bcfd (Texas LNG Brownsville) (PF15-14)
14. **Brownsville, TX:** 0.94 Bcfd (Annova LNG Brownsville) (PF15-15)
15. **Port Arthur, TX:** 1.4 Bcfd (Port Arthur LNG) (PF15-18)
16. **Brownsville, TX:** 3.6 Bcfd (Rio Grande LNG – NextDecade) (PF15-20)
17. **Freeport, TX:** 0.72 Bcfd (Freeport LNG Dev) (PF15-25)
18. **Corpus Christi, TX:** 1.4 Bcfd (Cheniere – Corpus Christi LNG) (PF15-26)
19. **Plaquemines Parish, LA:** 2.80 Bcfd (Venture Global LNG) (PF15-27)
20. **Nikiski, AK:** 2.55 Bcfd (ExxonMobil, ConocoPhillips, BP, TransCanada and Alaska Gasline) (PF14-21)
21. **Cameron Parish, LA:** 1.84 Bcfd (G2 LNG) (PF16-2)

PROPOSED TO U.S.-MARAD/COAST GUARD

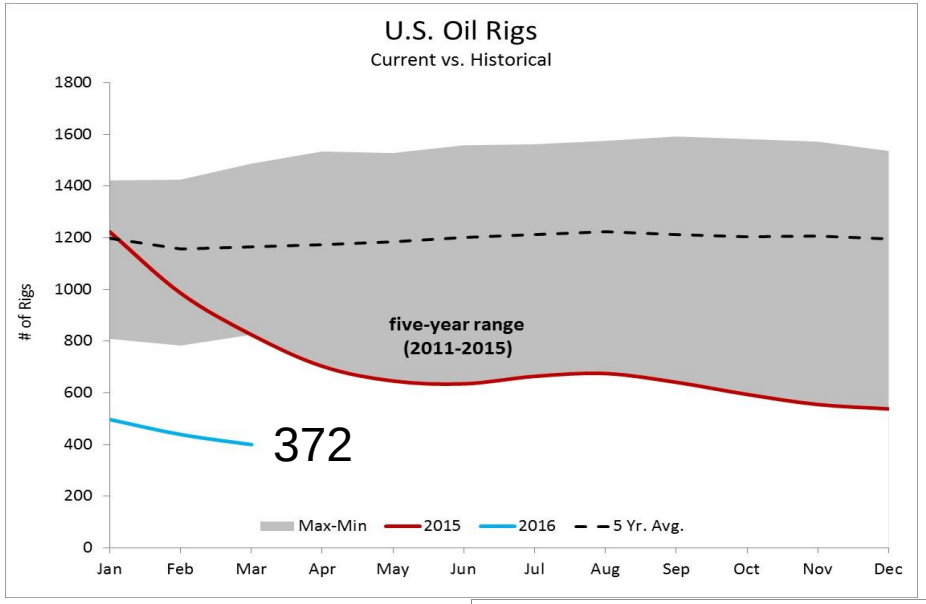
22. **Gulf of Mexico:** 1.8 Bcfd (Delfin LNG)

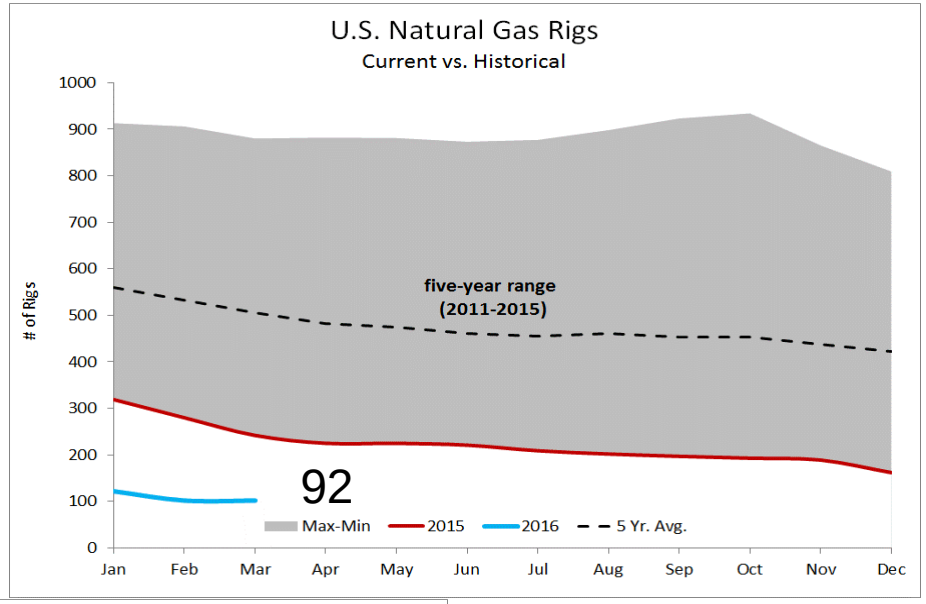
PROPOSED CANADIAN SITES

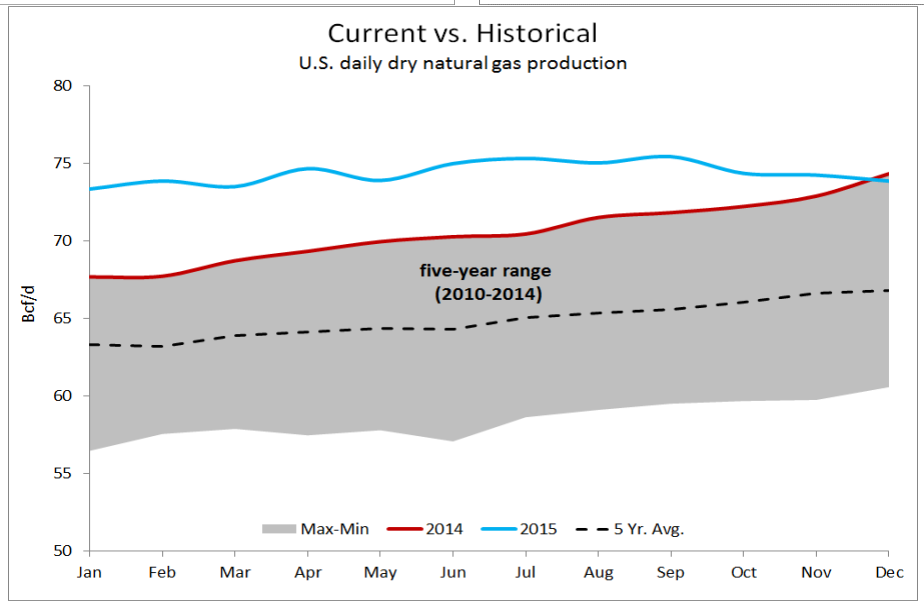
23. **Kitimat, BC:** 1.28 Bcfd (Apache Canada Ltd.)
24. **Douglas Island, BC:** 0.23 Bcfd (BC LNG Export Cooperative)
25. **Prince Rupert Island, BC:** 2.74 Bcfd (Pacific Northwest LNG)

