The Efficient Frontier: Integrating Energy Efficiency into Resource Planning in the Pacific Northwest

Ehud Abadi

Danielle Gidding

ACEEE EE as a Resource

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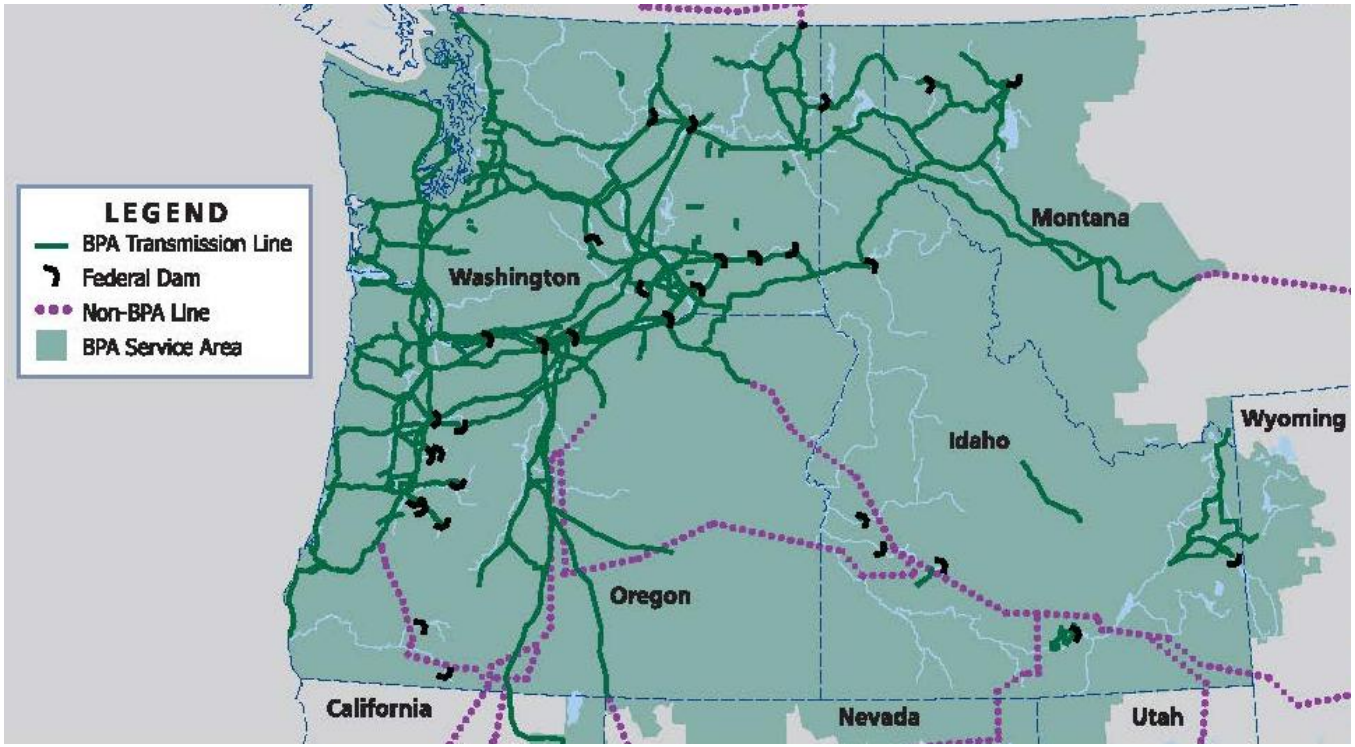
TODAY'S AGENDA

- ☐ Background
- ☐ EE Overview
- ☐ Integrating EE
- ☐ Opportunities & challenges
- ☐ Q&A

