

Chelan PUD

Energy Resources Quarterly Board Update Q3

November 7, 2016



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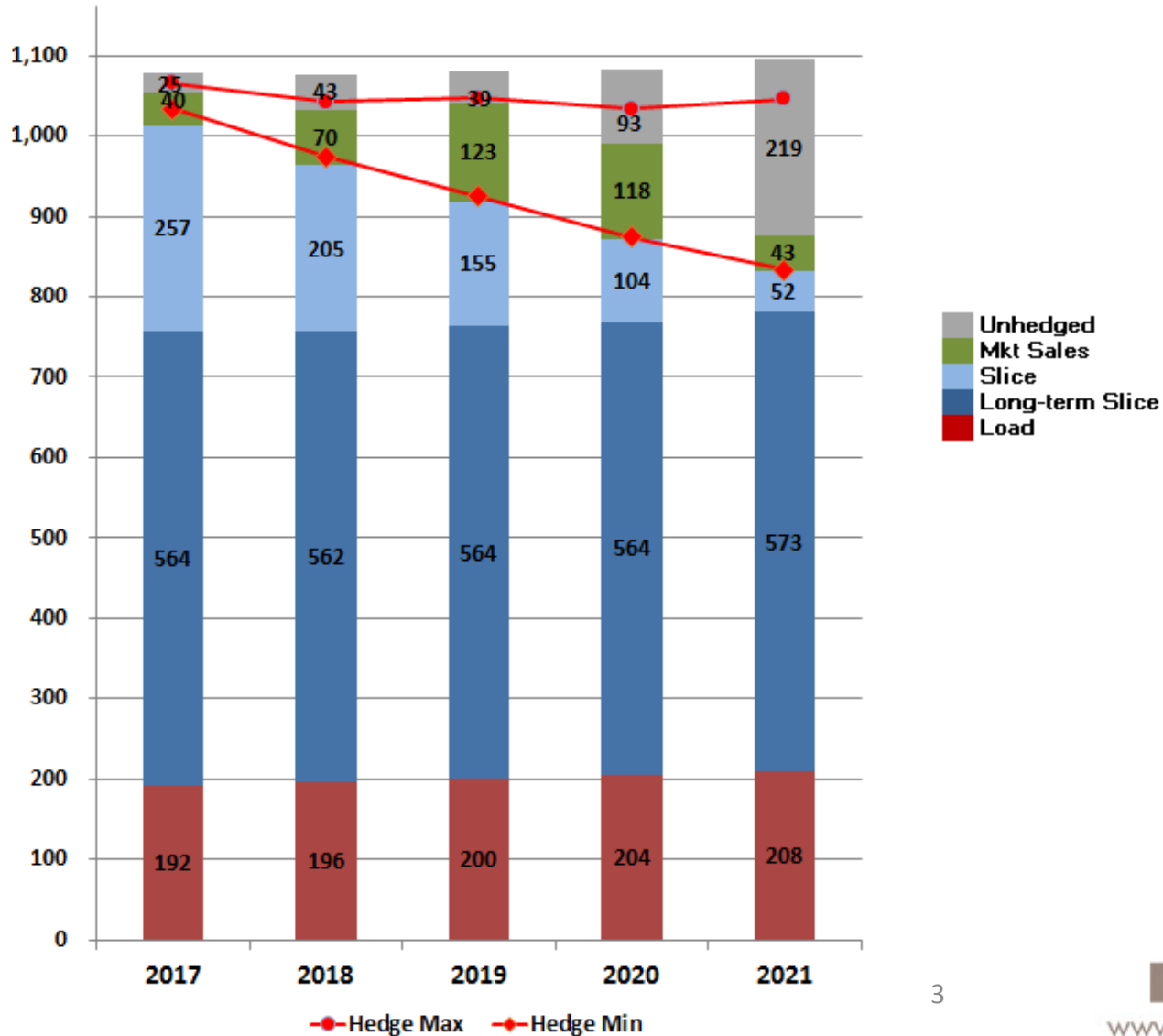
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Energy Planning & Trading

