

# Chelan PUD

## Energy Resources Quarterly Board Update 4<sup>th</sup> Quarter 2016

February 6, 2017



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# Energy Planning & Trading

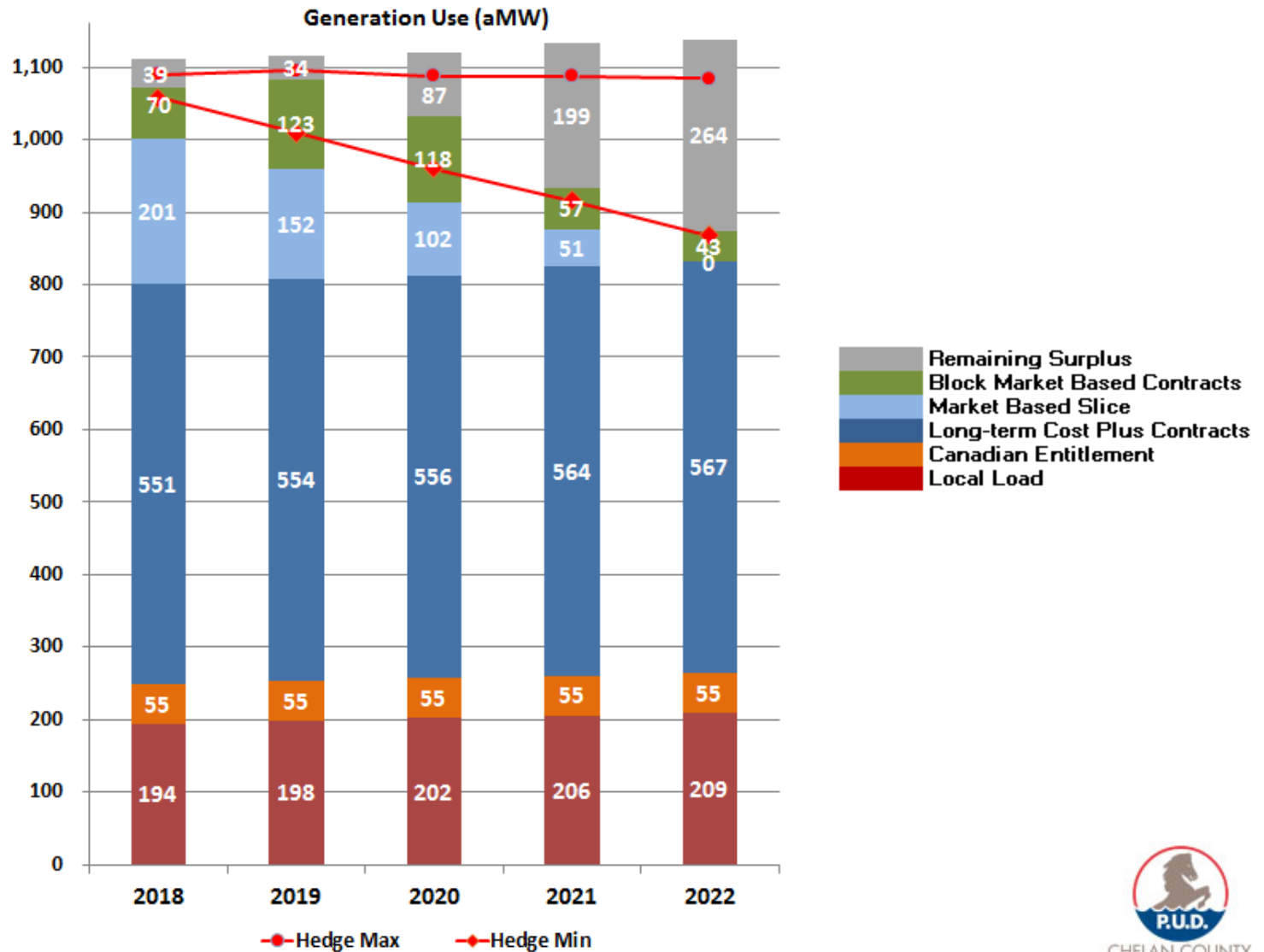
## 2016 Q4

- **Portfolio Overview** (Gregg Carrington)
- **Operations and Planning** (Janet Jaspers)
  - Snowpack, Streamflow and Pricing update
  - Net Wholesale Revenue Forecast update
- **Market Update** (Janet Jaspers)
- **Energy Efficiency Update** (Josh Mitchell)

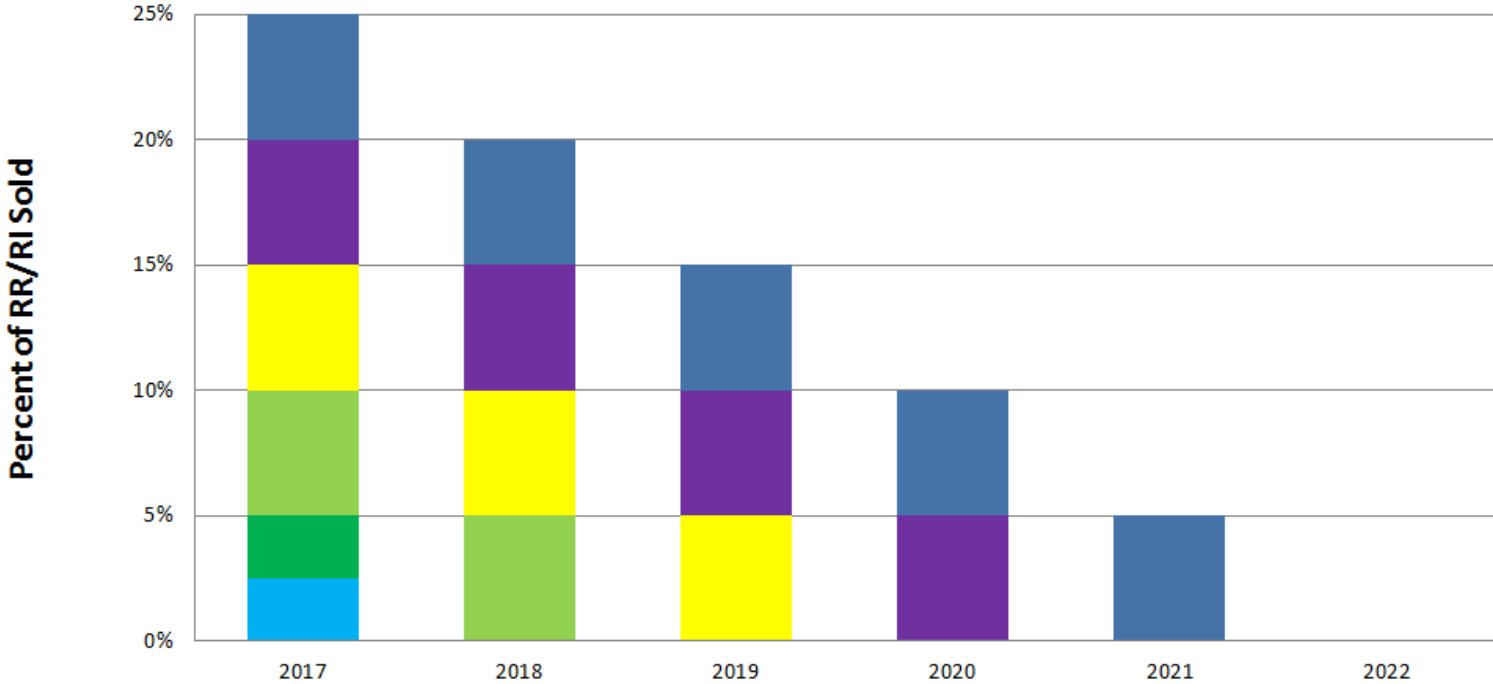
# Key Message Points

- The District's 2016 Net Wholesale Revenue and other energy related revenue forecast (\$122.6 Million) is slightly higher than the budget amount for 2016 (\$121.2 Million).
- The Specified Source energy sales contributed \$4.3 Million to the Net Wholesale Revenue which is \$1.6 Million higher than budget.
- A lower load forecast has offset declining forward energy prices to cause a slight increase in Net Wholesale Revenue projections in future years, particularly in years not tightly hedged.
- Energy efficiency compliance goal was met. 2017 is a compliance target setting year.

