Goldendale Energy Storage Project

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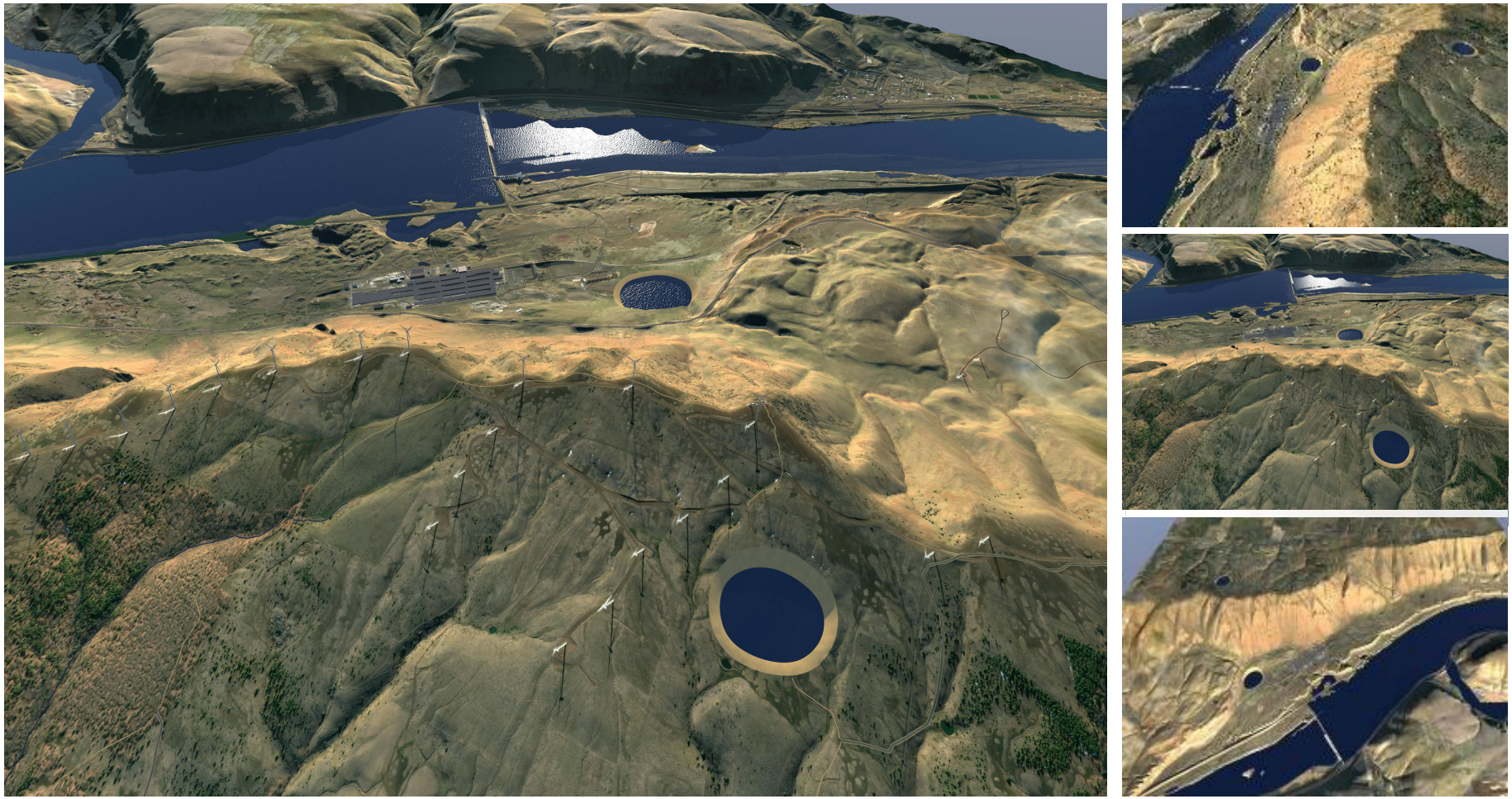

Supporting a carbon free future through proven, affordable grid-scale storage

Meeting Objectives

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- Provide an overview of the proposed Goldendale Energy Storage Project
- Discuss resource studies
- Solicit feedback on the proposed project and studies

Meeting Agenda

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- Introductions
- What is pumped storage
- Purpose and need for the proposed project
  - Why here why now?
- Description of project features
- Economic benefits
- Development timeline
- Description of the resource studies proposed in the Preliminary Application Document (PAD)
- Open discussion including questions and comments on the proposed project and studies

National Grid: one of the world's largest investor-owned energy utilities

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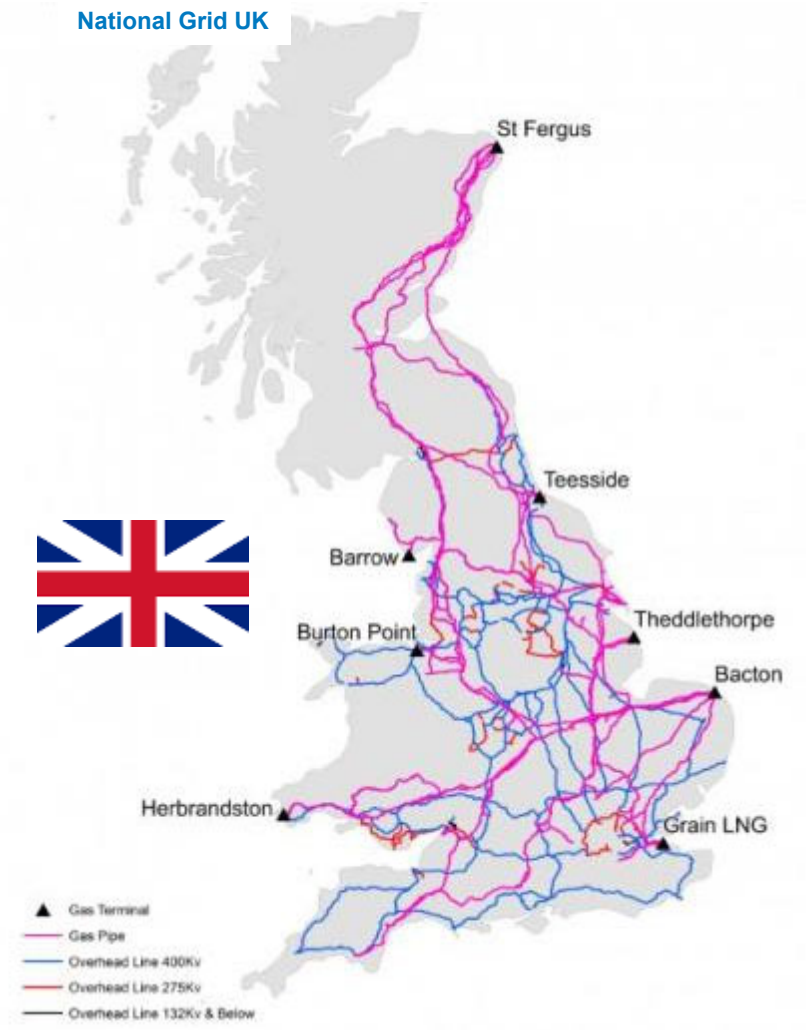
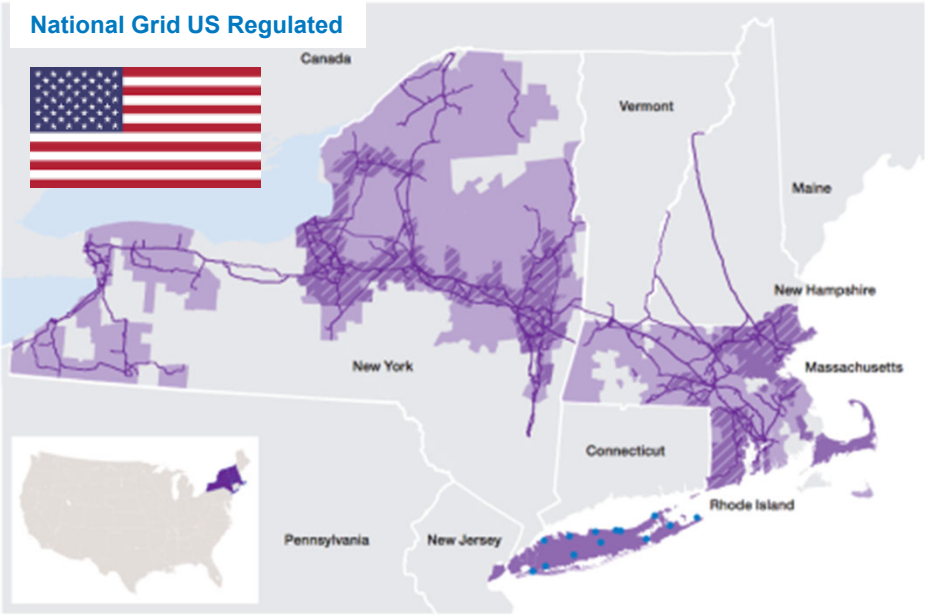
National Grid UK



