Energize Eastside in Draft IRP

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Contents

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(on behalf of the CENSE executive board)

Executive summary

Puget Sound Energy's "Energize Eastside" project proposes to double the voltage of an 18-mile transmission line that passes through four Eastside cities. The project was first announced in late 2013, but the public has never received satisfactory answers to these five questions:

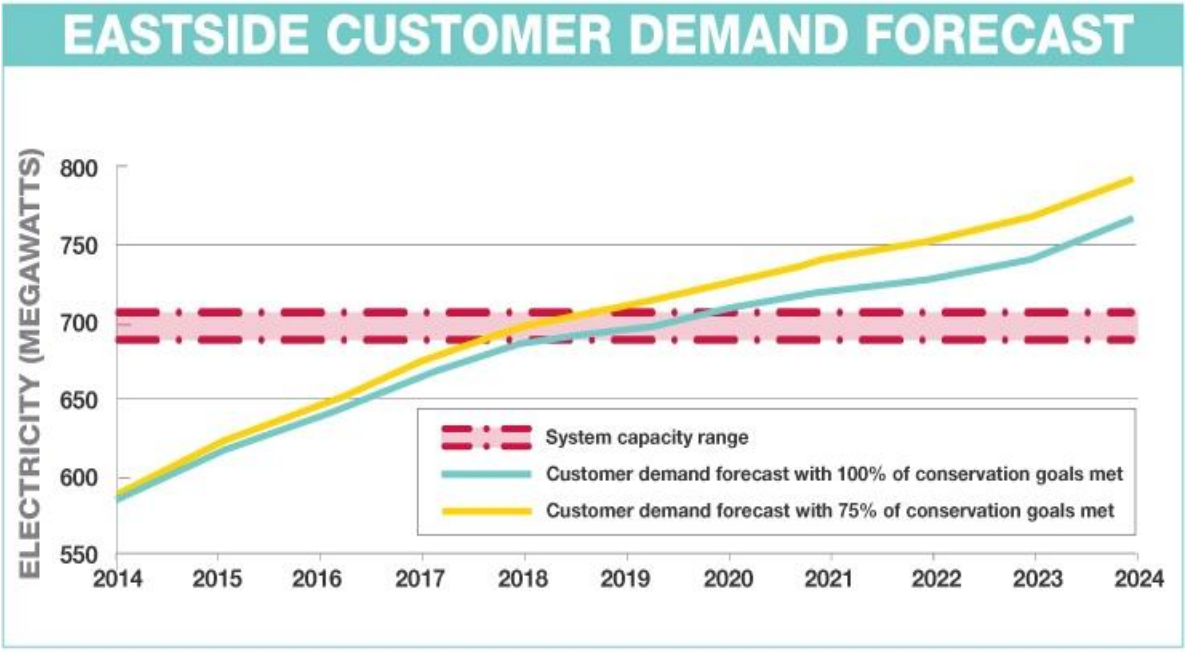
1. What justifies PSE's predicted growth of peak customer demand?
2. In which locations and customer sectors is high demand growth expected?
3. How much electricity is the state of Washington obligated to send to Canada?
4. What federal reliability standards apply to this project?
5. Can modern technologies like batteries help reduce peak demand?

The project PSE has proposed would cause many hardships for the community: increased electricity rates to cover the $300 million construction cost, loss of thousands of mature urban trees, months of construction that would disrupt residents and businesses, and heightened risk to public safety posed by locating the extra high-voltage lines within feet of half-century old petroleum pipelines.

The community asks that the UTC require PSE to provide thorough answers to the questions listed above in PSE's 2017 IRP. The Commission and the public must be assured that Energize Eastside is a necessary and prudent use of ratepayer funds, and that no better alternative has been overlooked.

1. Customer demand forecast

The graph shown below was created by PSE in 2015 to illustrate the need for Energize Eastside. The graph purports to show rapidly growing demand for electricity that PSE expects to cross the "system capacity" limit sometime around 2018, increasing the risk of rolling blackouts.



The graph shows an average annual growth rate of 2.4% (assuming 100% conservation goals are achieved). But is a 2.4% annual rate of increase realistic?

