

Glacier Battery Storage Innovation Project

Project Overview | September 30, 2014

Patrick Leslie, Emerging Technologies Program Mgr.



Department of Commerce
Innovation is in our nature.



Pacific Northwest
NATIONAL LABORATORY



Project Summary

- What:** PSE is proposing to develop a grid-scale battery energy storage system in Glacier.
- Why:**
- PSE has studied the feasibility of battery storage systems with Pacific Northwest National Laboratory (PNNL) and the results are promising.
 - Project is a opportunity for PSE and Glacier to evaluate this new technology. PSE chose Glacier for this project because of the area's unique grid challenges.
- Purpose:**
1. Provide limited backup power during outages
 2. Shave peak loads
 3. Help integrate intermittent renewable energy
 4. Evaluate the technical and operational realities
- Funding:** Substantial funding provided by the Washington Department of Commerce and the U.S. Department of Energy.

Battery System

Battery System

Type: Lithium iron phosphate
Power: 2.0 MW (megawatts)
Duration: 2.2 hours
Energy: 4.4 MWh

→ Equivalent to 1.7 million AA batteries
→ 150 avg. homes for 1 day

Lithium iron phosphate batteries:

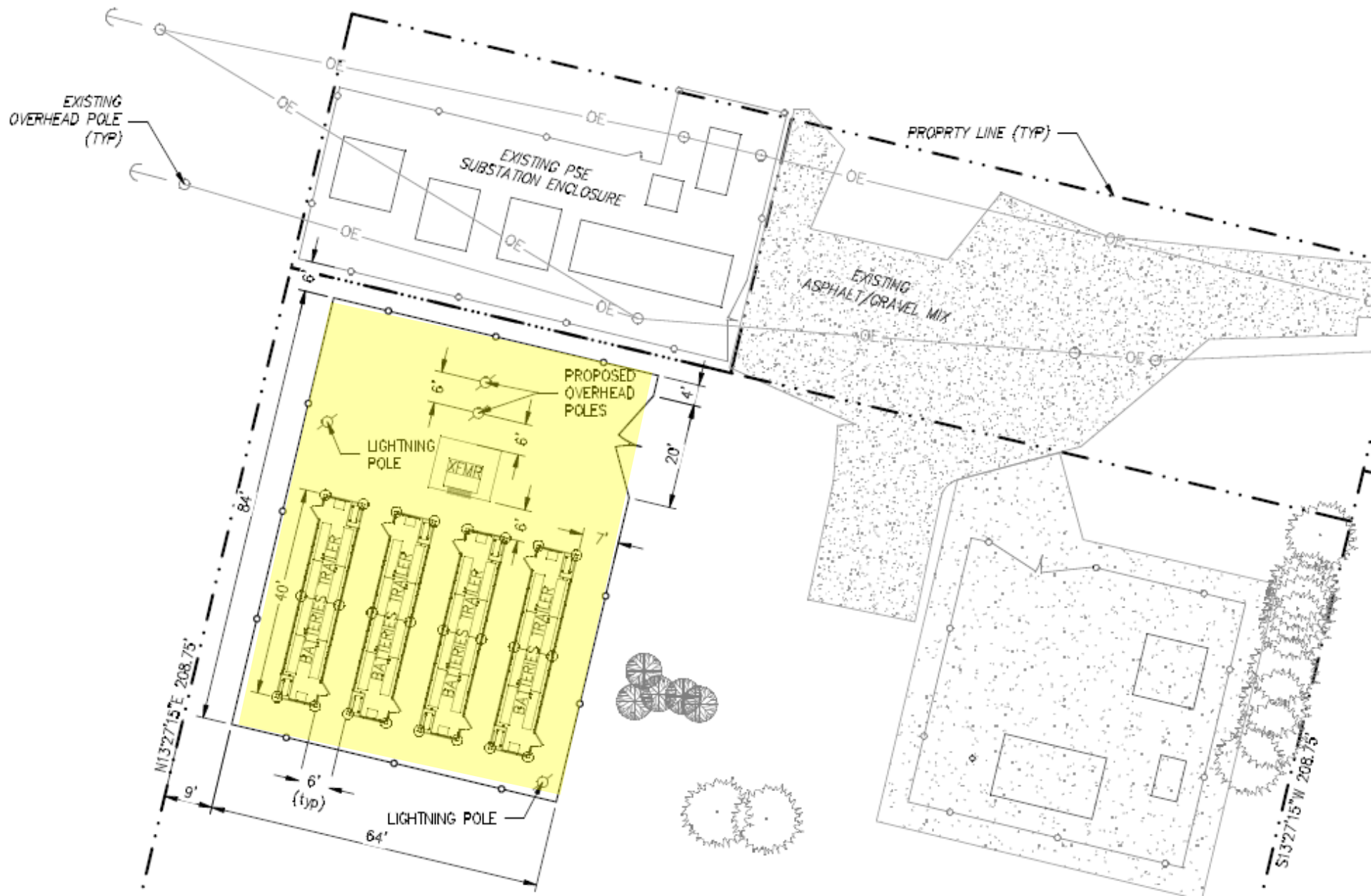
- superior safety record
- not subject to “thermal runaway”
- low environmental impact