National Grid US Regulated

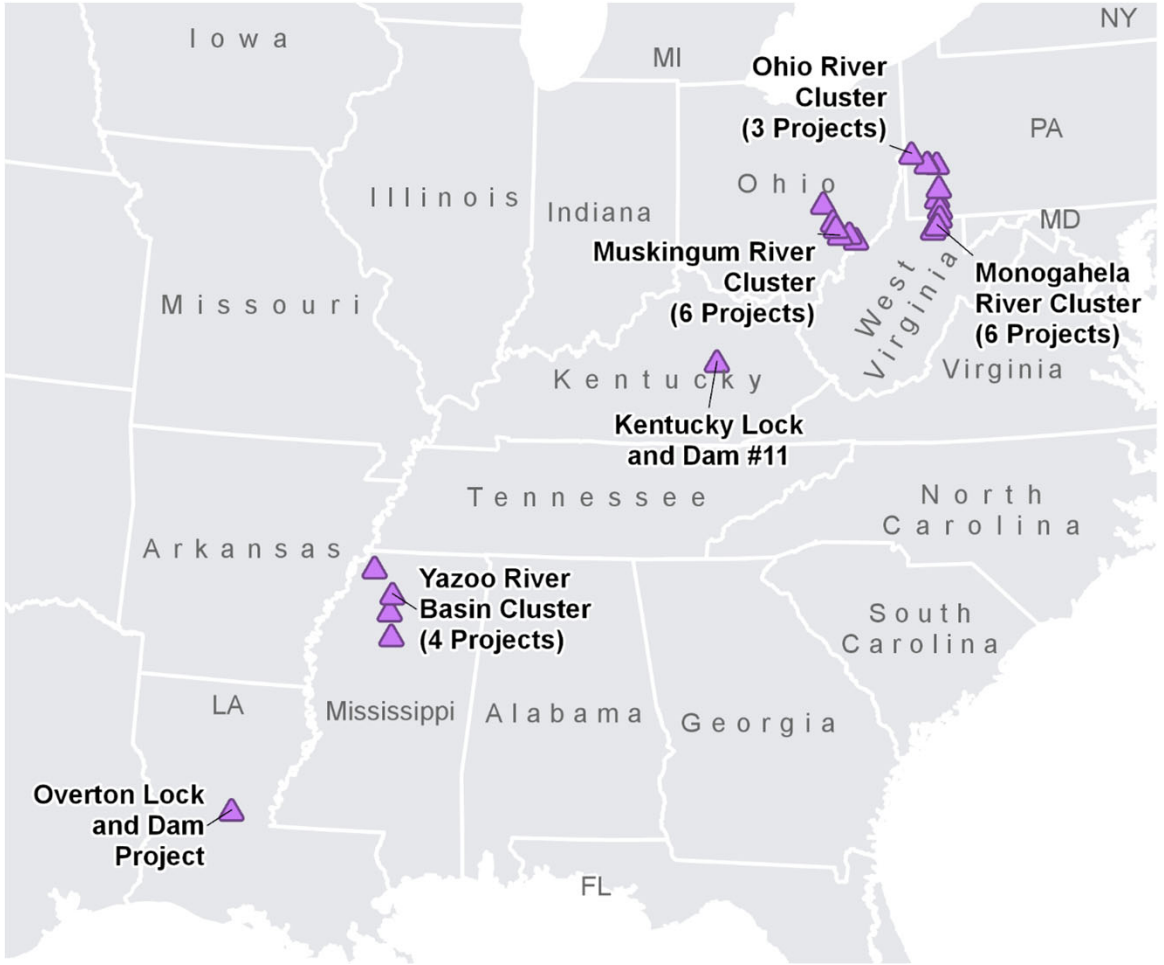


- Own/operate the electricity transmission network in England and Wales (i.e. System Operator or "SO")
- Operate, but do not own, the Scottish networks
- Own/operate the gas National Transmission System in UK
- Own/operate transmission facilities across upstate New York, Massachusetts, New Hampshire, Rhode Island and Vermont
- Own/operate electricity distribution networks in upstate New York, Massachusetts and Rhode Island
- Own/operate gas distribution networks across the northeastern US, located in upstate New York, New York City, Long Island, Massachusetts and Rhode Island.

Rye Development – Overview

Rye Development is the leading Developer of New Hydro in the US

- FFP New Hydro LLC ("FFP NH") is institutionally owned and funded, by US Renewables Group, Crestline Investors, and Ascent Holdings
- Rye Development, LLC ("Rye") is the manager of FFP NH
- 24 projects – $1.5-billion in development



Pumped storage is the only proven, cost-effective storage technology at scale

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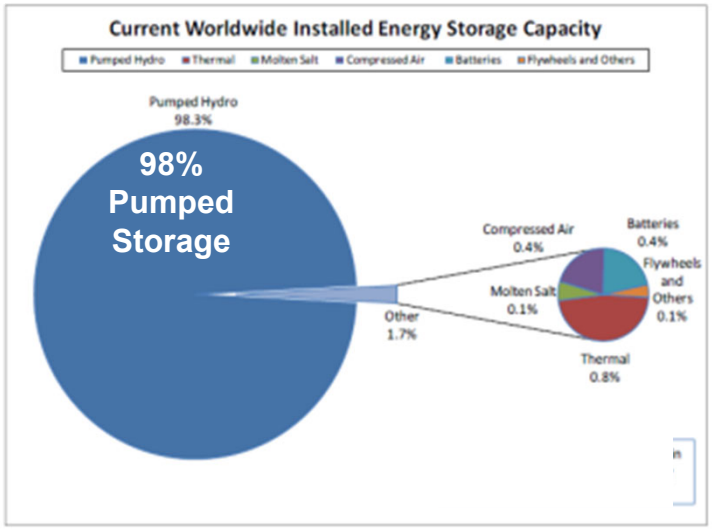
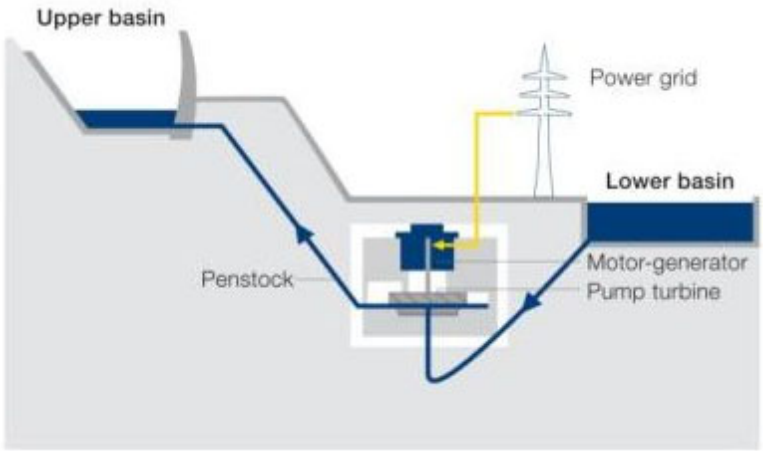
- **Pumped storage** is the only **proven**, **cost-effective** storage at **scale**
- Consists of pumping or generating by moving energy in the form of water through a powerhouse between an upper and lower reservoir
- **Pumped storage is prolific** in the **US** – there are **39 pumped storage plants** in operation with a total installed capacity of about **22,000 MW; however, over 2 decades since last built in US**
- **Globally**, there is nearly **131,000 MW** of pumped storage capacity currently in operation; **currently building all over world but US**
- **Batteries** still very expensive, uncertainty viability in replacing thermal plants, don't last nearly as long and come with mining/toxic waste issues

Current Worldwide Installed Energy Storage Facility Capacity





Regional Regulatory/Market Situation

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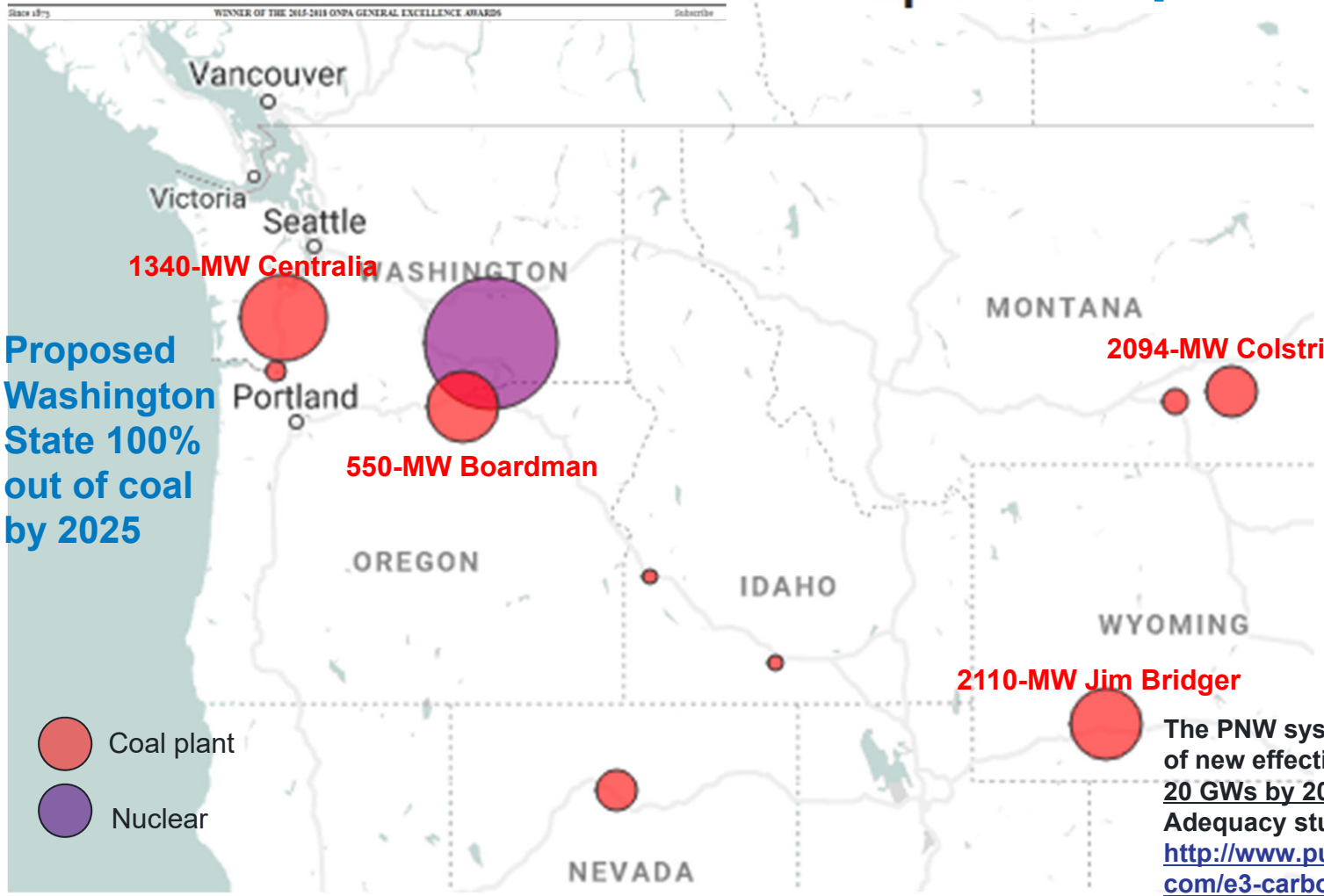
EAST OREGONIAN
OCTOBER 10, 2018