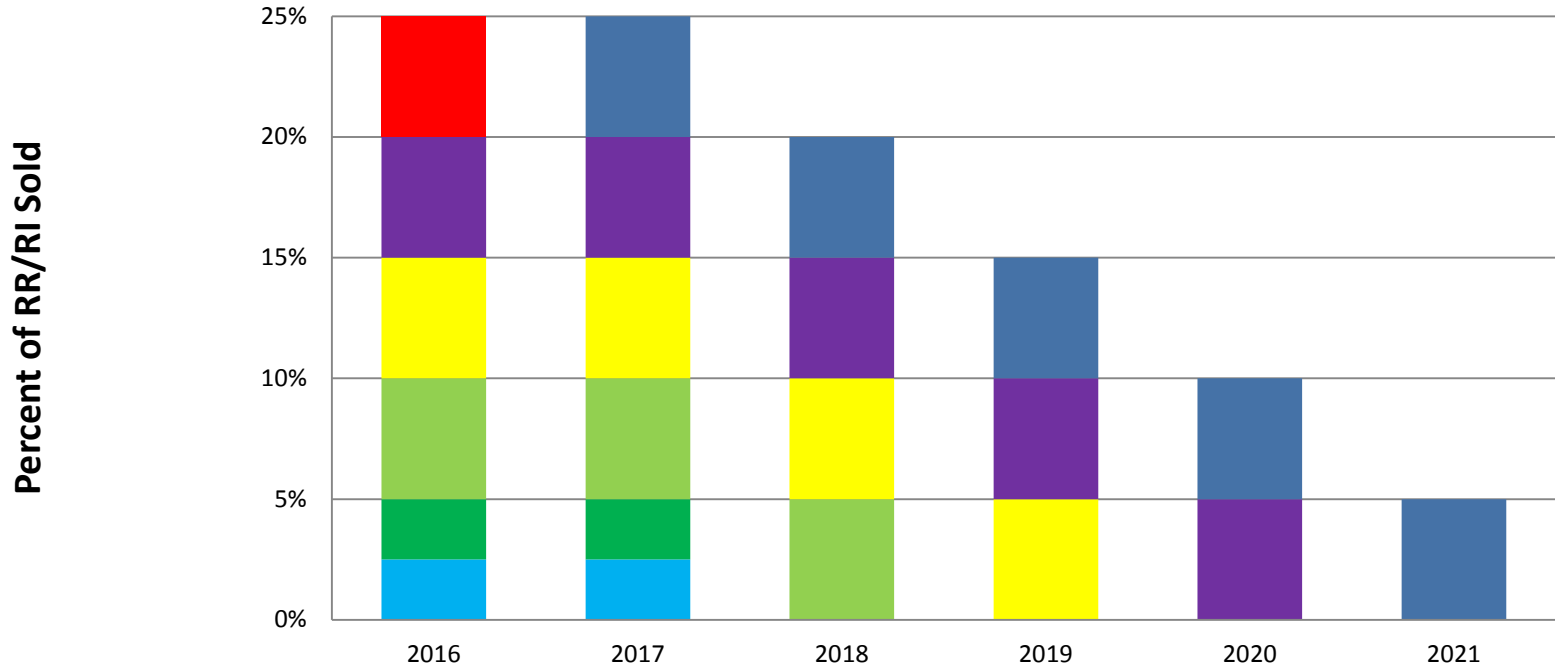
2016 Q3

- **Portfolio Overview** (Gregg Carrington)
- **Operations and Planning** (Mike Bradshaw)
 - Snowpack, Streamflow and Pricing update
 - Net Wholesale Revenue Forecast update