According to data published by the Puget Sound Regional Council (PSRC), employment in the Puget Sound region is expected to increase from 2.2 million in 2017 to 2.7 million in 2035, an average rate of 1.0% per year.[1] Eastside population is projected to grow from 505,000 in 2010 to 637,000 in 2035, about 0.9% per year.[2] Seattle City Light's 2016 Integrated Resource Plan predicts electricity demand will grow at less than 0.1% per year.[3]

Here is a summary of those forecasts:

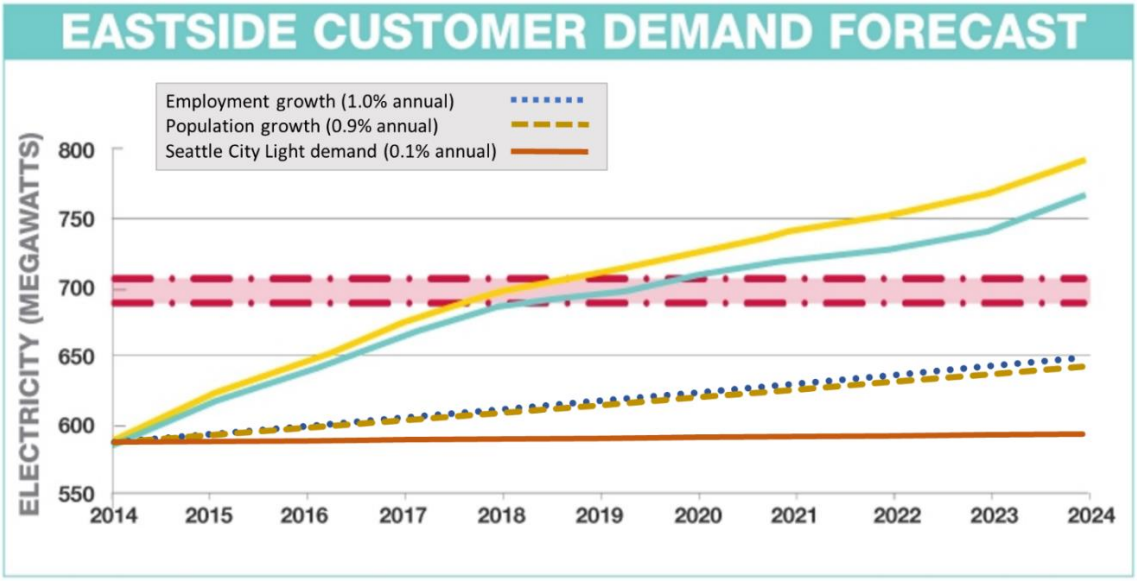
Source	Forecast	Annual change
PSRC	Puget Sound employment (2017-2035)	+1.0%
PSRC	Eastside population (2010-2035)	+0.9%
Seattle City Light	Electrical demand (2016-2035)	+0.1%

[1] https://www.psrc.org/sites/default/files/2015psrc-macroeconomicforecast.xlsx

[2] https://www.psrc.org/sites/default/files/landusevision_v1.xlsx

[3] http://www.seattle.gov/light/IRP/docs/2016App-1-Load%20Forecast%20.pdf

Adding the rates of growth forecast by the PSRC and Seattle City Light to PSE'S graph reveals a stark contrast:



Due to concerted conservation efforts enabled by advances in technology and electrical efficiency, consumption of electricity has not grown as fast as population or the economy during the last decade. The Energy Information Administration predicts national electricity consumption will grow at less than 1% annually for the next twenty years.[4] For the Eastside, it is reasonable to assume that the growth of population and employment provide an upper bound for the growth of electricity demand. It's likely that Seattle City Light's forecast of nearly flat growth will be matched on the Eastside.