# District's Load/Resource Balance

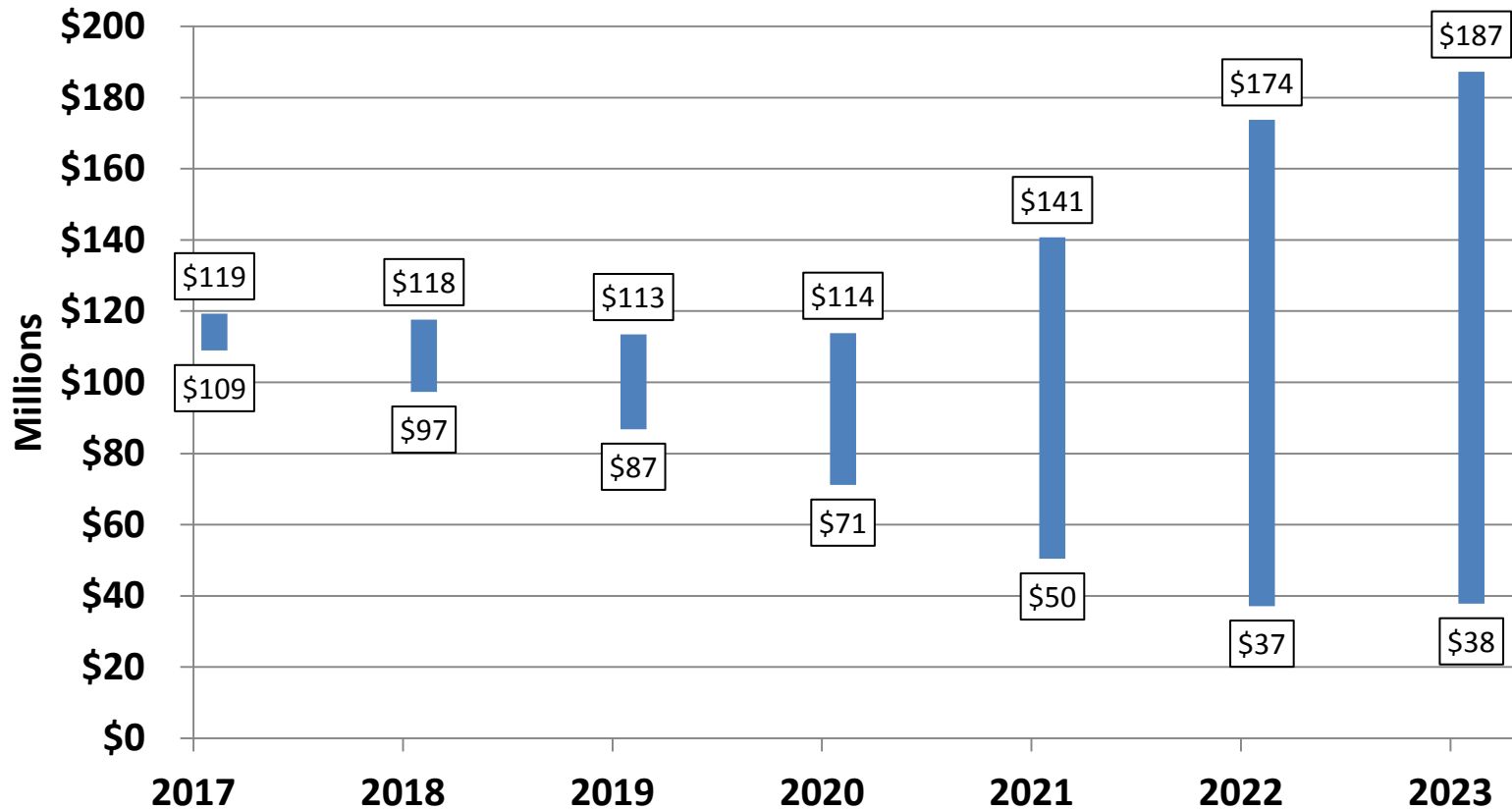


### Current Market Position - Slice Products



	2017	2018	2019	2020	2021	2022
■ Slice Product 26 - Morgan	5.0%	5.0%	5.0%	5.0%	5.0%	
■ Slice Product 22 - Avista	5.0%	5.0%	5.0%	5.0%		
■ Slice Product 18 - Exelon	5.0%	5.0%	5.0%			
■ Slice Product 15 - Morgan	5.0%	5.0%				
■ Slice Product 11 - Morgan	2.5%					
■ Slice Product 10 - Exelon	2.5%					

# Net Wholesale Revenue Projections



# Columbia River Flow Update for 2016

2016	Rocky Reach Flow (kcfs)	Budget Rocky Reach Flow (kcfs)	% of Budget
Jan	94	115	82%
Feb	98	110	89%
Mar	110	102	108%
Apr	153	114	134%
May	132	147	90%
Jun	128	167	76%
Jul	111	131	85%
Aug	96	106	90%
Sep	66	76	86%
Oct	75	78	96%
Nov	101	92	110%
Dec	118	108	109%
YTD Average	107	112	95%