- **Market Update** (Mike Bradshaw)
- **Energy Efficiency Update** (Andrew Grassell)

District's Load/Resource Balance (average MW)



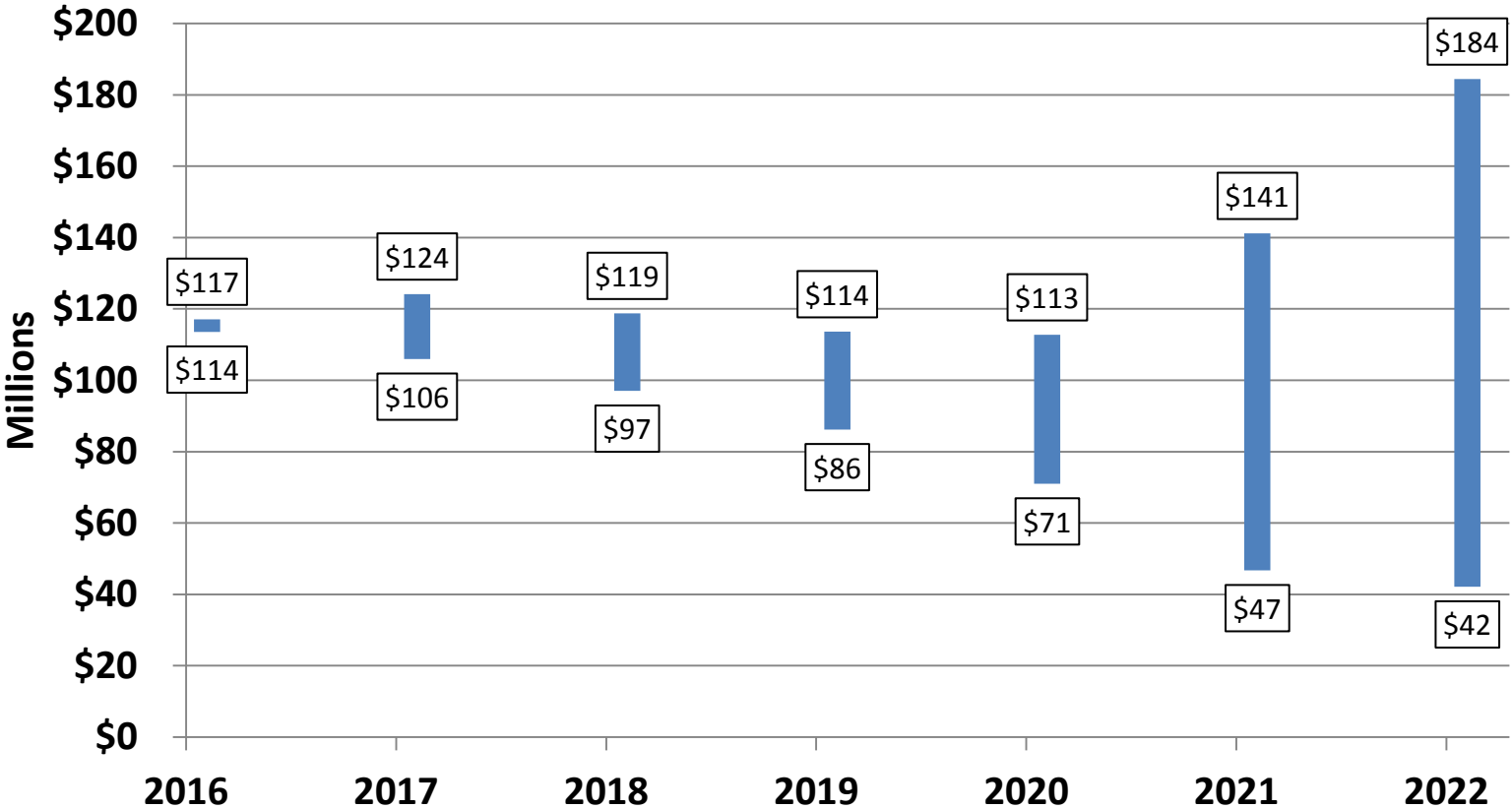
Current Market Position - Slice Products



