Email No. 1

Date/Time:

June 24, 2015 - 4:56 PM

From: Jens Nedrud

To: Keith Declerck

Subject: Loading and conservation numbers

From: Nedrud, Jens V <jens.nedrud@pse.com>
Sent: Wednesday, June 24, 2015 4:56 PM
To: 'DeClerck, Keith'
Cc: Mark Johnson
Subject: RE: Loading and conservation numbers

Keith,
Below is a snapshot of the various load and conservation levels within the Eastside area and the PSE system. As an example in the Winter 2017-18 year on the Eastside 50 MW is PSE's 100% conservation target. The additional conservation required (on top of the 50 MW) to reduce the transformer loading to 90% consistent with electrical solution performance criteria was found to be 163 MW. Thus the total conservation needed in the Winter 2017-18 year to meet the performance criteria is 50 MW + 163 MW = 213 MW. Additional studies were not performed to identify a specific MW value for future years, if this is needed it would require additional study work. However as discussed in the solutions report on Page 19, additional conservation up to 244 MW would be needed within the study period. Looking out further to 2028 to address the longevity requirement the amount of additional conservation is estimated to easily surpass 300MW. Overall that is a very large amount of conservation and higher than the achievable cost-effective non-wires (conservation) potential identified in the Energy and Environmental Economics, Inc. (E3) non wires report.

	Eastside Area				**PSE System***		
	Load with 100% Conservation	Load with no Conservation	Total Conservation	Additional conservation amount to reduce Eastside transformer loading to 90%**	Load with 100% Conservation	Load with no Conservation	To Conser
Winter2017-2018	688	738	50	163	5162	5502	
Winter2018-2019	697	758	61		5161	5585	
Winter2019-2020	708	783	75		5175	5665	
Winter2020-2021	722	808	86		5126	5740	
Winter2021-2022	730	827	97		5120	5814	
Winter2023-2024	764	874	110		5158	5990	
Winter2028-2029	869	996	127		5500	6440	

*Includes 270 MW Transmission customer load
**Load reduction only studied for Winter 2017-18

Jens Nedrud, P.E.
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The Energize Eastside project is undergoing environmental review, which includes preparation of a Washington State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS). The City of Bellevue is leading the EIS process in cooperation with Kirkland, Newcastle, Redmond and Renton. For more information on the EIS, please visit EnergizeEastsideEIS.org.

Please note: Inquiries made to Puget Sound Energy will not be included as part of the EIS process.

From: DeClerck, Keith [mailto:Keith.DeClerck@stantec.com]
Sent: Wednesday, June 24, 2015 1:56 PM
To: Nedrud, Jens V
Cc: Mark Johnson
Subject: Loading and conservation numbers

Jens,

I have to leave at ~2:50 today so please copy Mark Johnson - ESA with the values.

Thanks

Keith DeClerck, P.E.
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Email No. 2

Date/Time:

October 27, 2015 – 10:54 AM

From: Bradley Strauch

To: Mark Johnson; David Pyle; Michael Paine; Carol Helland

Subject: E2 Alternative 2 – additional generation

Kelly Wade

From: Strauch, Bradley R <bradley.strauch@pse.com>
Sent: Tuesday, October 27, 2015 10:54 AM
To: Mark Johnson; David Pyle (dpyle@bellevuewa.gov); Michael Paine; Carol Helland
Cc: DeClerck, Keith; Nedrud, Jens V; Reema Shakra; records@energizeeastsideeis.org; Steendahl, Denise
Subject: RE: E2 Alternative 2 - additional generation
Attachments: EE230 GenerationDiscussion 10-27-15.pdf

The generation discussion is attached.

Brad

From: Mark Johnson [mailto:MJohnson@esassoc.com]
Sent: Tuesday, October 27, 2015 10:15 AM
To: David Pyle (dpyle@bellevuewa.gov); Michael Paine; Carol Helland
Cc: DeClerck, Keith; Nedrud, Jens V; Strauch, Bradley R; Reema Shakra; records@energizeeastsideeis.org
Subject: RE: E2 Alternative 2 - additional generation

Following up on this:

I realized since writing this that the more common industry term is simple-cycle rather than single-cycle, although I did find some use of the latter.

We have been expecting some information about the 20MW size facilities that we discussed from PSE, per our conversation last Friday. Any chance we can get that today?