\* Budgeted Rocky Reach flow is the median year from the 1929-2011 data set



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# Water Supply Forecast

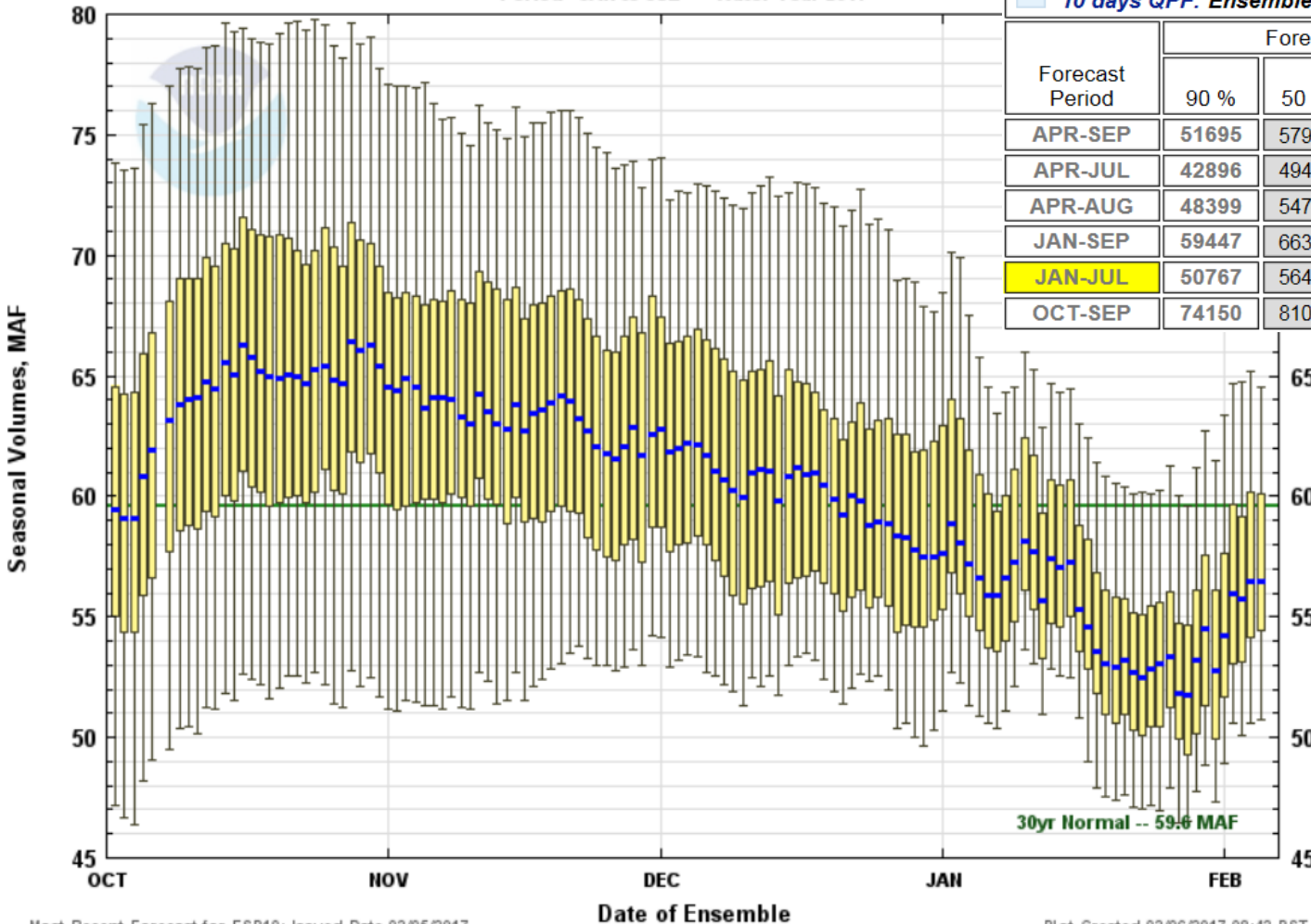


**Water Supply Forecasts**  
**COLUMBIA - GRAND COULEE DAM**  
 Period JAN to JUL -- Water Year 2017

## Official Forecast

10 days QPF: Ensemble: 2017-02-05 Issued: 2017-02-05

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	51695	57986	96	65364	60110
APR-JUL	42896	49400	97	55302	51015
APR-AUG	48399	54714	96	61568	56763
JAN-SEP	59447	66390	97	74982	68694
<b>JAN-JUL</b>	<b>50767</b>	<b>56460</b>	<b>95</b>	<b>64501</b>	<b>59599</b>
OCT-SEP	74150	81094	106	89685	76824

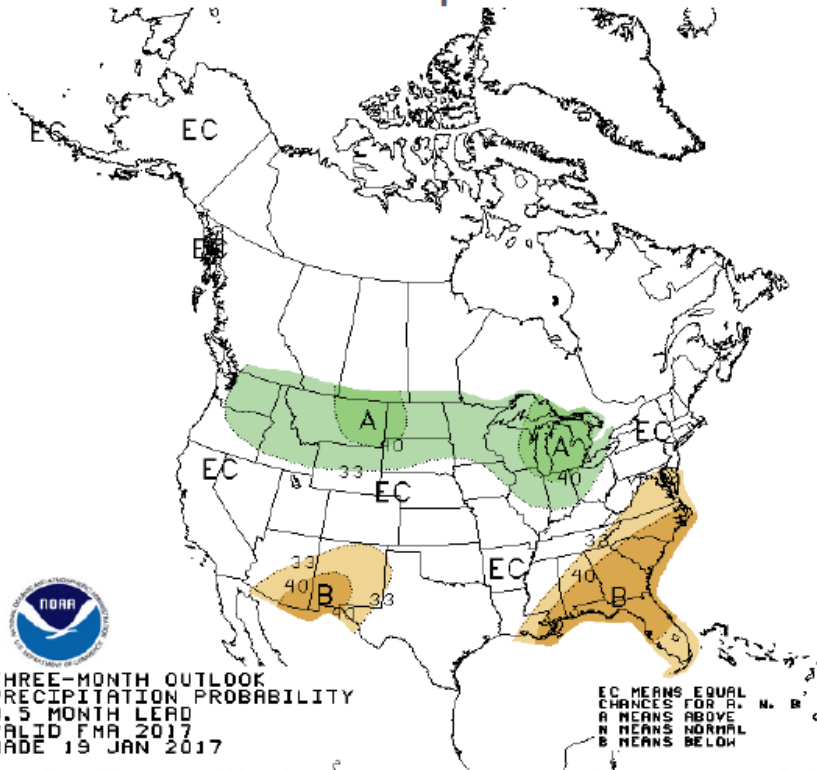


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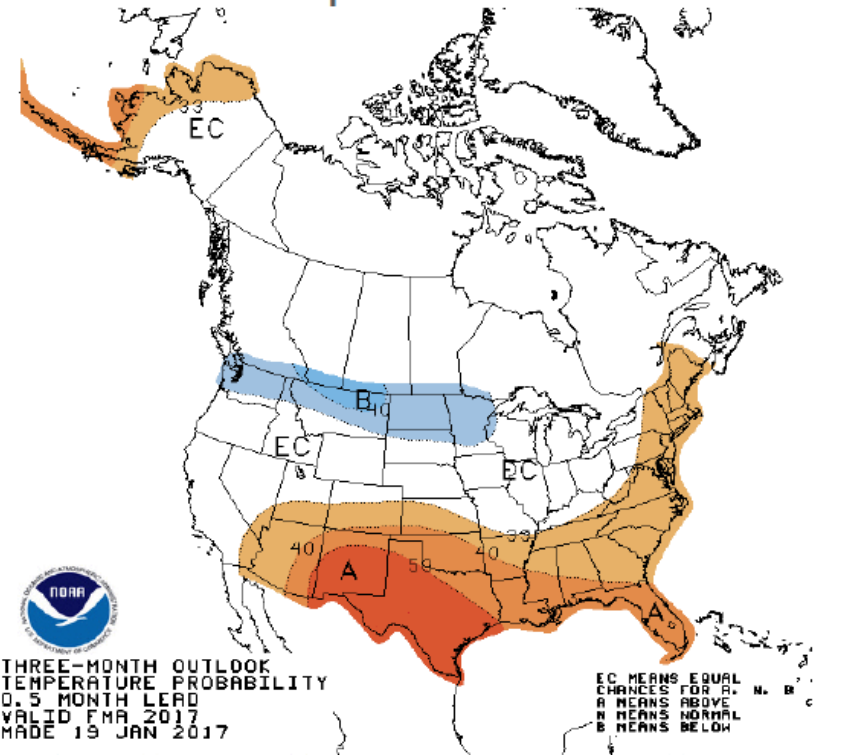


