

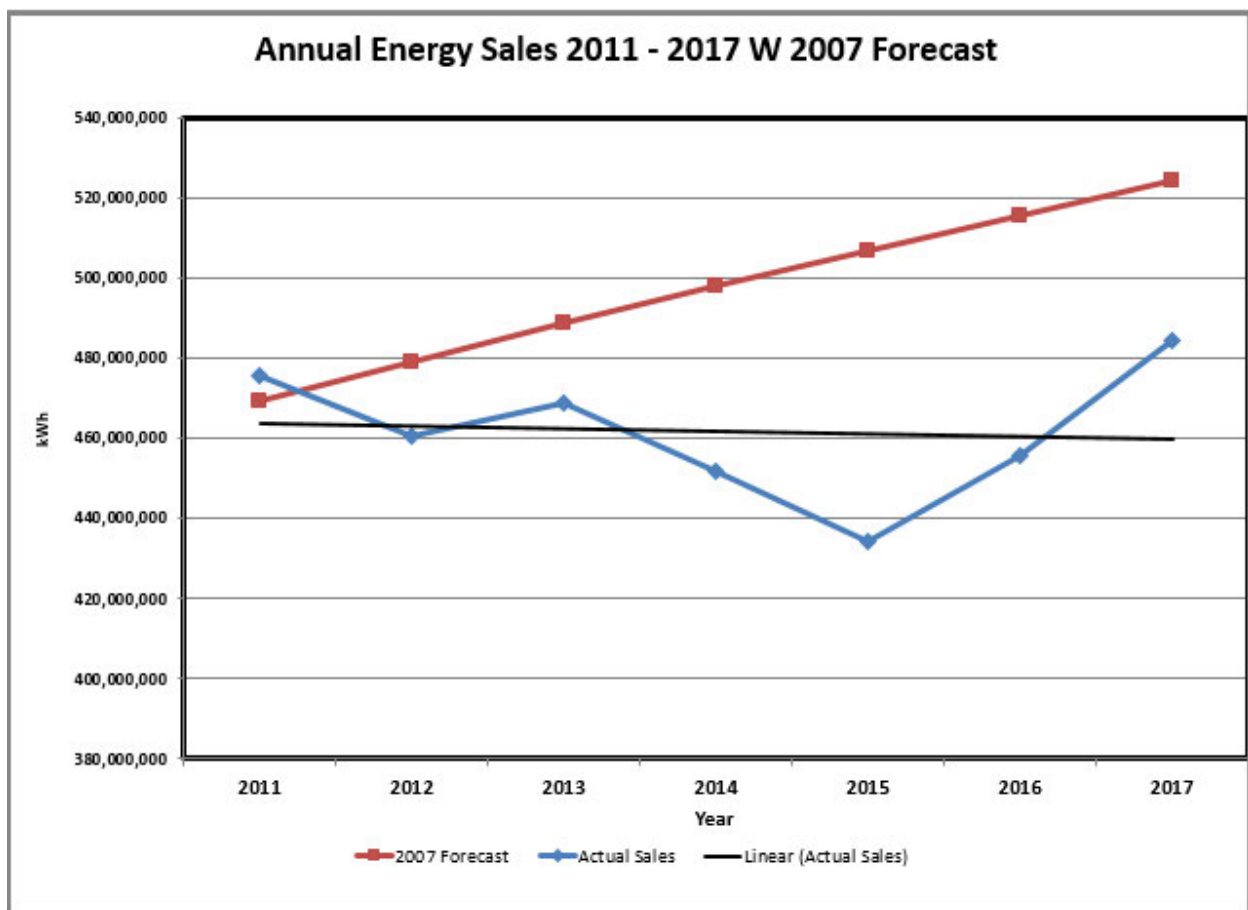
Reply Testimony of David Mast (David Mast/200)

I offer the following reply testimony to the testimony of PUC Staff. My testimony is organized by the portion of the Staff testimony to which I am replying.

Staff/200 Hanhan/8

Has Tillamook PUD's system experienced growth?

