Northwest **Power** and **Conservation** Council

July 1, 2014

MEMORANDUM

TO: Power Committee Members

FROM: Ben Kujala

SUBJECT: Case Study of Locational Value, Troutdale Energy Resource Center

Troutdale Energy Resource Center is a proposed power plant on the west side of the cascades. The location proposed will potentially have benefits to the transmission system that carry beyond the energy produced. Mark Klein will talk about this project as an example of why location should be considered in regional system planning.

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Troutdale Energy Center (TEC)

June 2014

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Increased Congestion on Regional Electric Transmission System

"Topics for the Seventh Northwest Power Plan: Incorporating intra-regional transmission constraints in regional power system planning."

– Northwest Power & Conservation Council Sixth Power Plan Midterm Assessment

"Existing flowgates and paths managed by the Bonneville Power Administration (BPA) continue to experience congestion resulting in curtailment. BPA has identified and implemented new flowgates and paths on its system to help manage new congestion, signaling the increasingly strained nature of the transmission system and the increasing risks of curtailment."

– Puget Sound Energy 2013 IRP

"There are 25 'Cut-Planes' or 'Constraint Points' or 'Flow Gates' on BPA's transmission system. ***The number of cut-planes has increased ~30% in the last 5-years.****"*

– Portland General Electric Joint CREPC/SPSC Meeting, October 2013

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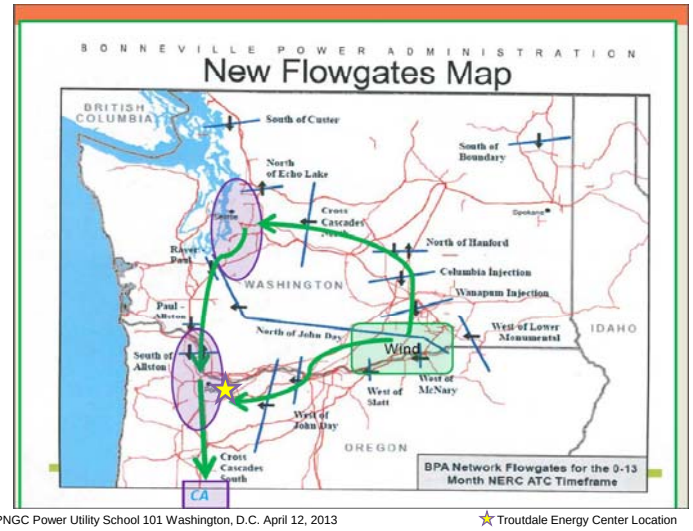
BPA Congestion Flowgates



Source: PNGC Power Utility School 101 Washington, D.C. April 12, 2013

☆ Troutdale Energy Center Location

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Project Overview

- **650 MW natural gas fired power plant in Troutdale, Oregon**
  - Configured as 450 MW 1X1 combined cycle and 200 MW simple cycle peaker
- **Strategic location on increasingly constrained regional electric transmission system**
  - Site location on BPA's transmission system allows for energy deliveries across the system during congested periods
- **Brownfield site in Troutdale Reynolds Industrial Park (TRIP)**
  - Williams interstate gas pipeline borders the site
  - Existing public utilities and services within TRIP, including water supply and discharge
- **Advanced stage of development**
  - Site secured with Port of Portland
  - Final Air permit issued
  - Site Certificate Proposed Order issued
  - NPDES Wastewater Discharge Application completed
  - NPDES Construction Stormwater permit issued
  - Enterprise zone tax abatement extension approved by City of Troutdale
  - Experienced Engineering, Procurement and Construction firm Kiewit Power retained

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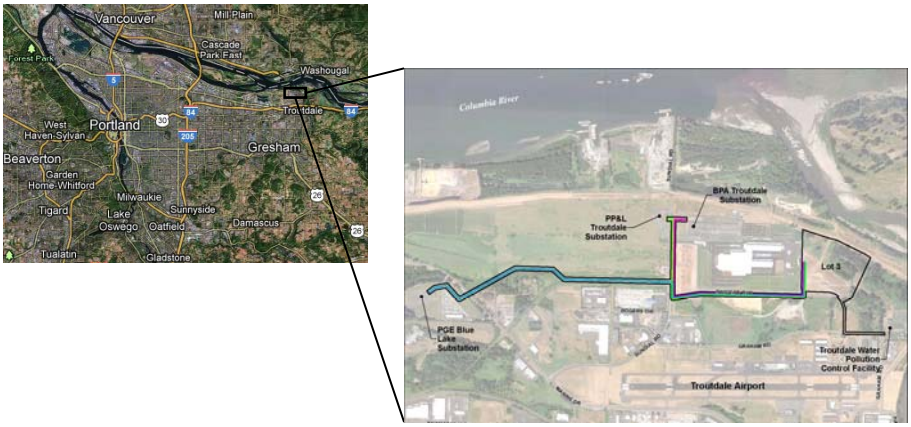
Project Site within the Troutdale Reynolds Industrial Park



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Locational Benefits

- **Interconnection options for three Balancing Authorities**
  - BPA (BPA Troutdale Substation, <1 mile from facility)
  - PacifiCorp (PPL Troutdale Substation, < 1 mile from facility)
  - PGE (Blue Lake Substation, ~2 miles from facility)
- **Facility provides system stability in Portland load pocket**
  - Reactive Power (VAR) Support and Frequency Response
  - Avoids long-distance transmission losses
- **Location doesn't further exacerbate flowgate issues on BPA Transmission System**
  - Delays or avoids the need for additional BPA system upgrades
- **Power deliveries from the facility will move in counter-flow to congested flowgates**

Existing BPA Flowgate	Counter-flow Congestion Relief
South of Allston	200 MW on southbound flows
North of John Day	450 MW on westbound flows
West of McNary	85 MW on westbound flows

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Flexibility Benefits

- **Flexible design with gas turbines permitted to run on natural gas or ULSD**
  - Dual fuel capability reduces exposure to natural gas supply and transportation disruptions
  - Dual fuel capability improves start-up flexibility and reliability
- **Quick startup and ramp capability with each GE LMS100 gas turbine**
  - 25 MW minimum capacity, 100 MW maximum capacity
  - 8 minute startup to minimum capacity, 10 minute startup to maximum capacity
- **Flexible operation with combined cycle Mitsubishi G gas turbine configuration**
  - 233 MW minimum capacity, 450 MW maximum capacity
- **Variable output resources connected to BPA drives need for INC and DEC resources**
  - 5,000 MW of wind interconnected to BPA
  - PGE Wind: 726 MW
  - PacifiCorp Wind: ~ 500 MW

Facility Configuration	INC (min)	INC (max)	DEC (min)	DEC (max)
Single GE LMS 100	25 MW	75 MW up to 100 MW	25 MW	75 MW up to 100 MW
Two GE LMS 100	50 MW	150 MW up to 200 MW	50 MW	150 MW up to 200 MW
Combined Cycle	42 MW	Up to 217 MW	42 MW	Up to 217 MW
Full Facility	92 MW	Up to 417 MW	92 MW	Up to 417 MW

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