	2016	2017	2018	2019	2020	2021
■ Slice Product 26 - Morgan		5.0%	5.0%	5.0%	5.0%	5.0%
■ Slice Product 23 - TransAlta	5.0%					
■ Slice Product 22 - Avista	5.0%	5.0%	5.0%	5.0%	5.0%	
■ Slice Product 18 - Exelon	5.0%	5.0%	5.0%	5.0%		
■ Slice Product 15 - Morgan	5.0%	5.0%	5.0%			
■ Slice Product 11 - Morgan	2.5%	2.5%				
■ Slice Product 10 - Exelon	2.5%	2.5%				



Net Wholesale Revenue Projections



Columbia River Flow Update for 2016

2016	Rocky Reach Flow (kcf)	Budget Rocky Reach Flow (kcf)	% 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		78	
Nov		92	
Dec		108	
YTD Average	110	119	92%

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



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Water Supply Forecast



COLUMBIA - GRAND COULEE DAM (GCDW1) Forecasts for Water Year **2017**

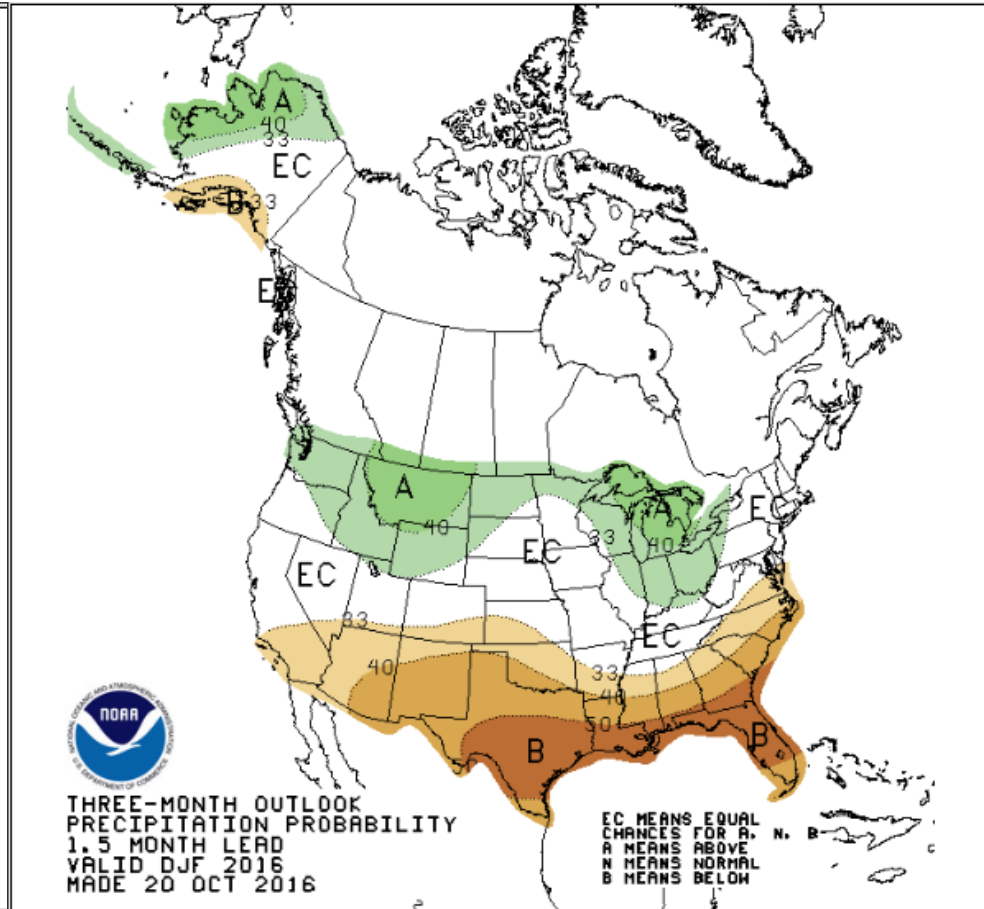
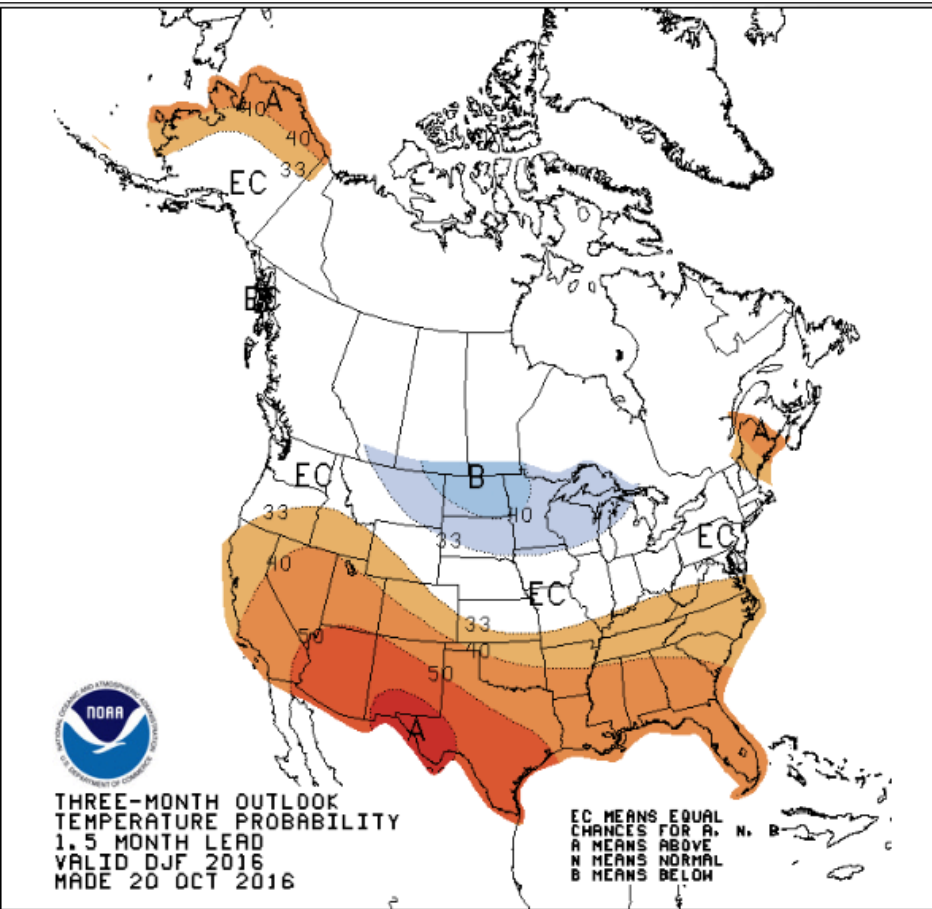
Official Forecast

10 days QPF: Ensemble: **2016-10-23** Issued: 2016-10-23

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	53251	63610	106	82790	60110
APR-JUL	44634	54243	106	68641	51015
APR-AUG	50009	60076	106	76741	56763
JAN-SEP	60796	74328	108	91585	68694
JAN-JUL	52252	64706	109	79382	59599
OCT-SEP	73055	86560	113	104796	76824



NOAA Dec-Feb Climate Forecast



Short term market info

Dec 2016 Henry Hub natural gas price

1/2/2016

ENG216 ~ Daily Mon Oct 24 2016 4:08:26 PM H:3.403 L:3.300 O:3.387 T:3.323 -0.038 -1.13%