Potential Layout

The diagram illustrates a potential layout for a battery storage facility. Key features include:

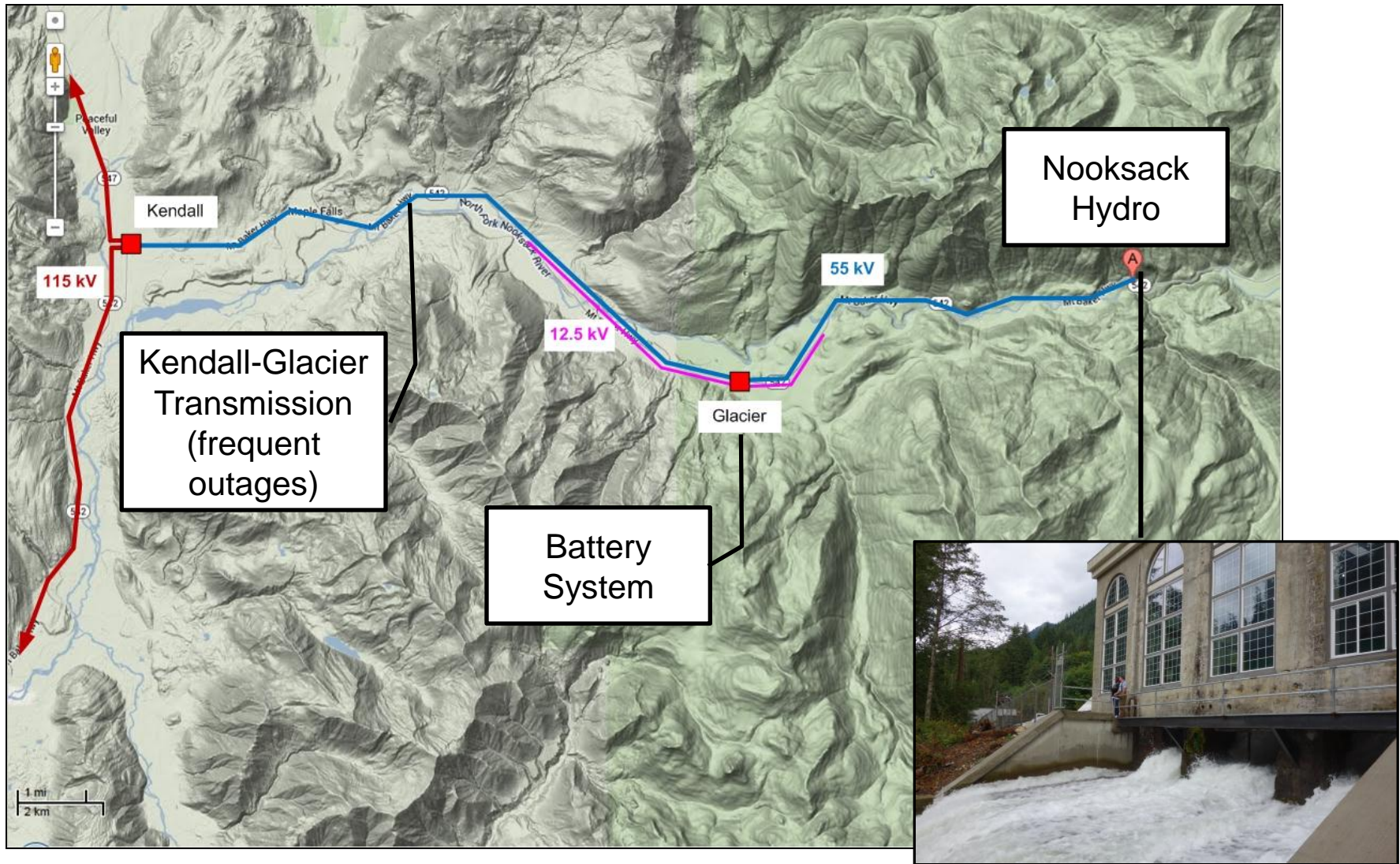
- EXISTING PSE SUBSTATION ENCLOSURE:** Located in the upper left, containing several rectangular structures.
- EXISTING ASPHALT/GRAVEL MIX:** A large area to the right of the substation enclosure.
- PROPOSED OVERHEAD POLES:** Indicated by small circles along the top and right boundaries of the yellow-shaded area.
- LIGHTNING POLE:** Two poles are shown, one near the top and one near the bottom of the yellow-shaded area.
- BATTERIES TRAILER:** Four rectangular trailers are arranged in a row within the yellow-shaded area.
- PROPERTY LINE (TYP):** A dashed line indicating the boundary of the property.
- Dimensions:** Various dimensions are provided, including 84', 20', 4', 6', 7', 40', 64', and 9'.
- Orientation:** The site is oriented with a bearing of N13°27'15"E 208.75'.



