Initial Portfolio Results

2010 IRP Stakeholder Group

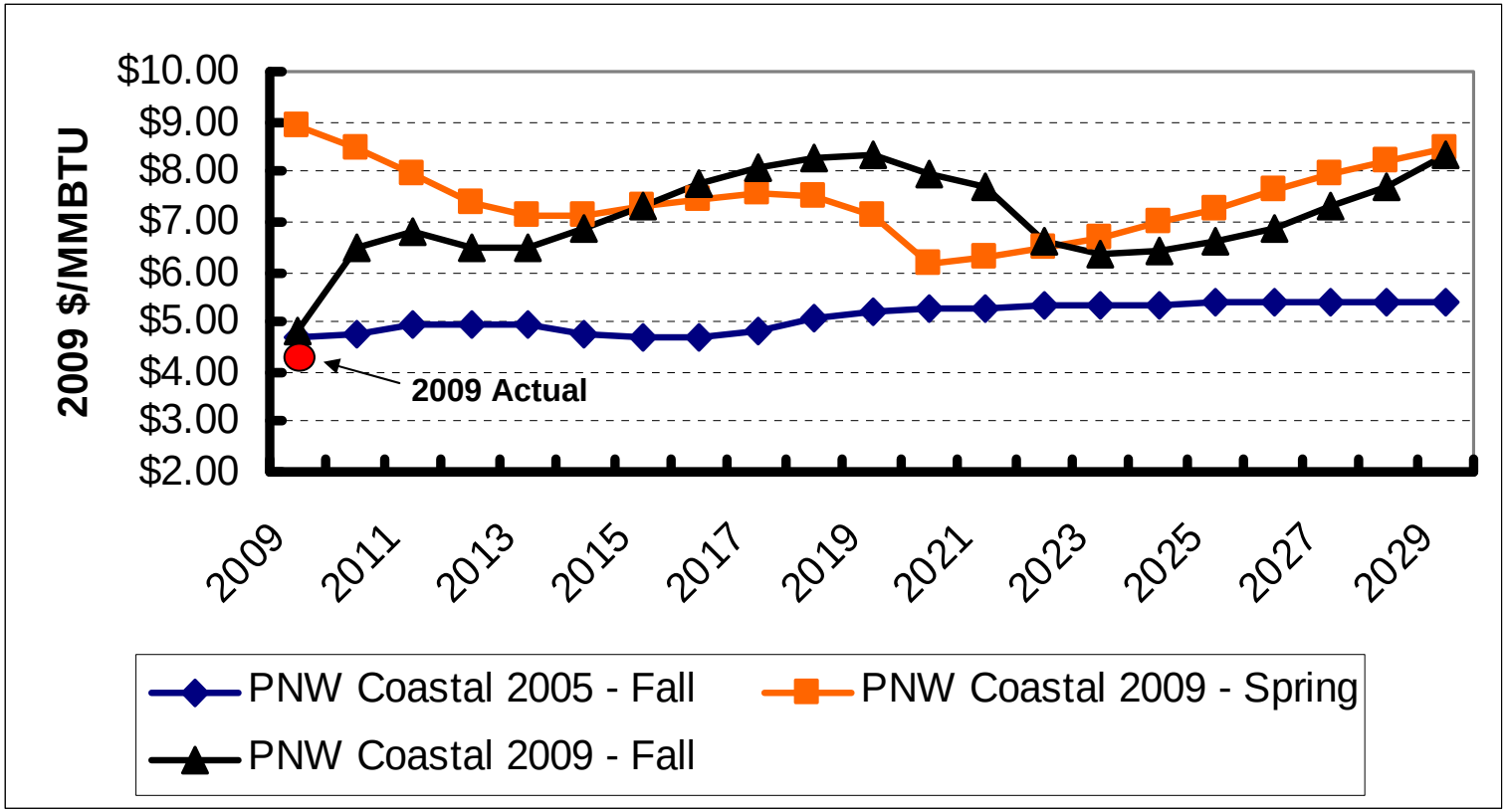
Seattle City Light

February 25, 2010

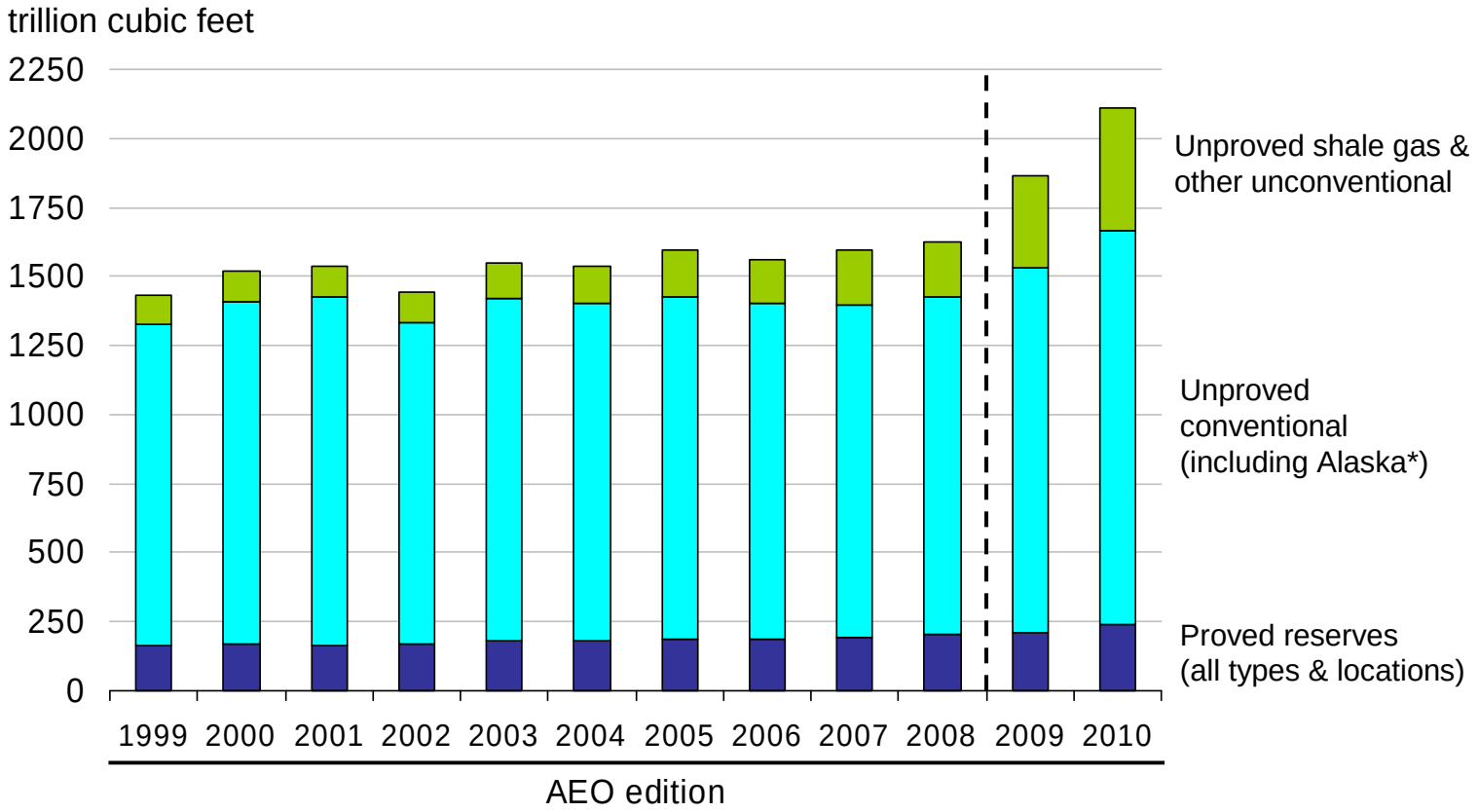
Agenda

- Key Issues in 2010 IRP
  - Natural Gas: Improved Prospects?
  - Change in Need for Resources
  - I-937 Compliance
- Initial Portfolio Results and Recommendation
- Break
- Next Steps
  - Risk Analysis
  - Scenarios
  - Other Analyses