10/24/2016

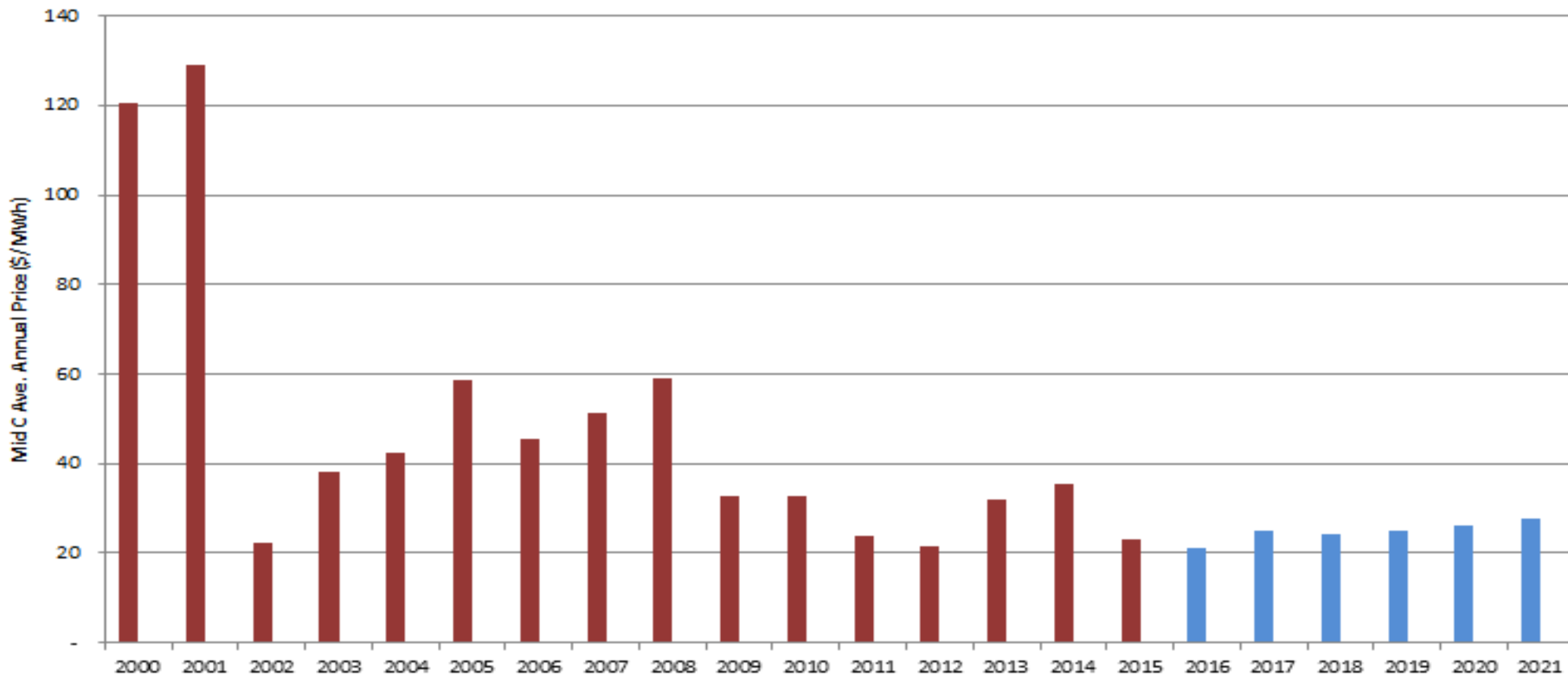


2/29/16: \$2.46

10/24/16: \$3.32

8/3/16: \$3.28

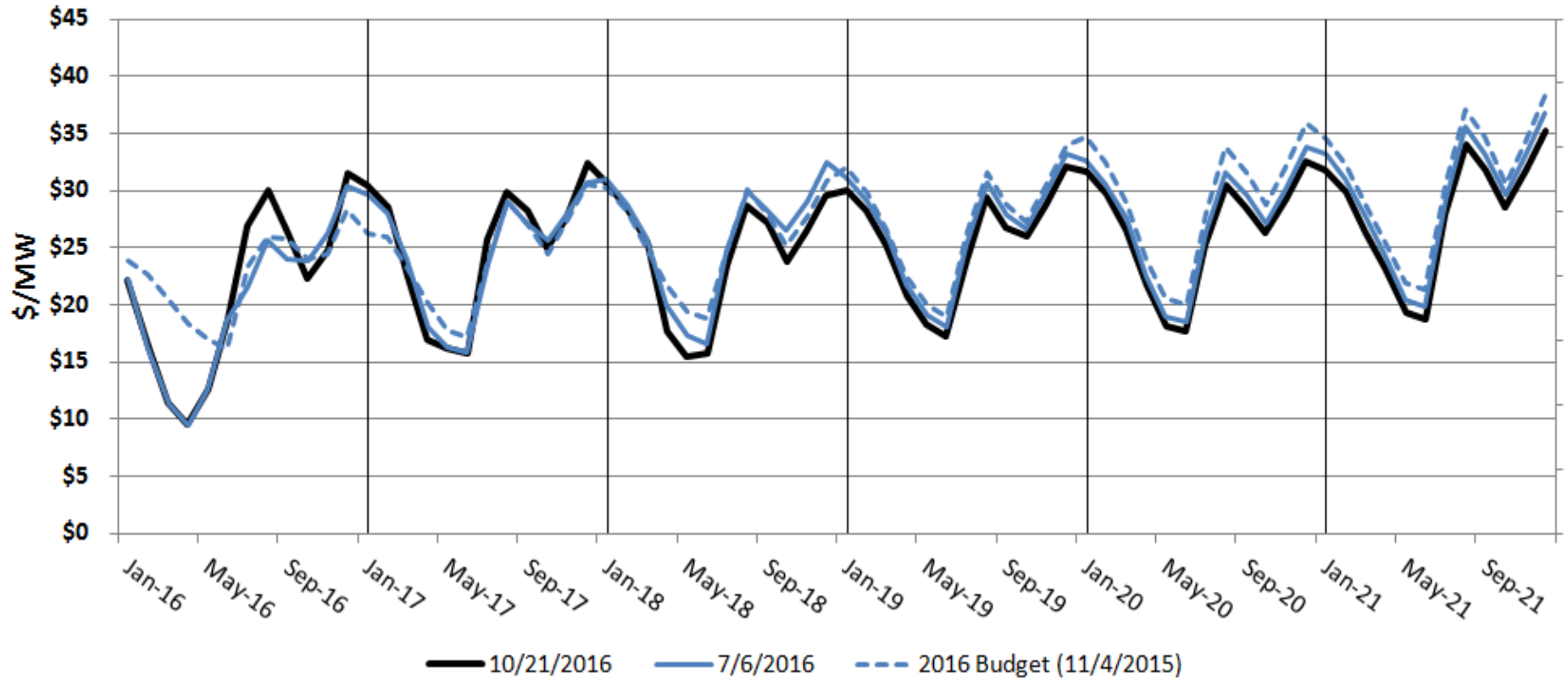
Mid-C Flat Annual Wholesale Electricity Prices