- Mark J

From: Mark Johnson
Sent: Friday, October 23, 2015 10:30 AM
To: David Pyle (dpyle@bellevuewa.gov); Michael Paine; Carol Helland
Cc: DeClerck, Keith; Nedrud, Jens V; Brad Strauch; Reema Shakra
Subject: E2 Alternative 2 - additional generation

Per our conversation yesterday we will be making two changes to Alternative 2:

1) We will revise the name of the alternative to “Integrated Resource Approach”
2) We will add “single-cycle peak power generators” as the fifth category or component of this alternative.

“Single Cycle Peak Power Generators” will be defined as PSE-owned and operated gas-fired single cycle generation facilities with a capacity of approximately 20 MW each, located within or adjacent to existing substations within the Eastside. These generators would run during peak demand periods for one to three weeks at a time, and also at other times when it is economical to do so, based on the market cost of power.

We will add a discussion in the alternatives considered and not carried forward that talks about why using peakers as the sole solution was not considered viable. To use these facilities as the sole solution would require twenty of these 20 MW plants. Most would be in residential zones. The noise from these facilities is

significant when they are running, and that many locations with significant noise impacts did not seem to be a reasonable alternative to the proposed transmission line approach. In addition, using that number of plants would require significant expansion of the natural gas supply system. However, as a component of Alternative 2, the use of three or four 20 MW generators would not has as widespread impacts, and so this type of facility is being included as a component of that alternative. The exact locations would need to be determined for any project level alternative to be evaluated.

Please correct me if I have missed anything or not properly characterized the conclusion of our discussion yesterday.

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Generation Discussion

Request: Provide a description of the various generation solutions that meet the need and objectives of the proposed Energize Eastside project.

Response: PSE has identified a transmission capacity deficiency in the Eastside area. Utilization of generation is one of the possible solutions to correcting this deficiency. However, this requires the generation to be located within the Eastside area, preferably towards the center of the study area and within the vicinity of where PSE's multiple 115 kV lines converge. The ideal location for a single generator would be near PSE's existing Lakeside substation. When utilizing generation to solve the transmission capacity deficiency, developing a single generation source of approximately 300 MW, when sited and designed correctly, could provide the necessary additional electricity to the Eastside 115 kV system to address the transmission capacity deficiency.

To meet the need requirements using multiple generators rather than a single generation source, PSE's electrical system planning studies have shown that a 400 MW composite of smaller peaker plants (e.g., 20 MW each) distributed throughout the Eastside could also work to resolve the deficiency. As generation is located farther away from the center of the study area, more generation is required because of redundancy and efficiency factors. Thus, to use peaker plants to solve the problem, approximately twenty of them would be required. These 20 peaker plants would need to be sited near existing distribution substations and connected to the transmission lines located in the Eastside area. More information about using a single generator or multiple smaller generation facilities is provided below.

Single Combined Cycle: A single 300 MW generating plant could address the Eastside need provided that supporting infrastructure was also provided. It is assumed that such a plant would be fueled with natural gas as this is the cleanest burning fossil fuel. Additional infrastructure needed would include construction of a new high pressure natural gas pipeline, water supply main and sewer connection. If the generation facility could not be sited adjacent to a substation such as Lakeside, then additional transmission lines would be necessary to deliver power to the system.

It is anticipated that such a facility would need between 12 and 15 acres of land, plus additional area for landscaping, noise attenuation, and other factors. Vent stacks for such a facility would typically be around 150 feet tall. Additional considerations would look at factors such as EPA's Clean Power Plan, the early drafts of which do not include natural gas fired generators as a renewable energy.

Peaker Plants

Developing twenty 20 MW-peaker plants would encounter the same development obstacles as described above for a stand-alone 300 MW plant. Additionally, the associated operation and maintenance costs of multiple smaller plants would not be practical or efficient.

As part of PSE's 2012 Integrated Resource Planning process, typical cost and performance characteristics of simple-cycle combustion turbines (CT) for peaking applications were evaluated. PSE evaluated the following generation technologies that could be used for peaking generation: conventional frame, aeroderivative, and reciprocating Combustion Turbines (CTs). These types are generally described below.

Conventional Frame CT

Conventional frame CTs utilize a mature technology. They can be fueled by natural gas, distillate oil, or a combination of fuels (dual fuel). Typical units have efficiencies in the range of 15 percent to 35 percent (HHV) at full load. These units are typically less flexible than their aeroderivative and reciprocating counterparts, meaning they cannot reduce output beyond about 50 percent to 60 percent, they have slower ramp rates (on the order of 15 MW/min), and although some can start in ten minutes, the power output achieved in ten minutes is typically not base-load.