Regulators deny gas plant expansion [PGE Carty 2]



Proposed Washington State 100% out of coal by 2025

The PNW system will need 8 GWs of new effective capacity by 2030, 20 GWs by 2045 per E3 Resource Adequacy study.
http://www.publicgeneratingpool.com/e3-carbon-study/

Significant PNW capacity needs

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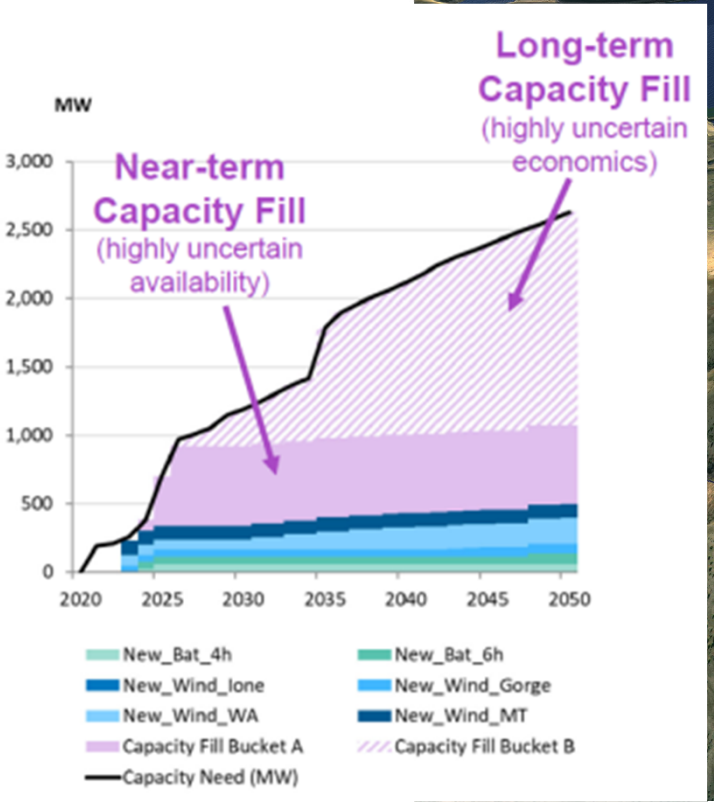
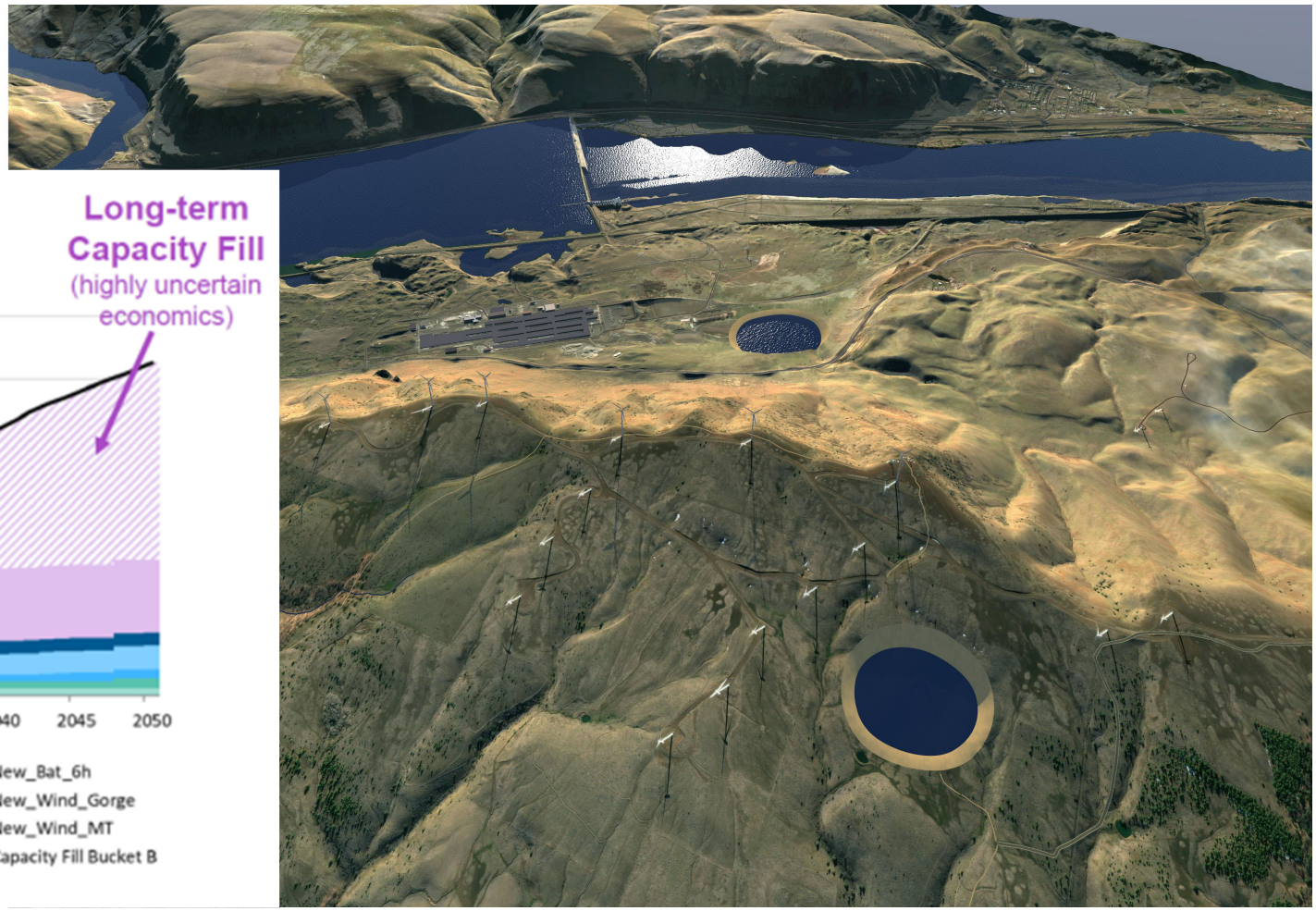
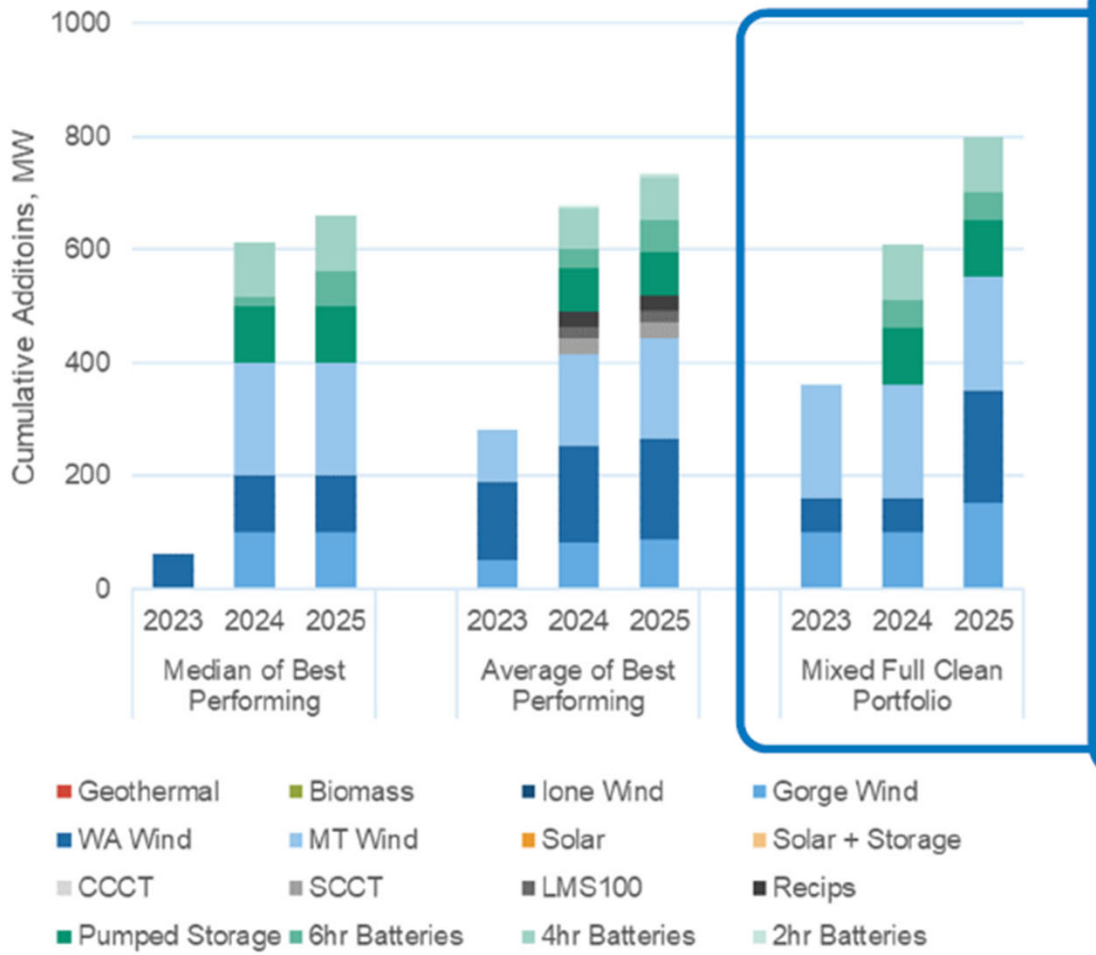
Portland General Electric





- Significant capacity deficits for PGE beginning in 2025

2019 PGE IRP draft “Preferred Portfolio”



Mixed Full Clean Portfolios includes:

Diverse portfolio of wind resource additions in 2023

Additional wind in 2025

Storage (4 hour duration and longer) to meet remaining capacity needs

Significant PNW capacity needs

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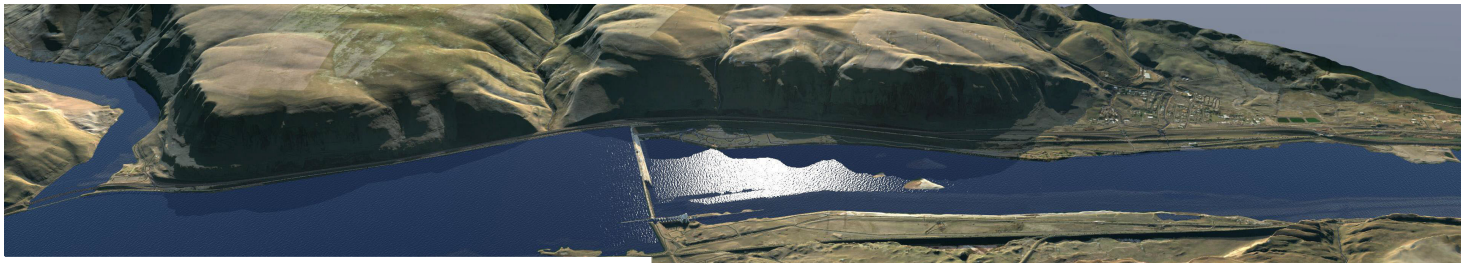

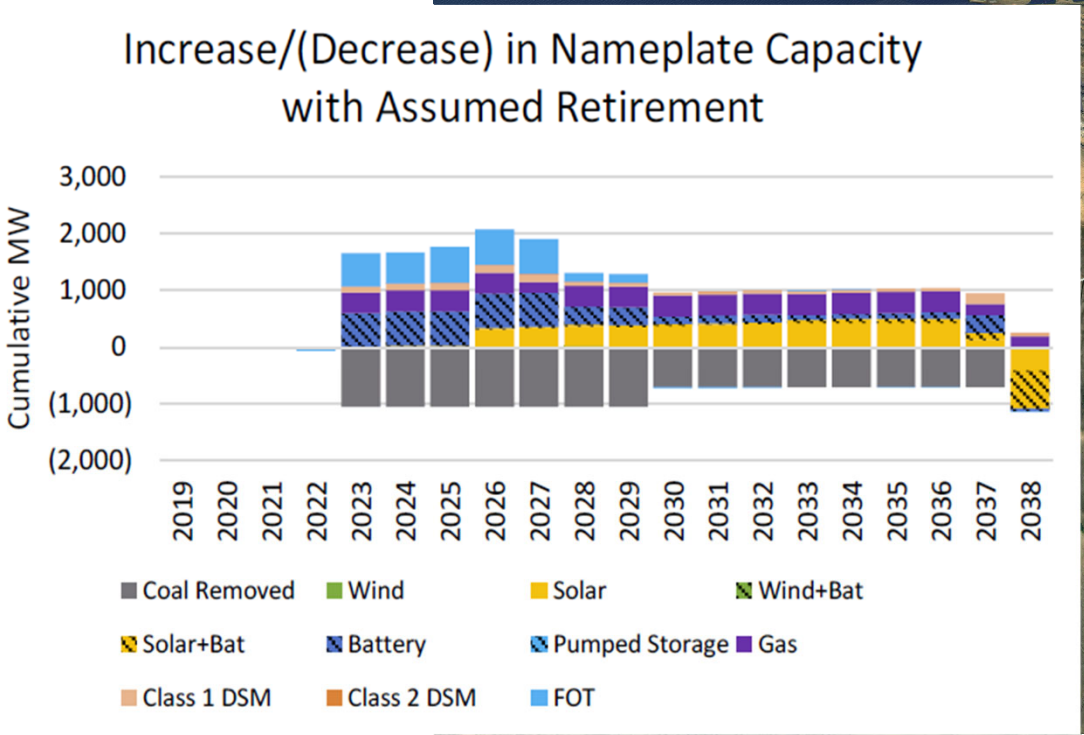

PACIFICORP

- Early/accelerated coal plant retirement

Significant PNW capacity needs

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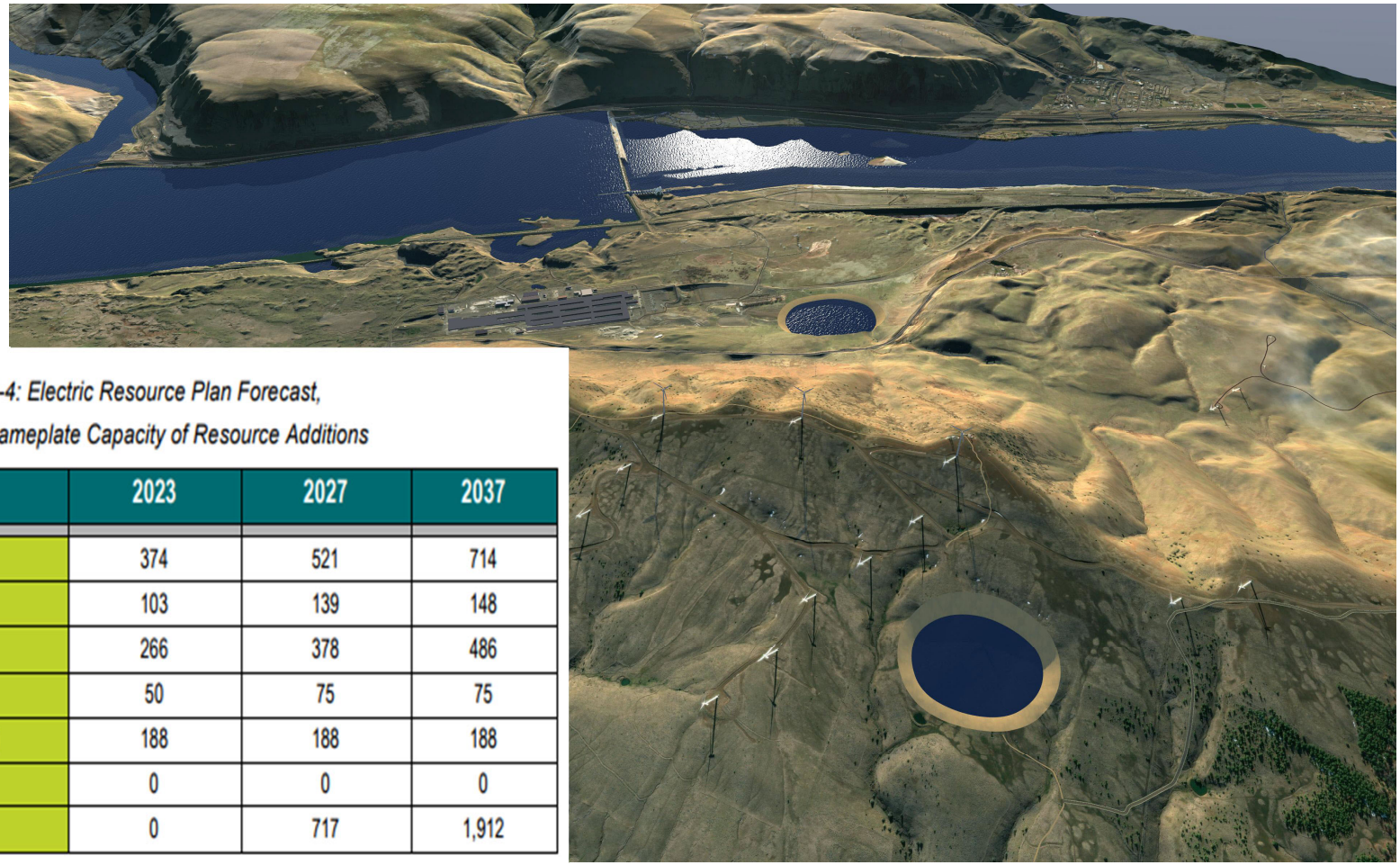

Figure 1-4: Electric Resource Plan Forecast,
Cumulative Nameplate Capacity of Resource Additions

	2023	2027	2037
Conservation (MW)	374	521	714
Demand Response (MW)	103	139	148
Solar (MW)	266	378	486
Energy Storage (MW)	50	75	75
Redirected Transmission (MW)	188	188	188
Baseload Gas (MW)	0	0	0
Peaker (MW)	0	717	1,912

PSE PUGET SOUND ENERGY

- With **no new thermal resources** available the only resource large enough to meet the capacity need is **pumped storage** hydro. ***PSE 2017 IRP***

Pumped storage **strategically located in grid** for **renewable integration** and **replacement capacity**