2009: Natural Gas Price Forecasters Get Another Lesson in Humility



US Natural Gas Supply Increases 30% Since 2008 IRP

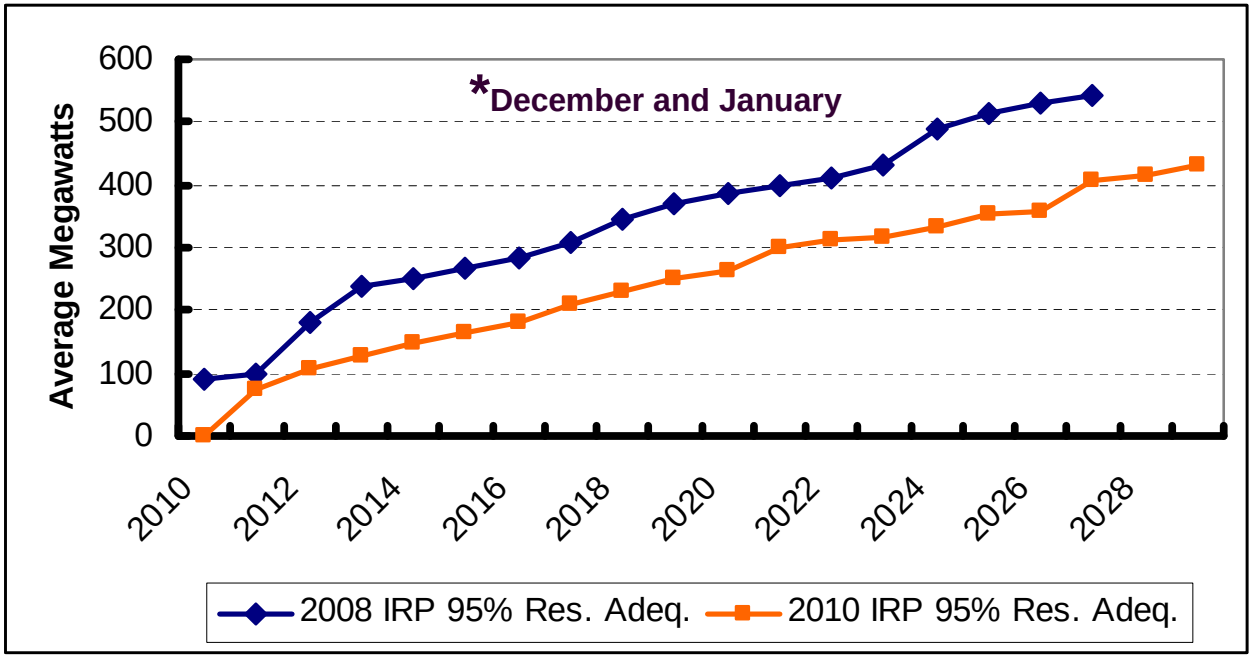


* Alaska resource estimates prior to *AEO2009* reflect resources from the North Slope that were not included in previously published documentation.

Source: Energy Information Administration, US Dept. of Energy, 2010

Note: Shale gas drilling receiving opposition from environmental groups concerned about pollution of ground water