In general, gas turbines in an uncontrolled state (no noise abatement) are deafening to the point of impracticality. Some distributed generations systems emit a constant hissing/roaring sound like that of a jet engine, which is not desirable in areas with sensitive receptors. This is true for frame CT's, whose noise output from in an uncontrolled state is impracticable. Some frame distributed generation systems emit a constant hissing/roaring sound like that of a jet engine, which is not desirable in areas with sensitive receptors. Muffled single-cycle frame CT systems are typically 80-85 decibels (dB) at 30 feet and further reduction is difficult without significantly impacting system efficiencies[1]. Decibel limits established by the Washington Department of Ecology at WAC 173-60-040 limit noise received at Class B Environmental Designation for Noise Abatement (EDNA) properties, i.e., commercial properties, to only 65 dB. Operation of frame CTs sited adjacent to substations on typically small lots within commercial or residential areas will not likely meet noise regulations.

Frame CTs are commercially available. Greenfield development typically requires approximately four years, comprising at least two years for development (design and siting) and permitting, one-and-a-half years for major equipment acquisition and manufacturing (lead-time), and a half-year for construction. This would not meet the 2017/18 required in-service date.

Aeroderivative (Aero) CT

Aeroderivative (aero) CTs use a mature technology, although new features and designs are continually being introduced. Aero CTs can be fueled by natural gas, oil, or a combination of fuels (dual fuel). Typical aero units have efficiencies in the range of 25 percent to 38 percent (HHV) at full load. Aero units are typically more flexible than their frame counterparts; many can reduce output to nearly 30 percent, providing more operational flexibility. Most can start and achieve full output in less than ten minutes and start multiple times per day without maintenance penalties. Ramp rates range from 50 to 90 MW per minute. Another key difference between aero and frame units is size. Aero CTs are typically smaller in size, from 40 to 100 MW each, but newer smaller models can generate output of approximately 20 MW.

[1] http://www.dg.history.vt.edu/ch5/turbines.html; July 16, 2015

Like frame CT's, Aero CT noise (constant hissing/roaring sound like that of a jet engine) is deafening to the point of impracticality. This noise emission is not desirable in areas with sensitive receptors. Muffled single-cycle systems are typically 80-85 dB at 30ft and further reduction is difficult without significantly impacting system efficiencies. More specifically, it is estimated that a 20 MW Aero CT would have a noise level of approximately 65 dB at 330 feet (100 meters) (per manufacturer's specifications; *see*, e.g., Siemens SGT-500). In order to meet Class C to Class B EDNA noise limits (65dBA) at the property line of the power plant, it is anticipated that additional property would need to be acquired adjacent to an existing distribution substation simply to meet the noise limits through attenuation by distance. Siting Aero CTs in residential areas would require even larger parcels of land to meet noise limits. In other words, it takes a very large parcel of land in order for the peaker's noise to diminish to a level that meets commercial standards. This assumes that a jurisdiction's commercial or residential zones would allow power plants in the first instance. Peakers are not facilities that can be easily fit on small lots tucked into commercial or residential areas whose receiving noise limits must be observed. Operation of frame Aero CTs sited adjacent to substations on typically small lots within commercial or residential areas will not likely meet noise regulations.

Aero CT technology is commercially available. Like frame CT, greenfield development typically requires approximately four years: at least two years for development and permitting, one-and-a-half years for major equipment lead-time, and a half-year for construction. This would not meet the 2017/18 required in-service date.

Reciprocating (Recip) Engines

Compared to the frame and aeroderivative CT technologies, reciprocating engines are a relatively new generation technology; consequently, they are less commonly used in power generation. The reciprocating engine technology evaluated to address the Eastside transmission capacity deficiency used a four-stroke spark-ignited gas engine, which applies a lean burn method to generate power. The lean burn technology uses a relatively higher ratio of oxygen to fuel, which allows the reciprocating engine to generate power more efficiently. Lean burn reciprocating engines typically show HHV efficiencies in the range of 30 percent to 40 percent, while some newer units claim efficiencies as high as nearly 50 percent. However, reciprocating engines are constrained by their size. The largest commercially available reciprocating engine produces just 18 MW (Wärtsilä 18V50SG), which is much smaller than the typical frame CT. Larger generation projects would require a relatively greater number of reciprocating units compared to an equivalent-sized project implementing either an aero or frame turbine, reducing economies of scale.

As provided by the manufacturer, noise level for typical building-enclosed Wärtsilä 18V50SG is 70 dB at 200 meters (~660 ft.). In order to meet Class C noise limits at the property line, a property of approximately 8 acres would be required. Meeting an adjacent commercial property's Class B EDNA limits would require further attenuation to 65 dB, thereby increasing the parcel size even more. To meet a Class A EDNA limit would require even more land.