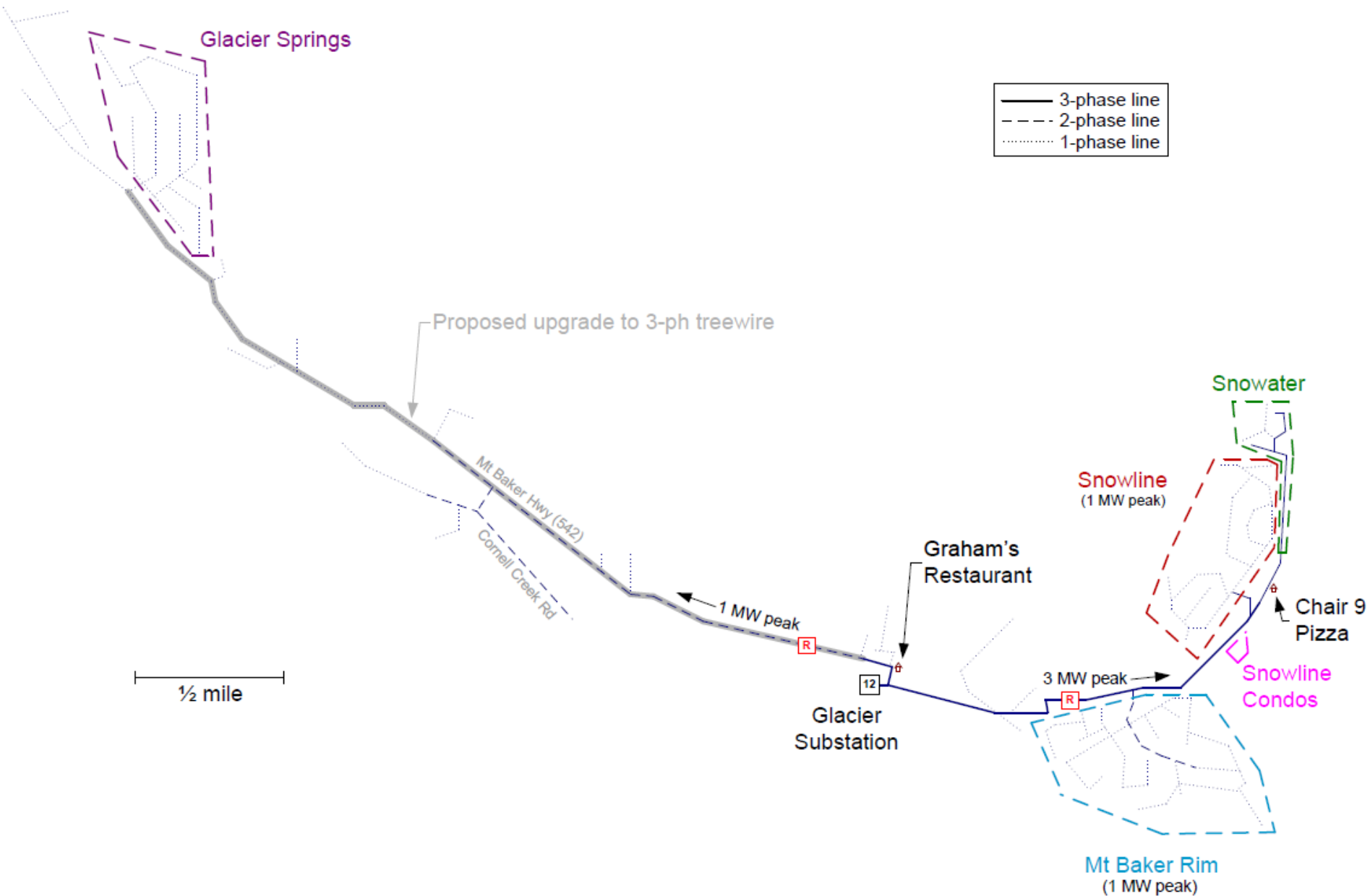
Project Partners

 Department of Commerce Innovation is in our nature.	Grant funding, project oversight
	Turnkey contractor
	Advanced software controls
 	Performance testing, economic analysis
	Long-term maintenance





Glacier Grid



Glacier Distribution Grid



Project Timeline

	2014		2015				2016	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Community Outreach								
Engineering, Permitting								
Construction, Commissioning								
Testing and Evaluation								