# NOAA Feb-Apr Climate Forecast

## Precipitation



## Temperature

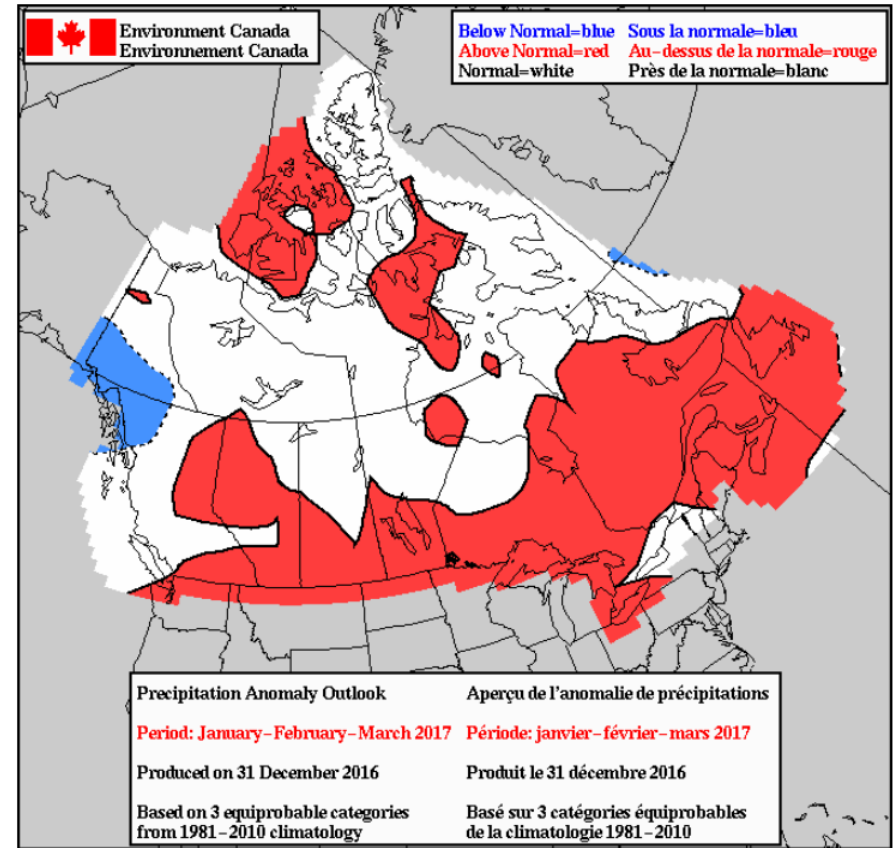
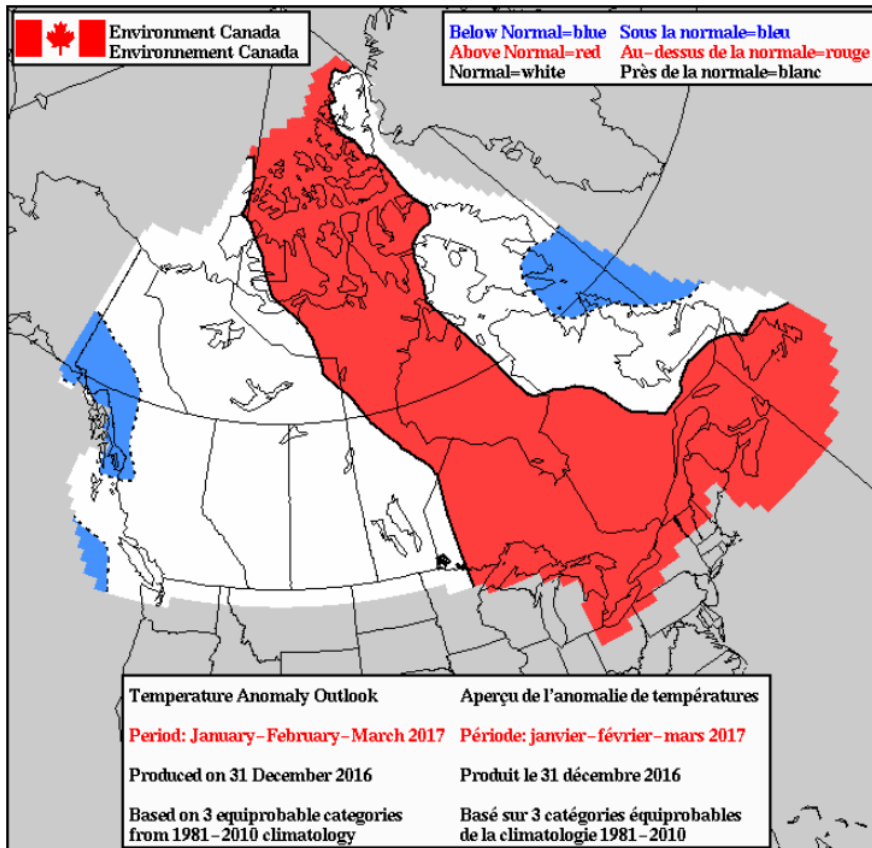


# Canadian Seasonal Forecasts

## Temperature and Precipitation Deterministic Forecasts

Red = Above (warmer)  
Blue = Below (colder)

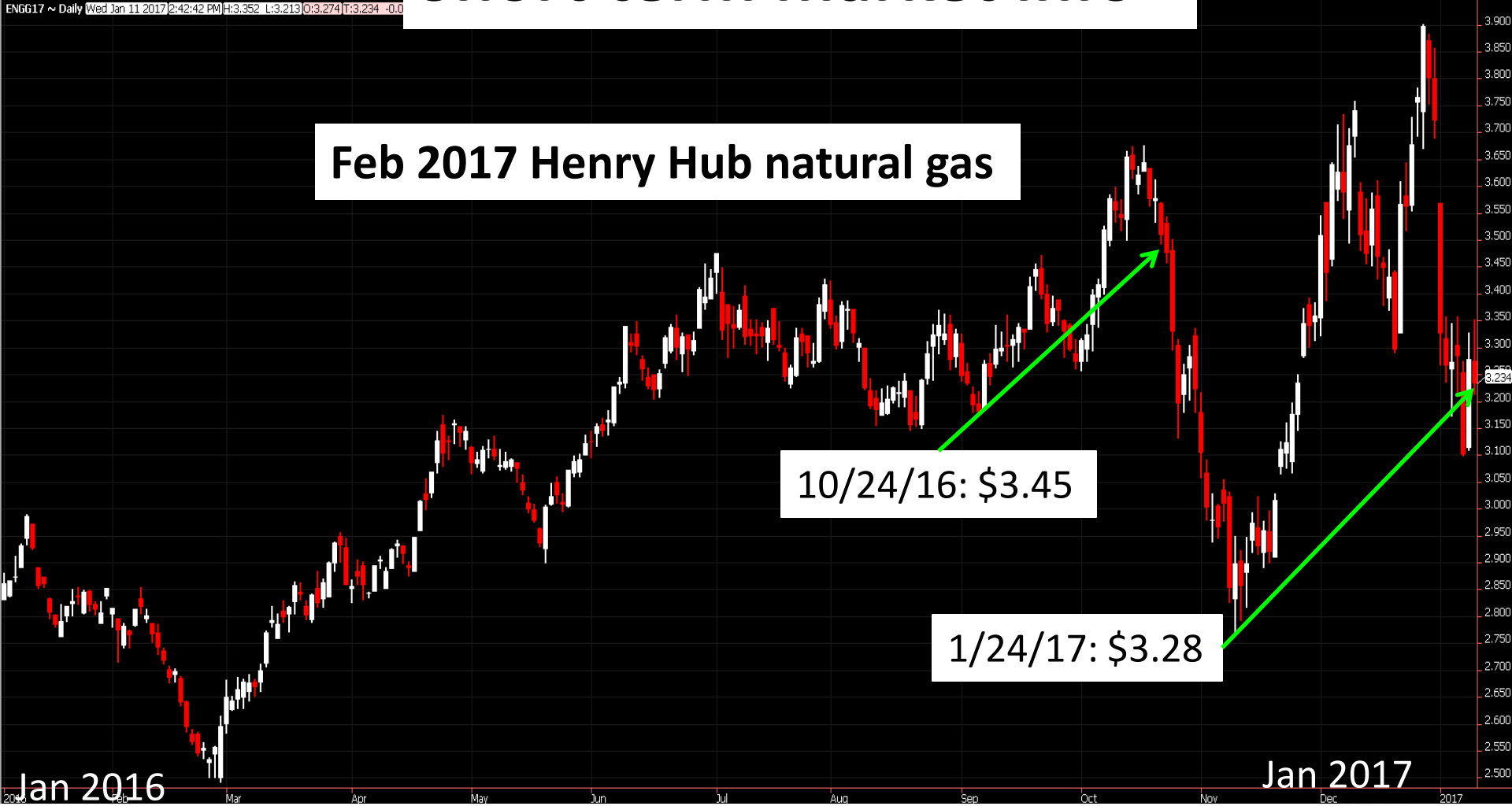
Red = Above (wetter)  
Blue = Below (drier)