2010 IRP: Less Resources Needed to Preserve 95% Winter* Reliability

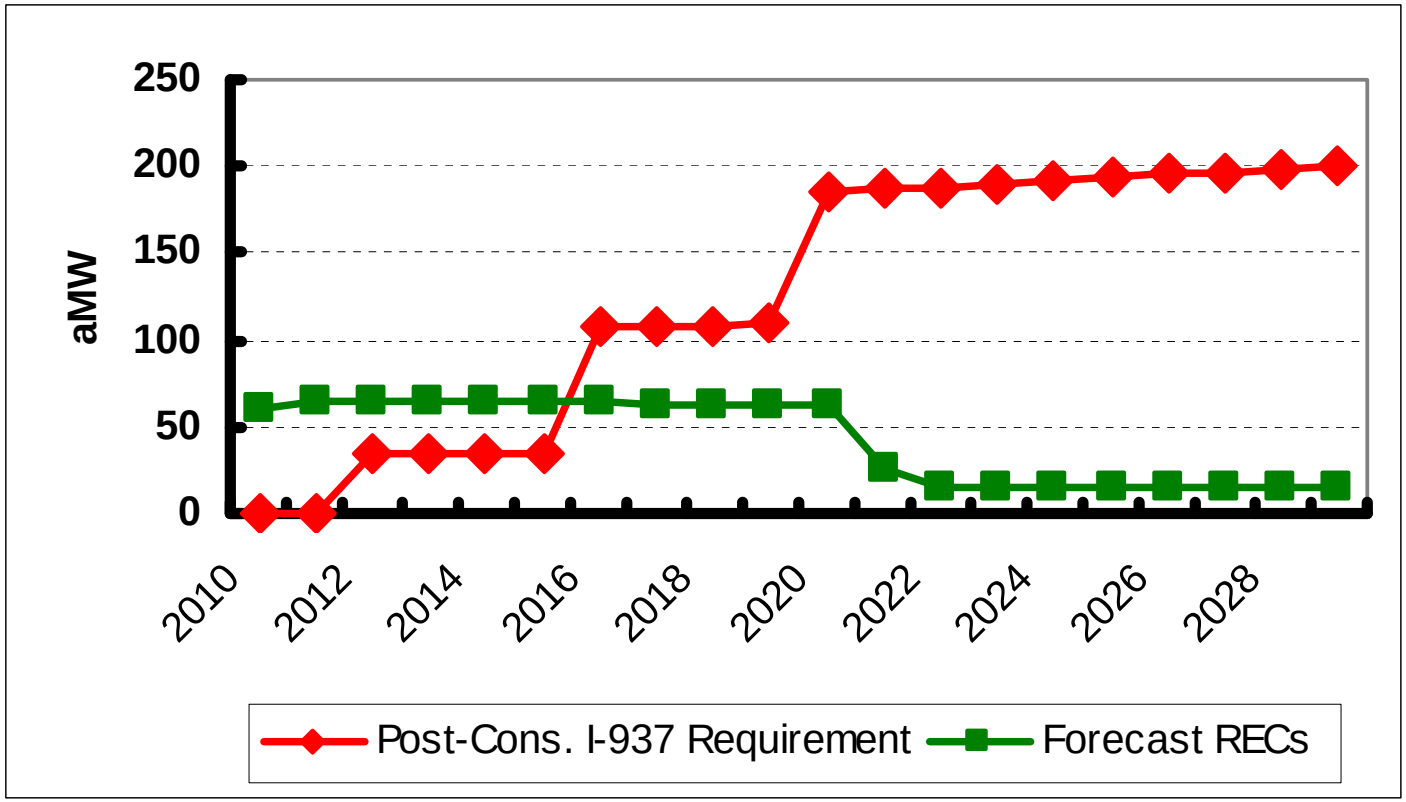


Major Reasons:

Recession Reduces Demand; New BPA Contract Assumptions; Assumes Greater Use of Other Existing Contract Flexibility

Notes: Both 2008 and 2010 assume 100 aMW from wholesale spot market. Winter reliability-based resource needs are independent of I-937 requirements.