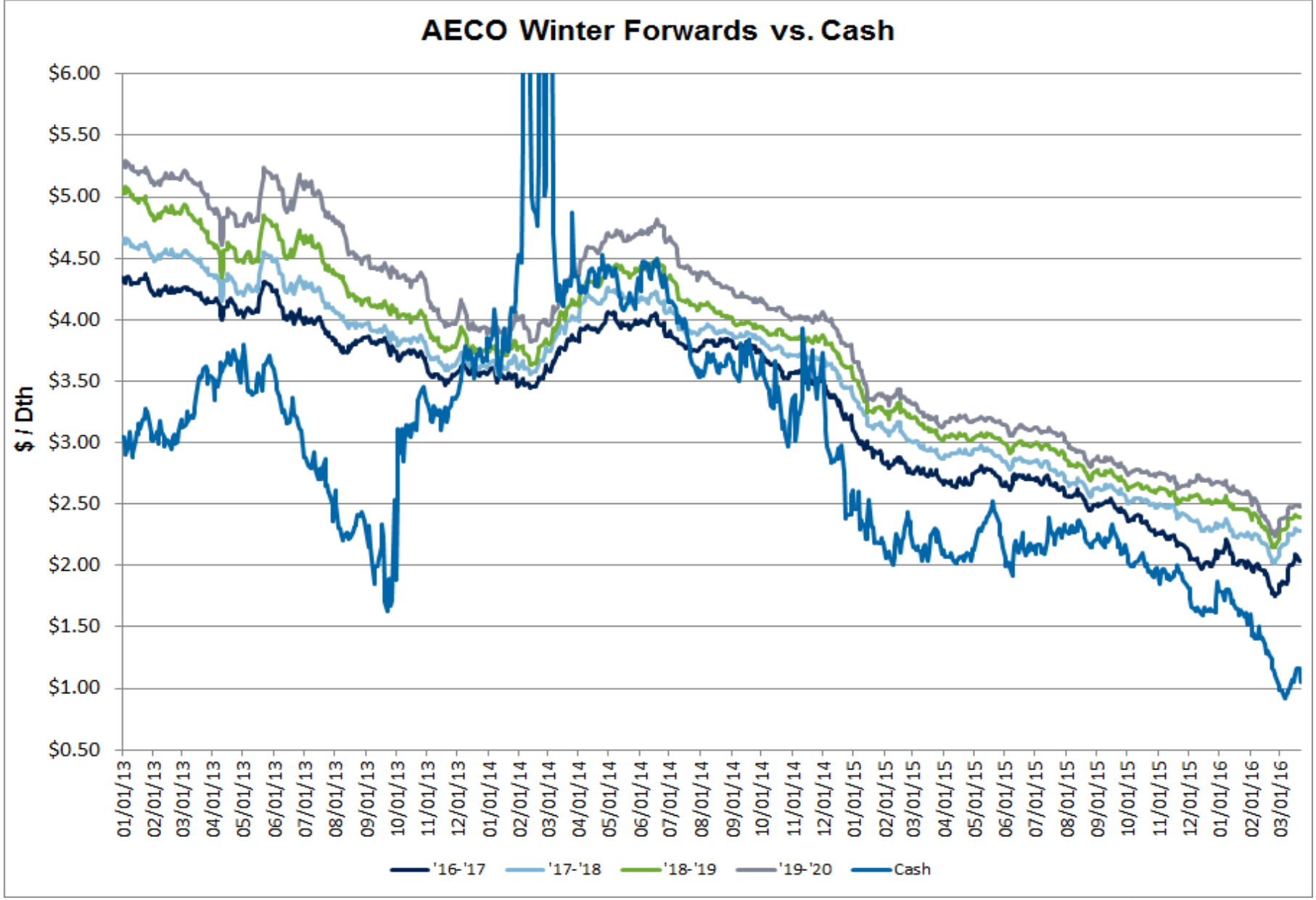
Source: FERC

Oil and Gas Rigs & Production








AECO Winter Forwards vs. Cash
$ / Dth
$6.00
$5.50
$5.00
$4.50
$4.00
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