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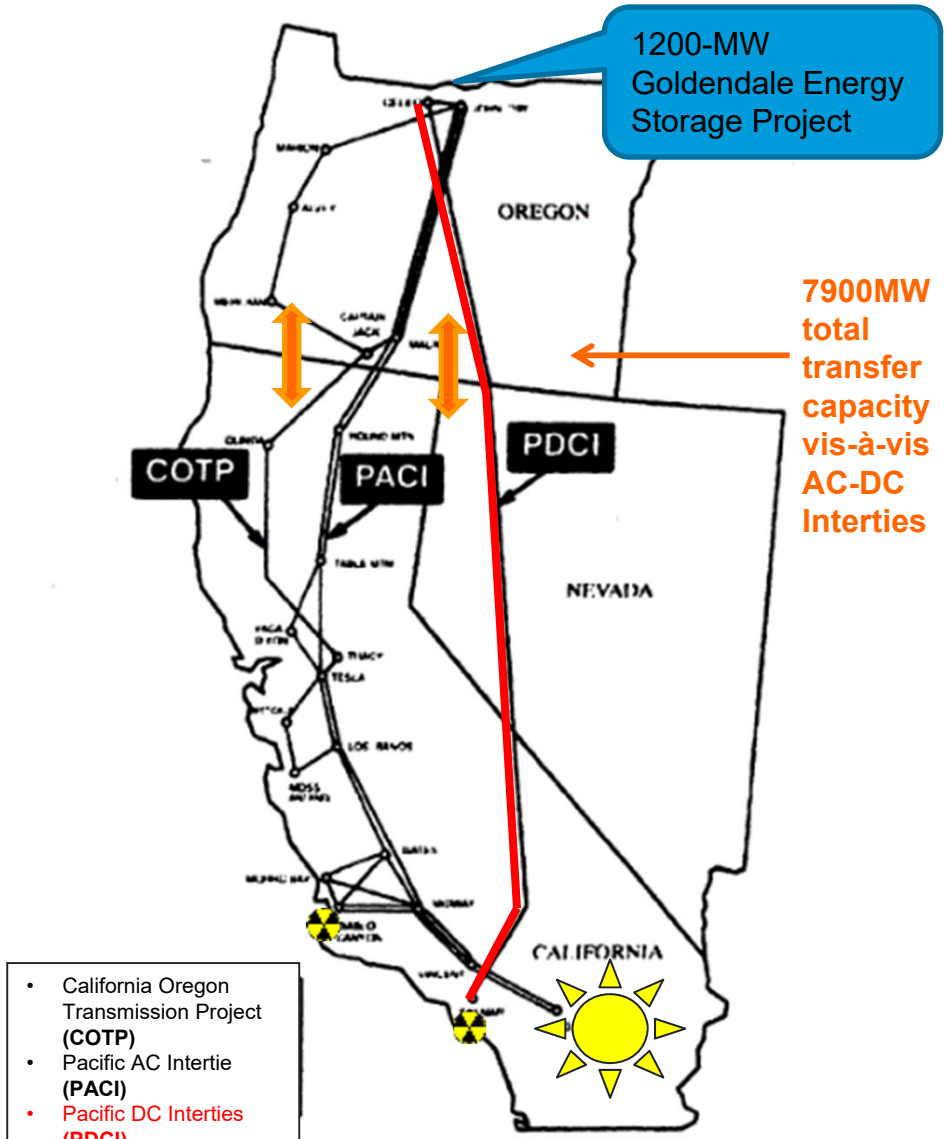
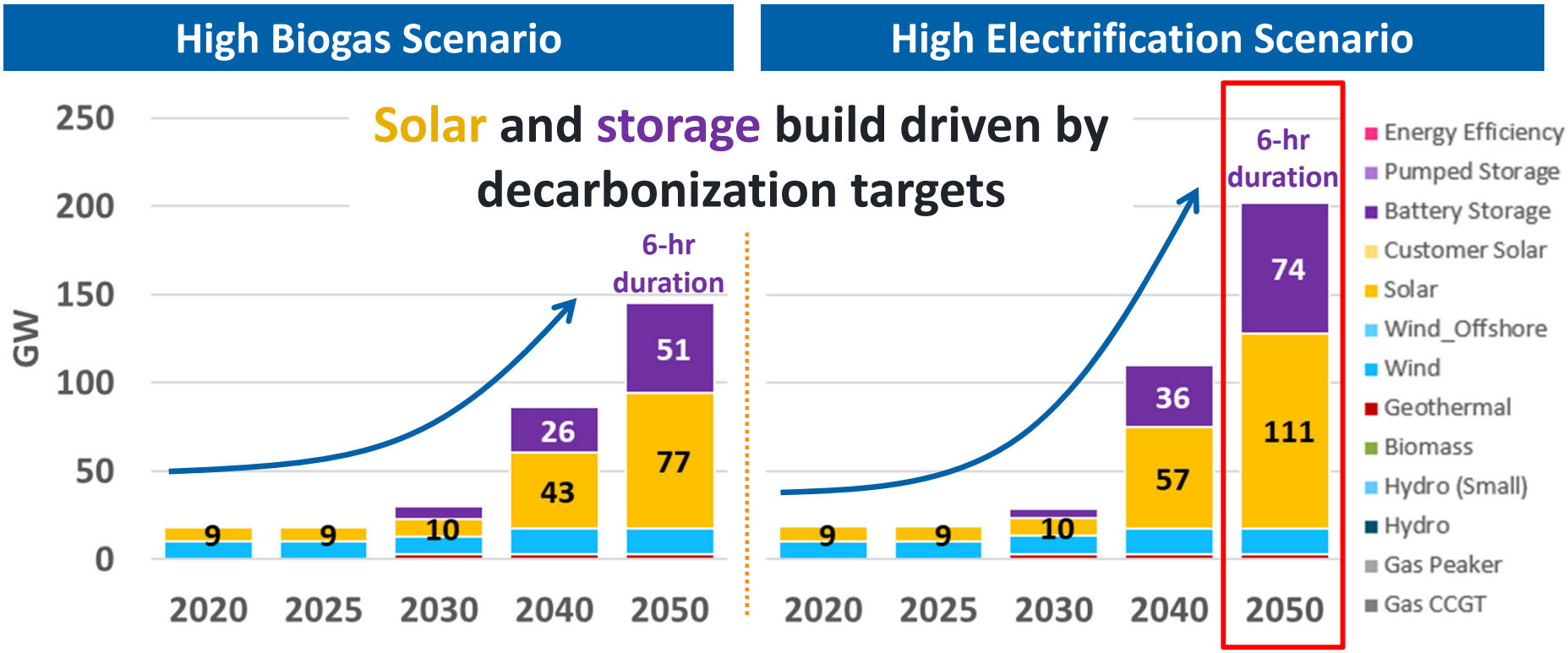


- Viable/constructible **"closed-loop"** project interconnecting into **existing high-voltage transmission** that leverages major import/export path to California
- Proven storage solution **strategically located in grid** to support regional **decarbonization** goals affordably and reliably
- Project support **continued history** of beneficial regional bulk power **exchanges between California and the Pacific Northwest**
- **Hundreds of millions of annually potential cost-saving/revenue based on E3 economic modeling** (in addition to staggering economic development/jobs)

CA 100% modeling selects mostly solar and storage to meet decarbonization goals

- 100%+ RPS achieved by 2050 in both scenarios
- E3's RESOLVE utilizes a Planning Reserve Margin constraint but does not examine resource adequacy in detail



Installed renewable resources AS OF 3/4/2019

Solar	11,799 MW

With transmission/market access to CA, Goldendale can extract value of cheap mid-day solar oversupply from the market

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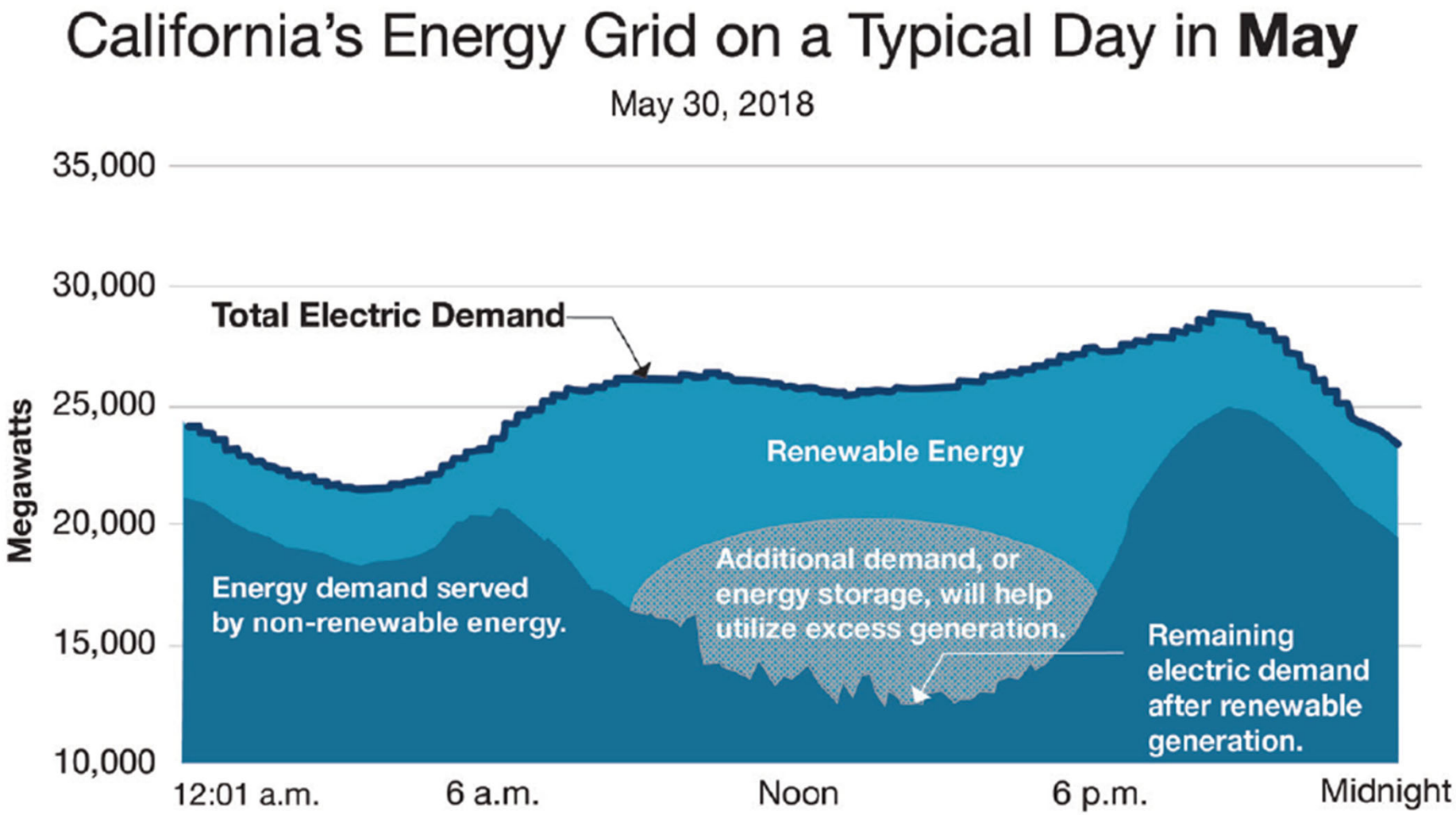