# Short term market info

ENGG17 ~ Daily Wed Jan 11 2017 2:42:42 PM H:3.352 L:3.213 O:3.274 T:3.234 -0.0

Feb 2017 Henry Hub natural gas

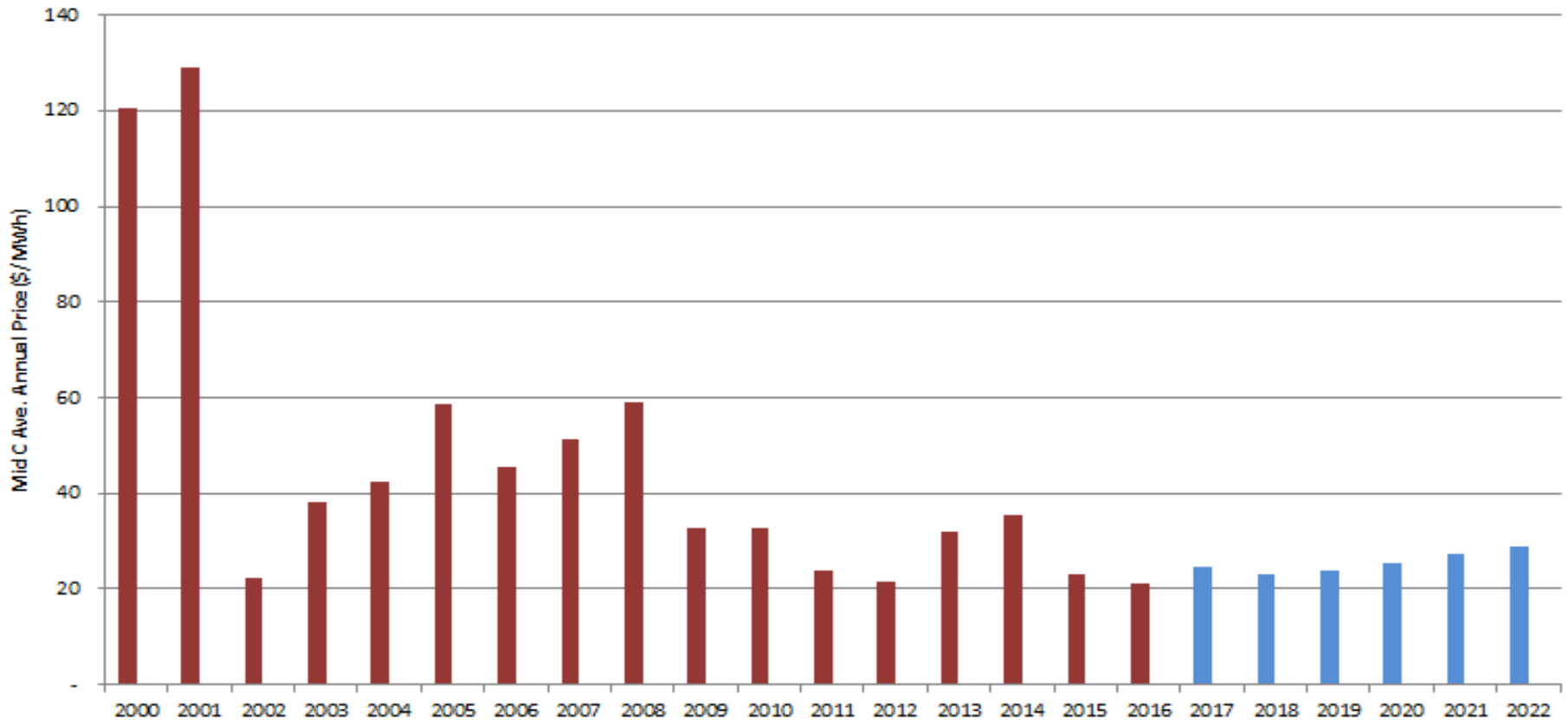


Jan 2016

Jan 2017



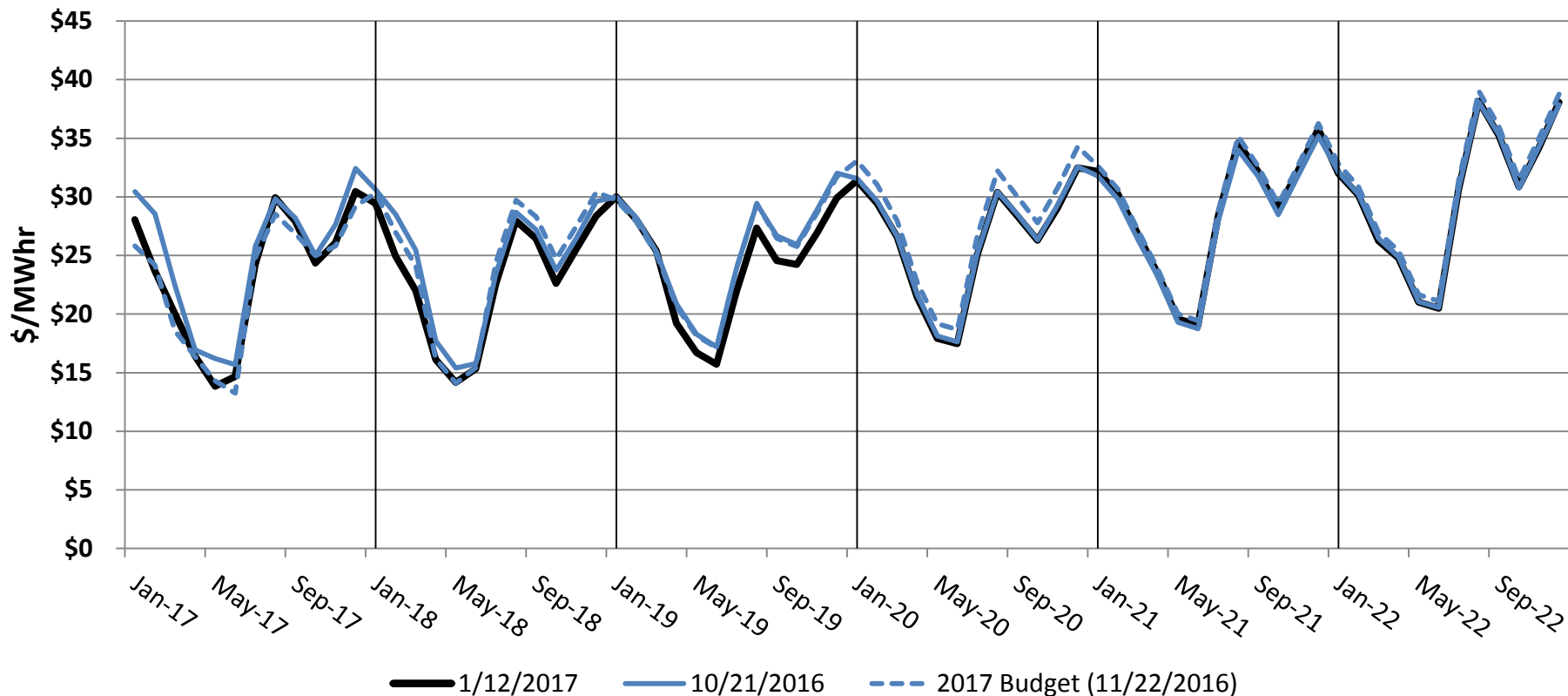
# Mid-C Flat Annual Wholesale Electricity Prices