City Light I-937 Compliance Outlook: About 40 aMW Short for 2016



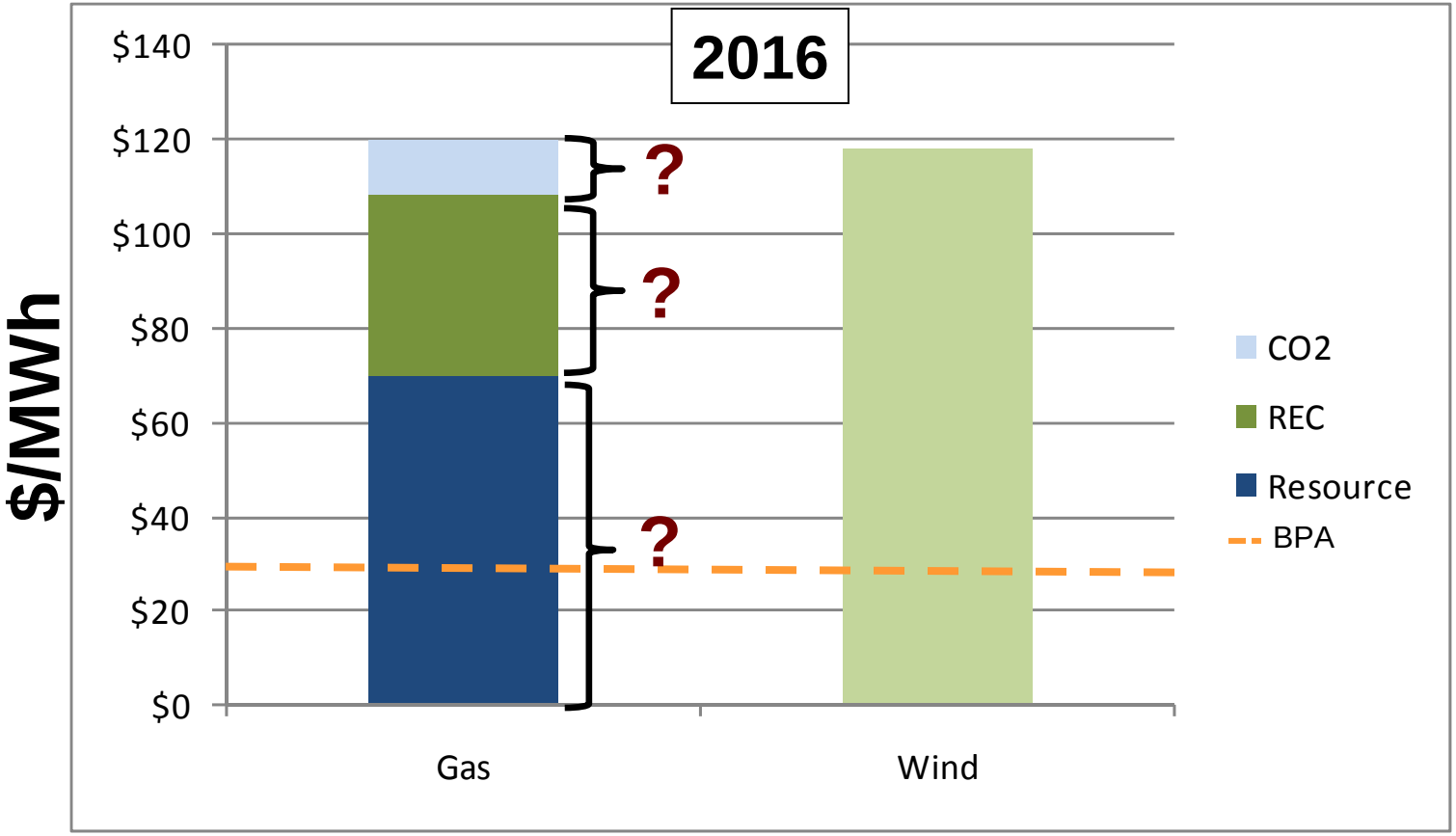
I-937 compliance expected to cost $250 Million (NPV) over 20 Years

Note: Renewable energy credits (RECs) may be substituted for renewable resources at 1 per megawatt-hour, representing the environmental attributes of renewable generation.