Goldendale Energy Storage Project

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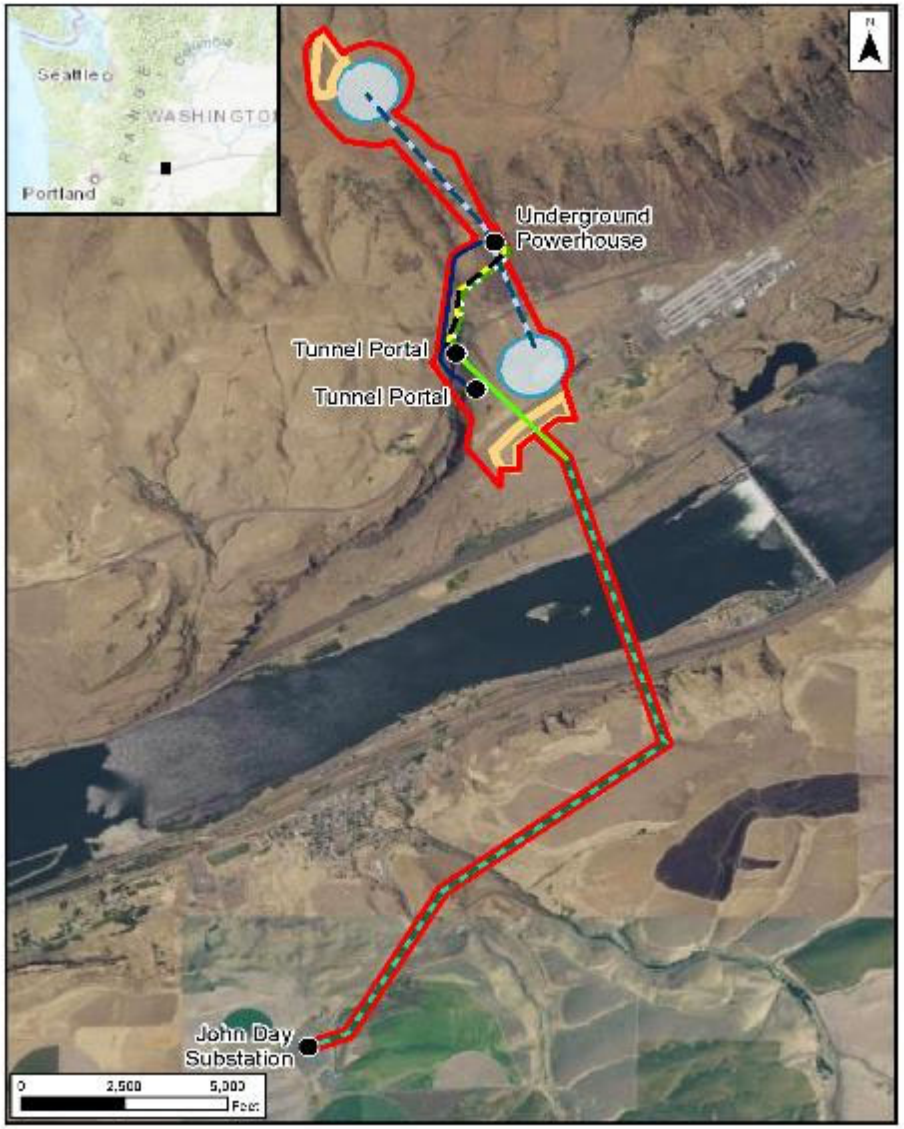
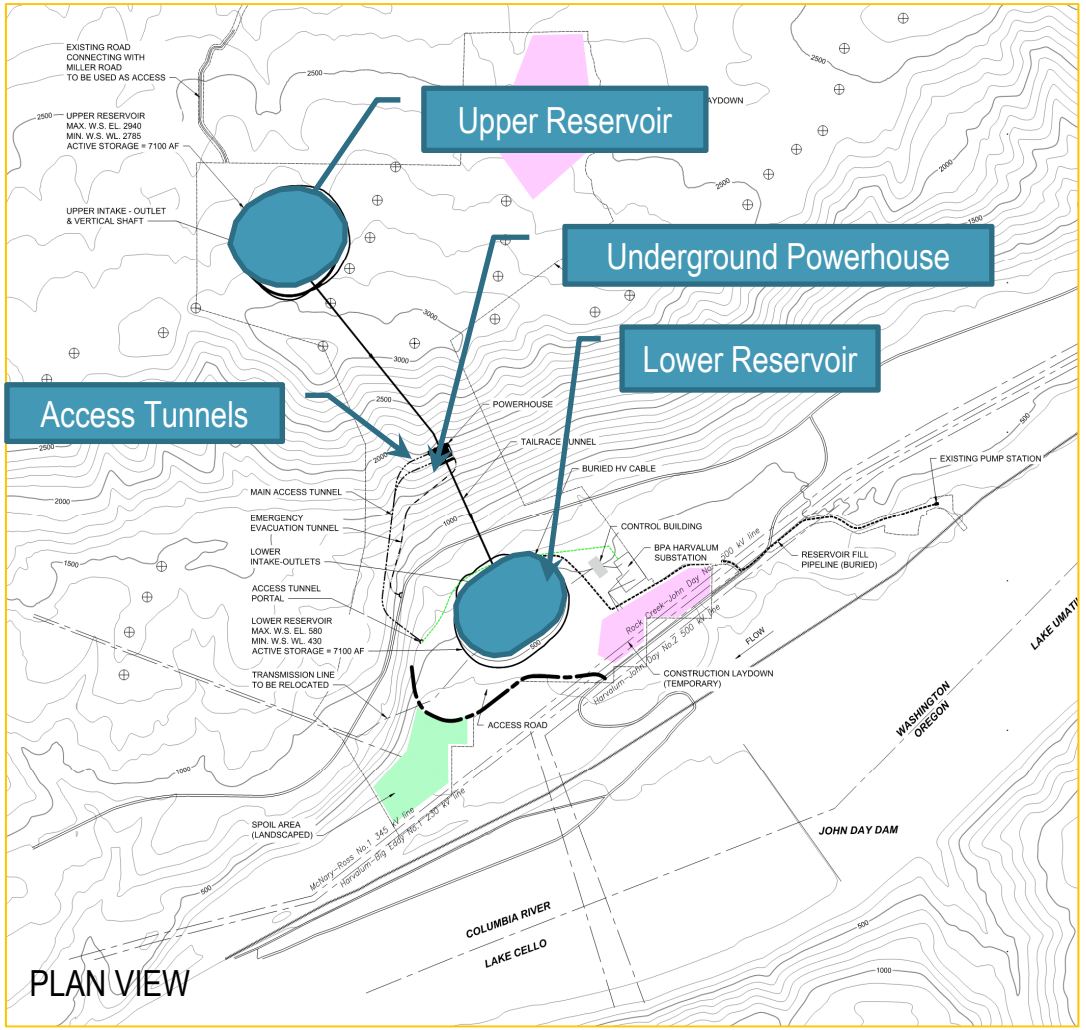
- 1200MW “closed loop” pumped storage facility
  - 2,360 feet of head (719 m)
  - 3 x 400MW pump-turbine/generator units)
  - 25,506 MWh energy storage
- **Leasing water from KPUD**. Water rights secured by KPUD for the specific purpose of a pumped storage facility by Washington law
  - 9000 AF initial fill
  - 300 AF annual water use
- Achievable in-service date 2028
- Interconnection Feasibility Study performed by Bonneville Power Administration at 500-kV John Day Substation; cost $11M
- HDR Opinion of Probable Construction Cost $2B



Project Characteristics

- 10% Engineering Definition
- Three 400-MW reversible pump-turbines = 1,200 MW
- Energy storage =12 hours = 14,400 MWh @ rated capacity
- Two modes of operation
  - Generating
  - Pumping
  - Time to change mode: minutes



Project Characteristics

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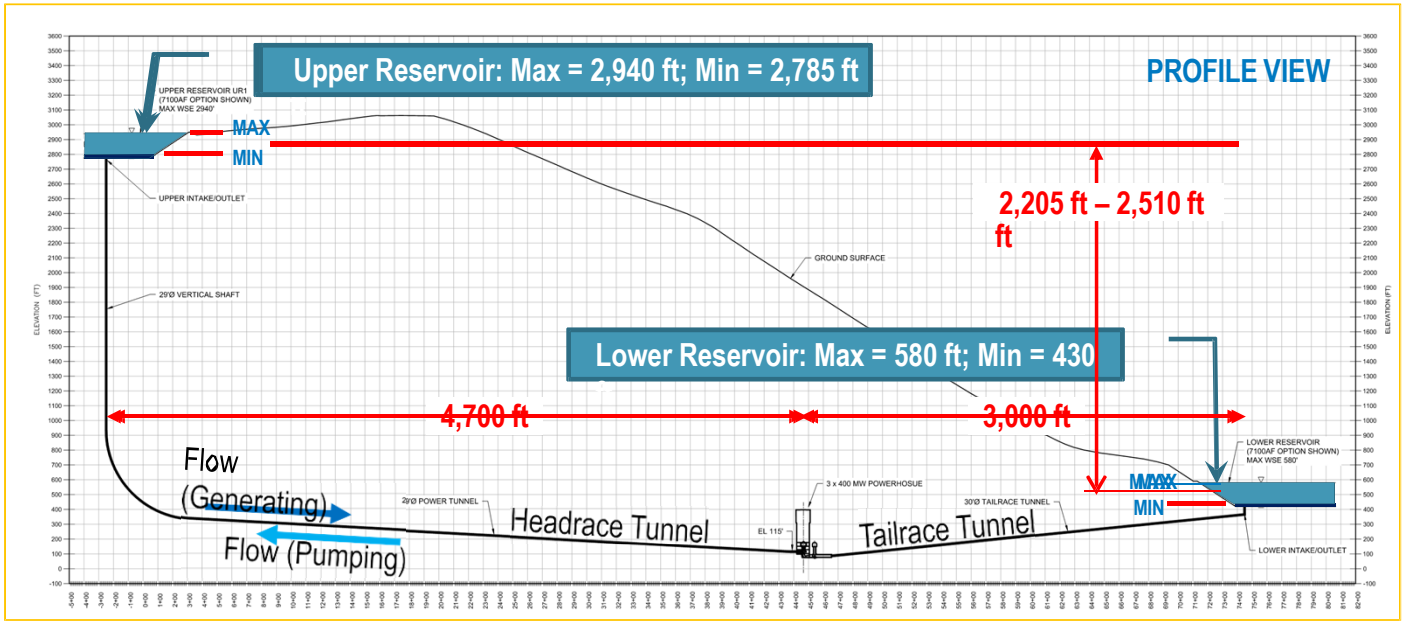
10% ENGINEERING DEFINITION