As with frame and aero CT technology, greenfield development requires approximately four years: two years for development and permitting, one-and-a-half years for major equipment lead-time, and a half-year for construction. This would not meet the 2017/18 required in-service date.

Regardless of the technology type used, the installation of multiple peaking plants throughout the Eastside area is not a prudent way to solve the Eastside's transmission deficiency problem. Issues associated with a solution that would see the development of twenty or more peaker plants around the Eastside to remedy the need include:

- Acquisition of additional property at each location
- Construction of multiple new natural gas supply pipelines
- Extensive noise abatement requirements
- Additionally operation and maintenance costs and logistics
- Inability to meet the 2017/18 in-service date
- Cities' indication that installing power plants is not desired

Email No. 3

Date/Time:

October 29, 2015 – 8:25 AM

From: Bradley Strauch

To: Mark Johnson

Subject: Lake Sammamish Cable Information

From: Strauch, Bradley R <bradley.strauch@pse.com>
Sent: Thursday, October 29, 2015 8:25 AM
To: Mark Johnson
Cc: Steendahl, Denise
Attachments: Lake Sammamish Cable Information.pdf

Mark,

Attached is the information you requested related to marine cable and Lake Sammamish. If you have any additional questions, please let me know.

Brad Strauch
Sr. Land Planner/Environmental Scientist
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Lake Sammamish Cable Information

Placing a 230kV transmission line in Lake Sammamish presents a number of hurdles, with the principle ones being the expected transportation restrictions related to the cable reels and the installation/laying equipment for submarine cable splicing and placement. These restrictions include road axle weight and load height restrictions, which will most likely limit the length of continuous cable and equipment that can be transported to the lake. Construction costs associated with a land-locked location could double or possibly triple the normal expected cost when compared to an "accessible" water body.

The assumed cable for the Energize Eastside project is a 1,600 mm^2 three-core cable that weights approximately 55 lbs/ft. Assuming a maximum cable reel weight of 60,000 pounds, this would allow for an approximately 1,100 ft/reel for the three-core cable. A reel of single-core cable might typically hold 2,500 to 3,000 ft. of cable. These reels are approximately 14 ft in diameter; therefore, their transport to the lake may be inhibited by highway height restrictions. Assuming the cable path in Lake Sammamish would be around 7 miles, approximately thirty-four cable reels of three-core cable would be required along with an associated number of splices. Splices add risk of failure to cables, especially to those placed underwater. Minimization of splices is a critical factor to help ensure the cable remains reliable.

Email No. 4

Date/Time:

October 30, 2015 – 12:57 PM

From: Bradley Strauch

To: Mark Johnson; Jens Nedrud

Subject: E2 – questions for PSE

Kelly Wade

From: Strauch, Bradley R <bradley.strauch@pse.com>
Sent: Friday, October 30, 2015 12:57 PM
To: Mark Johnson; Nedrud, Jens V
Cc: records@energizeeastsideeis.org; Reema Shakra; Kathy Fendt; Michael Paine; Steendahl, Denise
Subject: RE: E2 - questions for PSE
Attachments: EIS Questions 10-30-15.docx

Attached are the responses to the last set of questions. Let us know if you need anything else.

Thanks,

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From: Mark Johnson [mailto:MJohnson@esassoc.com]
Sent: Friday, October 30, 2015 10:11 AM
To: Strauch, Bradley R; Nedrud, Jens V
Cc: records@energizeeastsideeis.org; Reema Shakra; Kathy Fendt; Michael Paine
Subject: RE: E2 - questions for PSE

Two more questions that we would like your answers on:

4. Are there other types of electrical lines, besides HPFF, that contain hazardous materials (i.e. SCFF) in the project area?
5. How many gigawatt hours per year (gWh/yr) of electricity do customers in the Eastside service area consume?

- Mark J

From: Mark Johnson
Sent: Thursday, October 29, 2015 4:14 PM
To: Brad Strauch; Nedrud, Jens V
Cc: records@energizeeastsideeis.org; Reema Shakra; Kathy Fendt; Michael Paine
Subject: E2 - questions for PSE

Brad and Jens
Thanks for meeting with me by phone yesterday to answer questions we had for PSE. Below are two questions we discussed that you said you would like to get back to us on.

1. About how long would construction of Alt 3 (new 115 kV lines and transformers) take?

2. The maximum capacity available using this option as presently configured is approximately _____, which does not meet PSE's stated need of _____ MW.

For the Lake Sammamish issue I wanted to run this past you now that I have the weight concern clarified.