01/01/13
02/01/13
03/01/13
04/01/13
05/01/13
06/01/13
07/01/13
08/01/13
09/01/13
10/01/13
11/01/13
12/01/13
01/01/14
02/01/14
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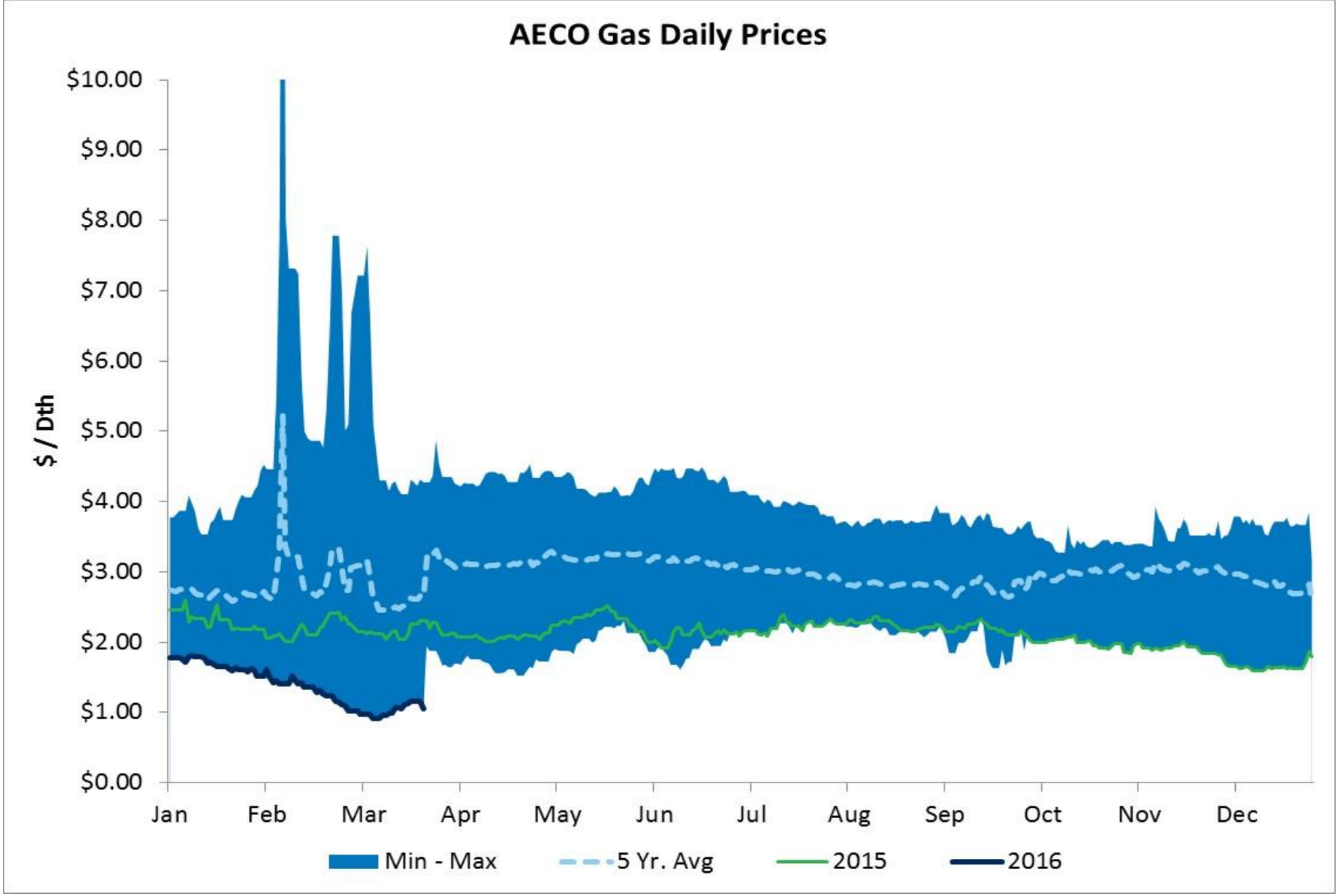