Economic Benefits

- **Project construction will create 1,000's of good-paying construction jobs**
- **Project Operation: 30 family wage operator positions, 40 additional local jobs indirectly created**
- ***Millions of dollars in annual property taxes to the county for an area that has long been the focus of commercial/industrial redevelopment***

Economic Benefits

- Klickitat County Assessor annual tax district estimates
  - County general: $2,601,249
  - County road: $3,221,685
  - Goldendale school district: $3,000,000
  - EMS: $1,000,000
  - Klickitat County Hospital: $1,230,566
  - Fire 7: $1,692,540
  - Library: $727,160
  - Rec. District 1: $540,000

Development Schedule

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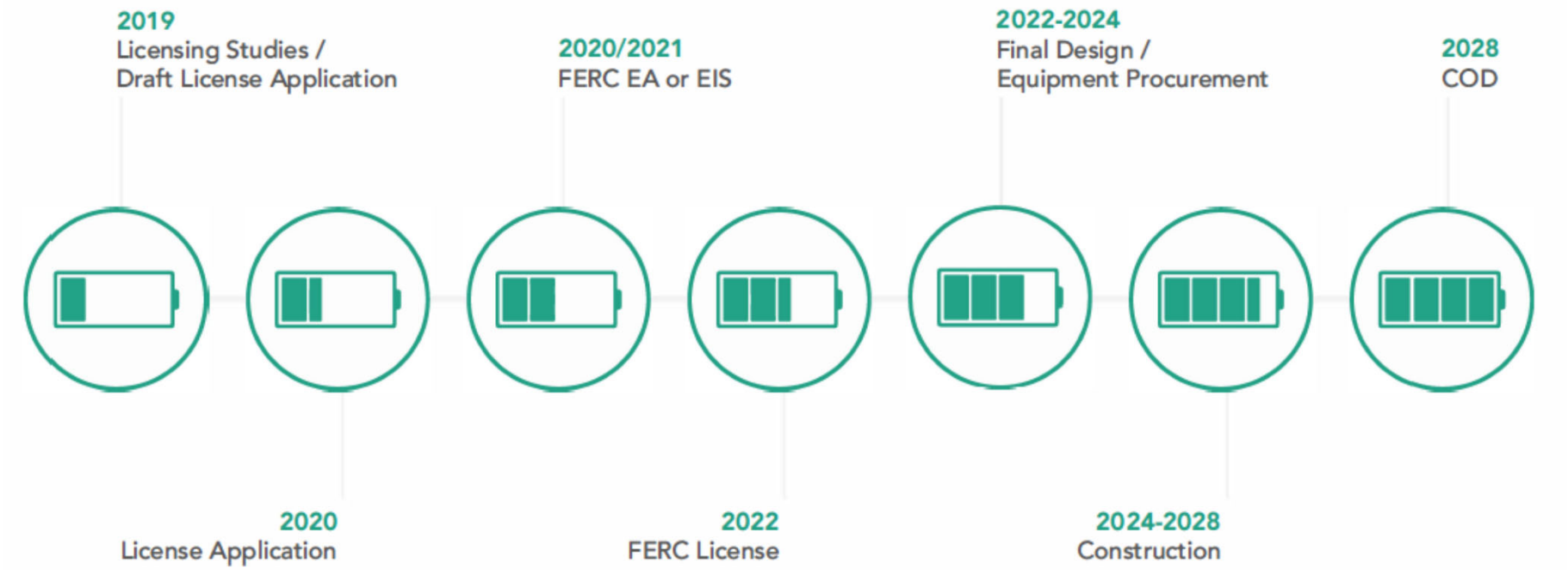


Proposed Studies

- The Project's goal is to identify, avoid, and minimize potential impacts. The following studies have been proposed in 2019 to support a License application:
- Geology and Soils
- Engineering
- Wildlife Habitat/Botanical
- Sensitive Plants
- Wetlands and Waters of the US
- Cultural Resources
- Visual Resources
- Socioeconomic

Geology and Soils Study

Study area: **Project boundary and borrow source sites**

Schedule: **Snow-free season, 2019**

Who: **Geotechnical contractor**

- Completed:

  Extensive studies and sampling related to the former CGA smelter and to determine feasibility for the proposed Project.

- Proposed:

  Geological and geotechnical investigations needed for the design and construction of the project: field and desktop programs to characterize the surface and subsurface geological conditions at potential areas of concern. These include but are not be limited to:

  - Detailed geologic mapping;
  - Identification of fault zones;
  - Mapping of potential and existing geologic hazards such as landslides and areas subject to potential for liquefaction;
  - Subsurface borings, sampling, and testing to determine rock quality for underground facilities; seismic refraction surveys; exploratory trenching;
  - Description of seismicity; mapping of soils within the Project boundary; and
  - Evaluation of potential borrow sources and suitability of materials for construction.

Wildlife Habitat/Botanical Survey

Study area: **Project vicinity**

Schedule: **May-June 2019**

Who: **ERM**

- Completed in 2015:
  - Wildlife habitat, vegetation classification, and invasive plants field survey of the Project boundary in Washington, and areas of Project vicinity.
  - Nine vegetation sample plots and other observation points to document species composition and percentage of cover.
  - Vegetation mapped using Washington Natural Heritage Program (WNHP) Field Guide to Washington's Ecological Systems classes.
- Proposed:
  - Sensitive habitat assessment to ground-truth WDFW and ODFW desktop data on location of sensitive habitats in and near the Project boundary.

Sensitive Plants Survey

Not a Project photo
Copyright Slitcher 2018
Lomatium lavaegatum

Study area: **Project vicinity**

Schedule: **May-June 2019**

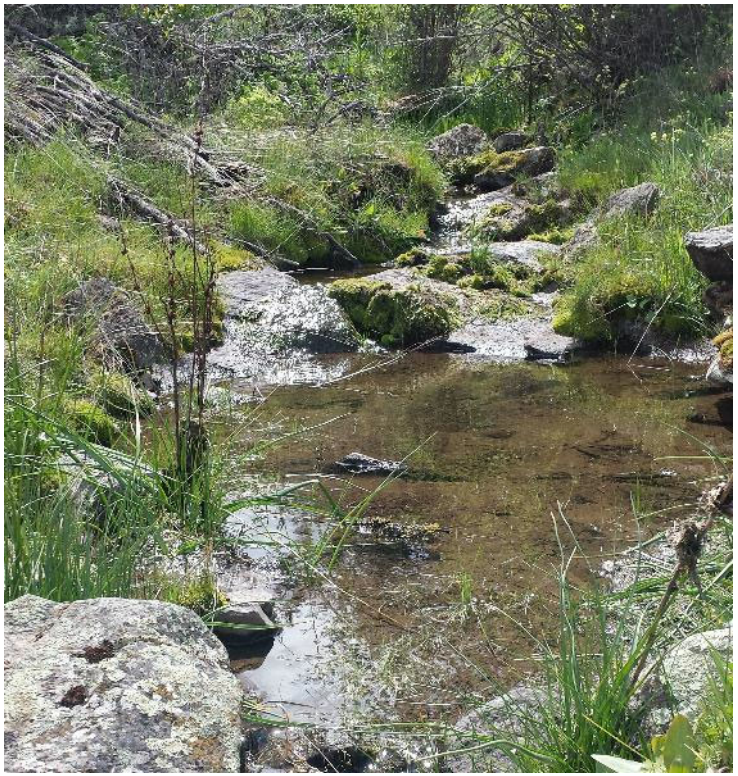
Who: **ERM**

- Completed in 2015:

  Potential habitat for 14 special status plant species was identified within the 2015 plant survey study area. One species, smooth desert parsley (*Lomatium lavaegatum*), was verified within the study area during the 2015 assessment by surveying the area of known occurrence documented in the Washington Natural Heritage Program records.

- Proposed:
  - Field survey to document any additional status plants that may occur in the currently proposed Project boundary.
  - Survey methods would follow standard methods for sensitive plant surveys, including surveying all areas of suitable habitat for the 13 target species.
  - Coordinate with the ethnobotanist from the Yakama Nation and the cultural resources studies.

Wetland and Waters Delineation



Study area: **Project boundary**

Schedule: **Growing season, 2019**

Who: **ERM**

- Completed in 2015:
  - Preliminary assessment of wetlands and waters to inform engineering of potential wetlands or waters.
  - Thirteen wetland polygons were determined to be potential wetlands and require a formal delineation.
  - All of the other wetland and water features may require formal delineation as well and should be revisited in the field in 2019.
- Proposed:

  Conduct a formal wetland and water delineation is to document the location and extent of jurisdictional wetlands/waters of the US within the Project study area including all areas that may be temporarily or permanently displaced during construction and/or operation, using USACE protocol (USACE 1987).

Visual Resources Study

Study area: **6-mile buffer around Project boundary**

Schedule: **Snow-free season, 2019**

Who: **ERM**

- Completed in 2015:
  - Visual resource assessment, including a review of the visual resources inventory process and a preliminary assessment of the visual impact of a potential pumped storage at the proposed Project location in 2015.
  - KOPs established and the visual characteristics of the affected environment were described in accordance with the BLM VRM
- Proposed:

  Update the visual resources assessment to evaluate the current project design using BLM VRM methods. The established KOPs and any unchanged information regarding visual characteristics will be utilized in the 2019 study, which will include:
  - Inventory and classification of Project facilities and surrounding landscape features;
  - Assessment of Project impacts from KOPs;
  - Proposed PM&E measures for aesthetic resources.