Who We Are

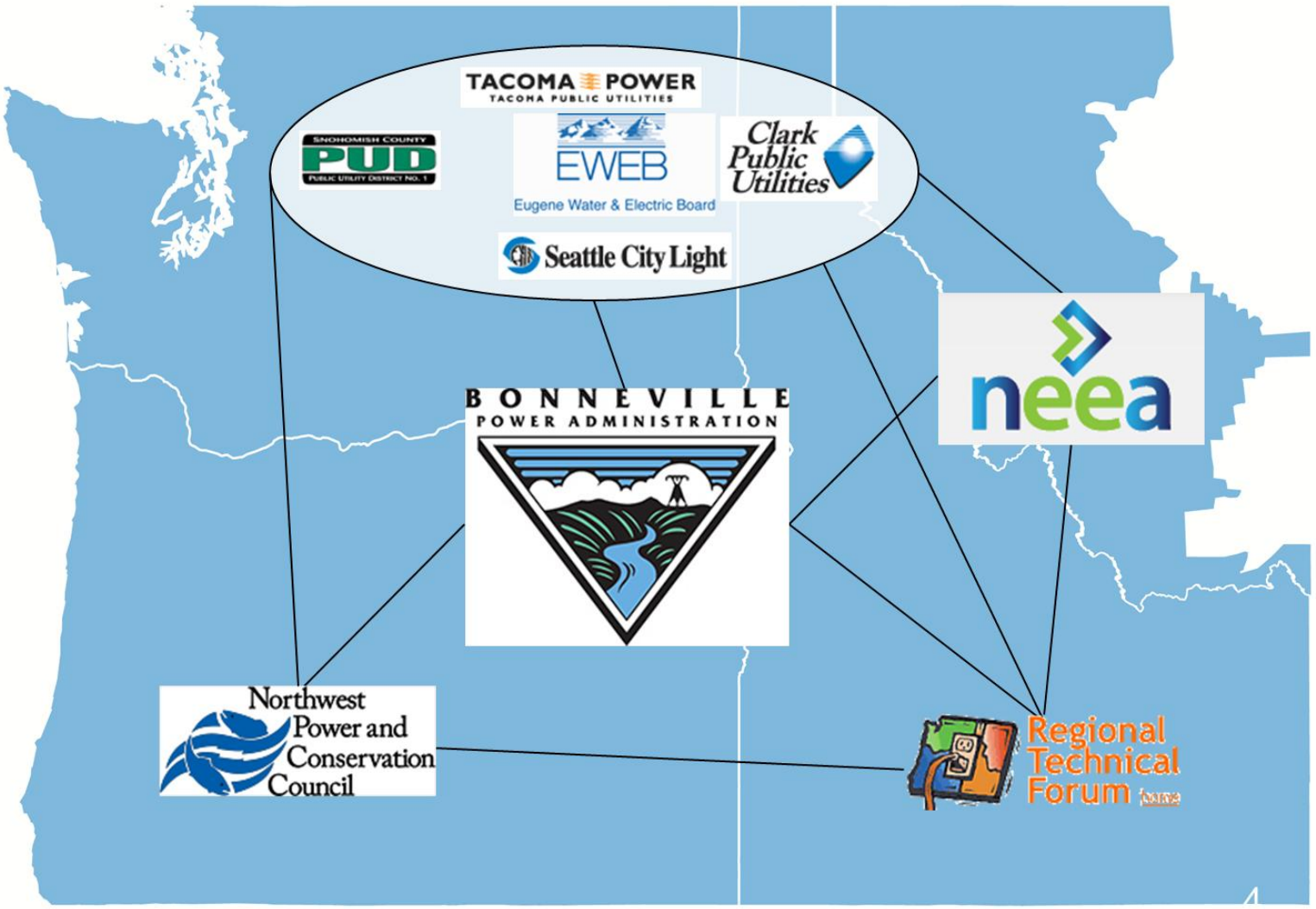


- 31 Federal Dams: 22,458 MW
- Columbia Generating Station Nuclear Facility: 1,100 MW
- Cumulative Total EE Since 1981: 1,400 aMW
- Total Transmission Line Mileage: 15,239

