

# Overview of the Northwest Power and Conservation Council's Power Plan Development Process

Webinar

October 15, 2014

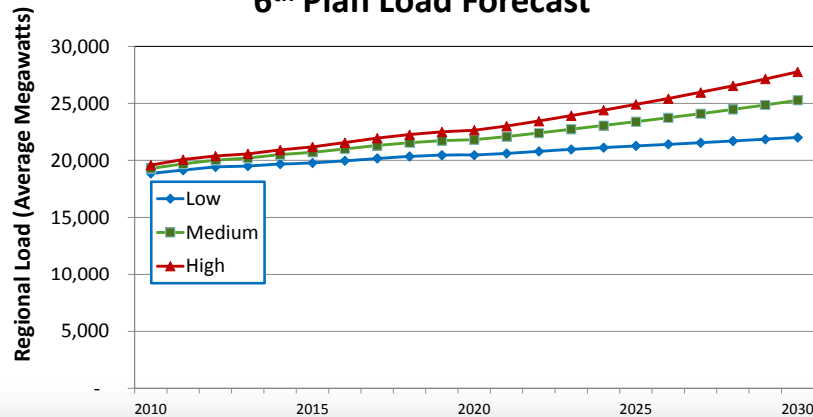
## Agenda

- What's in a Power Plan?
  - Major Elements  
(Briefing on the Act's complete legal requirements is scheduled for full Council in November)
- What are the major analytical steps in the Plan development process?
  - What models are used?
  - What role does each model play in plan development?
- How do we engage the public/stakeholders in Plan development?

# What's In A Plan?

## A demand forecast of at least twenty years

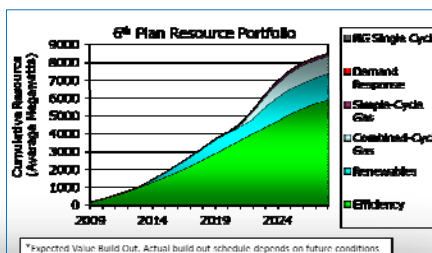
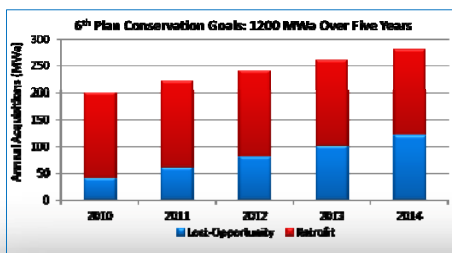
6th Plan Load Forecast



## A forecast of resources required to meet forecast demand by resource priority type

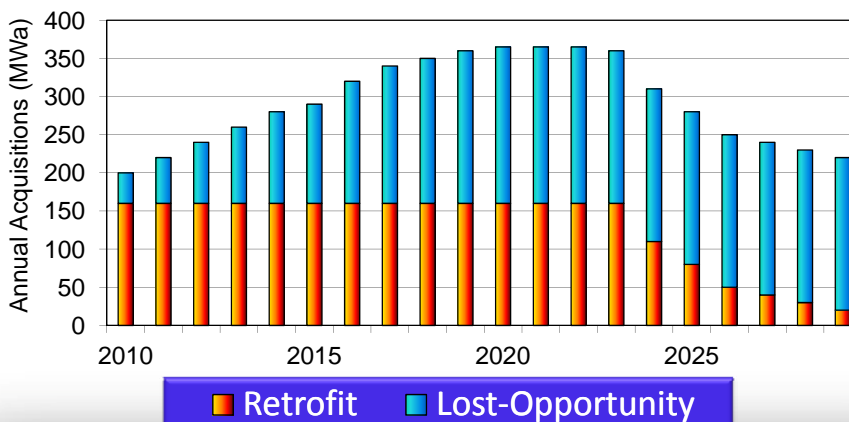
The 6<sup>th</sup> Plan's resource strategy can be summarized in five specific recommendations:

- Cost-effective energy efficiency should be developed aggressively and on a consistent basis for the foreseeable future.
- Expand the supply of cost-effective renewable resources options
- Meet remaining needs for energy and capacity with natural gas-fired generation.
- Address the challenges of wind integration through improvements in system operating procedures and business practices.
- Expand long-term resource alternatives.