Evidence of flat or decreasing electricity consumption is evident from sources like the 10-K forms PSE files with the SEC and Bellevue's Environmental Stewardship website.[5]

Just a few miles from PSE's headquarters. Seattle City Light's revenues are under pressure due to declining use of electricity:

> *"This is not a phenomenon that's unique to City Light, it's a phenomenon being experienced across the country," Seattle City Light CFO Paula Laschober told a council committee recently. "Energy use peaked in 2007 and since then has been declining."*[6]

The Seventh Power Plan from the Northwest Power and Conservation Council says "The regional peak load for power, which typically occurs in winter, is forecast to grow from about 30,000 - 31,000 megawatts in 2015 to around 31,900-35,800 megawatts by 2035. This equates to an average annual growth rate of between 0.3 – 0.8 percent."[7]

[4] https://www.eia.gov/outlooks/aeo/pdf/0383(2017).pdf, slide 75
[5] https://k4c.scope5.com/pages/61
[6] http://mynorthwest.com/647139/seattle-city-light-lost-revenue/
[7] https://www.nwcouncil.org/media/7149937/7thplanfinal_chap01_execsummary.pdf, p. 1-4

PSE's forecast chart is based on analysis performed by Quanta Services and reported in the 2013 Eastside Needs Assessment. This study does not meet the standards required of an integrated resource plan by Washington Administrative Code 480-100-238.3:

> *At a minimum, integrated resource plans must include:*
>
> *(a) A range of forecasts of future demand using methods that examine the effect of economic forces on the consumption of electricity and that address changes in the number, type and efficiency of electrical end-uses.*

In "Section 4 Study Assumptions" of Quanta's report, sensitivity studies were run only for variations of conservation and local generation.[8] There is no study of economic forces or significant advances in electrical efficiency, which is a primary focus of the Seventh Power Plan.

We ask that the UTC require PSE to explain why the company's demand forecast grows more than twice as fast as the population or economy. Why does PSE's forecast grow 25 times faster than Seattle City Light's forecast?

[8] https://energizeeastside2.blob.core.windows.net/media/Default/Library/Reports/Eastside_Needs_Assessment_Final_Draft_10-31-2013v2REDACTEDR1.pdf, p. 24

2. Where is demand growing?

It is important to understand *where* demand is expected to grow as well as *how much* it is growing. High growth in certain areas (such as downtown Bellevue) might be served by cost-effective smart solutions such as energy storage, distributed generation, or combined heat and power. The public would benefit from a more specific solution than a one-size-fits-all transmission line.

For several years, the Energize Eastside website showed a map depicting localized demand for electricity. It seemed anomalous that Mercer Island would have the same level of demand as downtown Bellevue.

That observation prompted an engineer to ask PSE how this map was created. PSE revealed that data was combined from two extreme weather events in 2009:

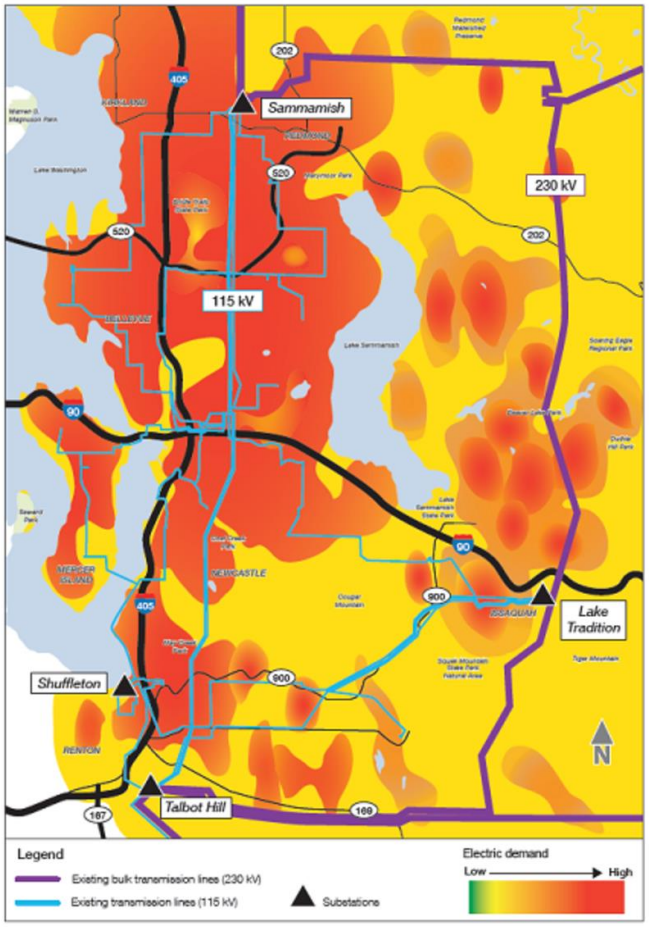
- 7/29/2009: Hottest day on record (Bellevue at 106° F)
- 12/10/2009: Very cold day