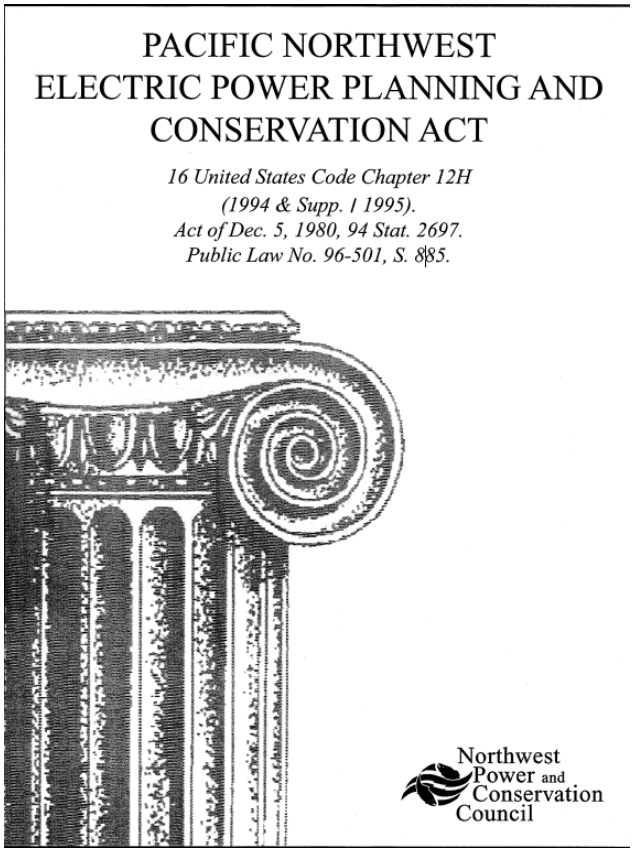
Energy Efficiency in the Northwest

- BPA collaborates with over 140 public power utilities and regional organizations to achieve EE savings
  - Incentive programs
  - Market transformation
  - Codes and standards
  - Regional infrastructure

Collaboration in the Northwest



The Leader of the Pack

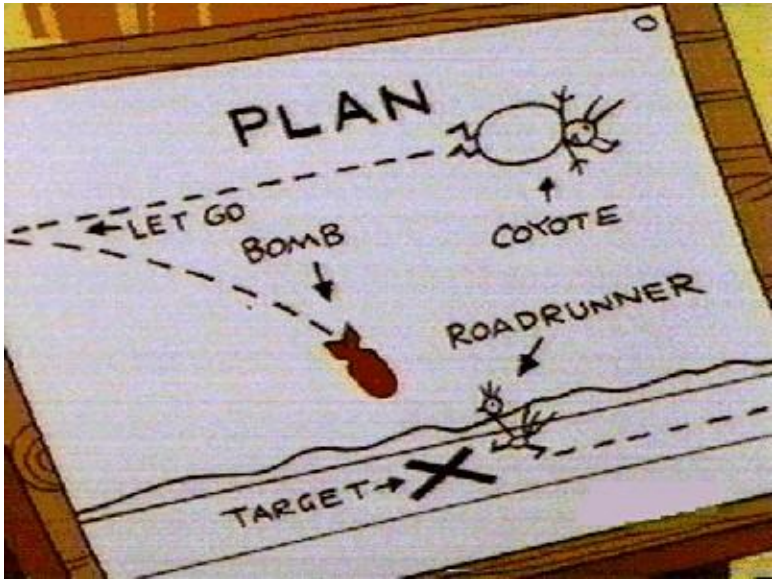


Northwest Power and Conservation Council

The Plan and Resource Planning

- **"The Plan" shall consider *conservation (energy efficiency) its highest priority resource*** equivalent to generation with a 10% cost advantage over power generating resources

- **BPA must act 'consistent' with "The Plan"**



The Plan and Savings Targets

- Each Plan establishes a 5 year regional conservation savings targets
- BPA is committed to achieving public power's share of the target
  - 504 aMW between 2010-2014

But then what?