3. For elimination of the Lake Sammamish submerged option, we concluded the following based on the reports you have provided:
    - Submerged cables are typically delivered to a site by ship or barge
    - Large barges cannot access Lake Sammamish due to the weir at the outlet
    - Weight limits on highways would limit the length of cable reels to 1100 feet, requiring 34 splices to reach the length of the lake
    - Splicing underwater increases risk of cable failure, while splices on land require construction of a vault at each splice
    - Highway transport may also be limited due to the 14-foot reel diameter
    - Given these constraints, placing a cable in Lake Sammamish does not appear to be a viable option.

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EIS Questions 10-30-15

1. **About how long would construction of Alt 3 (new 115 kV lines and transformers) take?**

   Typical construction duration for 115 kV above ground lines on standard wood poles is dependent upon the type of corridor and the number for crews. In general, 60 miles (assuming 900 poles) of 115 kV line would take between 24 and 28 months using three to four crews that would on average be able to install 3 poles per day.

2. **The maximum capacity available using this option as presently configured is approximately _____, which does not meet PSE's stated need of _____ MW.**

   The present emergency ratings of the SCL lines are 426 MVA in the summer and 526 MVA in the winter. In order for PSE to utilize these lines as the source for an additional 230 kV transformer on the Eastside, the present ratings are insufficient. If lines were upgraded by only replacing the conductor, then the assumed ratings for the reconductored lines are 692 MVA in the summer and 771 MVA in the winter. This would still not be adequate to meet the needs of both PSE and SCL. The next incremental increase in capacity would be to rebuild (structure and conductor replacement) the SCL lines, which could provide a line capacity of approximately 1139 MVA in the summer and 1366 MVA in the winter. The rebuild is anticipated to provide sufficient capacity for a short period of time (possibly less than 10 years).

3. **For elimination of the Lake Sammamish submerged option, we concluded the following based on the reports you have provided:**

   - Submerged cables are typically delivered to a site by ship or barge
   - Large barges cannot access Lake Sammamish due to the weir at the outlet
   - Weight limits on highways would limit the length of cable reels to 1100 feet, requiring 34 splices to reach the length of the lake
   - Underground and underwater cables most often fail at splices. Putting splices underwater increase the ~~Splicing underwater increases~~ risk of cable failure, while splices on land require construction of a vault at each splice. Vaults are typically required every ¼ to ½ mile.
   - Highway transport may also be limited due to the 14-foot reel diameter
   - Given these constraints, placing a cable in Lake Sammamish does not appear to be a viable option.

4. **Are there other types of electrical lines, besides HPFF, that contain hazardous materials (i.e. SCFF) in the project area?**

   In the project area, PSE's operates two SCFF (self-contained fluid filled) marine cables that cross Lake Washington over to Mercer Island. However, PSE does not operate land-based HPFF (high pressure fluid filled) or SCFF cables in the project area.

5. **How many gigawatt hours per year (gWh/yr) of electricity do customers in the Eastside service area consume?**

   Based on 2012 MW load data, the summed energy usage for the Eastside was just over 3,000 GWh for the year.

Email No. 5

Date/Time:

December 28, 2015 - 11:47 AM

From: Bradley Stauch

To: Mark Johnson

Subject: E2-Pole and load configuration assumptions

From: Strauch, Bradley R <bradley.strauch@pse.com>
Sent: Monday, December 28, 2015 11:47 AM
To: Mark Johnson
Cc: Reema Shakra; Kathy Fendt; Heidi Bedwell; records@energizeeastsideeis.org; Chris Hooper (chrishooper@enertech.net); Steendahl, Denise
Subject: RE: E2- Pole and load configuration assumptions

Mark,

We are pulling together the information you have requested.

Regarding our discussion about pole heights, specifically in the Newcastle area, the actual pole heights, in Newcastle, range from 49 feet to 65.5 feet (avg. 56.4 ft) above ground for the Talbot – Lakeside #1 line and 46 to 69 feet (Avg. 55.6 ft) for the Talbot – Lakeside #2 line. For analysis purposes, you can expect that the typical height for the structures that could be used to rebuild the exiting 115kV line to 230kV, would likely be around 20 to 30 feet taller than the existing structures. This is dependent upon the configuration, topography, span length, etc…

We do expect that the typical pole heights for the 230kV line will be around 85 feet.

Brad

From: Mark Johnson [mailto:MJohnson@esassoc.com]
Sent: Thursday, December 24, 2015 4:40 PM
To: Strauch, Bradley R
Cc: Reema Shakra; Kathy Fendt; Heidi Bedwell; records@energizeeastsideeis.org; Chris Hooper (chrishooper@enertech.net)
Subject: E2- Pole and load configuration assumptions

Brad,
Per out conversation, here are some details we'd like to track down to firm up our EMF analysis.