## An energy conservation program

6<sup>th</sup> Plan Energy Efficiency Goals



## Including *model conservation standards* (MCS)

**Goal - MCS designed to produce all power savings that are *cost-effective for the region and economically feasible for consumers***

... shall include (but not limited to) standards applicable to

(A) New and Existing Structures



(B) Utility, customer and governmental conservation programs

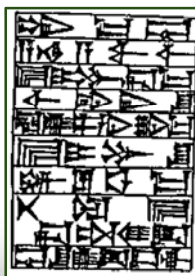


(C) Other consumer actions for achieving conservation



## and, *surcharge methodology* if recommended

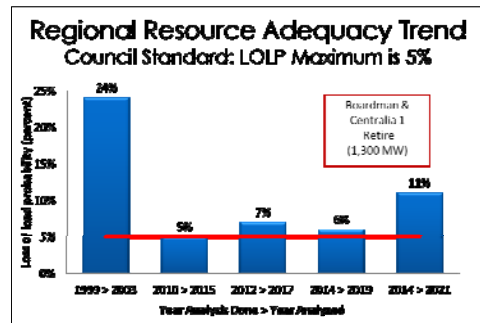
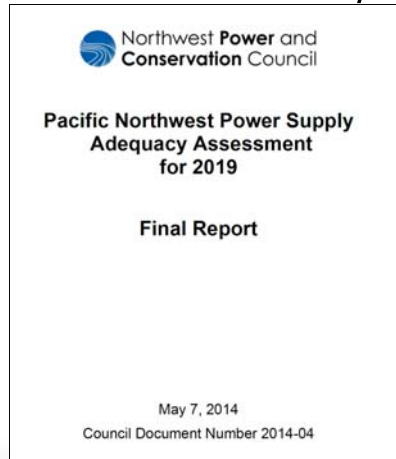
The Council may recommend that the BPA Administrator impose surcharges of not less than 10% nor more than 50% of BPA's applicable rates to recover costs incurred because savings from the model conservations standards have not been achieved



***The Code of Hammurabi contained the "Original" MCS Surcharge Policy -***

***"If a builder has built a house for a man, and has not made his work sound, and the house he built has fallen, and caused the death of its owner, that builder shall be put to death."***

## Regional *reliability and reserve requirements*



## *Research and development recommendations*

### *Sixth Power Plan Action Plan Examples*

- **CONS-20.** In order to ensure the long-term supply of conservation resources, develop and fund a regional research plan that directs development, demonstration, and pilot program activity.
- **GEN-7.** Commercialize and confirm low-carbon resources with special Northwest promise.

*A methodology* for determining quantifiable environmental costs and benefits

### **6<sup>th</sup> Plan Methodology**

- The four components of Council's methodology are:
  1. Include the cost of meeting existing environmental regulations
  2. Where possible, quantifying the potential costs of new regulations
  3. Account for the environmental benefits that may be associated with specific resources; and,
  4. Recognize additional environmental effects that may remain after compliance with existing regulations