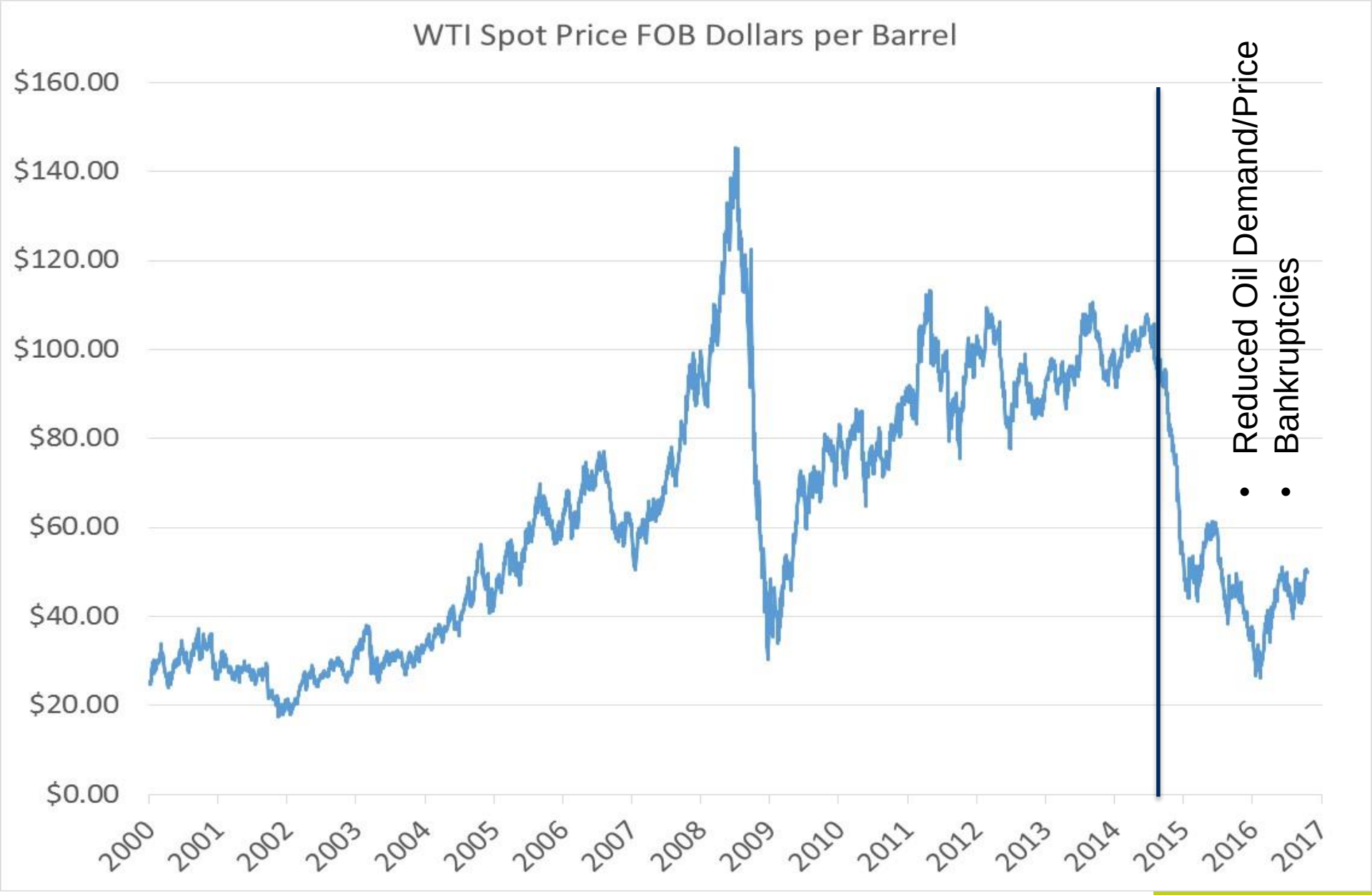
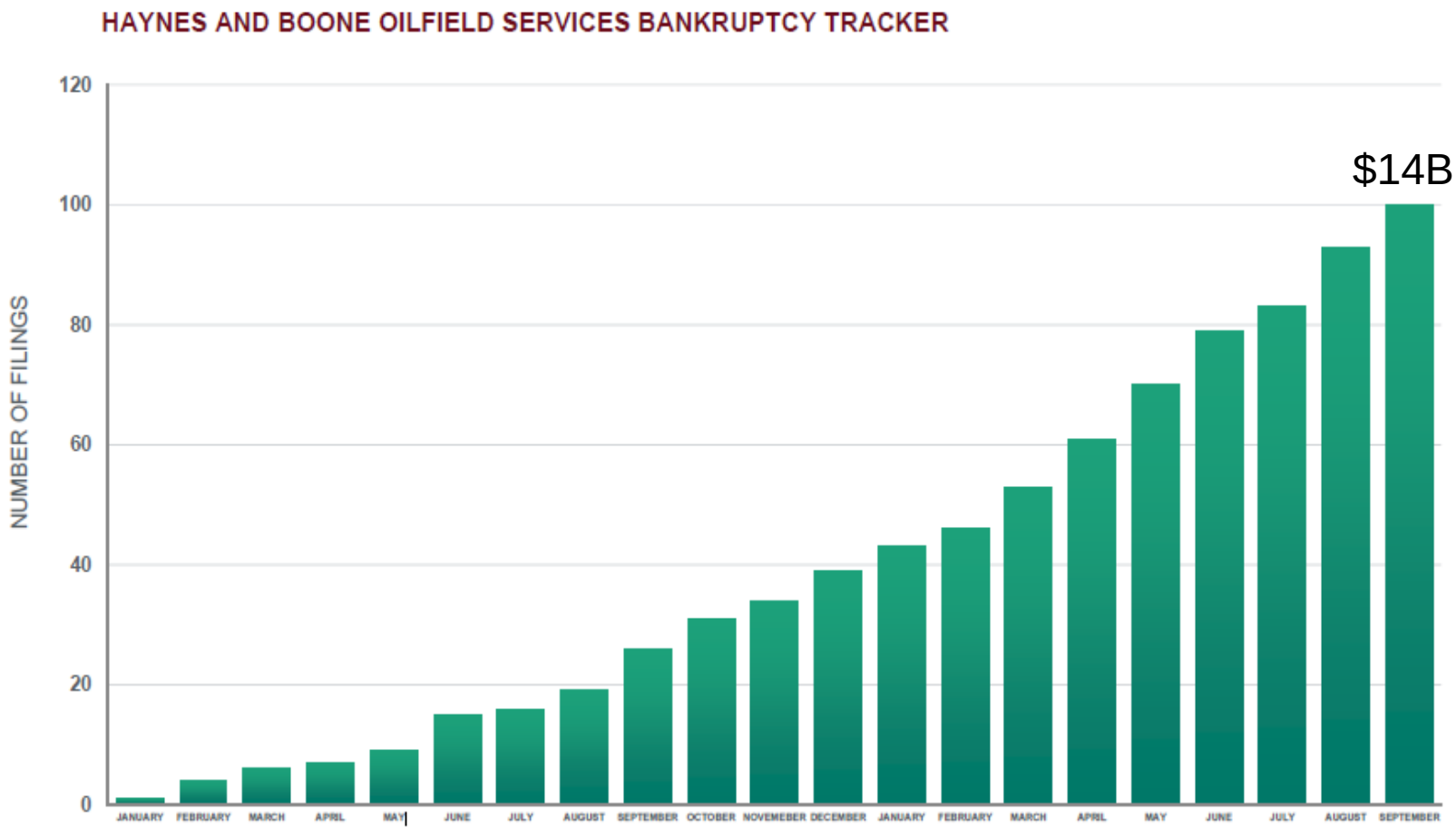
05/01/15
06/01/15
07/01/15
08/01/15
09/01/15
10/01/15
11/01/15
12/01/15
01/01/16
02/01/16
03/01/16
'16-'17
'17-'18
'18-'19
'19-'20
Cash