From EE to Power

Sending (and translating) the EE Data

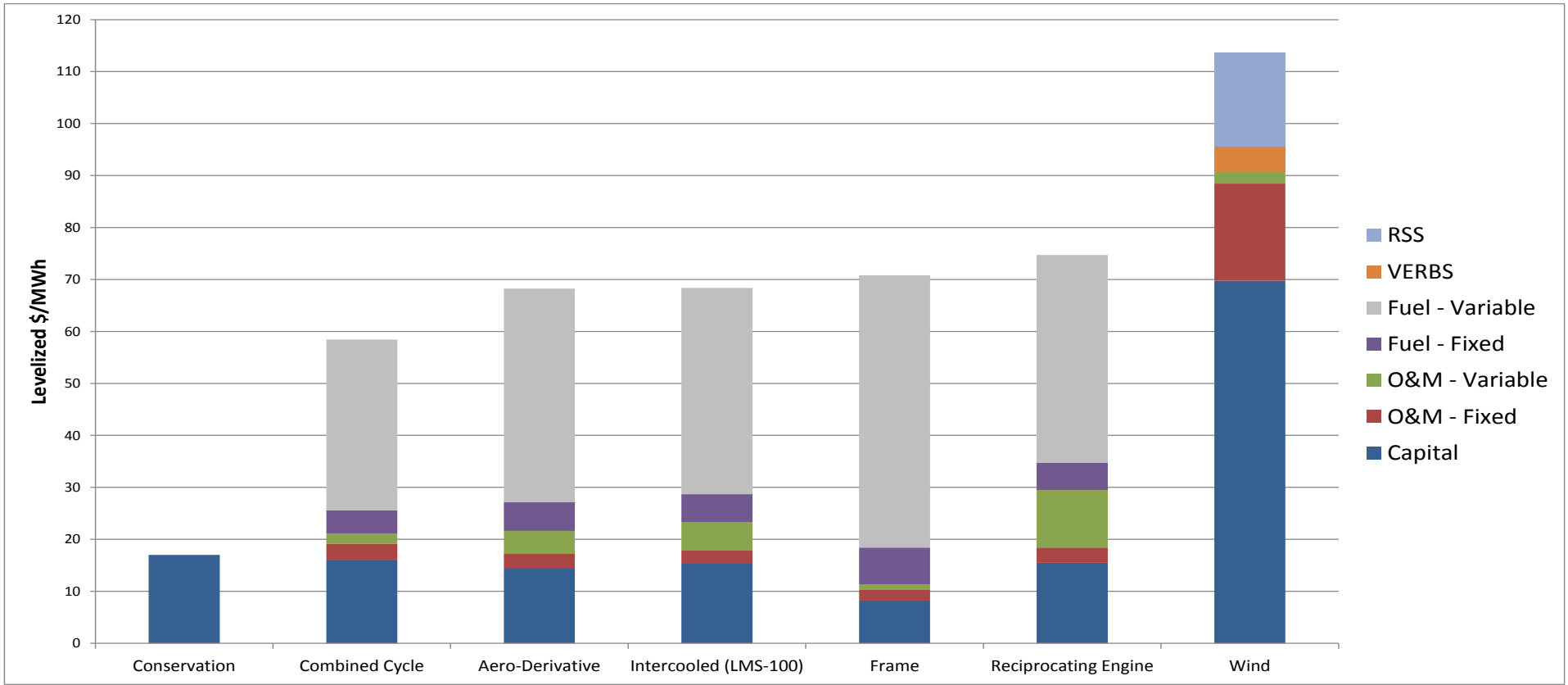
- Shaped to average annual load shape of savings (projected)
- Assigned average measure life of portfolio (12 years)
- Account for savings already included in the load forecast

BPA Resource Program

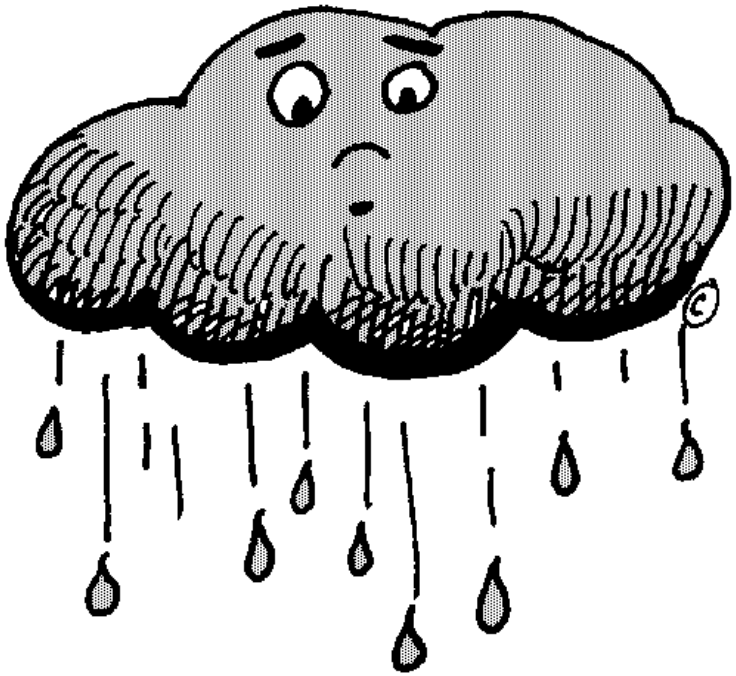
- Long-term analysis of Agency's supply and demand forecasts
- Provides most cost and risk efficient means to meet projected energy and capacity deficits
- In the 2013 Resource Program we concluded:
  - BPA's energy needs through 2021 can be met with a combination of Energy Efficiency (EE) and open market power purchases
  - The Agency could face potential capacity deficits as early as 2021
  - EE is the most cost and risk effective resource for energy.
  - Further work should be done looking into EE and its capacity benefits

Resource Costs

- EE Levelized at 12-year Measure Life
- EE has no variable or fuel costs
- Resource Support Services (RSS) and Variable Energy Resource Balancing Service (Verbs) are “firming” products that BPA markets for intermittent generators