*A fish and wildlife* program

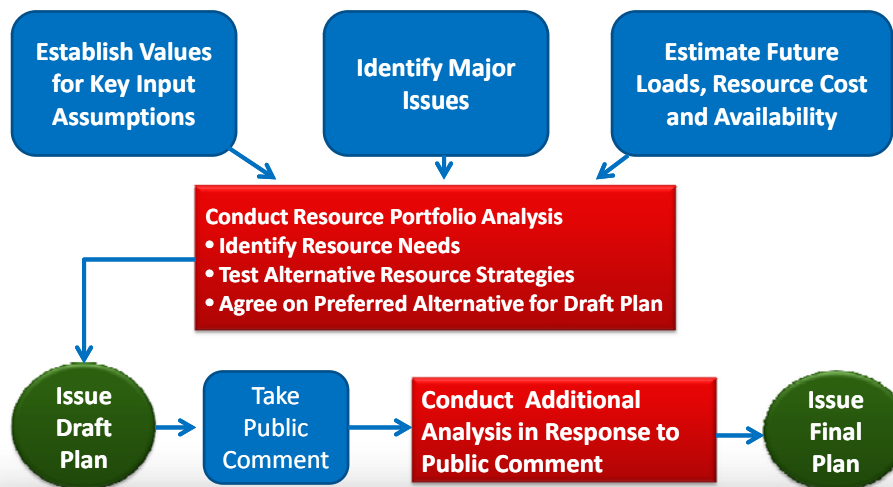


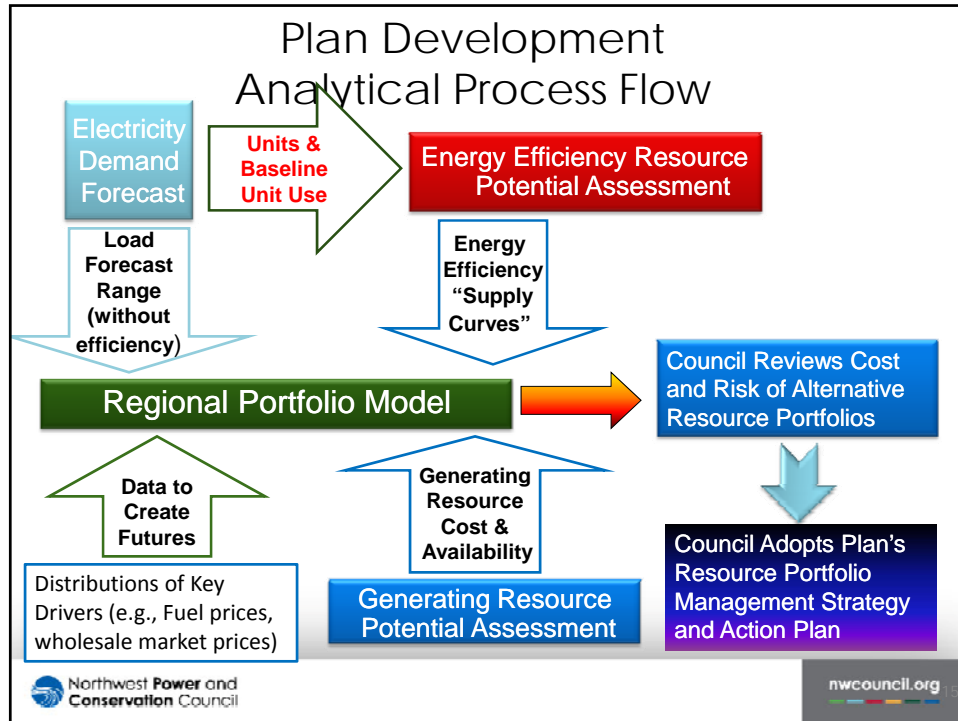
# An Action Plan

## Sixth Power Plan Action Plan

Introduction .....	1
Conservation .....	1
Deployment .....	2
Adaptive Management .....	5
Development and Confirmation .....	8
Generating Resources .....	9
Generating Resource Acquisition .....	10
Adequacy of System Integration Services .....	11
Information to Support Sound Planning and Decisionmaking .....	15
Future Role of Bonneville .....	15
Ensuring Adequacy .....	18
Demand Response .....	19
Smart Grid .....	20
Transmission .....	21
Fish and Power .....	22
Monitoring Plan Implementation .....	23
Maintaining and Enhancing Council's Analytical Capability .....	23

# Plan Development Process





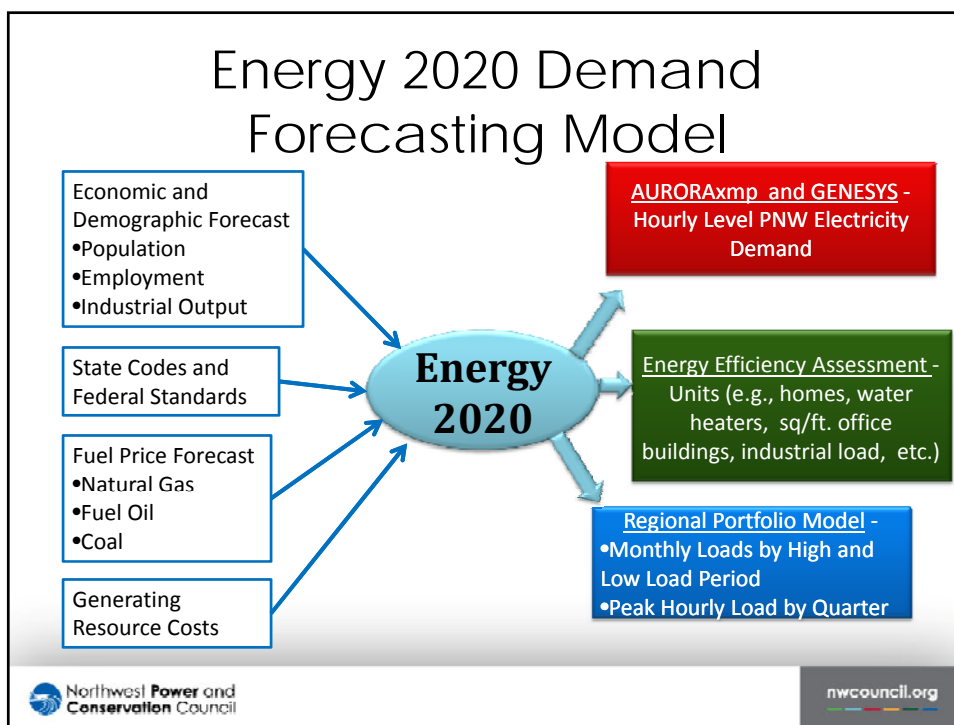
## Models Used in Council Plan Development