AECO Gas Daily Prices
$10.00
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
$ / Dth
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Min - Max
5 Yr. Avg
2015
2016


WTI Spot Price FOB Dollars per Barrel
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
• Reduced Oil Demand/Price
• Bankruptcies

Oil and Gas Bankruptcies

2015-2016 CUMULATIVE NORTH AMERICAN OILFIELD SERVICES BANKRUPTCY FILINGS



See pages 6-7 for the list of bankruptcies.
(As of September 30, 2016)

http://www.haynesboone.com/~/media/files/attorney%20publications/2016/ofstracker.ashx

Prices

How prices affect IRP Planning?

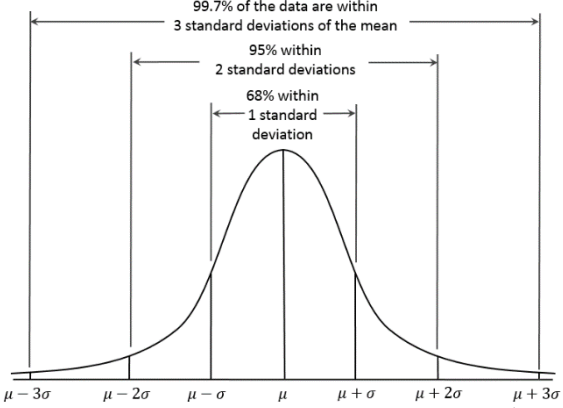
- Major component of the total cost
- Change in price **can** trigger price elastic response
- **THE** major piece of avoided costs and therefore cost effectiveness of DSM
- Can change resource selection based on basin differentials
- Storage utilization

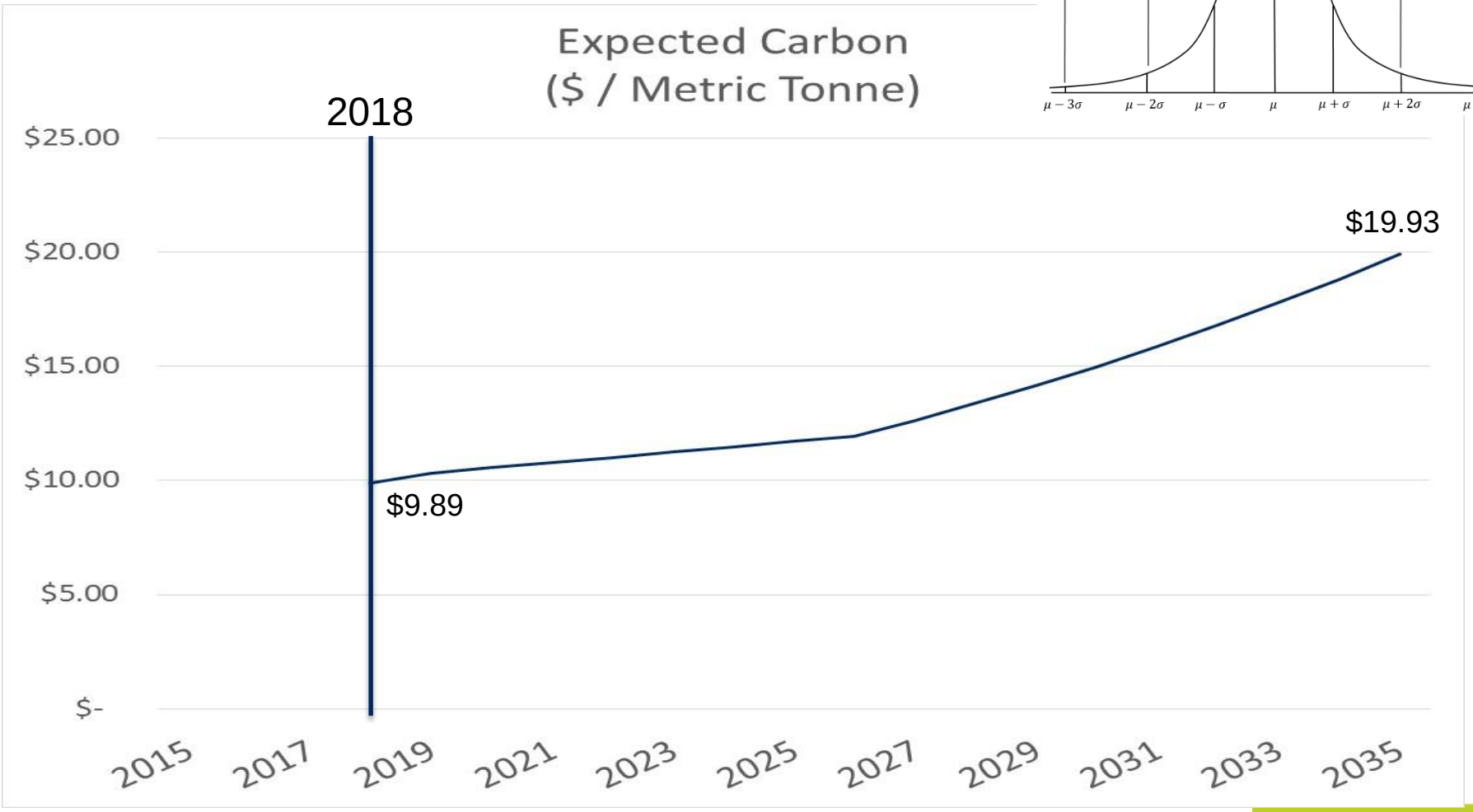
Price Elasticity Proposed Assumptions

- The data is a mixed bag at best:
  - 8 of 9 super regions have statistically significant short and long run elasticity's.
  - At a state level only 10 of 50 show statistical significant elasticity's.
  - In some cases, the estimated elasticity's are positive.

– We incorporated a -.15 price elastic response for our expected elasticity assumption.
  – A price elasticity factor of -0.15:
    - A 10% price **increase** will prompt a 1.5% consumption **decrease**
    - A 10% price **decrease** will prompt a 1.5% consumption **increase**