LINE 7 –The statement *Overall Tillamook PUD is expecting a system load growth rate of 1.1%*. is NOT correct. Behold. I don't know why TPUD is still expecting system load growth of 1.1% when the past 7 years have all been below the 2007 forecast.



In Staff DR-49 TPUD admits that the 1.1% was not a forecast, however, they report it as if it is a forecast. The last TPUD board approved forecast was in 2012 and was a growth rate of 0.45% and the BPA forecast in 2018 was for 0.25%. The

expected growth rate is more like 0.289% when you look at BPA's forecast spreadsheets.

Staff/200 Hanhan/8, lines 8 through 9, says that *"TPUD is expecting a combined Wilson River substation transformer 1 and transformer 2 growth rate of 0.9%"* .

Where is the documentation? The BPA load forecasts of DR41 1 – 8 did not show forecasts of 0.9%. I couldn't find any documentation and I suspect it doesn't exist. I found a loading chart in DR-40 showing an actual loading on the T1 + T2 with a trend line of 0.9% **BUT THAT IS NOT A FORECAST**. TPUD, show the forecast.

Staff/200 Hanhan/9

What has Staff identified as the primary reasons behind the transmission line proposal?

Another reason the project is not necessary is that in September 2017, the PUD Board of Directors approved the purchase of 4 new transformers at a cost of 2.5 million dollars. The aging Wilson River T1 transformer at Wilson River will be replaced in the fall of 2018. This will add 13 MW of capacity to the system. **That capacity addition is more than the 10.5 MW that is planned for the Oceanside transmission project.**

Staff/200 Hanhan/9

What has Staff identified as the primary reasons behind the transmission line proposal?

In the repair of the 2 miles of 50 year old line as discussed in Staff/200 Hanhan/9, lines 16 - 20, TPUD could build a temporary line around the affected area and could repair the line without having to spend \$13 M for a Transmission line and

substation. They could rent a 10MW generator for less than \$13 million. Just rebuild it.

Staff/200 Hanhan/11

Did Tillamook PUD consider alternatives to this transmission project to meet its need?

Throughout this whole process, public input was not allowed in the discussion of the need for the line (see DR-24) or the evaluation of options 1 - 4 or in the final selection from options 1 – 4. The selection of option 4 was made by TPUD with no public input. Even the Citizens Advisory Group was not allowed to discuss the need for the transmission lines or the other possible alternatives to transmission lines. The non-transmission line alternatives are shown in DR-21. Alternative 3 is the best. The first part of alternative 3, the larger transformer, is already being done. The aging Wilson River T1 transformer at Wilson River will be replaced in the fall of 2018. This will add 12 MW of capacity to the system. That capacity addition is more than the 10.5 MW that is planned for the Oceanside project. This will accommodate load growth. Option 3 calls for another distribution line to Oceanside which would provide dual sources of electricity. The majority of the major outages in the line are from car/pole and wind/trees incidents. Segments of this line would be buried so the reliability would be greatly increased because of decrease from car/poles or wind/trees. This line would allow the replacement of the 50 years old lines. In addition it would have much less impact on the major contributors in the local economy. The following in blue is from the TPUD 2007 load growth plan:

Agriculture and forestry are major contributors in the local economy. Each faces different challenges in the future.

The dairy industry continues to thrive in Tillamook County, while, according to experts, other dairy regions around the nation struggle with the ebb and flow of milk prices. It is widely accepted that Tillamook's success is largely due to the marketing engine of the Tillamook County Creamery Association (TCCA). The association of county dairymen created a Tillamook brand recognized around the country and around the world. TCCA employs about 500 people and produces a variety of milk and cheese products, of which, 85 percent of production is cheddar cheese.