Red = Historical prices

Blue = Forward price curve

## MIDC Flat Forward Price Curve (ICE DA index prices for previous months)



## 2016 NWR and Other Energy-Related Revenue

	Budget	Forecast**	Variance
Net Wholesale Revenue*	\$ 112,896,790	\$ 113,157,862	\$ 261,072
Specified Source	\$ 2,727,396	\$ 4,308,289	\$ 1,580,892
Other	\$ 523,275	\$ 589,761	\$ 66,486
Renewables	\$ 285,435	\$ 403,108	\$ 117,673
Real-Time Revenue	\$ 8,000,000	\$ 6,708,371	\$ (1,291,629)
<b>NWR and Other Energy-Related Revenue</b>	<b>\$ 121,182,225</b>	<b>\$ 120,269,341</b>	<b>\$ (912,884)</b>

\*Net Wholesale Revenue (NWR) includes all premiums from specified source and other premium products as well as slice sales and standard forward / pre-schedule energy trading activity. Other premium products include hubbing, system delivery, scheduling services, Lake Chelan reserves, super peak products.

\*\*2016 forecast based on Jan-Dec actuals. Note: Actuals are preliminary and likely to change until books are final.

## 2017 NWR and Other Energy-Related Revenue

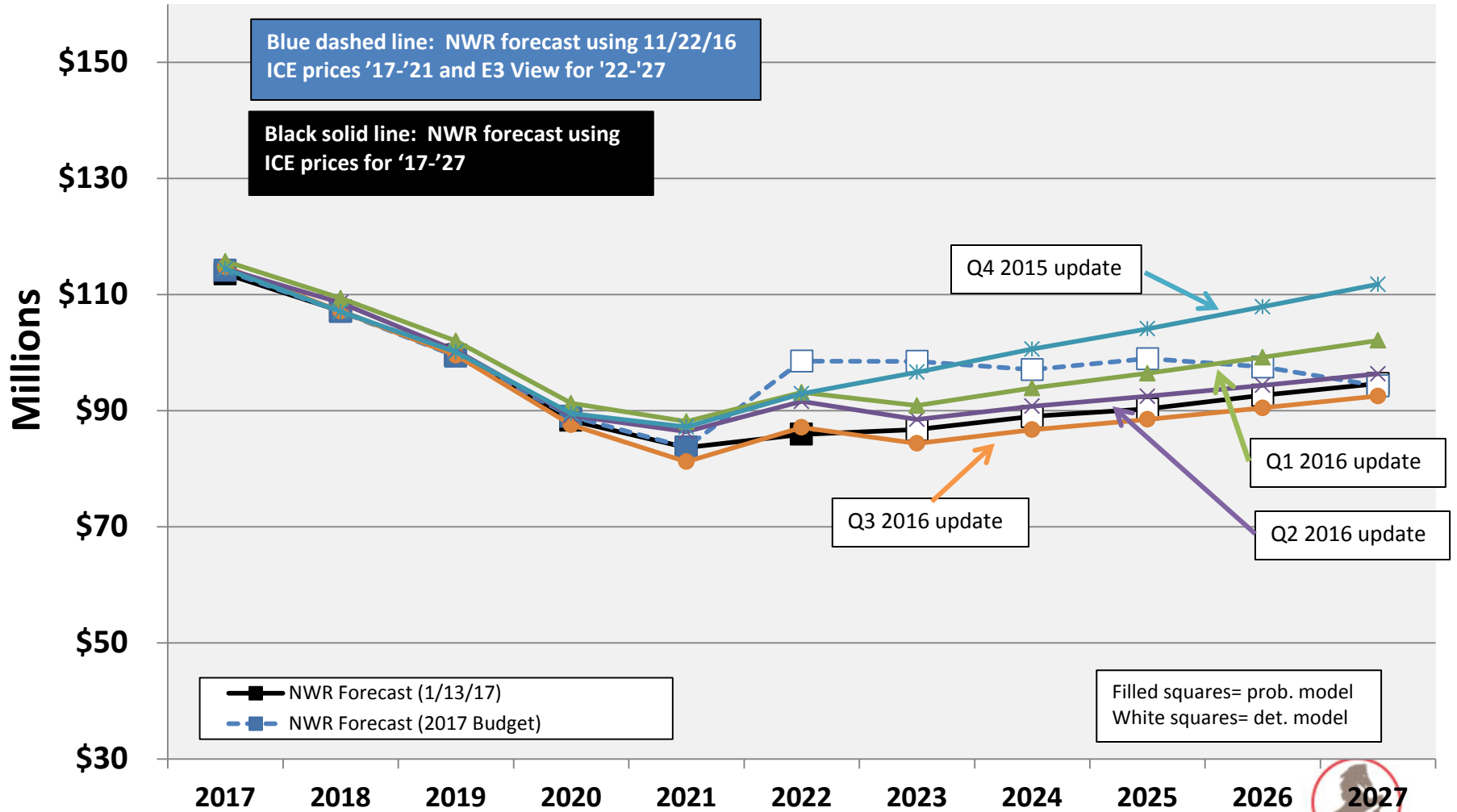
	Budget		Forecast**		Variance
Net Wholesale Revenue*	\$ 114,138,098	\$	113,522,122	\$	(615,975)
Specified Source	\$ 3,091,960	\$	3,091,960	\$	-
Other	\$ 615,896	\$	615,896	\$	-
Frequency Response	\$ 282,750	\$	282,750	\$	-
Renewables	\$ 458,090	\$	458,090	\$	-
Real-Time Revenue	\$ 7,000,000	\$	7,000,000	\$	-
<b>NWR and Other Energy-Related Revenue</b>	<b>\$ 121,878,938</b>	<b>\$</b>	<b>121,262,962</b>	<b>\$</b>	<b>(615,975)</b>

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*\*\*2017 forecast based on Jan-Dec estimates.*