Red = Historical prices

Blue = Forward price curve

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



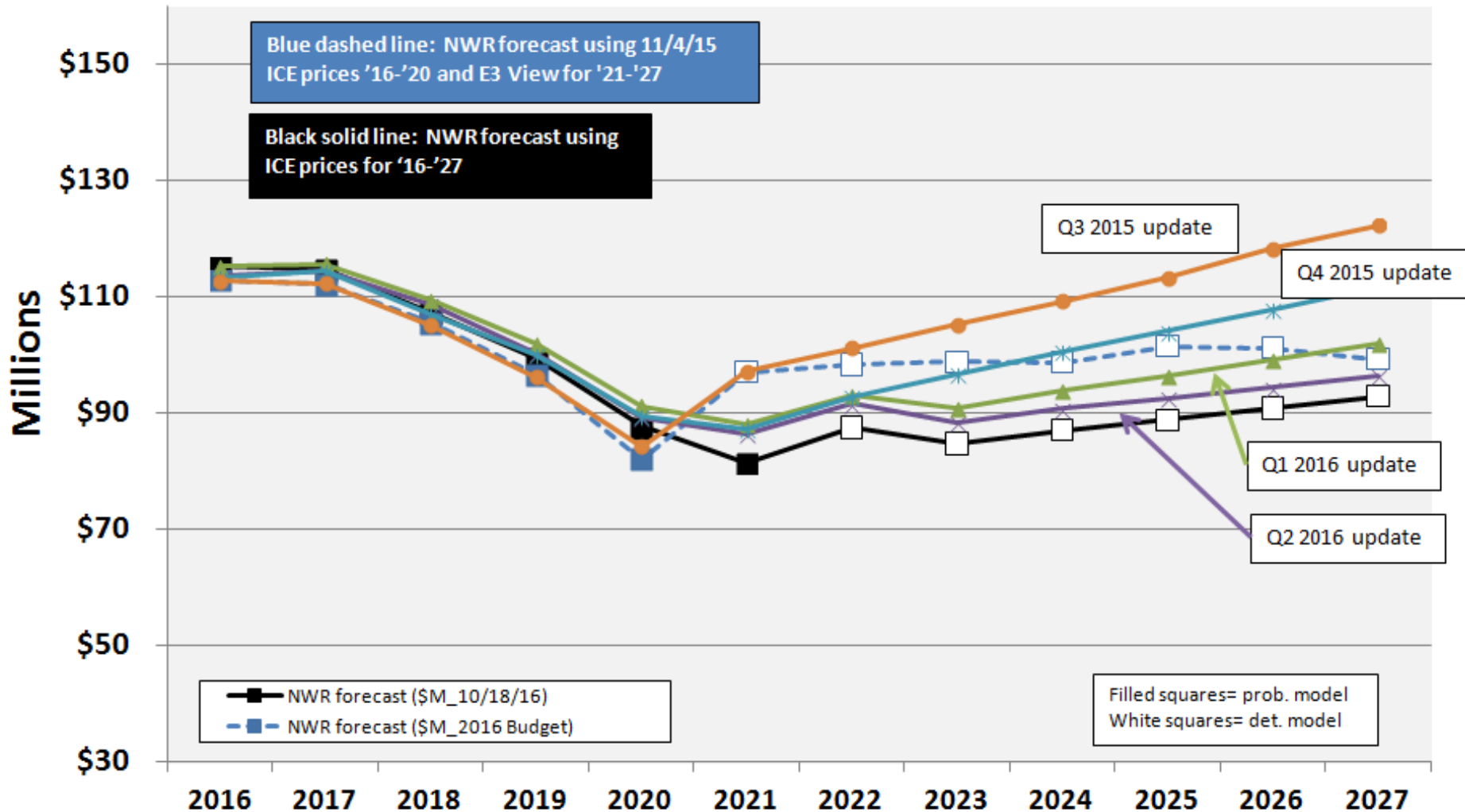
2016 NWR and Other Energy-Related Revenue

	Budget	Forecast**	Variance
Net Wholesale Revenue*	\$ 112,896,790	\$ 115,176,215	\$ 2,279,425
<i>Specified Source</i>	\$ 2,727,396	\$ 4,095,994	\$ 1,368,597
<i>Other</i>	\$ 523,275	\$ 504,261	\$ (19,014)
Renewables	\$ 285,435	\$ 403,139	\$ 117,704
Real-Time Revenue	\$ 8,000,000	\$ 6,981,907	\$ (1,018,093)
NWR and Other Energy-Related Revenue	\$ 121,182,225	\$ 122,561,261	\$ 1,379,036

*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.