The Tillamook State Forest harvest levels in Tillamook County are projected to increase in the coming years. Family wage jobs have been created today to harvest the trees reaching maturity. Associated jobs include tree fallers, the people who operate the

Option 3 is very environmentally friendly because it would keep 49 acres of forest land in production and would save 22,200 trees which sequester 1,100,000 pounds of CO₂ per year. This alternative was rejected because it would only be good for 13 years. However, we found a significant error in the calculations. The incorrect calculations are shown in DR-40 "It takes only 13 years before the 12MVA of added capacity is consumed by a load growth rate of 0.9 percent a year ($12/0.9=13$).” The correct answer is 28 to 87 years, depending on the growth, and a chart follows this report (Page 7). Therefore option 3 has a similar time horizon as the transmission line option. I am concerned that the transmission line option was selected because calculation errors eliminated option 3 which TPUD considered as “good”. Also, the transmission line is the only option in which TPUD does not have to write off \$800,000 which they owe BPA for setting up a new bay at BPA's Wilson substation prior to obtaining a permit (See DR-21 on page 6). I do not want to see Tillamook farmers and foresters have eminent domain on their properties because of a calculation error or TPUD's reluctance to write off a hasty decision. Option 3 is a much better option and should be considered. TPUD has not proved that they need a transmission line to solve capacity problems, improve reliability or rebuild line 51.

/s/David Mast

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SUMMARY OF OPTIONS

	Option 1	Option 2	Option 3	Option 4
Cost (Million)	\$0.8	\$3.8 - \$4.2	\$5.5 - \$6.0	\$9-\$10.5
Capacity Addition	0 MVA	0 MVA	12 MVA	33 MVA
\$/MVA	0	0	0.5	0.3
Reliability	None	Good	Good	Excellent
Longevity	0 years	2 years	13 years	33 years

CONCLUSION: The Tillamook to Oceanside transmission line project provides the lowest cost per unit of capacity (MVA) and has the life expectancy of 33 years (2.8 times the non-transmission line option).

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OPTIONS CONSIDERED

Option 1

- Do nothing

Option 2

- Improve system to provide redundant 26kV feeders to Netarts and Oceanside
- Strengthen tie points between Wilson and Trask substations
- Perform improvements to resolve voltage and loading issues

Option 3

- Same improvements as Option 2
- Replace Wilson T1 with equivalent size of Wilson T2 (44 MVA)

Option 4

- Construct the Tillamook to Oceanside transmission line and a 33 MVA substation

DR - 21

Wilson Substation - Contingency Plan Transformer 2 Out of Service			
Non-Transmission Line Alternatives			
Alternative 1		Unit Cost	Total
No work		\$0	\$0
Reimburse BPA for 115kV Bay at Wilson			
\$600,000 to \$800,000			\$ 800,000
		Total	\$ 800,000
Alternative 2		Unit Cost	Total
1. Construct a new 24.9kV circuit from Trask to Oceanside			
a. Rebuild from Hwy 101 along Gienger, Tillamook River, and Matejeck roads to 465 AAAC three phase			
2.5 miles		\$ 180,000	\$ 450,000
b. Construct new line from Matejeck Road to Highway 131 via existing transmission line right of way.			
4.025 miles		\$ 100,000	\$ 402,500
4.025 miles	Right-of-way clearing	\$ 15,000	\$ 60,375
1 miles	Roads	\$ 25,000	\$ 25,000
c. Construct new underground line from Highway 131 to Oceanside via existing USF roads			
4.5 Miles		\$ 250,000	\$ 1,125,000
d. Install Recloser at Tillamook River & Matejeck.			
2. Rebuild Trask T68			
a. Rebuild BPA Transmission Line			
4.6 Miles		\$ 350,000	\$ 1,610,000
b. Rebuild T68 to 465AAAC			
4.6 Miles		\$ 70,000	\$ 322,000
		Subtotal	\$ 3,995,000
		Contingency 30%	\$ 1,199,000
		Contingency 50%	\$ 1,998,000
Reimburse BPA for 115kV Bay at Wilson			
\$600,000 to \$800,000			\$ 800,000
		Total Low End	\$ 5,994,000
		Total High End	\$ 6,793,000