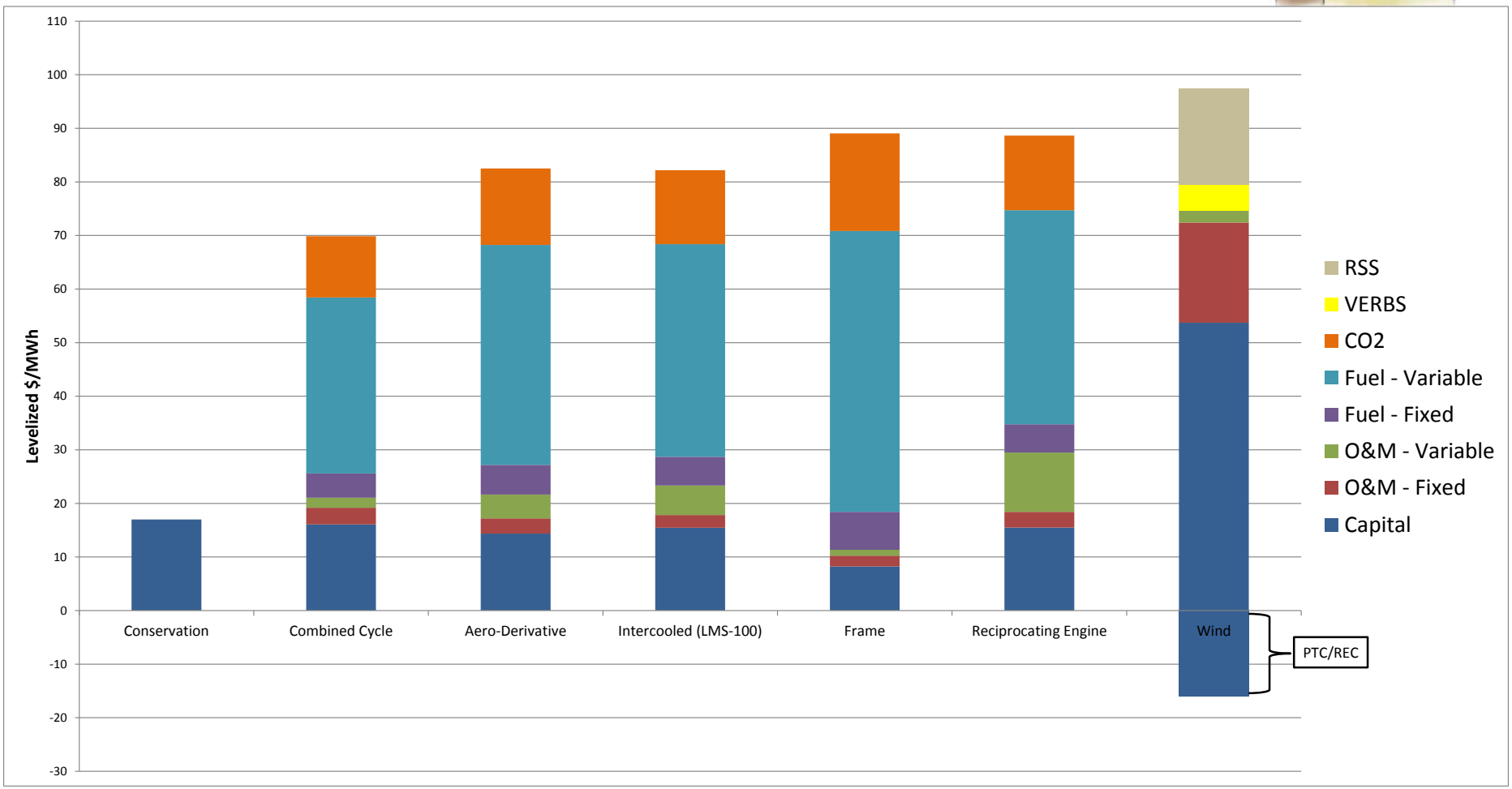
No, no solar.