The corresponding values for electricity demand were added together, and then the results were "smeared" to "protect everyone's privacy."

This process destroyed any useful information the map could have provided. It simulates a scenario where Eastside residents and businesses turn on every heater and air conditioner simultaneously. That would never happen in real life.

PSE removed the map from the Energize Eastside website in October 2016. No update has been published. In any case, we would prefer a map showing expected growth. This would be more helpful for project planning than a map depicting an impossible scenario from nearly a decade ago.

The Eastside's electric demand



We ask that the UTC require PSE to create an up-to-date map showing where electric demand is expected to grow in the coming decade.

3. How much electricity for Canada?

In 2013, PSE contracted with Quanta Services to study the need for the Energize Eastside project. These findings are described in the 2013 Eastside Needs Assessment, which lists the following "key assumptions" for the study:[9]

- Generation dispatch patterns reflected reasonably stressed conditions to account for generation outages as well as expected power transfers from PSE to its interconnected neighbors.
- Winter peak Northern Intertie transfers were 1,500 MW exported to Canada.

CENSE has continually questioned both assumptions, with special focus on the 1,500 MW figure. This is an enormous amount of electricity, more than twice the level consumed by the entire Eastside at its highest peak during the year.

PSE claims this requirement comes from ColumbiaGrid, the regional planning authority for the Northwest. How did ColumbiaGrid settle on this amount? It probably consulted with its members, including PSE and Seattle City Light, working with BPA. These were all parties to an agreement that aimed to boost exports to Canada in 2012.[10]

Whatever merits may have existed five years ago for increasing transfers to Canada, the situation has clearly changed. In September 2017, the British Columbia Utility Commission published a review of the controversial "Site C" dam project. As part of this review, it was necessary to assess the amount of electricity Canada might import through the "Canadian Entitlement" agreement in the Columbia River Treaty:

> *BC Hydro states that it doesn't rely on the Columbia River Treaty Entitlement for the following reasons:*
>
> 1. *The Clean Energy Act requires that BC Hydro be self-sufficient for energy and capacity…*
>
> 2. *Access to the electricity markets and delivery of the Canadian Entitlement all rely upon the same I-5 transmission corridor through the Seattle region that is frequently constrained. BC Hydro has previously limited the reliance on U.S. for no more than 300-500 MW due to transmission restrictions;*
>
> 3. *The CRT can now be terminated with 10-years notice. While notice was not given for the earliest potential termination date fiscal 2024, there is a high likelihood that negotiations between U.S. and Canada may begin this year and the Canadian Entitlement would be within the scope of negotiations. The U.S. has been seeking a reduction of power benefits to Canada.*[11]

Canada's earlier reliance on 300-500 MW has been reduced, or soon will be, in accordance with British Columbia's Clean Energy Act. The Clean Energy Act was passed in 2010, directing utilities in the province to achieve energy independence by 2016.

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[9] https://energizeeastside2.blob.core.windows.net/media/Default/Library/Reports/Eastside_Needs_Assessment_Final_Draft_10-31-2013v2REDACTEDR1.pdf, p. 8