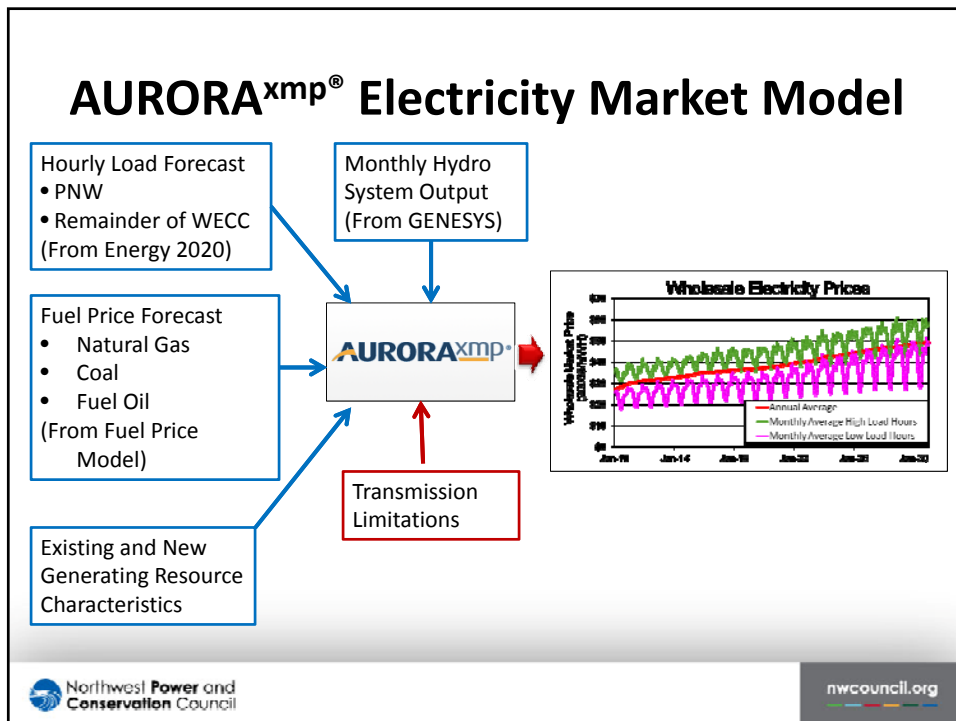
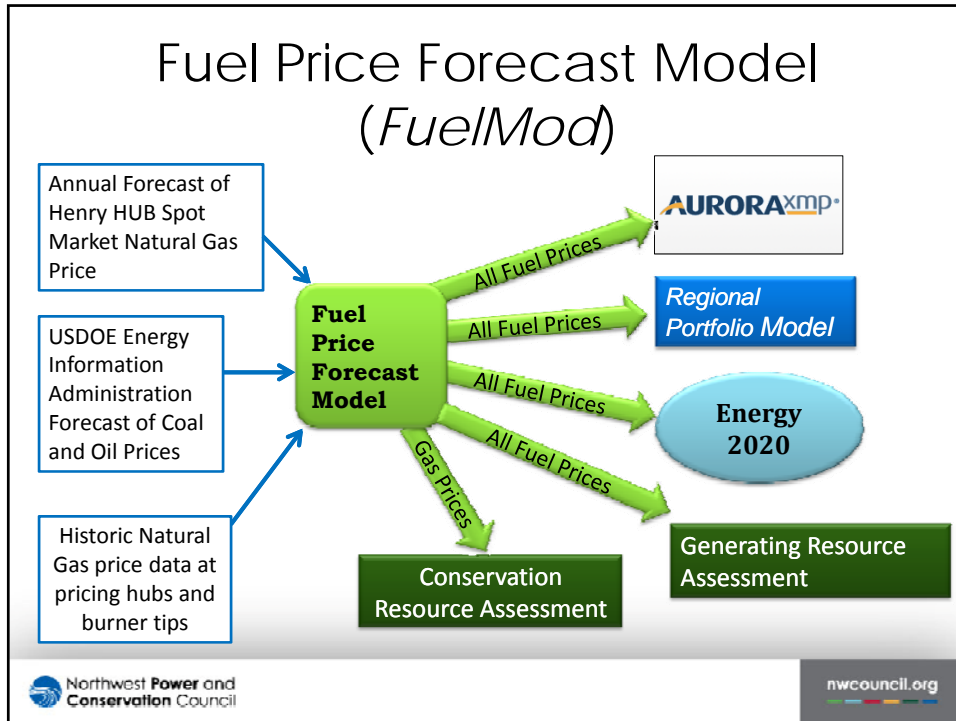
- **Energy 2020**
- **Fuel Price Forecasting Model**
- **AURORA<sup>xmp</sup><sup>®</sup> Electricity Market Model**
- **GENESYS**
- **Regional Portfolio Model (RPM)**