Carbon Prices





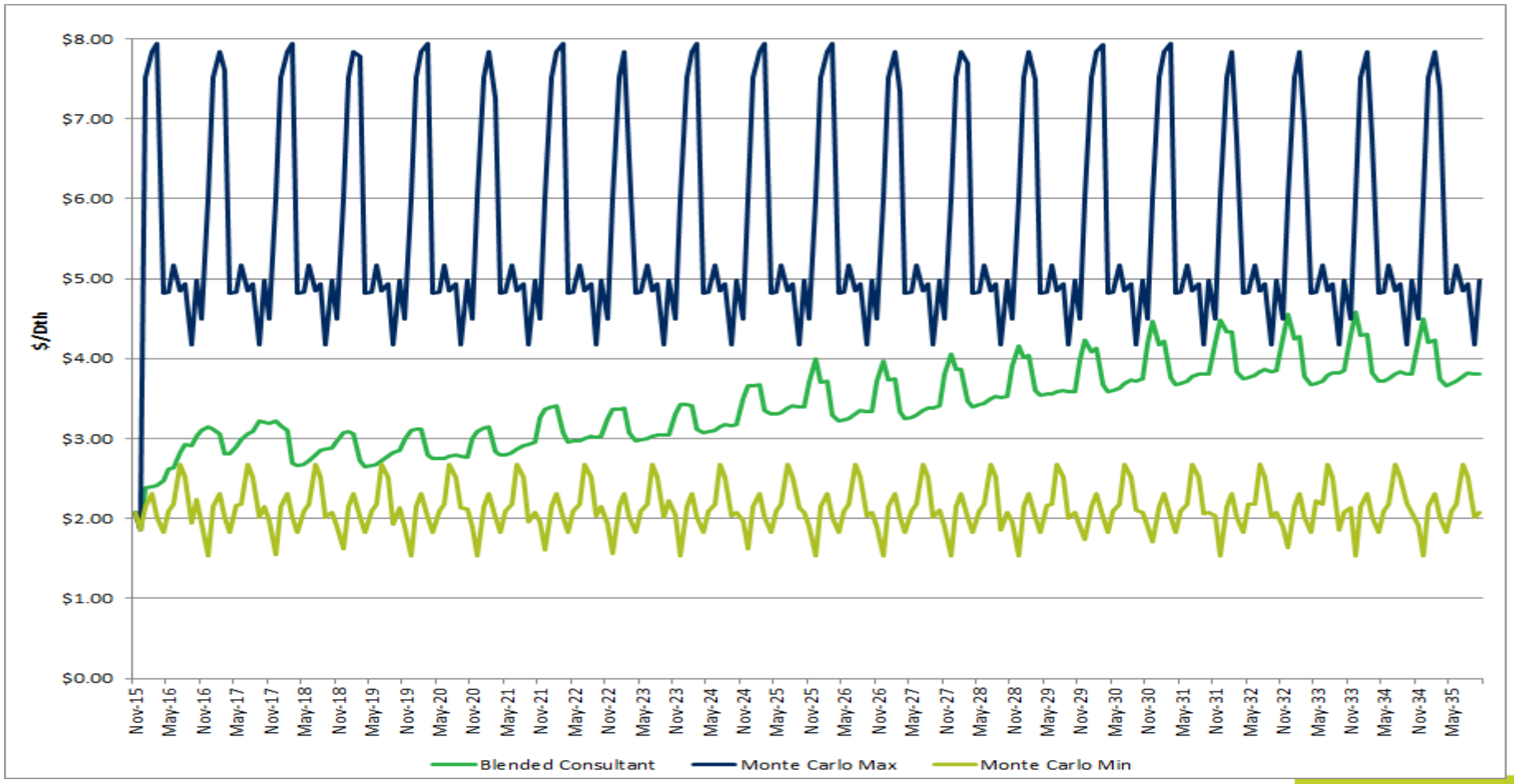
Expected = 2 Sigma of “Likely Policy” &
No carbon & i-732 @ equally distributed between remaining probability

Carbon Adder – Expected

- Includes carbon pricing from 2026-2035 from our consultant
- Avista added pricing starting from 2018 to address incremental adders from legislation in our service territory jurisdictions.
  - We assume floor pricing the same as California's cap and trade of $10 back at the programs initial auction in 2013.

$ / Metric Tonne			
	Starting Price	Ending Price	Years
Low	$ -	$ -	2015-2035
Likely Policy	$ 10.00	$ 19.85	2018-2035
2015 Electric IRP	$ 12.03	$ 25.00	2020-2035
i-732	$ 15.00	$ 46.44	2018-2035
Expected	$ 9.89	$ 19.93	2018-2035

Long Term Henry Hub Price Forecasts (Real $ / Dth)