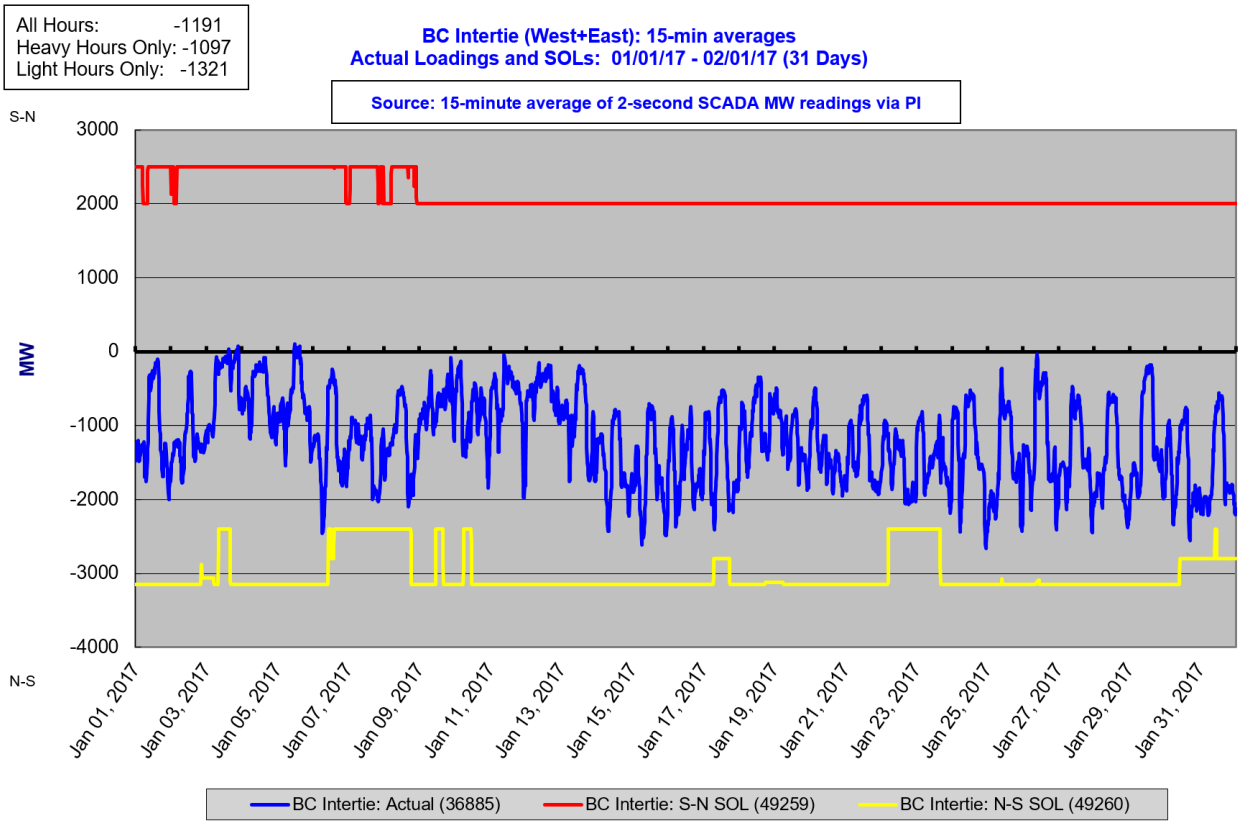
[10] https://www.bpa.gov/news/newsroom/releases/Documents/20120124-PR-5-12-Joint-transmission-system-projects-to-improve-system-reliability.pdf

[11] http://www.sitecinquiry.com/wp-content/uploads/2017/09/DOC_90185_A-13_Preliminary-Report.pdf, Appendix B

The commission's report also shows that additional infrastructure investments would be needed north of the border to support transfers of greater magnitude:

> *[Increased U.S. imports] would require the construction of a new, high voltage power line (230 kV to 500 kV). Such a transmission line could cost about $2million/km, based on BC Hydro's Northwest Transmission Line cost, so in the range of $500 million to $750 million.*

These expenses are not justified if Canada doesn't need or want U.S. electricity. The actual scenario is likely to be the opposite of what PSE assumes. During cold weather in the Puget Sound, Canada would probably provide electricity to the U.S. This can be seen on a public website provided by BPA.[12] BPA publishes data about the flow on the Northern Intertie (aka, BC Intertie) at 15-minute intervals for the past twenty years. For example, here is a chart showing the flow that occurred during the unusually cold month of January 2017.