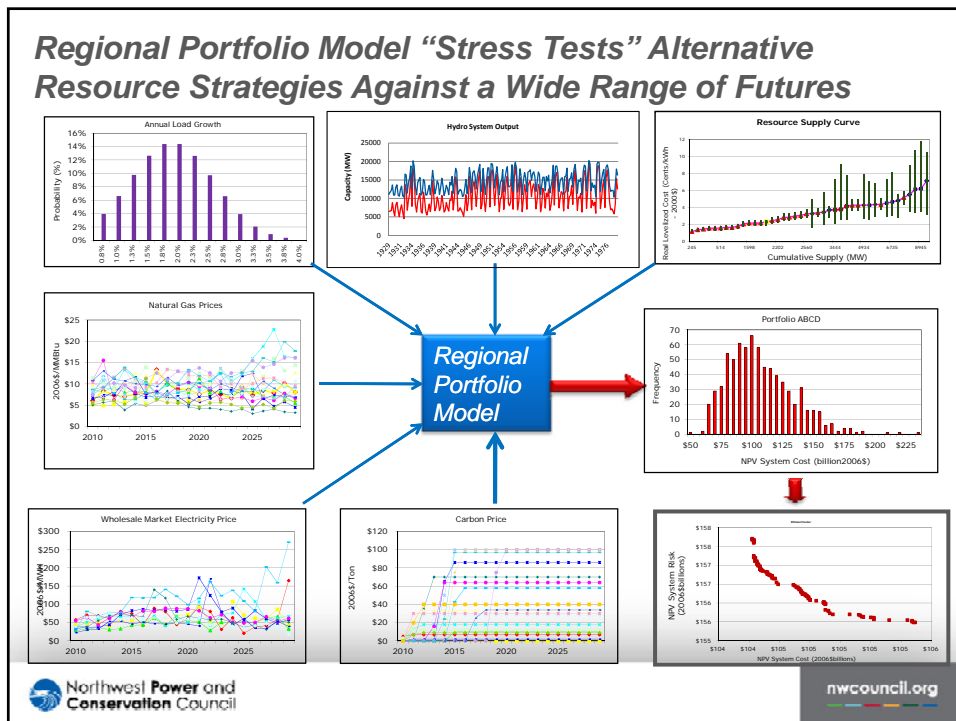
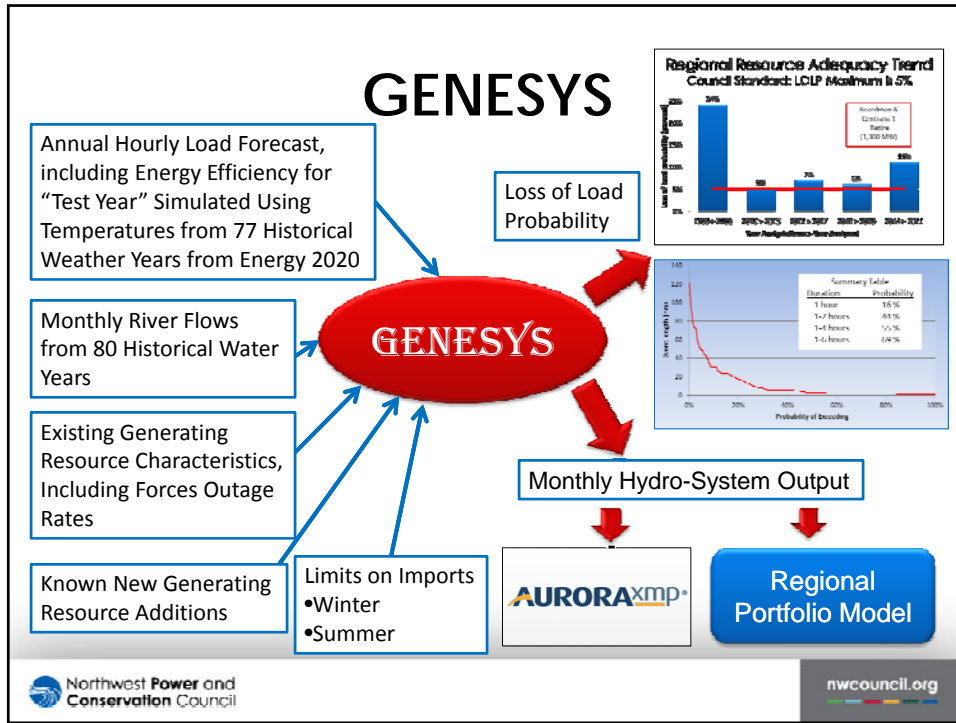