For 230 kV, what is the expected average load in 2024? And what is the expected peak load?

For overhead lines:
Pole height: assumption: 85 feet (average) Configuration is assumed to be as shown on the attached figure (the 85 foot poles) [please confirm]
What is the expected minimum conductor ground clearance (height to ground) at midspan?
What is the expected horizontal and vertical phase spacing of the conductors?
What is the distance between the two poles?

If the double circuit poles being considered, please provide equivalent information for those.

For underground, we would assume:
Typical: 5 feet below ground surface to the top of the pipe [please confirm]
Double circuit 230 kV XLPE cable, using two cables per phase
Would all of the phases bundled together within a common pipe, or are individual phases bundled within individual pipes with spacing between pipes, etc.?
(If we don't have these details, we will assume a worst case arrangement.)

Merry Christmas. We are working next week so feel free to call or write back if you have questions.

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Email No. 6

Date/Time:

January 6, 2016 – 11:19 AM

From: Bradley Stauch

To: Reema Shakra; Denise Steendahl

Subject: Request for Information

From: Strauch, Bradley R <bradley.strauch@pse.com>
Sent: Wednesday, January 06, 2016 11:19 AM
To: Reema Shakra; Steendahl, Denise
Cc: Mark Johnson; Karmen Martin; Kathy Fendt
Subject: RE: Request for Information
Attachments: EISQuestions01052016.docx

Attached are the responses to the questions you posed last week. Let me know if you have any additional questions or comments.

Brad Strauch
Sr. Land Planner/Environmental Scientist
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From: Reema Shakra [mailto:RShakra@esassoc.com]
Sent: Wednesday, December 30, 2015 5:28 PM
To: Steendahl, Denise; Strauch, Bradley R; Nedrud, Jens V
Cc: Mark Johnson; Karmen Martin; Kathy Fendt
Subject: RE: Request for Information

Actually, can we throw on a few more questions, please? These relate to our environmental health chapter of the EIS, which includes hazardous materials and public safety risks.

Can you confirm or revise these statements?

1. For No Action – statement refers to all substations on Eastside: "Design details of the existing substations are not available, but it is known that equipment at these substations is operating on impervious surfaces (compacted gravel or pavement), and within contained areas not draining directly to surface waters or storm sewers."

2. For hazardous materials that may be used on a regular basis or No Action: " Transmission corridors would be maintained by PSE (and/or any other entity they share a corridor with). Maintenance would primarily involve control of vegetation that may interfere with power lines. Depending on the details of PSE's vegetation management procedures, they may use chemicals to control vegetation within these areas."

3. Regarding haz mat management related to existing transmission lines for No Action: "The transmission lines could be co-located with other utilities including gas pipelines and in these locations PSE would most likely coordinate use of hazardous materials with the operations and uses of hazardous materials by the other utility. For instance, only one party would likely perform vegetation maintenance, which could involve use of herbicides, along a shared utility corridor."

4. With regard to public safety No Action: "Lightning strikes to existing power poles and lines are not known to have occurred." *(anticipating that this is not an accurate statement but we need some type of data source to address this topic here)*

Thanks again!

From: Steendahl, Denise [mailto:Denise.Steendahl@pse.com]
Sent: Wednesday, December 30, 2015 2:36 PM
To: Reema Shakra; Strauch, Bradley R; Nedrud, Jens V
Cc: Mark Johnson; Karmen Martin
Subject: RE: Request for Information

Hi Reema,

Brad is out of the office today and tomorrow so I'm responding on his behalf.

We should be able to provide you with answers to these questions as well as provide you with the additional details sought next week. However, it's likely that the answers may not get to you until later in the week rather than earlier.

I'll get started on getting these questions disseminated internally so we can do our best to have answers to you as quickly as possible.

Let me know if you have any other questions or needs.

Happy New Year!

Denise

Denise Steendahl
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From: Reema Shakra [mailto:RShakra@esassoc.com]
Sent: Wednesday, December 30, 2015 2:25 PM
To: Strauch, Bradley R; Steendahl, Denise; Nedrud, Jens V
Cc: Mark Johnson; Karmen Martin
Subject: Request for Information

Brad, Denise and Jens,

We have some follow-up questions to help us wrap up the utilities chapter in the Draft EIS that I don't believe we've requested from you yet. Can you please review the attached and let us know if it's feasible to provide responses early next week?

Thanks very much.