The wavy blue line shows power flowing from Canada to the U.S. (all values below the zero axis). For January, electricity was flowing almost exclusively south. The average southward transfer was 1191 MW. The peak occurred on January 24, when Canada supplied the U.S. with 2660 MW. Large amounts of electricity flowed south in November and December as well.

We ask that the UTC require PSE to update its study with realistic assumptions about the flow of electricity to Canada, considering recent trends and regulatory changes in British Columbia.

[12] https://transmission.bpa.gov/Business/Operations/Paths/ (click History button next to "BC Intertie")

4. What are the federal standards?

A report by Bellevue's Independent Technical Analyst, Utility System Efficiencies, explains that Energize Eastside is mandated by the Energy Policy Act of 2005. This act made mandatory NERC reliability standards that were previously voluntary.

The NERC standards are straightforward. PSE is required to avoid power outages during a peak demand scenario in which two of the most critical elements of the electric grid are out of service. In the 2013 Eastside Needs Assessment, PSE determined that those critical elements are two of the four 230kV/115kV transformers that serve the Eastside.

PSE amplified the emergency scenario by additionally assuming eleven local generation plants are offline at the same time the transformers have failed, as shown in this table from the 2013 Eastside Needs Assessment:[13]

Table 4-4: List of Puget Sound Area Generators Adjusted in the 2013 Eastside Needs Assessment

Generation Plant	Winter MW Rating	Expected MW Output during Winter Peak for Low-Generation Sensitivity Case	Type	Owner	Transmission Delivery Area
Enserch	184.8	125	Natural Gas, Combined Cycle	PSE	Whatcom County
Sumas	139.8	0	Natural Gas, Combined Cycle	PSE	Whatcom County
Ferndale	282.1	0	Natural Gas, Combined Cycle	PSE	Whatcom County
Whitehorn	162.2	0	Natural Gas, Simple Cycle	PSE	Whatcom County
Fredonia	341	0	Natural Gas, Simple Cycle	PSE	Skagit County
Sawmill	31	22	Biomass	Private Owner	Skagit County
Upper Baker	106	80	Hydro Dam	PSE	Skagit County
Lower Baker	78	54	Hydro Dam	PSE	Skagit County
Komo Kulshan	14	0	Hydro Run-of-River	Private Owner	Skagit County
March Point	151.6	134	Natural Gas, Combined Cycle	Shell	Skagit County
Ross	450	295	Hydro Dam	SCL	Snohomish County
Gorge	190.7	157	Hydro Dam	SCL	Snohomish County
Diablo	166	160	Hydro Dam	SCL	Snohomish County
South Tolt River	16.8	0	Hydro Run-of-River	SCL	Northeast King County
Snoqualmie	37.8	0	Hydro Run-of-River	PSE	East King County
Twin Falls	24.6	0	Hydro Run-of-River	Private Owner	East King County
Cedar Falls	30	0	Hydro Run-of-River	SCL	East King County
Freddy 1	270	0	Natural Gas, Combined Cycle	Atlantic Power/PSE	Pierce County
Electron	20	4	Hydro Run-of-River	PSE	Pierce County
Frederickson	162.2	0	Natural Gas, Simple Cycle	PSE	Pierce County
Expected MW output during Winter peak is based off of actual 2011-2012 Winter peak output except for SCL hydro, which is based off of modeled generation levels in WECC winter peak case.					

In total, PSE assumes 1,827 MW of generation capacity will not be available during peak winter demand, the scenario these local generators were meant to serve. With this extreme assumption, PSE's remaining transformers would overload. The contrived overloads are used to justify Energize Eastside.

Is this reduced generation scenario required by NERC reliability standards? This question arose in an "informational" study described in ColumbiaGrid's 2013 System Assessment. ColumbiaGrid's

[13] https://energizeeastside2.blob.core.windows.net/media/Default/Library/Reports/Eastside_Needs_Assessment_Final_Draft_10-31-2013v2REDACTEDR1.pdf, p. 32

assumptions are similar to PSE's (heavy exports to Canada and low generation in western Washington):

> *The Northwest to British Columbia transfer was **increased to 1500 MW** and the West of Cascades North transfer was increased to near its limit (10,200 MW) by **reducing local west side gas generation**. This case is being studied for information purposes and mitigation is not required as **it goes beyond what is required in the NERC Reliability Standards**.*[14]

PSE must follow NERC standards or explain why it is prudent to exceed them.

