

Exh. JES-9
Dockets UE-170033/UG-170034
Witness: Jennifer E. Snyder

**BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

**DOCKETS UE-170033 and
UG-170034 (*Consolidated*)**

**EXHIBIT TO
TESTIMONY OF**

Jennifer E. Snyder

**ON BEHALF OF STAFF OF
WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION**

PSE's First Supplemental Response to Staff Data Request No. 250

June 30, 2017

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

**Dockets UE-170033 and UG-170034
Puget Sound Energy
2017 General Rate Case**

WUTC STAFF DATA REQUEST NO. 250

WUTC STAFF DATA REQUEST NO. 250:

RE: Glacier Battery Storage System

Please provide copies of the alternative site evaluations, referenced in Exh. No. MM-1HCT, page 17:13-18, including the timeframe they were each initiated and completed.

Response:

Beginning in April 2015, PSE conducted a series of formal and informal internal discussions to identify and discuss potential alternative sites for the battery storage project. PSE engaged functional area experts from Emerging Technologies, System Planning, Substation Engineering, System Controls, Protection, Plant Technical Services, Real Estate, Permitting and Financial Analysis to help consider the merits and challenges of a variety of generation and distribution system-connected sites.

Team members were encouraged to suggest sites with particular potential, typically a significant need or with the potential to demonstrate additional use cases. These recommended sites were then vetted through numerous discussions with internal stakeholder groups. The most promising options were identified and subjected to further feasibility assessments, including a preliminary analysis of costs, schedule, risks and benefits.

Sites with limited need or few benefits, high risks or high costs were eliminated from consideration. In addition to projects with reasonable cost and risk profiles, PSE was looking for options where a battery storage system could appreciably impact system performance in a positive way, and where the pilot project could potentially be used to demonstrate multiple use cases. Ultimately, PSE identified four promising site options with clear benefits and no obvious fatal flaws: Glacier-12 (full 2 MW), Glacier-12 (300

kW only), Frederickson Generating Station, and the Lake Holm substation. Table 1 summarizes and compares PSE’s findings associated with these sites.

Table 1. site alternatives summary

SITE	CAPEX IMPACT (\$MM)	BENEFIT/COST		Ribbon Cutting	PROS	CONS
		TOTAL	INCR.			
Glacier - Full Upgrade	+0.92*	0.8	1.8	Q1 2016	<ul style="list-style-type: none"> - Fulfills grant obligations - Provides long-term reliability benefit - Engineering nearly complete - Soonest completion - Maximizes learning value - Unique project, interesting story 	<ul style="list-style-type: none"> - Budget impact - Some uncertainty remains on upgrade costs - Long distance from HQ
Glacier - 300kW Only	-0.58*	0.3	1.1	Q1 2016	<ul style="list-style-type: none"> - Provides long-term reliability benefit - Engineering nearly complete - Soonest completion - Unique project, interesting story 	<ul style="list-style-type: none"> - Doesn't fulfill grant requirements, risk of losing Grant - Prudence justification is difficult (only 30% cost effective) - Long distance from HQ
Frederickson	+0.54**	0.7	2.0	Q3 2016	<ul style="list-style-type: none"> - Less complexity (probably) - Less budget impact - Close to PSE HQ - Manned facility 	<ul style="list-style-type: none"> - Loss of sales tax exemption (~\$700k) - No direct customer benefit - Schedule delay - Many uncertainties (concept only)
Lake Holm	+0.93**	0.7	1.8	Q4 2016	<ul style="list-style-type: none"> - Provides (short-term) value to customers - Closer to PSE HQ 	<ul style="list-style-type: none"> - Major schedule delay - Budget impact - Loss of sales tax exemption (~\$700k) - Short-term reliability benefit only (until 2018) - Many uncertainties (concept only)
NOTES: * Contingency has been eliminated ** Preliminary cost estimates						

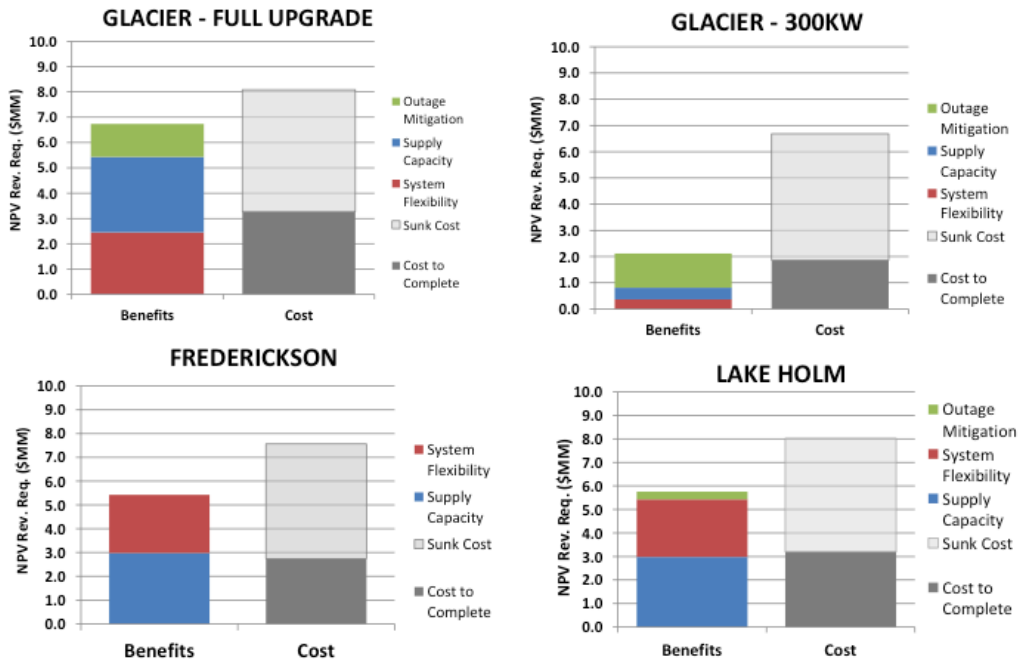
Early analysis, pending the outcome of a Facilities Study, supported continuing to develop a 2 MW energy storage system at the Glacier-12 location. PSE’s analysis showed that Glacier was the best option economically, despite upgrade costs. Given all of the planning and design work that had already been completed, Glacier would also be the best option to avoid significant schedule delays, and would have the earliest completion date. The advanced stage of the Glacier ESS project reduced the likelihood of potential risks going forward. Glacier continued to offer the most attractive opportunity to demonstrate multiple use cases in an environment with a significant need for a transmission and distribution solution, and maximized the potential learning value on PSE’s system. Additionally, with the circuit switcher upgrade, installation of the 2 MW ESS would enable the opportunity to further consider the microgrid option at a later date, if remaining uncertainties associated with using the Nooksack hydro facility could be addressed.¹ Glacier would also fulfill the obligations PSE agreed to in its grant

¹ The circuit switcher represents a substantial portion of the incremental cost difference between the microgrid and islanding only options in the preliminary cost-benefit analysis performed prior to the System Impact Study.

agreement with the Washington State Department of Commerce, which strongly favored the Glacier location.

Table 2 illustrates the results of the cost-benefit analysis performed for each of the four most promising site alternatives.

Table 2. Economic analysis of site alternatives



The project team presented two site reassessment updates in presentations to management on April 13, 2015 and April 27, 2015, and ultimately recommended to management that the project proceed at Glacier on July 21, 2015, as shown in Attachment A to PSE's Response to WUTC Staff Data Request No. 251.