Council Planning Models	
<b>Energy 2020</b>	Energy 2020 is an open source model developed by Systematic Solutions, Inc. This model has been customized for and by the Council. Used to forecast the hourly demand for electricity, potential applications for efficiency resources, ensure consistency between the demand forecasts and efficiency assessment.
<b>Fuel Price Forecasting Model</b>	Council developed model. Used to convert assumptions about fuel commodity prices to regional wholesale prices at various locations, and to convert to estimate retail fuel prices for input to demand forecasts and resource costs estimates
<b>AURORA<sup>xmp</sup>® Electricity Market Model</b>	Proprietary model from EPIS, Inc. Production cost model used to forecast hourly wholesale electricity market prices at various pricing points in the western U.S. (WECC area). Can also be used to forecast hourly and total system NO <sub>x</sub> , SO <sub>x</sub> , and CO <sub>2</sub> emissions.
<b>GENESYS (GENERATION Evaluation SYSTEM)</b>	Council developed model that performs hourly chronological simulation of the Northwest's resources using many different assumptions for uncertain variables, including 1) river flows (which affect the amount of water for hydroelectric generation), 2) temperature (which affects demand for electricity), 3) forced outage conditions for generating resources and 4) wind generation.
<b>Regional Portfolio Model (RPM)</b>	Council developed model used to identify low-cost and low-risk resource strategies given uncertain future conditions and policies. It determines cost-effectiveness of alternative generating and efficiency resources. Time resolution is quarterly, with capacity assessments done for peak hour within period.

Northwest Power and Conservation Council [nwcouncil.org](http://nwcouncil.org)







## Regional Portfolio Model (RPM)

### What It Does

- Tests alternative resource mixes and development timing (aka, *Resource Strategies*) against a range of future conditions (e.g., load growth, natural gas prices, emissions costs/limits, etc.)
- Identifies the “least cost” *Resource Strategy* for a given level of “risk”

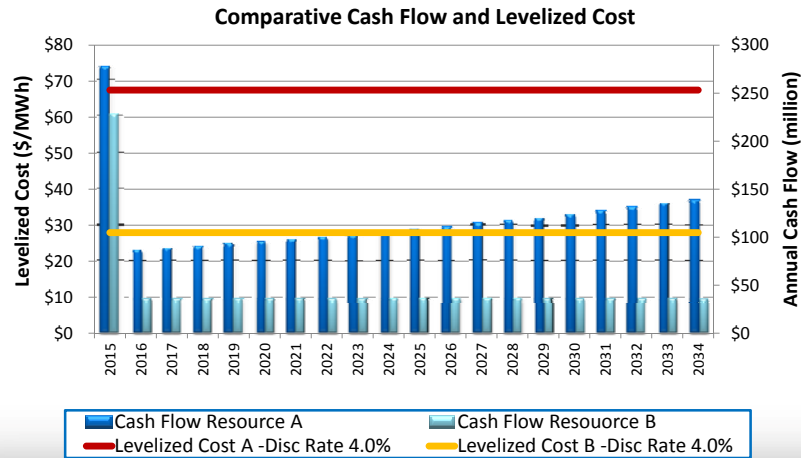
### What It Doesn't Do

- Determine what is an acceptable level of “risk”
- Determine what is an acceptable level of “cost”
- Decide which *Resource Strategy* is “The Plan”

## Council Financial Calculators

<b>ProCost</b>	Council developed tool. Used to calculate levelized costs of saved energy from efficiency resources based on measure and program cost and how the capital, operating and financing costs of installation are shared between consumers and ratepayer funded programs.
<b>MicroFin</b>	Council developed tool. Used to calculate the levelized cost of generating resources based on each project's cost structure and the share of capital, operating and financing costs borne by different project sponsors.