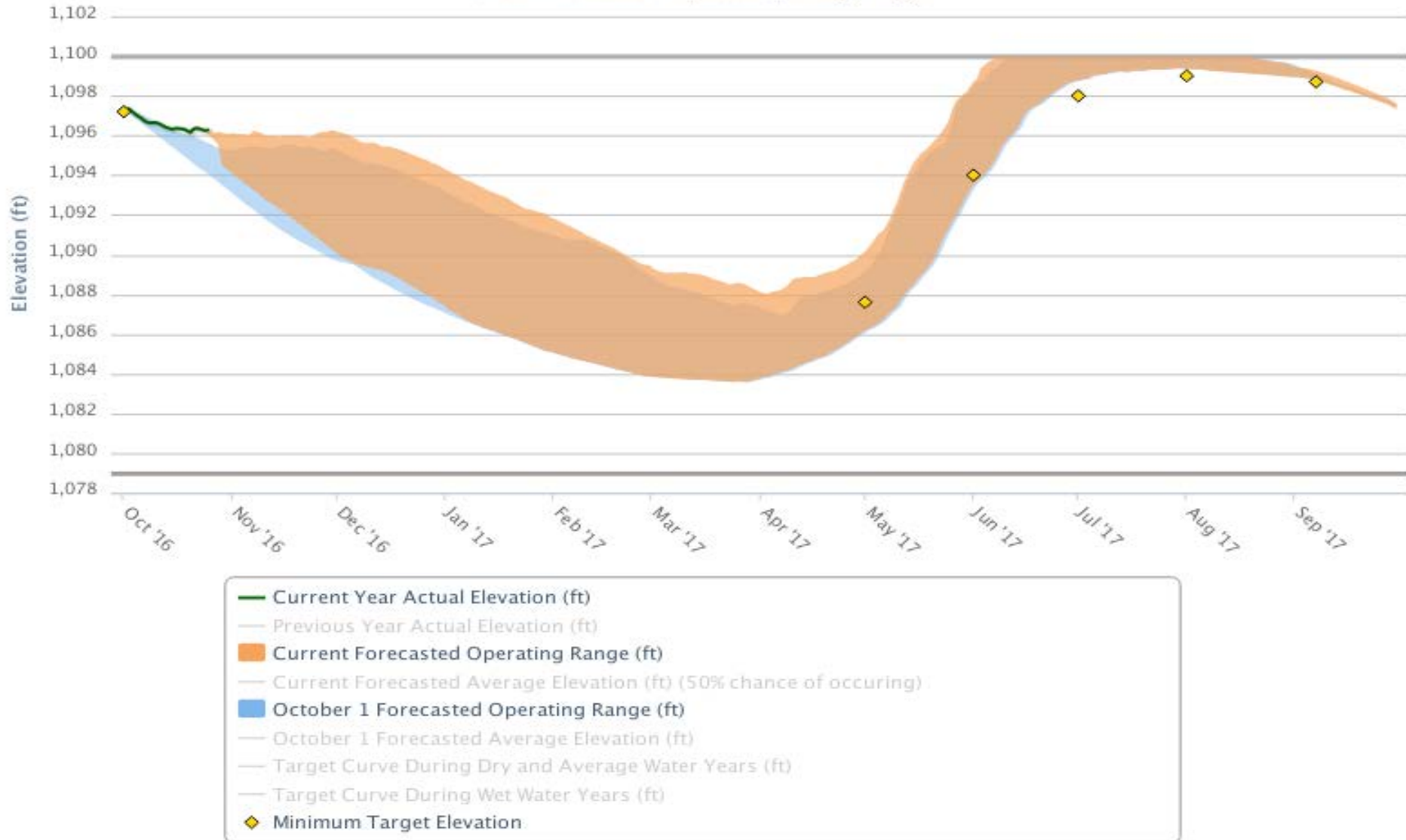
**2016 forecast based on Jan-Sep actuals and Oct-Dec estimates.