We ask that the UTC require PSE to update its study with all local generation running.

[14] http://columbiagrid.org/books/pdf/2013SA-FB.pdf, p. 12

5. Can batteries help?

Battery technology has advanced rapidly since PSE announced Energize Eastside. In 2014, PSE hired E3 to determine if non-wire solutions were a feasible alternative to upgrading the transmission line. E3's report contained no mention of batteries.

E3's goal was to find 70 MW of savings by 2021. If successful, the project could be deferred until 2021, saving ratepayers $40 million (according to E3's analysis). However, E3 found only 56 MW of cost-effective savings, 14 MW short of the target.

By 2015, PSE recognized that batteries might be useful in filling that 14 MW gap. PSE engaged Strategen to work out the details. Strategen found that only the biggest battery in the world (328 MW) could cover the 14 MW shortfall. CENSE argues that unrealistic criteria and outdated assumptions led Strategen to this questionable conclusion.

For example, conservation has been more effective than PSE originally assumed. In October 2016, PSE included flyers in customers' bills congratulating everyone for saving 7% more electricity than PSE anticipated. This higher rate of conservation could cut the E3 deficit to 7 MW instead of 14 MW. If a battery must be five times bigger than the need, as Strategen explains in its report, the Eastside would need a 35 MW battery in 2021. That is not a big battery by today's standards, and may be considered tiny by 2021.

PSE acknowledges that batteries are attractive because they can be added incrementally as demand rises. A small battery can address any near-term need for a fraction of the price of Energize Eastside. Deferring additional battery purchases until they are needed would reduce the average cost due to the rapidly declining price of batteries. A battery purchased a few years from now may cost half as much as it would today.

In addition to saving money, batteries increase year-round reliability and store off-peak wind and solar energy, thereby reducing carbon emissions.

CENSE is especially interested in a vanadium flow battery manufactured by UniEnergy Technologies, located in Mukilteo. These batteries do not degrade over thousands of charging cycles as lithium ion batteries do, they are totally non-flammable, and PSE has determined they are cost-effective. Sustainability is also important, and vanadium can be extracted from waste products like coal ash and mine tailings without harming the environment. If UniEnergy were to supply a favorable bid, we would have the opportunity to support local jobs and invest in our local economy.

We ask that the UTC require PSE to revisit the analysis provided by E3 and Strategen using updated assumptions about load growth and conservation, Canadian exports, fully utilized local generation, and modern battery specifications.

6. Conclusion

The data and assumptions PSE used to justify Energize Eastside are no longer valid.

- PSE's demand forecast wasn't credible in 2013 and is even less believable now.
- PSE does not show where pockets of growth may occur in the future.
- Exports to Canada are declining or reversing direction.
- PSE's assumptions about local generation exceed NERC reliability standards.
- Batteries can be smaller and more feasible than Strategen found in 2015.

CENSE has raised these issues with PSE for months or years and has not received satisfactory answers.

Seattle City Light and BPA are experiencing lower than expected demand for electricity. Seattle is suffering revenue shortfalls, and BPA is canceling long-planned projects:

> *The Bonneville Power Administration has canceled a costly and controversial transmission line that would have run 80 miles from Troutdale through southwest Washington. Experts decided the project would have increased the reliability of electricity but would have added far more capacity than the region needed. To manage congestion, Mainzer said BPA is looking at battery storage, reducing demand from big customers and managing generation more effectively during periods of peak demand.*[15]

Given new technology and reduced demand, BPA decided to save its ratepayers hundreds of millions of dollars using solutions other than a controversial transmission line. PSE should do the same.

Ratepayers ask that the UTC compel PSE to address these significant changes in its IRP, ensuring that Energize Eastside is a prudent investment based on solid facts and up-to-date information.

[15] http://www.oregonlive.com/business/index.ssf/2017/05/bpa_nixes_costly_and_controver.html