Construction

Equipment:

- Crane (165 – 200 ton)
- Bucket/pole setting trucks
- Excavator, backhoe, compactors
- Concrete trucks
- Haul trucks

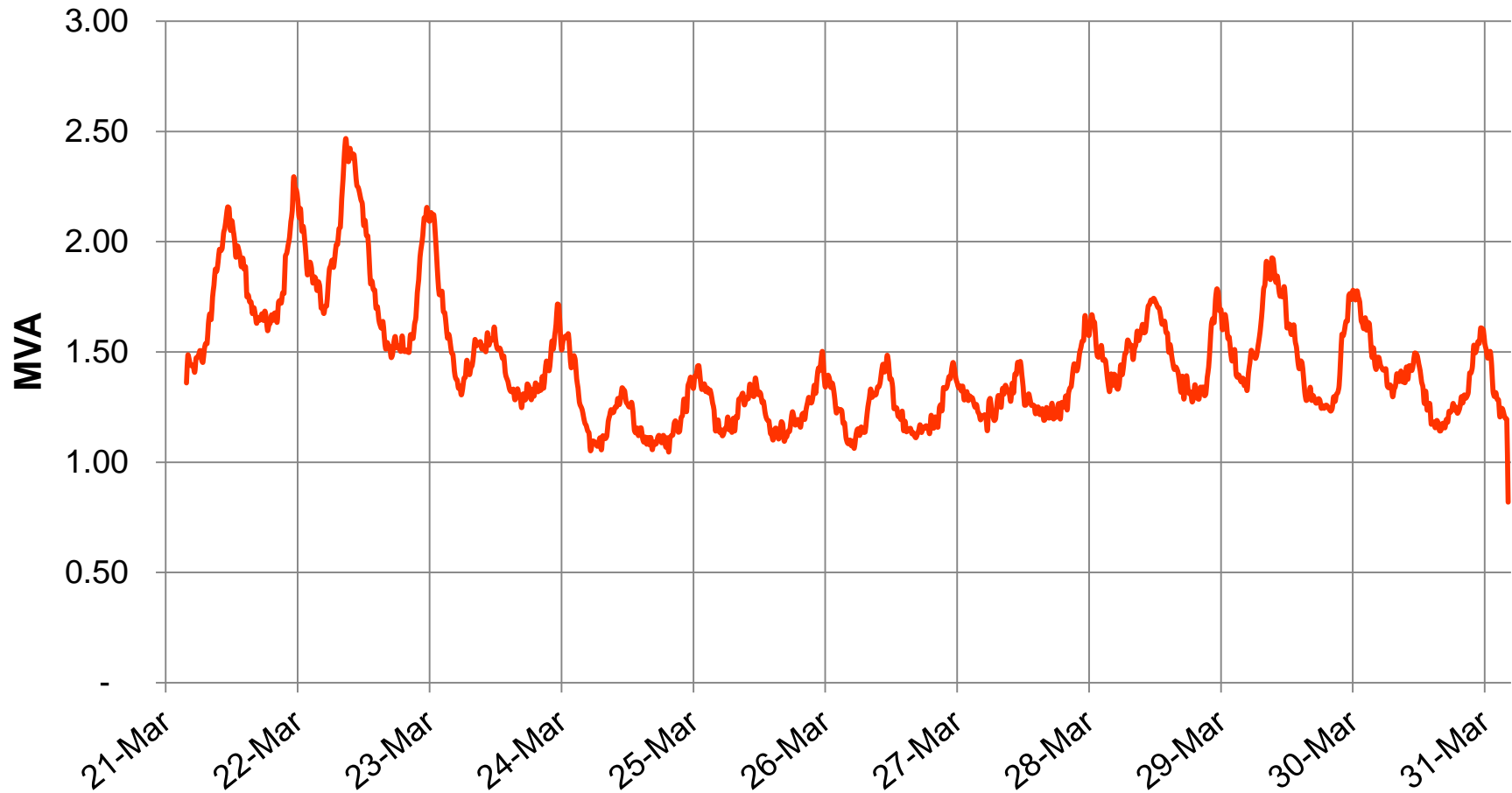


Outage History

Outage Date	Duration (hours)
November 15, 2009	2.8
November 16, 2009	5.4
June 23, 2010	2.1
November 15, 2010	12.1
January 17, 2011	12.7
February 16, 2011	9.6
November 23, 2011	10.0
January 4, 2012	10.0
June 23, 2012	7.0
May 28, 2013	33.5
Average Duration	10.5

Glacier Power Demand

Glacier-12 Load Sample – March 2014



Glacier Battery Storage Conclusion

- Innovative technology that will provide real-world data
- Explores how batteries might provide important service for balancing energy supply & demand
- Not at scale to eliminate the need for the traditional power system (Generation, Transmission, Distribution)