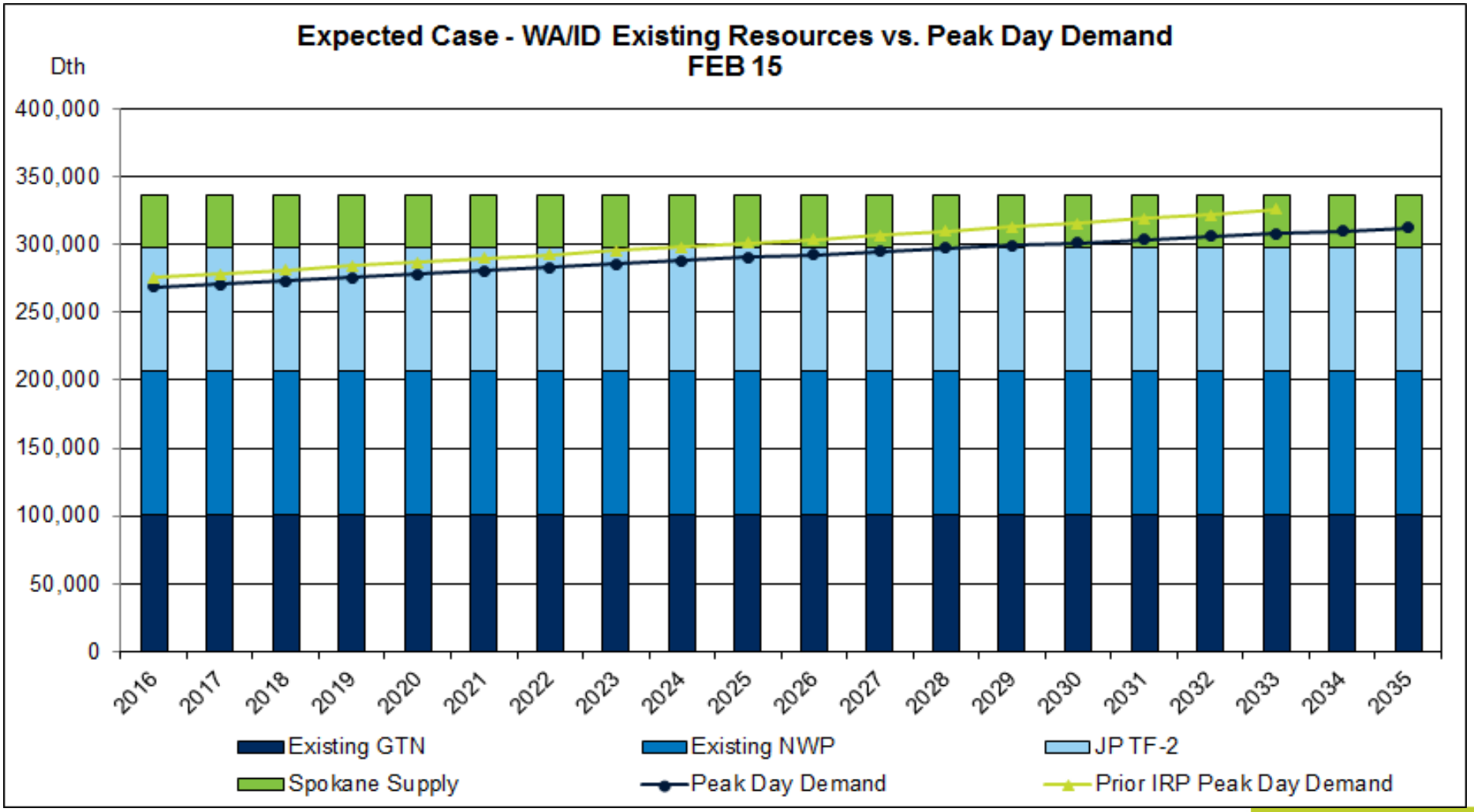


Integrated Resource Scenarios and Action Plan

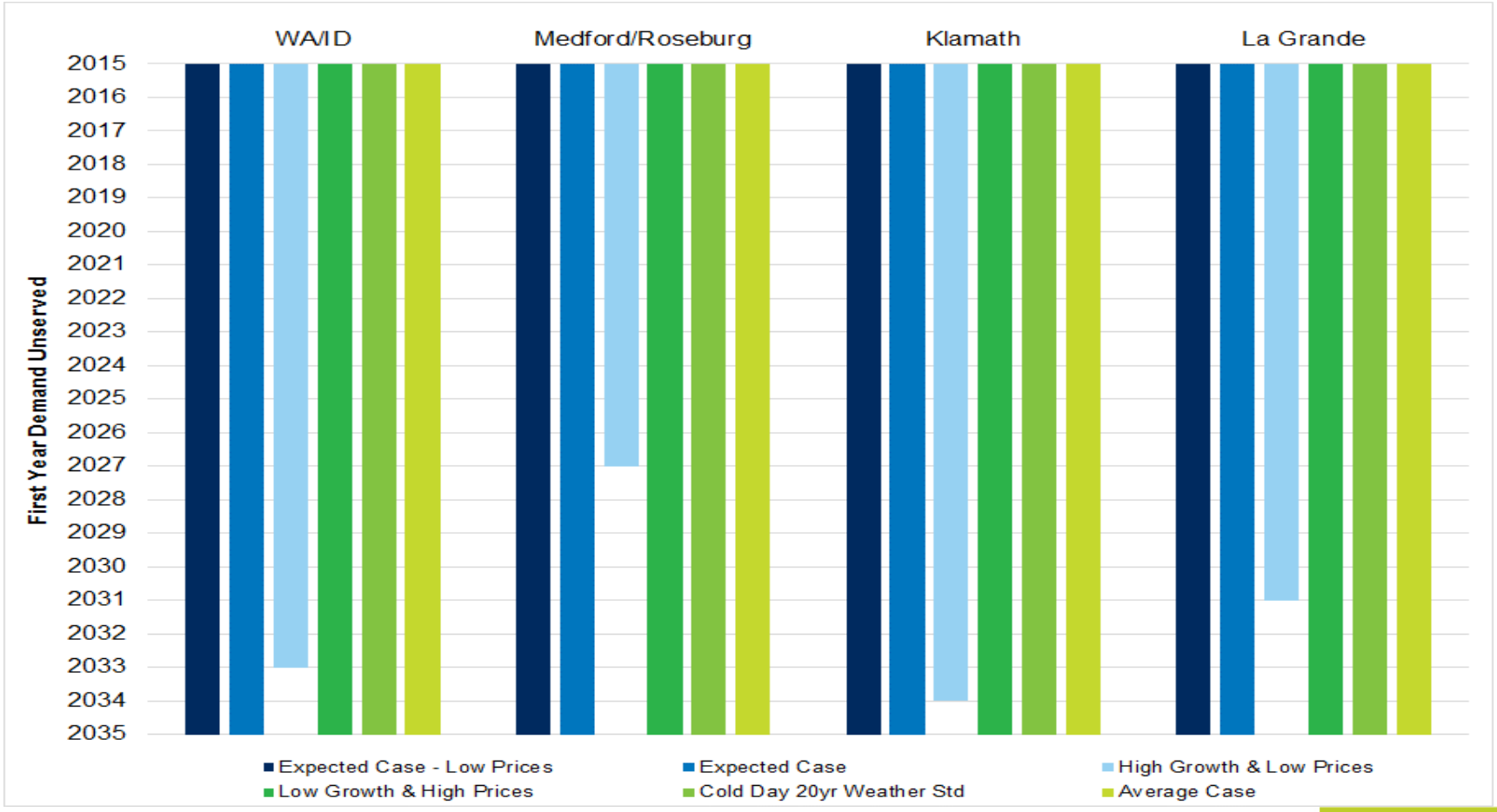
Proposed Scenarios

Proposed Scenarios INPUT ASSUMPTIONS	**Expected** **Case - Low Prices**	**Expected** **Case**	**High Growth** **& Low Prices**	**Low Growth** **& High Prices**	**Cold Day 20yr** **Weather Std**	**Average** **Case**
Customer Growth Rate	Reference Case Cust Growth Rates	Reference Case Cust Growth Rates	High Growth Rate	Low Growth Rate	Reference Case Cust Growth Rates	Reference Case Cust Growth Rates
Use per Customer	3 yr Flat + Price Elast.	3 yr Flat + Price Elast.	3 yr Flat + Price Elast. + CNG/NGV	3 yr Flat + Price Elast.	3 yr Flat + Price Elast.	3 yr Flat + Price Elast.
Demand Side Management	Yes	Yes	Yes	Yes	Yes	Yes
Weather Planning Standard	Coldest Day	Coldest Day	Coldest Day	Coldest Day	Alternate Planning Standard	Normal
Prices						
Price curve	Low	Expected	Low	High	Expected	Expected
Carbon Legislation ($/Ton)	$9.89 - 19.93	$9.89 - 19.93	None	$9.89 - 19.93	$9.89 - 19.93	$9.89 - 19.93
RESULTS						
First Gas Year Unserved						