Reema Shakra, AICP
Senior Planner
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Placeholders Needing PSE Input

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Public Services and Utilities

Questions

How does PSE deal with accidental leaks or spills of hazardous materials at PSE facilities?

PSE complies with state and federal laws regulating the potential for accidental leaks or spills of hazardous materials, including, but not limited to the Clean Water Act, Resource Conservation and Recovery Act, Emergency Planning and Community Right-to-Know Act, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), and Model Toxic Control Act ("MTCA"). Oil-filled devices are required to operate electrical systems. PSE has an Emergency Spill Response Program to ensure that accidentally released substances are contained.. This program incorporates a 24-hour pager number that is widely distributed to PSE and its contractor's employees through training, facility signs, Spill Prevention, Control, and Countermeasure ("SPCC") plans, office bulletin board posters, internal mailings and company vehicle dashboard stickers. Additionally, if required, the new 230 kV transformer necessary for the Energize Eastside project would have secondary oil containment (SPCC curb).

Upon receiving notification of a release, PSE begins the spill response process, which includes providing notification of the releases to state or federal agencies. Smaller incidental releases can often be addressed by internal PSE staff. Releases that are larger or more complex or involve regulatory oversight from state or federal agencies are directed by an environmental consultant that is contracted to provide 24-hour emergency spill response services. PSE has on contract a number of emergency response contractors that have the necessary equipment and personnel to remediate the sites per the state or federal regulations (MTCA and/or CERCLA).

Under what circumstances would PSE notify local fire departments for response assistance?

PSE would notify local fire departments for response assistance in the event of a fire at one of PSE facilities. When PSE becomes aware of a spill, a call is made to the Washington Department of Emergency Management ("WDEM") as they have the appropriate emergency contacts for all agencies (including fire departments).

Does PSE prepare an Emergency Management Plan for each of its facilities? Do these plans include coordination and special training with local emergency services?

PSE meets all state and federal requirements for emergency planning. Those requirements can include preparation of SPCC plans. For facilities that meet the threshold, a site specific SPCC plan is developed. The training associated with those SPCC plans meets the requirements of all applicable federal and state regulations.

Does PSE coordinate with the Port of Seattle Fire Department for provision of specialized foam trucks for fighting substation fires? Does PSE have agreements with any other response department?

If there is a fire at a substation, either electrical or oil, PSE promptly sends the appropriately qualified personnel to meet fire department crews on site. If the responding fire department requires additional resources, such as a foam truck from the Port of Seattle, they contact those resources for assistance in responding to the fire. For safety and security reasons, access to substations is restricted to emergency responders and qualified PSE staff. Non-PSE personnel are required to have a qualified PSE staff escort in order to enter a substation.

Please describe the potential fire risk associated with battery storage facilities

As with almost any chemical reaction, the energy stored and released by battery cells has the potential to cause overheating and, if undetected and unmitigated, eventually cause the battery to experience "thermal runaway" (i.e., a positive feedback loop where an increase in cell temperature and pressure leads to an uncontrolled heat reaction). Runaway could result in the destruction of the cell through melting or fire, which has the potential to spread to other cells.

Primary concerns with battery fires include the release of toxic fumes from hazardous materials (varying by battery chemistry and enclosure materials), challenges and uncertainty with extinguishing battery fires by first responders (as recommended response techniques vary by chemistry type), the risk of electric shock inherent in dealing with any electricity-related fire, and re-ignition and overhaul procedure after extinguishment.

Are PSE's high-pressure natural gas mains, specifically the ones that cross through existing PSE 115 kV easements and the SCL easement, made of steel or of corrosion-resistant plastic?

PSE defines a high-pressure gas main as the portion of the natural gas distribution system, which operates pressures greater than 60 psig. PSE's high pressure gas mains are made of steel.

For a new 230 kV line, would PSE upgrade cathodic protection on nearby buried gas lines? Please describe.

PSE provides corrosion protection for steel pipelines as required by the Code of Federal Regulations, Title 49. This includes dielectric coatings, cathodic protection and maintenance. The cathodic protection meets the criteria specified in federal law and recommended by the National Association of Corrosion Engineers (NACE). Plastic pipelines are made of

polyethylene and do not require cathodic protection. No additional cathodic protection is needed for either the steel or plastic pipelines with the addition of a new 230kV line.

Requests for Confirmation

Please confirm and provide electricity consumption:
Customers in the Eastside service area consume electricity at a rate of approximately 3,000 gigawatt hours (gWh) per year (gWh/yr). Residential uses represent the largest portion (about 90 percent) of PSE's customers; however, business and industry consume about 62 ~~XX~~ percent of the electricity provided.