Net Wholesale Revenue Forecast



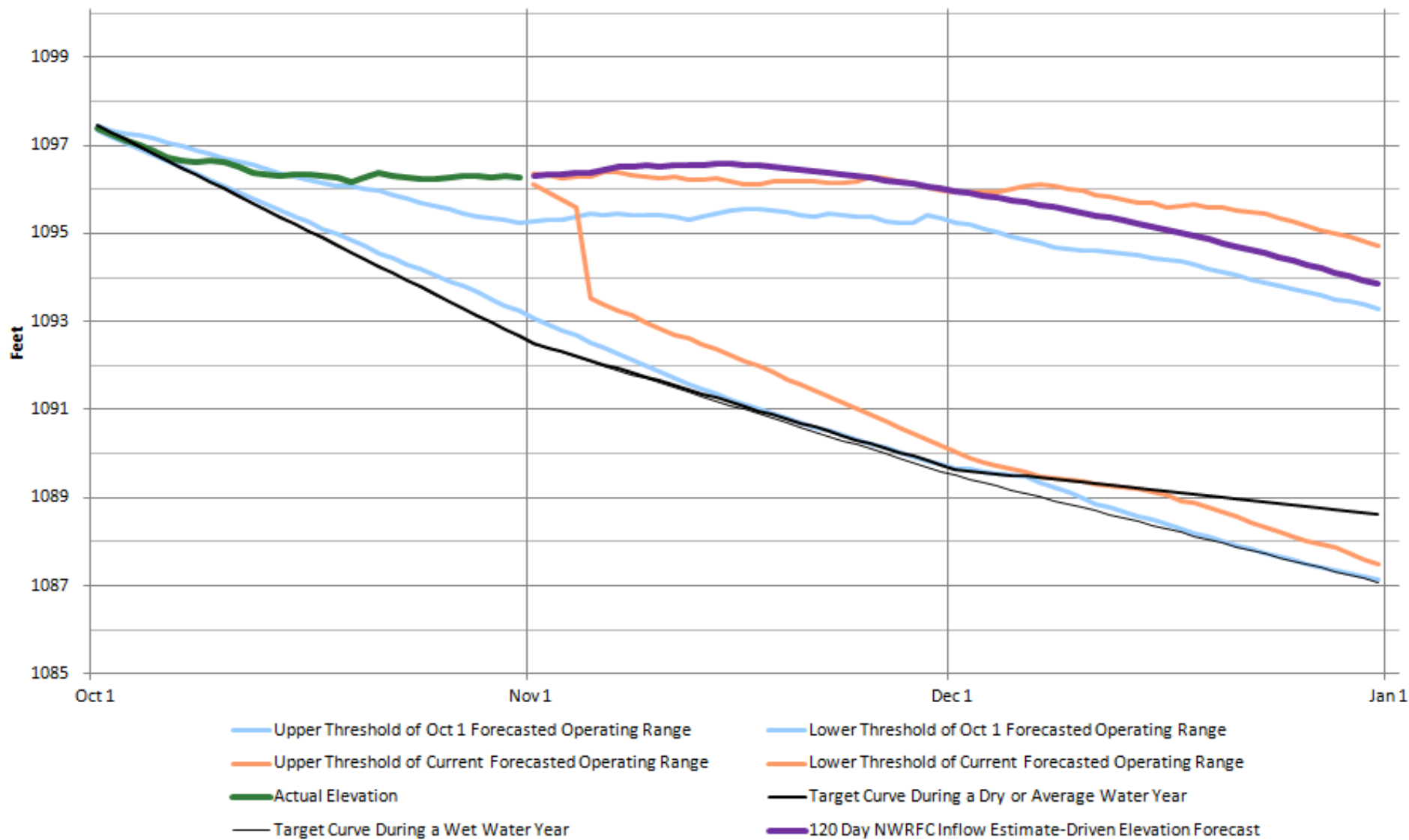
Lake Chelan Lake Level Webpage (10/25/16)

Chelan Lake Levels: Expected Operating Ranges



Lake Chelan Forecasted Operating Ranges (Oct 1 & Current) & NWRFC Point Forecast

Created Nov. 1, 2016



Market Info

Proposed Hydro Project

- Basin irrigators propose 500 MW Banks Lake Pumped Storage project near Grand Coulee
- Expected to apply for FERC license in 2 years; the project would take 7-9 years to build (2025 projected in-service date).
- Pumped storage gains feasibility when its potential for carbon-free, on-demand generation combines with US DOE funding.
- Shell is also seeking funding for their own proposed project.

The Next Big Issue to Watch for NW Utilities: Microsoft vs. PSE

- Microsoft's proposal to switch from full service to delivery only isn't just a matter of a very big single customer negotiating with its utility to change its contract—it's a revival of an issue long dormant in the NW and a precursor to even bigger debates that are coming.
- PSE's Voluntary Renewable Energy Tariff does not meet Microsoft's needs—no direct access to market, limited power available, lack of cost predictability.
- Microsoft wants to select its own suppliers and does not need aggregation-type services. They think they can find more "cutting edge" technologies to go carbon-free.

WA Adopts first-of-its-kind Rule to Combat Climate Change

- Goes into effect on 10/17/16.
- 2 pending lawsuits



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Energy Efficiency Results to Date

2016

Compliance Target is .83 aMW

Stretch Target was 2.1 aMW

Energy Efficiency Savings (aMW) ¹	Incentive and Labor Cost	\$/MWh over life	Estimated Value over Life ²
1.73	\$ 3,136,000	\$ 14.00	\$4,772,000

1 Pending metering and verification and based on expected NEEA savings

2 Based on weighted avg. life of measure and discounted at 7%

Summary

- The District's current 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).
- Declining forward energy prices has caused Net Wholesale Revenue projections to decline as well, particularly in years not tightly hedged
- The Energy Efficiency team surpassed the compliance target. Meeting the stretch goal will be challenging.



Questions?



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