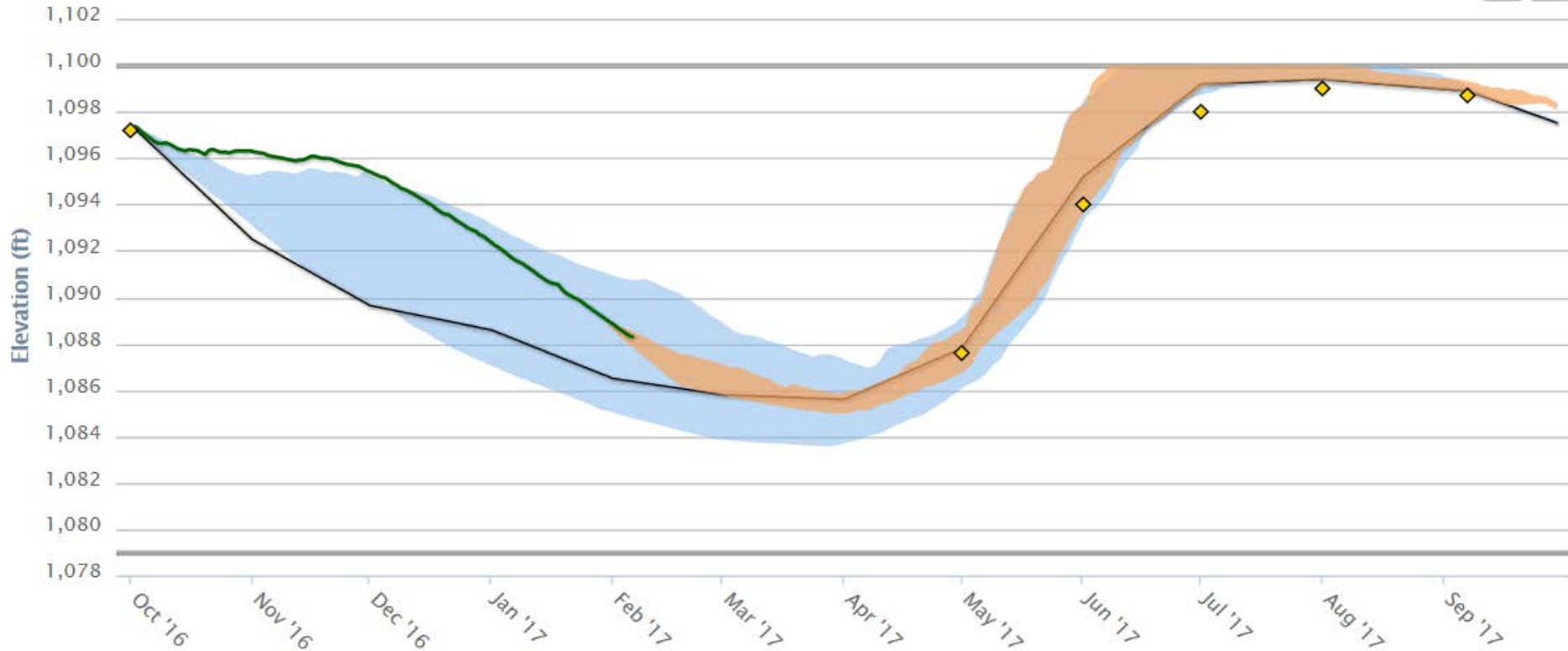


# Net Wholesale Revenue Forecast



# Lake Chelan Lake Level Webpage (2/6/17)

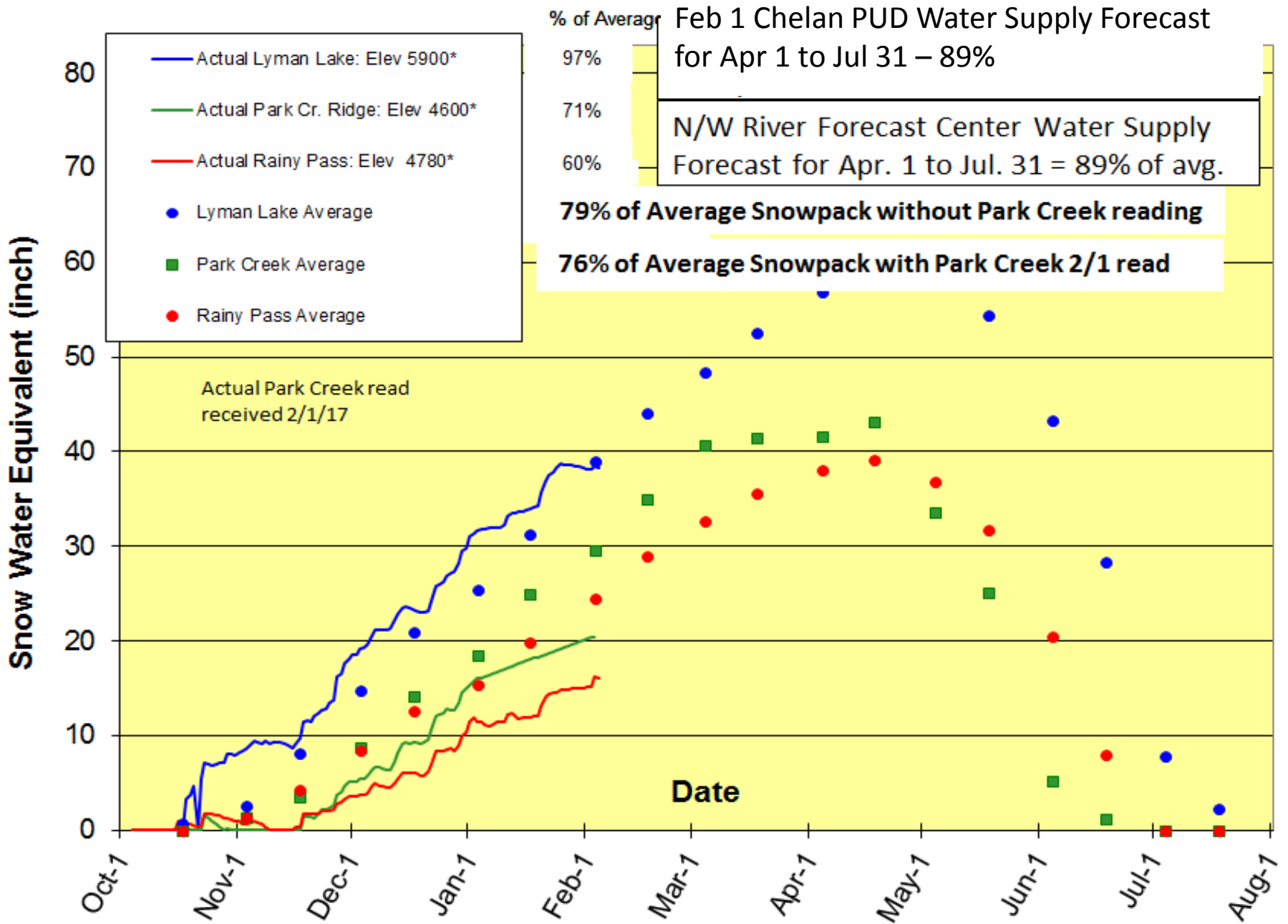
Chelan Lake Levels: Expected Operating Ranges



- Current Year Actual Elevation (ft)
- Previous Year Actual Elevation (ft)
- Current Forecasted Operating Range (ft)
- Current Forecasted Average Elevation (ft) (50% chance of occurring)
- October 1 Forecasted Operating Range (ft)
- October 1 Forecasted Average Elevation (ft)
- Target Curve During Dry and Average Water Years (ft)
- Target Curve During Wet Water Years (ft)
- ◆ Minimum Target Elevation