Please confirm and provide details on PSE's plans for other future projects in the study areas:
Systemwide, in the next decade, PSE anticipates building over 200 miles of new transmission lines (100 kV and above) and upgrading over ~~3~~200 miles of existing transmission lines to carry greater loads. Energize Eastside is the only project in the study area~~s~~ that proposes new 230 kV transmission lines. In addition, PSE anticipates needing to add up to six 230-115 kV bulk power transformers across its service area (PSE, 2013b), including a new transformer for Energize Eastside.

PSE is monitoring preliminary "point load" needs where two new substations may be needed in the study area to help serve new load, where adjacent existing substations are inadequate, or to serve specific facilities. The timing of the construction of these substations would be aligned with customer plans to add point loads and available capacity from existing substations to serve this load (PSE, 2013b). Additionally, PSE replaces many major substation components, including those in the study areas, on a continuous basis as a result of ongoing inspection and diagnostics (PSE, 2013b).

~~Systemwide, PSE also anticipates needing to build approximately eight new distribution substations to help serve new load and where adjacent existing substations are inadequate. Of these none would be within the study area within the next 10 years. Additionally, PSE is monitoring preliminary "point load" needs where another four to eight new substations may be needed to serve specific facilities. The timing of the construction of these *substations* would be aligned with customer plans to add point loads and available capacity from existing *substations* to serve this load (PSE, 2013b).~~

~~Based upon current projections and past experience, PSE expects to replace 500 to 1,000 miles of underground distribution cable, **xxx to xxx** miles of underground transmission cable, approximately 2,000 transmission poles, and up to 10,000 distribution poles throughout PSE's service area over the next 10 years. Additionally, PSE replaces many major substation components on a continuous basis as a result of ongoing inspection and diagnostics (PSE, 2013b).~~

Comment [A1]: This sentence is not related to the study area.

Comment [A2]: This is about the system and not the study area.

Comment [A3]: This paragraph is about the system and not the study area.

Please confirm PSE's cathodic protection for utilities leaving substation and new transformer site

No impacts to utilities around the substation and new transformer relative to electric current are anticipated. If necessary, PSE would provide nonconductive pipe on ~~all~~ underground utilities leaving the substation site to avoid damage to utility line coatings in the rare event of a possible fault condition at the substation site.

Confirm or Revise the Following Statements

For No Action – statement refers to all substations on Eastside: "Design details of the existing substations are not available, but it is known that equipment at these substations is operating on concrete foundations within ~~impervious surfaces (compacted~~ gravel ~~or pavement) yards, and within contained areas not draining directly to surface waters or storm sewers~~. Where required, appropriate SPCC containment structures or other measures are installed to contain potential equipment leaks so that they are not discharged directly to surface water or storm sewers."

Comment [A4]: The yard rock is actually very pervious.

For hazardous materials that may be used on a regular basis or No Action: "Transmission corridors would be maintained by PSE (and/or any other entity they share a corridor with). Maintenance along existing rights-of-way and corridors would primarily involve mechanical control of vegetation that may interfere with power lines. ~~Depending on the details of PSE's vegetation management procedures, they may use chemicals to control vegetation within these areas.~~ PSE uses Integrated Vegetation Management (IVM)[1] techniques to control vegetation on transmission line corridors. Selective application of herbicides is included in IVM. PSE does not broadcast spray herbicides on transmission corridors, and when used, herbicides are applied directly to the vegetation by a Washington State licensed applicator. In general, PSE does not apply herbicides in maintained landscape settings, particularly in urbanized settings. However, in some instances, for example, a tree is removed and stump sprouting occurs, then direct application of herbicides may be used."

Regarding haz mat management related to existing transmission lines for No Action: "The transmission lines could be co-located with other utilities including gas pipelines and in these locations PSE would most likely coordinate use of hazardous materials with the operations and uses of hazardous materials by the other utility. Pipelines typically have more aggressive vegetation management plans than do transmission lines. For instance, only one party would likely perform vegetation maintenance, which could involve use of herbicides, along a shared utility corridor."

With regard to public safety No Action: "Since 1999, PSE recorded 23 outages due to lightning strikes on transmission lines. The proposed 230 kV line would have a shield wire that would reduce the probability of potential outages arising from a lightning strike."

[1] Miller 2014, Integrated Vegetation Management for Utility Rights-of-Way, Second Edition, Best Management Practices. International Society of Arboriculture, Champaign, Illinois.

~~"Lightning strikes to existing power poles and lines are not known to have occurred."~~
~~*(anticipating that this is not an accurate statement but we need some type of data source to address this topic here)*~~