Alternative 3		Unit Cost	Total
1. Same improvements as Alternative 2			\$ 3,995,000
2. Replace WT1 with 24/34/44			
\$ 1,800,000 each		\$ 1,800,000	\$ 1,800,000
		Subtotal	\$ 5,795,000
		Contingency 30%	\$ 1,739,000
		Contingency 50%	\$ 2,898,000
Reimburse BPA for 115kV Bay at Wilson			
\$600,000 to \$800,000			\$ 800,000
		Total Low End	\$ 8,334,000
		Total High End	\$ 9,493,000
Alternative 4		Unit Cost	Total
1. Construct 8.75 miles of transmission line			
8.75 Miles		\$ 400,000	\$ 3,500,000
2. Construct Oceanside Substation			
1 each		\$ 3,000,000	\$ 3,000,000
3. Construction Distribution Feeder			
2 miles		\$ 250,000	\$ 500,000
		Subtotal	\$ 7,000,000
		Contingency 30%	\$ 2,100,000
		Contingency 50%	\$ 3,500,000
		Total Low End	\$ 9,100,000
		Total High End	\$ 10,500,000
Low end and high end assume a 30% and 50% contingency allowance on the estimated construction cost.			

Longevity Analysis of the Larger T1 Transformer

LARGER WILSON RIVER TRANSFORMER

		Wilson River 1 & 2 Combined From TPUD Board Report			Wilson River 1 & 2 Combined From TPUD Board Report		Wilson River 1 & 2 Combined From TPUD Board Report	
Year	# Of Years	12 MW of Additional Load	0.289% Growth BPA Forecast	Yearly % Growth	TPUD 0.9% Growth Trend	Yearly % Growth	TPUD 1.9% Growth Trend	Yearly % Growth
2012			47.05		47.05		47.05	
2013			43.54		43.54		43.54	
2014			43.25		43.25		43.25	
2015			40.01		40.01		40.01	
2016			40.70		40.70		40.70	
2017			41.52		41.52		41.52	
2018	1	53.52	41.64	0.29%	41.89	0.90%	42.33	1.97%
2028	11	53.52	42.86	0.29%	45.82	0.90%	51.45	1.97%
2029	12	53.52	42.98	0.29%	46.23	0.90%	52.47	1.97%
2030	13	53.52	43.10	0.29%	46.64	0.90%	53.50	1.97%
2031	14	53.52	43.23	0.29%	47.06	0.90%	54.55	1.97%
2032	15	53.52	43.35	0.29%	47.49	0.90%	55.63	1.97%
2033	16	53.52	43.48	0.29%	47.92	0.90%	56.72	1.97%
2034	17	53.52	43.60	0.29%	48.35	0.90%	57.84	1.97%
2035	18	53.52	43.73	0.29%	48.78	0.90%	58.98	1.97%
2040	23	53.52	44.37	0.29%	51.02	0.90%	65.02	1.97%
2041	24	53.52	44.49	0.29%	51.48	0.90%	66.31	1.97%
2042	25	53.52	44.62	0.29%	51.94	0.90%	67.61	1.97%
2043	26	53.52	44.75	0.29%	52.41	0.90%	68.94	1.97%
2044	27	53.52	44.88	0.29%	52.88	0.90%	70.30	1.97%
2045	28	53.52	45.01	0.29%	53.35	0.90%	71.69	1.97%
2046	29	53.52	45.14	0.29%	53.83	0.90%	73.10	1.97%
2047	30	53.52	45.27	0.29%	54.32	0.90%	74.54	1.97%
2048	31	53.52	45.40	0.29%	54.81	0.90%	76.01	1.97%
2098	81	53.52	52.46	0.29%	85.78	0.90%	201.59	1.97%
2099	82	53.52	52.61	0.29%	86.55	0.90%	205.57	1.97%
2100	83	53.52	52.76	0.29%	87.33	0.90%	209.62	1.97%
2101	84	53.52	52.91	0.29%	88.12	0.90%	213.75	1.97%
2102	85	53.52	53.06	0.29%	88.91	0.90%	217.96	1.97%
2103	86	53.52	53.22	0.29%	89.71	0.90%	222.25	1.97%
2104	87	53.52	53.37	0.29%	90.52	0.90%	226.63	1.97%
2105	88	53.52	53.53	0.29%	91.33	0.90%	231.09	1.97%
2106	89	53.52	53.68	0.29%	92.16	0.90%	235.65	1.97%
2107	90	53.52	53.84	0.29%	92.99	0.90%	240.29	1.97%