Bonneville Power Administration HQ is in **Portland, OR.**

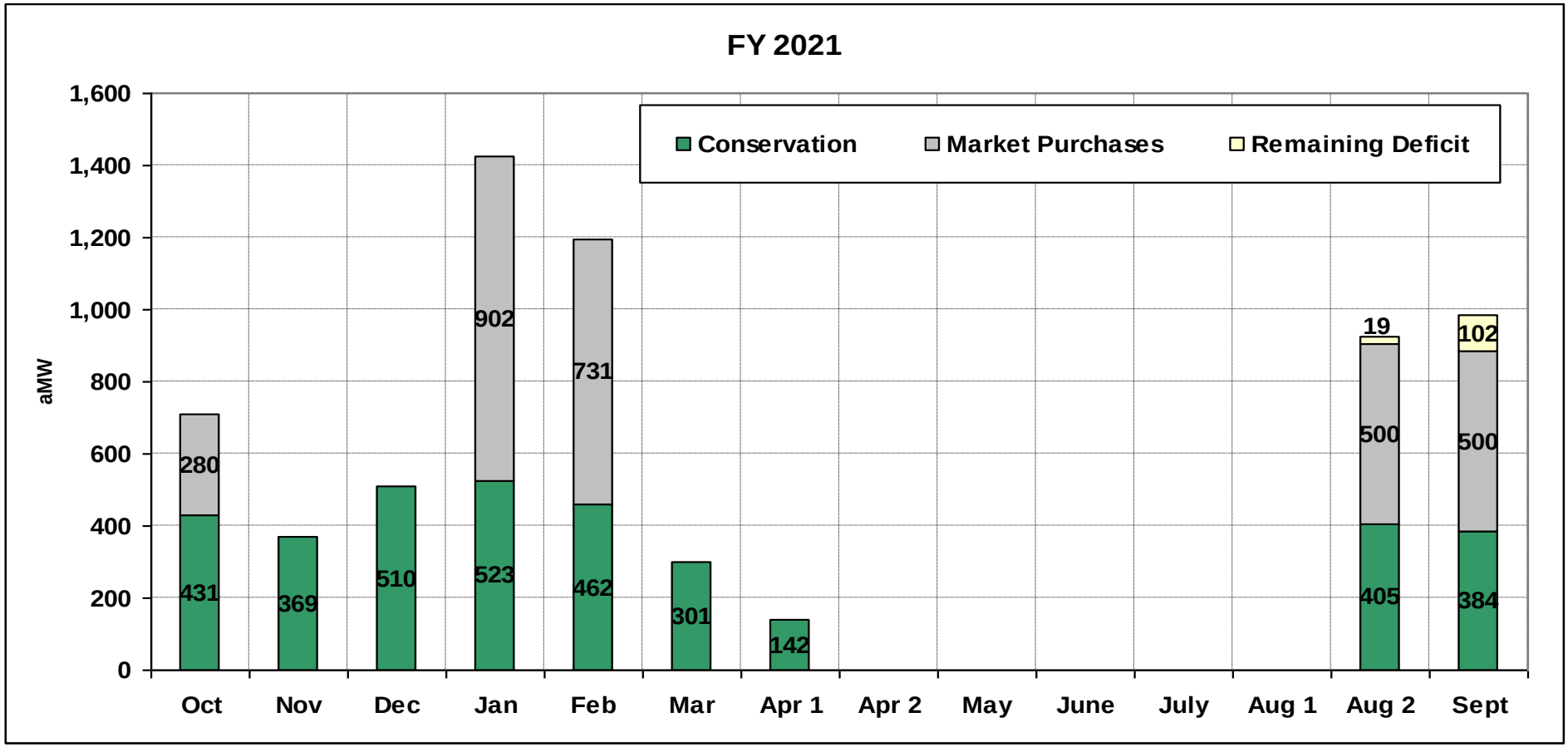
Resource Costs

- A similar picture, but this one accounts for some current/possible regulations: CO2 costs and PTC/REC values



Resource Strategy

- Bonneville's projected monthly energy deficits at the P10 level, color-coded to show resources used to meet them
- Output from our proprietary optimization model, MicroPort
- Resource strategy takes into account assumed EE targets and risk tolerance for market purchases

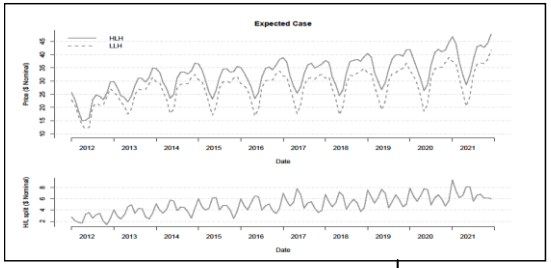


Looking at Risk

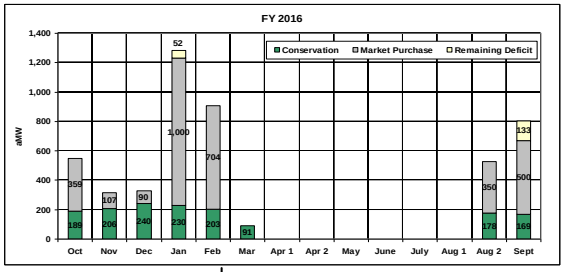
- As part of the portfolio selection process BPA develops 3,200 market price forecasts based on different weather, streamflow, natural gas price, and generation conditions
- These are fed into our resource portfolio model to produce a distribution of costs