# Lake Chelan Basin Snowpack 2016 - 2017 Corrected for Field Readings

Updated Feb 2



# Market Info

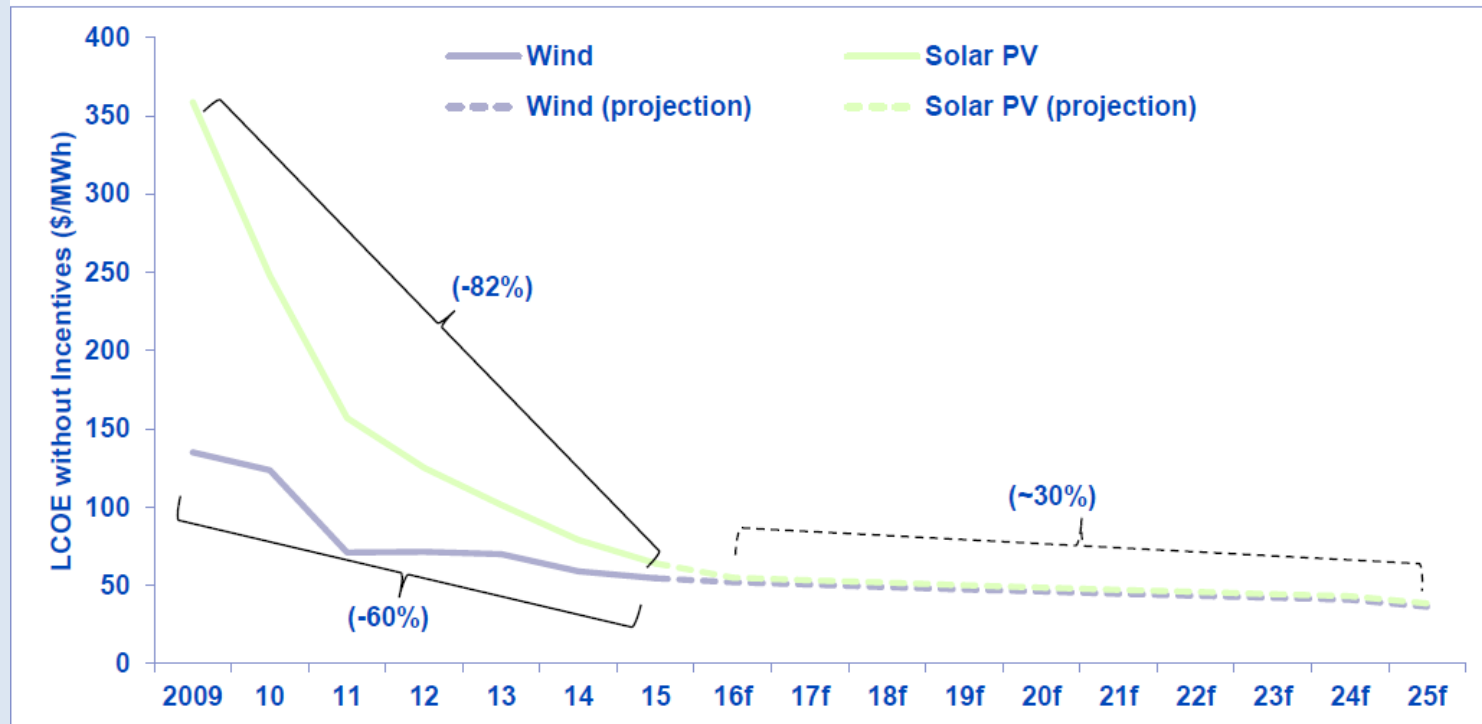
## Natural Gas Reaches New All-Time Storage Record

- EIA's Storage Report for week ending Nov 11<sup>th</sup> indicated that natural gas inventories have reached 4,047 Bcf, eclipsing last year's all-time record of 4,007 Bcf.

## Natural Gas Export

In November, with natural gas exports reaching 7.4 Bcf/d and imports hitting 7 Bcf/d the US became a net exporter of natural gas for the first time in 60 years. The change was mostly due to the rise in Mexican exports (4 Bcf/d), LNG exports (1 Bcf/d), and a decline in Canadian imports

Figure 4: Historical and Projected Cost Declines for Wind Power and Solar PV Technology<sup>3</sup>



# Energy Efficiency Results-2016

Compliance Target was .83 aMW  
Stretch Target was 2.1 aMW

Energy Efficiency Savings (aMW)	Incentive and Labor Cost	\$/MWh Over the Life	Estimated Value Over Life <sup>1</sup>
2.04	\$ 3,881,000	\$ 14.48	\$5,250,000

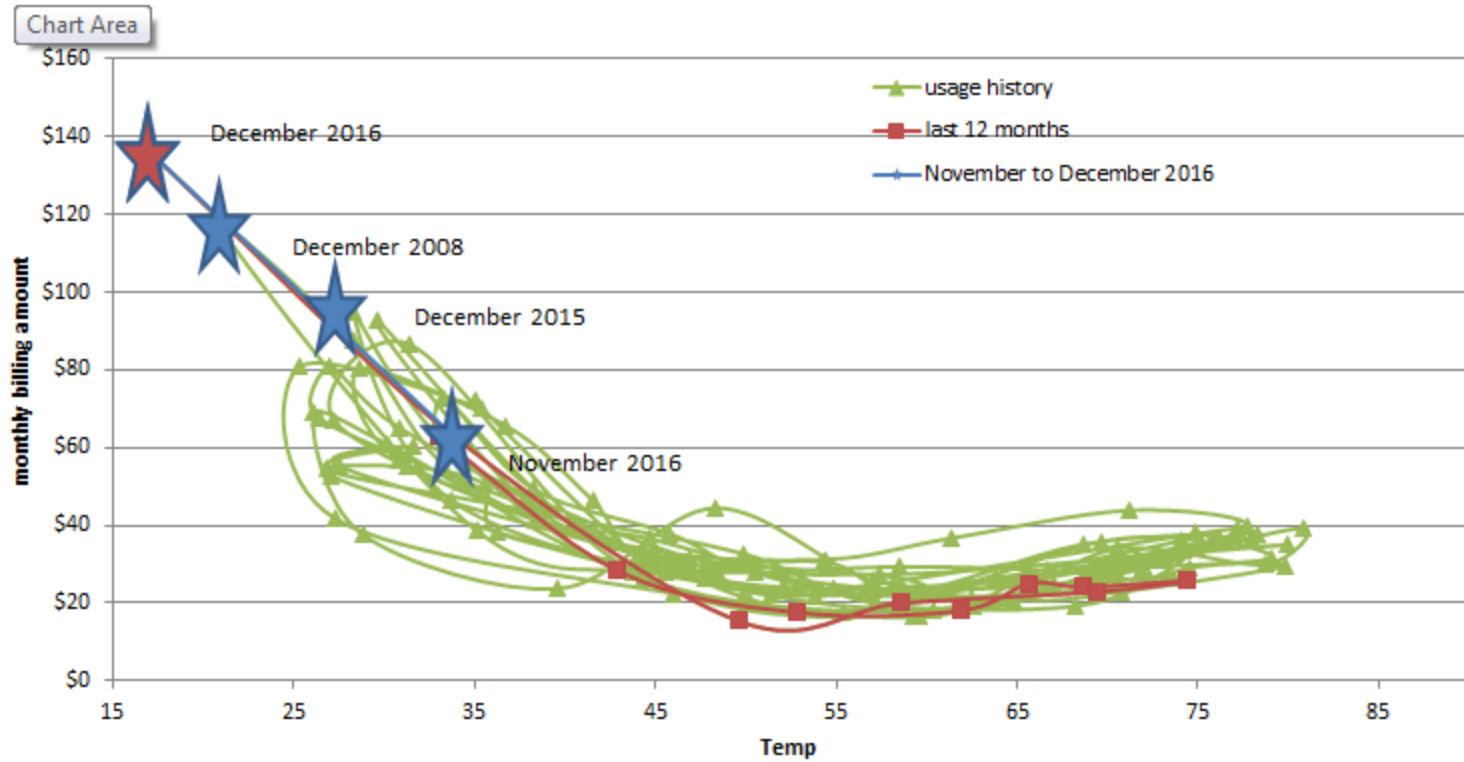
1. Based on weighted avg. life of the measure, 7% discount rate

# Resetting the Goal in 2017

- 2017 goals consistent with 2016:
  - Stretch- 2.1aMW
  - Compliance- .83aMW
- 2018/2019 Compliance Target will be set in November
  - Conservation Potential Assessment 2017
  - Board review and approval of target in Q4

# How Cold Was it?

## Homeowner Energy Usage



# Summary

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Questions?



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