COLUMBIA BASIN AND POWER GENERATION

CSG West - Legislative Council on River Governance

Nancy Hirsh
NW Energy Coalition
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NW Energy Coalition

• A non-profit advocacy coalition of more than 100 organizations in Washington, Oregon, Idaho, Montana and British Columbia that work toward a clean and affordable energy future.

• Membership: civic, consumer, low-income, environmental, faith based, and labor organizations, electric and natural gas utilities, clean energy (efficiency and renewables) and fishing businesses
Era of Climate Change

• Warming temperatures
• Changes in *total precipitation* expected to be less than past variability
• Reduced *snowpack*, shifts in streamflow timing
• Increases in *heavy rainfall*
• Changes in the **landscape** from fires, pests, et al.
Warmer Stream Temperatures

August Mean Surface Air Temperature and Maximum Stream Temperature

Historical (1970-1999) 2040s medium (A1B)

* Projections are compared with 1970-1999 average

Mantua et al. 2010
River System Impacts

• Summer of 2015 was a record for hot rivers

• High elevation watersheds, like the upper Snake Basin, are critical to providing cold spawning grounds

• Some changes to our hydropower infrastructure are needed to adapt to climate change
New Resource Diversity

**Demand-side resources** – NW Power and Conservation Council
- 4,000 aMW energy efficiency
  - Load management resources to help with peak and integration of renewables are plentiful

**Supply-Side resources** -
- Almost 1,500 aMW of new renewables are approved for development or in the permitting process.
- Another 2,000 aMW of new renewables have been proposed.
- Solar prices continue to fall.
- Existing hydropower is available in the market
- Storage
Court Ruling Directs Change

- Power Output - four Lower Snake River dams
  ~ 1,040 average megawatts (aMW) = to City of Seattle load
- Total NW load ~ 21,000 aMW - 4LSR dams = 5% of regional load

- November to February - minimal output ~ 460 aMW
- Spring snowmelt - output peaks
- Summer months - output at its lowest

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4LSR dams – more than energy

- Peaking power – limited ability

- Adjusts minute-by-minute
  - smooth supply-and-demand fluctuations
  - integrate variable resources such as wind or solar

- Overall - modest support
  - small role in overall regional grid
  - NW has additional resources and new technologies to provide those functions.
Is Change Realistic?

Late 2015 - NW Energy Coalition power replacement analysis

- Current costs of annual 4LSR dam maintenance and major rehabilitation projects - $250 million/yr
- Portfolio of replacement resources:
  - Develop new utility-scale solar to replace the baseline winter output (~ 460 aMW)
  - Long and short-term market purchases (about 580 aMW) to replace ramping and integration services
- Replacement power costs about a $1/month increase in the average electric customer’s monthly bill.
Diablo Canyon Model

- Carbon Free Resource Replacement
  - 2015 Carbon Free Replacement Study – 2000 aMW
  - all future costs, capital and O&M, of ongoing operation – and all the benefits – energy and grid support - $17B
  - four carbon free replacement portfolios to provide the same energy and grid support - all under $15B

- June 2016 – Pacific Gas & Electric announced closure of the Diablo Canyon nuclear plant by 2025. Carbon free replacement portfolio - solar, wind, hydro, efficiency, demand response, storage, etc
Opportunity and process from NEPA – optimistic about the future