Microfin and ProCost Are Used to Provide Cost Comparisons Between Resources with Different Patterns of Annual Cost (i.e., cash flows) and Lifetimes



## Requirements for Power Plan Advisory Committees

**The Northwest Power Act requires the Council to insure widespread public involvement in the formulation of regional power policies**



- Establish a voluntary scientific and statistical advisory committee (SSAC) to assist in the development and amendment of the power plan
- Ensure membership includes representatives of the Federal and various regional, State, local, and Indian Tribal Governments, consumer groups, and customers

## Seven-for-Seven Power Plan Advisory Committees

- Conservation Resources Advisory Committee (CRAC)
- Demand Forecasting Advisory Committee (DFAC)
- Natural Gas Advisory Committee (NGAC)
- Generating Resources Advisory Committee (GRAC)
- Resource Adequacy Advisory Committee (RAAC)
- System Analysis Advisory Committee (SAAC)
- Resource Strategies Advisory Committee (RSAC)

## Formation and Operation of Power Plan Advisory Committees

- Committees chartered for two years
- Committees report to the Executive Director
- Council staff usually chair & vice chair, though not required
- Members selected based on their technical expertise and experience.
  - Council solicits nominations for membership from regional stakeholders
  - Final appointments made by the Executive Director
- All meetings are open to the public
  - All notices, agendas, materials, minutes, membership lists, etc. are posted on each committee's webpage
- Committees serve in *advisory* capacity only
  - No votes are taken
  - Role is to review information, vet assumptions and information and make recommendations to the Council.
- All advisory committees help develop action plan

## Role of Council Members and Staff

- **Council members are free to participate in all Advisory Committee meetings**
- **Staff**
  - Prepare agenda and materials for the meetings
  - Facilitate meetings
  - Certify meeting minutes (required by law)
  - Report to the Executive Director and Council Members on all progress and recommendations

## Advisory Committee that Also Assist in Plan Development

- **Regional Technical Forum – Assist with review of conservation potential assessments**

## Sample of Issues On Which Advisory Committee Input Might Be Sought

- What should the Plan assume about the adoption of Emerging Technologies, such as solid-state lighting and solar photovoltaics (PV)?
- How should the Plan incorporate the 2020 provisions of the Energy Independence and Security Act's (EISA) general service lighting requirements?
- What cost reductions and performance improvements should be assumed for new wind and solar photovoltaics generating resources?
- What should be the upper and lower bounds of natural gas prices from 2016 – 2025?

## Next Time - Planning for Uncertainty

- *Resource Strategies* – actions and policies over which the decision maker *has control* that will affect the outcome of decisions
- *Futures* – circumstances over which the decision maker *has no control* that will affect the outcome of decisions
- *Scenarios* – Combinations of *Resource Strategies* and *Futures* used to “stress test” how well what we control performs in a world we don't control



# Questions?

# Backup Slides

## What's in a Power Plan?

### Illustrative Plan Table of Contents:

Executive Summary and Introduction	
Chapter 1:	Action Plan
Chapter 2:	Resource Strategy
Chapter 3:	Bonneville's Obligations
Chapter 4:	Analytical Inputs
	Section 1: Financial Assumptions
	Section 2: System Needs Assessment
	Section 3: Reserve and Reliability Assessment and Methods
	Section 4: Impact of Emerging Technologies on Loads and Resources
	Section 5: System Capacity and Flexibility Resources
	Section 6: Regional Adequacy Standards
	Section 7: Electricity Demand Forecast
	Section 8: Conservation Resource Supply Assumptions
	Section 9: Demand Response Supply Assumptions
	Section 10: Generating Resources and Energy Storage Technologies Supply Assumptions
	Section 11: Direct Use of Natural Gas
Chapter 5:	Developing a Resource Strategy (RPM)
Chapter 6:	Coordinating with Regional Transmission Planning
Chapter 7:	Environmental Methodology and Due Consideration for Environmental Quality
Chapter 8:	Fish and Wildlife Program
Chapter 9:	Model Conservation Standards and Surcharge Policy

## Basic Requirements of the Northwest Electric Power Planning and Conservation Act of 1980

### The Plan Shall Include:

- *A demand forecast of at least twenty years*
- *A forecast of power (energy and capacity) resources required to meet forecast demand by resource priority type (e.g., conservation, renewable, etc.)*
- *An energy conservation program, including model conservation standards; and a methodology for calculating surcharges if recommended*
- *Regional reliability and reserve requirements, including recommended cost-effective methods of providing reserves*
- *Research and development recommendations;*
- *A methodology for determining quantifiable environmental costs and benefits*
- *A fish and wildlife program*

## Council's Planning Process

- Longest running Integrated Resource Planning Process in US (and likely the world)
- Council has published six regional plans since 1983
- Council has no regulatory authority over utilities or state commissions\*
- However, Council's plans serve as a reference against which utility specific IRPs are reviewed