WA/ID	N/A	N/A	2033	N/A	N/A	N/A
Medford	N/A	N/A	2027	N/A	N/A	N/A
Roseburg	N/A	N/A	2027	N/A	N/A	N/A
Klamath	N/A	N/A	2034	N/A	N/A	N/A
La Grande	N/A	N/A	2031	N/A	N/A	N/A

Existing Resources vs. Peak Day Demand



Peak Day Deficiencies by Scenario and Area

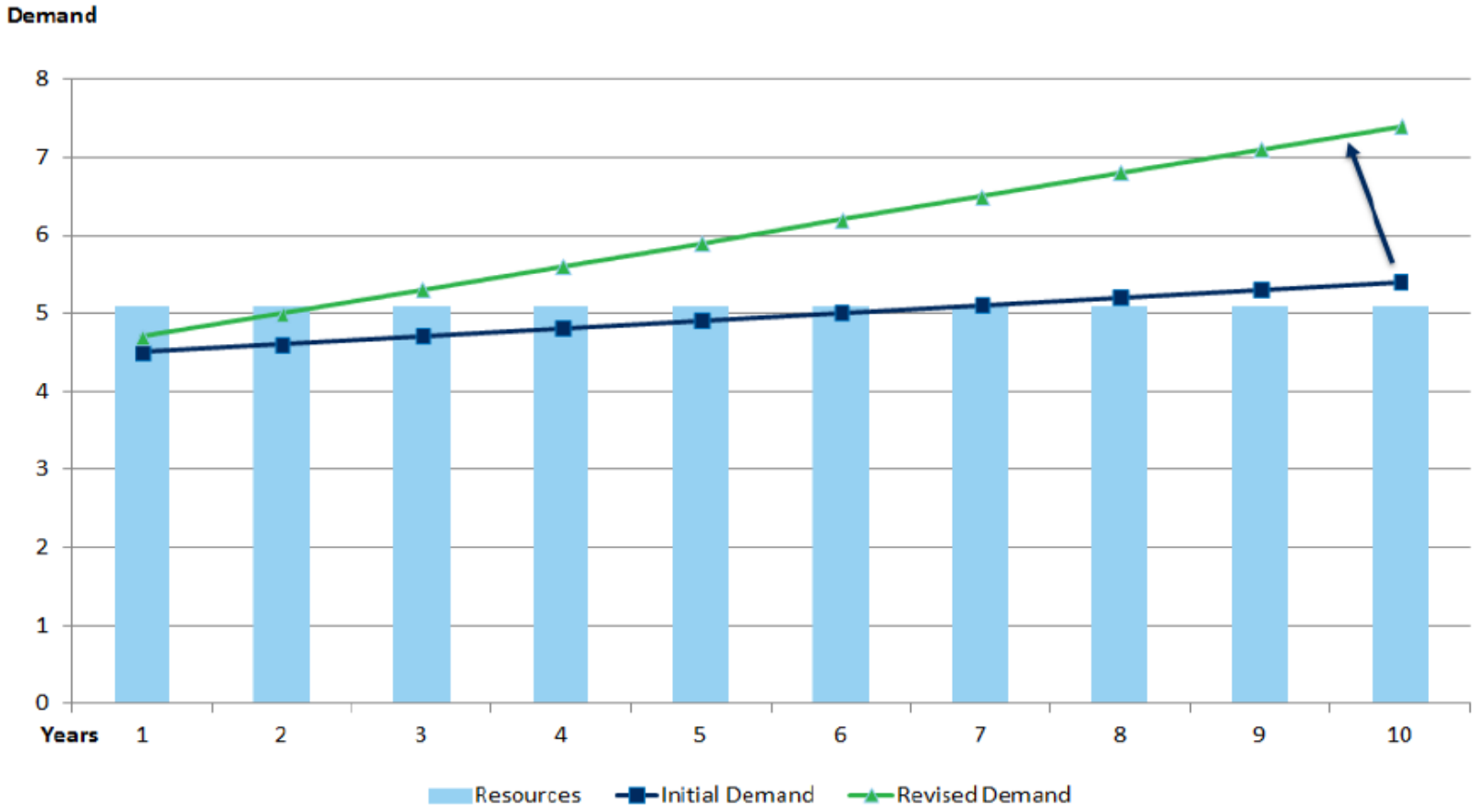


High Growth & Low Price scenario solve

- Washington/Idaho – Increase contracting on Alberta System, Foothills, and GTN pipeline by 13,000 Dth/day.
- Medford/Roseburg – Add an upsized compressing station on the Medford Lateral increasing deliverability by 50,000 Dth/day.
- Klamath Falls – Increase the Operating Pressure on the Klamath Falls Lateral.
- La Grande – Increase contract delivery on Northwest Pipeline.

Key Risk – "Flat Demand"
If demand rebounds the need for resources accelerates.

Figure 9: Flat Demand Risk Example



Action Plan

1. Avista will research market opportunities due to historically low prices including derivative based contracts, 10 year forward strip, and natural gas reserves.
2. Avista's 2018 IRP will contain a dynamic DSM program structure in its analytics.