MicroPort Diagram

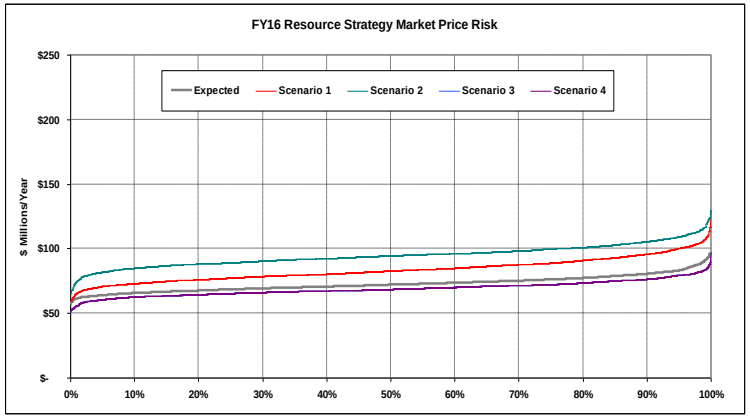
Market Price Forecast



Monthly Energy Strategy



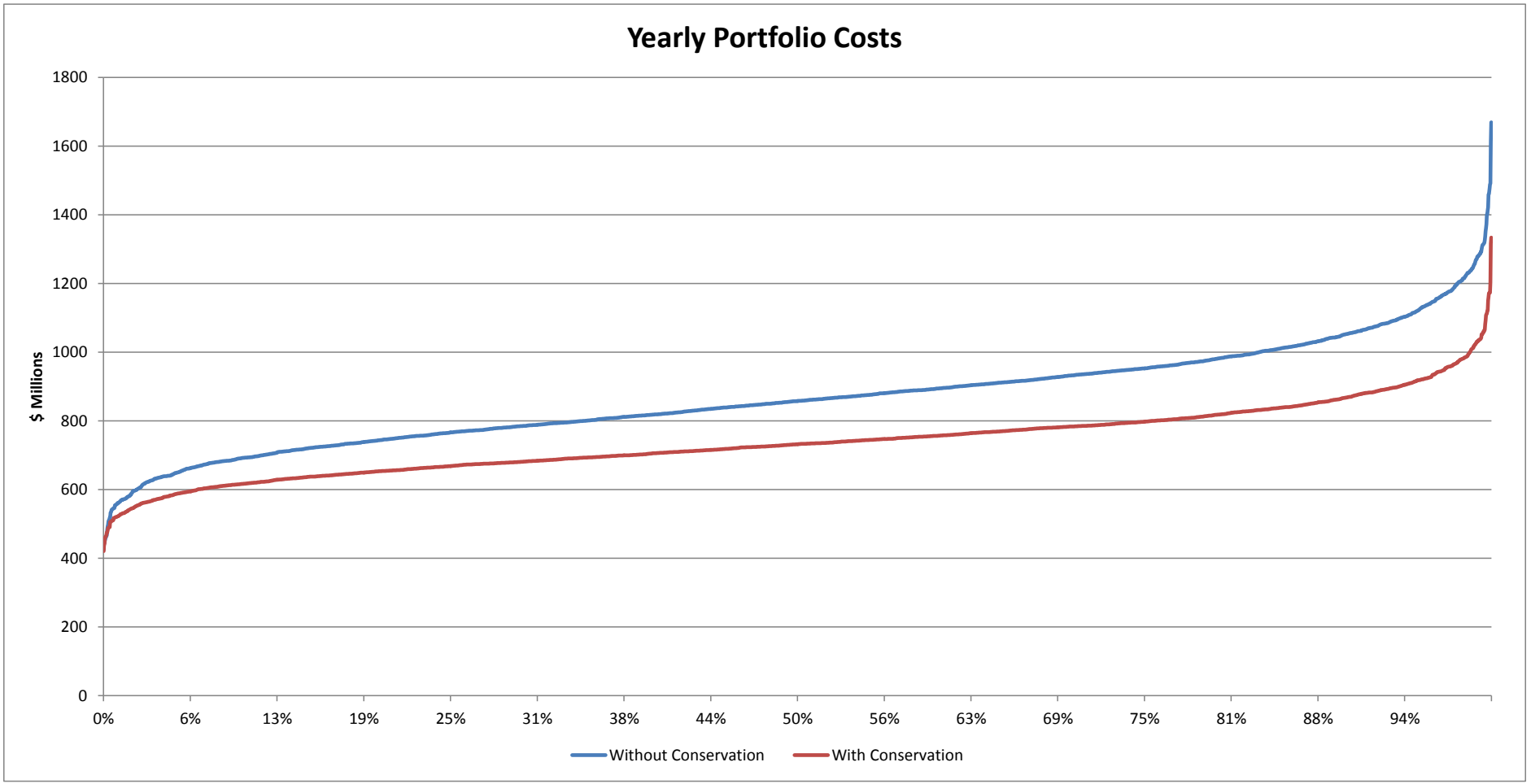
MicroPort



Market Exposure Risk

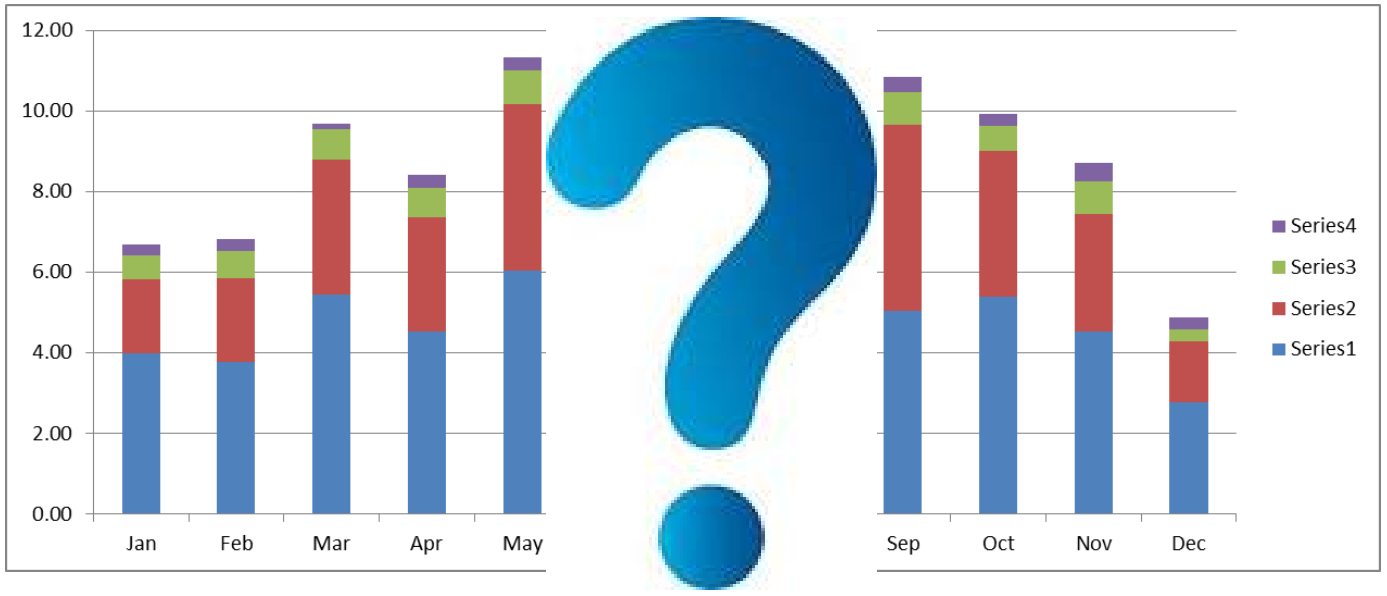
Looking at Risk

- Below is a distribution of costs for BPA's preferred Resource Strategy
  - Red: With Conservation
  - Blue: Without Conservation
- Conservation as a resource decreases BOTH cost and risk from a portfolio planning perspective



Need for End Use Load Shape Data

- ELCAP
  - Produced in early 1980's
  - Outdated and doesn't include many current end use load shapes (electronics, ductless heat pumps)
  - Use in understanding EE capacity benefits



Thank You

Ehud Abadi

ebabadi@bpa.gov

Danielle Gidding

dngidding@bpa.gov