\*Resource acquisitions by the Bonneville Power Administration (BPA), a federal power marketing agency, must be "consistent with the Plan"

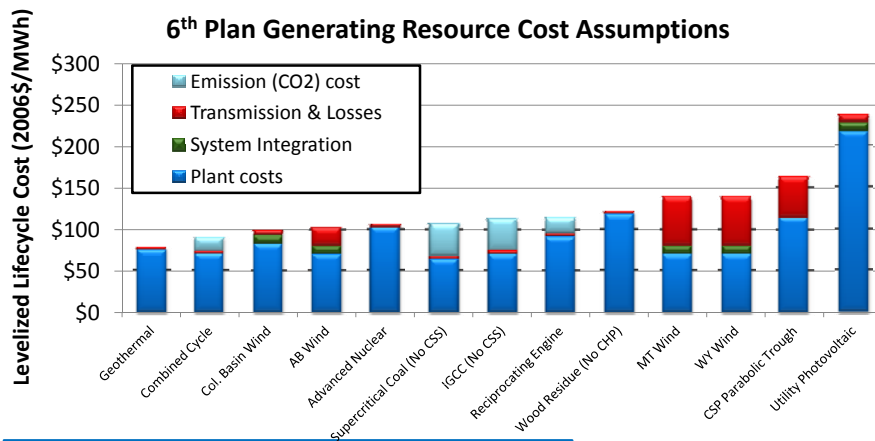
## GENESYS Inputs

Into GENESYS	From	Comments
Electricity prices	AURORAxmp	For resource dispatch
Generating resources	Council's Generating Resource Database	Existing and planned
Hourly loads	Short-term Load Model	Single operating year
Energy efficiency	Power Plan targets	Incorporated directly into the hourly loads
Firm contracts	BPA White Book	Into and out of region only Subtracted from loads
Hydro data (e.g. BiOp)	BPA hydro studies	
Hourly wind generation	Council's temperature correlated synthetic data	Based on the federal fleet, subtracted from load

# RPM Inputs

Into RPM	From	Comments
Electricity prices	AURORAxmp	
Generating resources	Council's Generating Resource Database	Same file that feeds into GENESYS
Frozen efficiency loads	Energy 2020 - Long-term Load Forecasting Model	20-year monthly average and monthly peak
Energy efficiency	Council's EE supply curves	GENESYS uses Plan targets
Firm contracts	BPA White Book	Same file that feeds into GENESYS
Monthly hydro generation	GENESYS	
Hydro peak vs. Energy curves	TRAP model	Also used in GENESYS, extrapolated to 16-hr HLH
Annual load/resource minimum balance	GENESYS	Adequacy check for energy
Seasonal peak-hour planning margin	GENESYS	Adequacy check for capacity (new for 7 <sup>th</sup> plan)

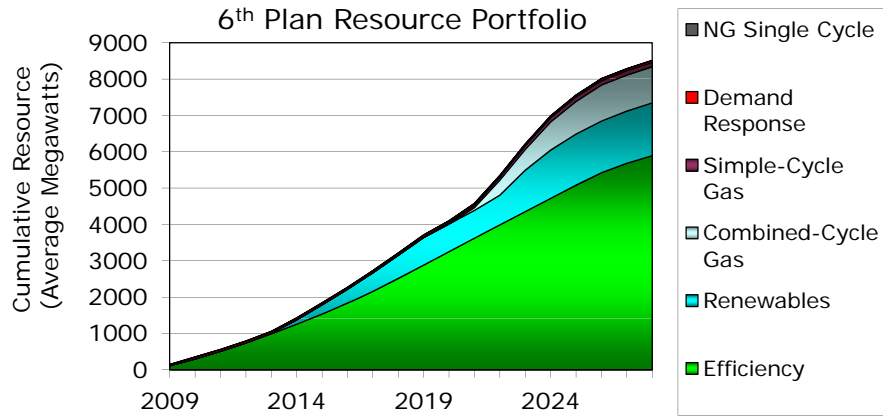
# Generating Resource Cost



Assumptions :

- Transmission cost & losses to point of LSE wholesale delivery
- 2020 service - no federal investment or production tax credits
- Baseload operation (CC - 85%CF, Nuclear 87.5% CF, SCPC 85%)
- Medium NG and coal price forecast (6<sup>th</sup> Plan draft)
- 6<sup>th</sup> Plan draft mean value CO2 cost (escalating, \$8 in 2012 to \$47 in 2029).

# Sixth Plan Resource Portfolio\*



\*Expected Value Build Out. Actual build out schedule depends on future conditions