Socioeconomics Study

Study area: **Project boundary, Klickitat County, and Washington State**

Schedule: **2019**

Who: **Consultant**

- Completed in 2015:

  KPUD completed an economic study of a similar proposed pumped storage project at this site.

- Proposed:
  - Socioeconomic analysis of the economic impacts resulting from the construction and operations of the proposed Project.
  - Utilize the IMPLAN (for IMpact Analysis for PLANning) economic impact model (or similar) to accurately measure the economic and fiscal impacts of construction and operation of the proposed project.

Cultural Resources Study

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Study area: **Project boundary**

Schedule: **March-August, 2019**

Who: **Yakama Nation**

- Completed:
  - Consultation with DAHP and appropriate Tribal interests in accordance with requirements of Section 106 of the NHPA.
  - DAHP indicated that there are recorded archaeological sites in the general area, and the area's landforms and environment are sensitive for archaeological resources.
  - Request from DAHP that an archaeological survey be completed in areas proposed for disturbance.
- Proposed:
  - Cultural resource study pursuant to Section 106.
  - Pedestrian transects and will be walked and auger probes will be conducted within the APE.
  - Desktop analysis will include the APE and a 1-mile buffer around the APE.
  - Consult with DAHP and the other interested tribes regarding inventory needs and appropriate measures for protection and/or mitigation of identified cultural resources throughout licensing process.

Proposed Protection, Mitigation, & Enhancement Measures

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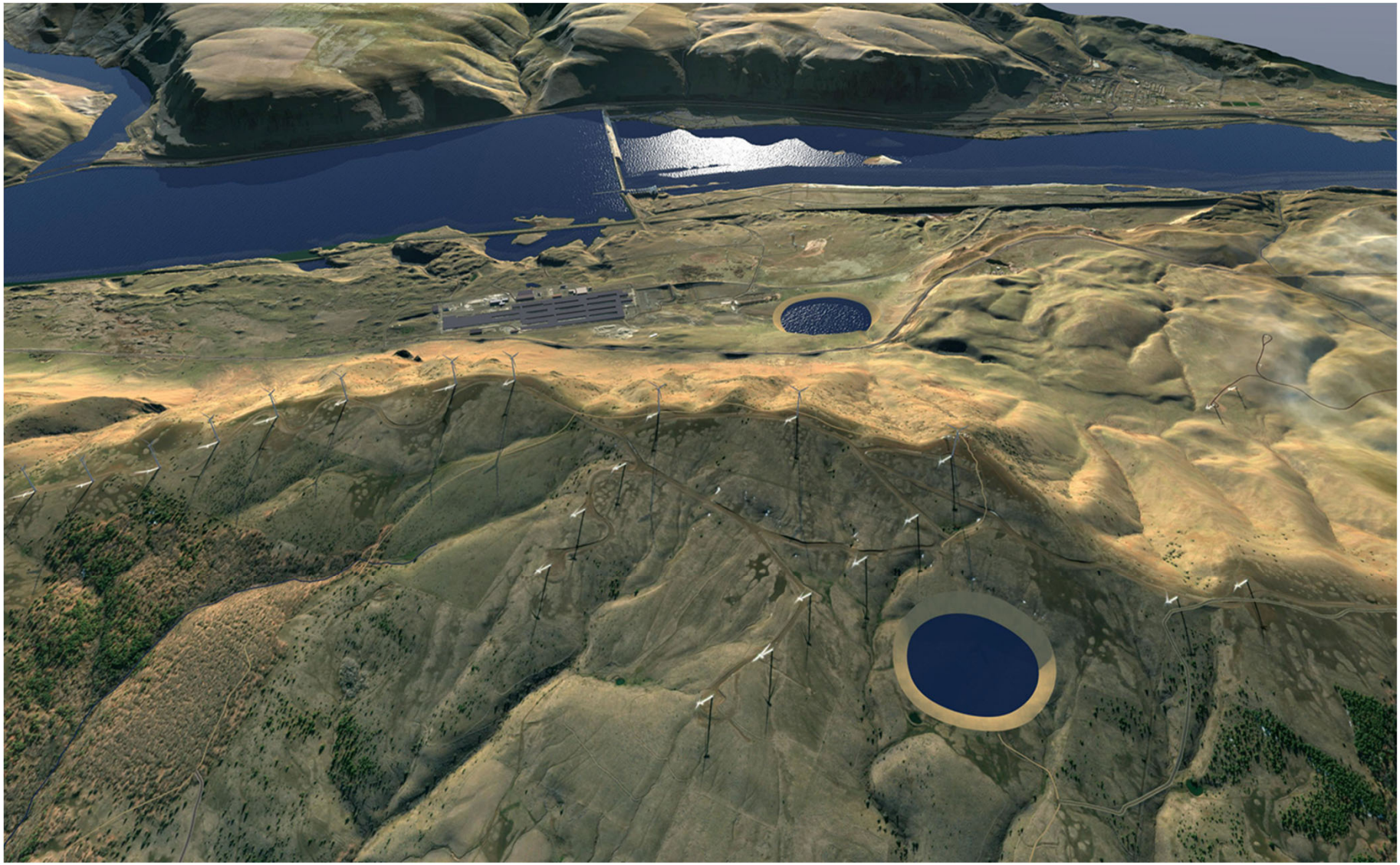

PM&E's Botanical

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- Prior to project construction, conduct a formal invasive plant survey to establish baseline environmental conditions. The survey would develop a list of target invasive species to be surveyed, and identify the location and extent of any target species. This information would be used to aid in the development of a comprehensive plan to control the spread of invasive plants within the Project boundary and that would maximize the effectiveness of restoration efforts following ground disturbance. The survey will be more fully described in the VMMP.
- Prior to construction, the Applicant will identify any sensitive plants within areas to be disturbed and either prevent or mitigate adverse effects on these species.
- Construction and operations activities will be planned and implemented to avoid disturbance to existing native and/or sensitive plant communities and prevent the spread of noxious weeds as described in the VMMP.
- All temporarily disturbed areas will be revegetated as outlined in the VMMP.

PM&E's Wildlife (1 of 2)

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- Continued and adaptive wildlife protection and eagle conservation including refining the WMP and consulting with agencies throughout Project construction and operation;
- Monitoring studies including pre-construction raptor nest surveys, monitoring of golden eagle use, and bald eagle monitoring;
- Risk assessment of activity and timeline to determine the impacts of the Project during breeding and non-breeding seasons;
- Develop nest protection measures with agencies, if necessary;
- Construction timing and scheduling limits (e.g., only allowing construction between 8 am and 6 pm) to minimize impacts to crepuscular foraging and nocturnal activity;
- Raptor-safe transmission construction (i.e., ensure that the transmission line installation complies with Avian Power Line Interaction Committee [APLIC] guidelines for avian protection [APLIC and USFWS 2005] and the Suggested Practices for Avian Protection on Power Lines, The State of the Art in 2006 [APLIC 2006] to protect avian species from electrocution as a result of landing or perching on transmission and distribution lines [WDFW 2014f]);

PM&E's Wildlife (2 of 2)

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- Noise minimization by avoiding blasting within 0.5 miles of active nests;
- Biological construction monitoring to ensure construction is avoiding protected/sensitive areas;
- Biological training program to inform employees of the sensitive biological resources;
- Minimize habitat loss by utilizing existing access roads;
- Manage traffic by implementing a speed limit to reduce wildlife injury due to collisions;
- Carcass removal program to limit attraction of scavenging wildlife;
- Reduce attraction for migratory birds by using bird deterrents, vegetation management, and/or exploring the use of plastic shade balls to cover reservoirs;
- Reduce attraction for mammals (prey species) by using deterrents;
- Implement a wildlife incident reporting system to disclose issues to agencies;
- Dust palliatives may be applied to unpaved roads to reduce dust; and
- Manage light pollution to reduce impacts on migrating and nocturnal birds.

PM&E's Visual

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- Minimize footprints or aboveground features to the furthest extent possible.
- Ensure facilities are free of debris and store unused or damaged equipment off site pursuant to the requirements of Klickitat County's EOZ. During construction, the Licensee will monitor the Project area for construction related debris. Where practical, designated locations will be established for the temporary storage of debris from construction.
- Minimize contrast through natural paint colors and surfacing materials that match the surrounding landscape and dulling reflective surfaces that cannot be painted.
- Native vegetation and/or trees could be planted to break up the lines of roads and facilities and soften the visual effect on the landscape.
- Design, install, and maintain facility lighting to prevent casting of light into adjacent native habitat. Incorporate directional lighting; light hoods, low pressure sodium bulbs or light emitting diode (LED) lighting; and operational devices in final design to allow surface night-lighting in the central Project area to be turned on as needed for safety.
- Install fully shielded low pressure sodium lighting to reduce lighting impacts to protect the current dark sky conditions from light pollution.
- Minimize lighting to the extent possible through the use of lamp types, covers, timers, motion sensors, or other means. Class II lamp source and shielding requirements will be used where outdoor lighting is necessary.

Project Participation & Filing Comments

1. You can send comments directly to National Grid and Rye Development at Nathan.Sandvig@nationalgrid.com or erik@ryedevelopment.com
2. Copies of all project documents can be found at: https://www.ryedevelopment.com/projectstor/goldendale-washington/
3. You can register directly on the FERC website (http://www.ferc.gov/docs-filing/eregistration.asp) and electronically file a formal comment under project docket P- 14861. This option allows you to subscribe to the docket and follow the process.
4. You can file an eComment with FERC (http://www.ferc.gov/docs-filing/ecomment.asp) this is an option for short comments (less than 6,000 characters). File under docket P-14861. This option is simpler than filing a formal comment.
5. You can file by mail using the address below. Please put in the subject line reference "FERC P-14861". Please send letters ASAP and preferably before Wednesday, April 4, 2015. Send letters to:

   Ms. Kimberly D. Bose
   Secretary

   Federal Energy Regulatory Commission
   888 First Street, NE

   Washington, DC 20426

Thank You

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