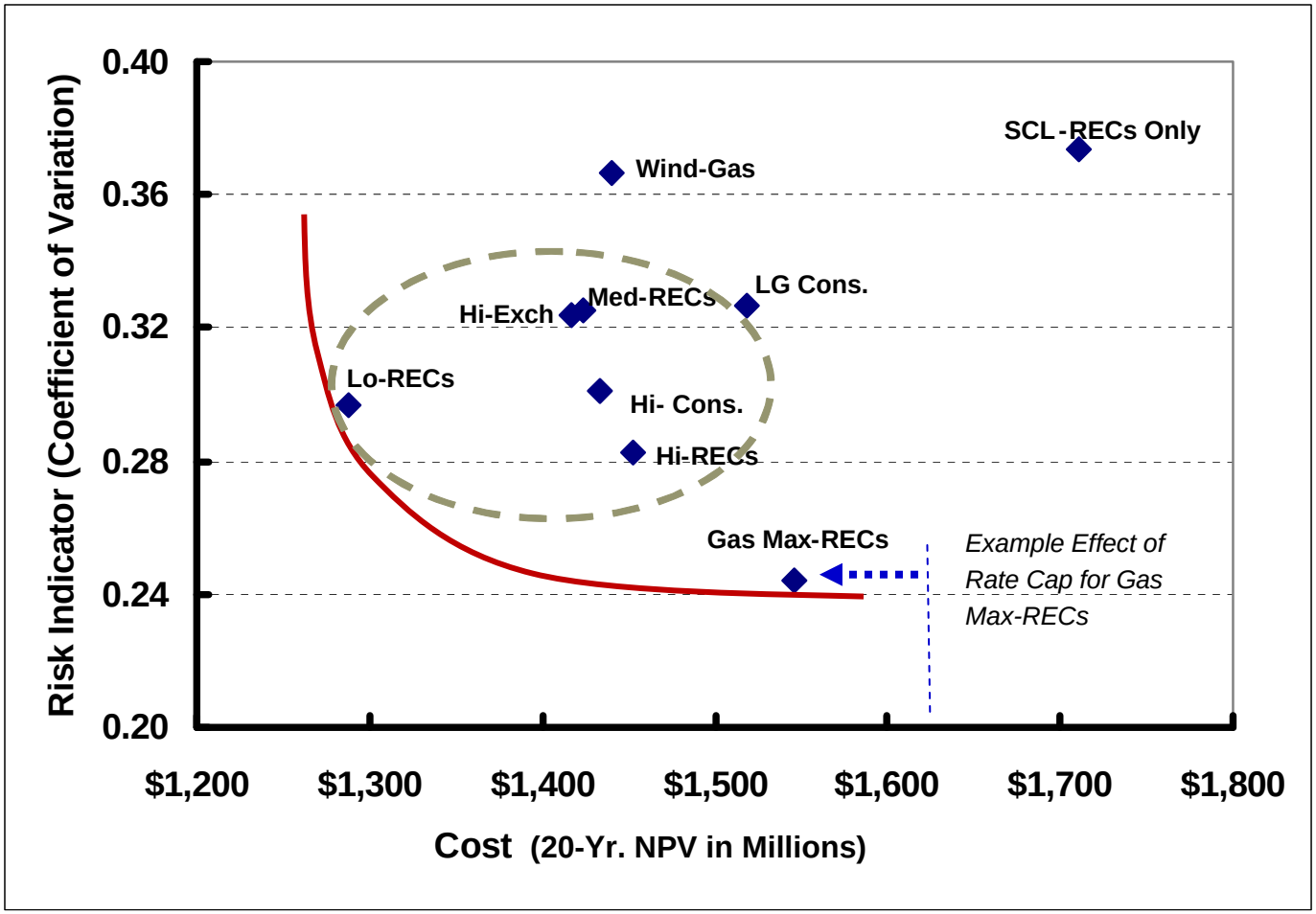
Future Changes to I-937?

- Senate Bill 6672 in the Washington Legislature Would Have Raised Existing Requirements by 1.25% for 2016 (10.25%) and 2020 (16.25%); and Added a New Requirement for 2024 (20%)
  - City Light's 2016 and 2020 targets would have increased about 15 aMW each and the 2024 target by 60 aMW
- The Bill Failed to Make it Out of the Washington Senate Rules Committee by the February 16 Deadline

Uncertainty and Possible Convergence of Future New Generation Costs



Cost vs. Risk* for Portfolios: Base Case With Rate Cap



*A better measure of risk comes from stochastic analysis, which will be done with a subset of portfolios

Top Resource Portfolios:

- Results Clustered in Cost, if Not Risk
- Sensitive to REC Prices
- Top 5 Portfolios Each Save More Than $200 Million NPV Over “SCL” Portfolio

Recommendation

- Given the Level of Uncertainty, Carry Forward the Top ~~3~~ 5 Portfolios Rated Upon Cost and Risk
  - Lo-RECs
    - Least REC purchases, resource heavy
  - Med-RECs
    - Medium REC purchases
  - Hi-RECs
    - RECs for I-937, resources for reliability
  - Max-Exch
    - Most exchanges, RECs like Med-RECs
  - Higher-Cons
    - More conservation, RECs like Hi-RECs

Next Steps

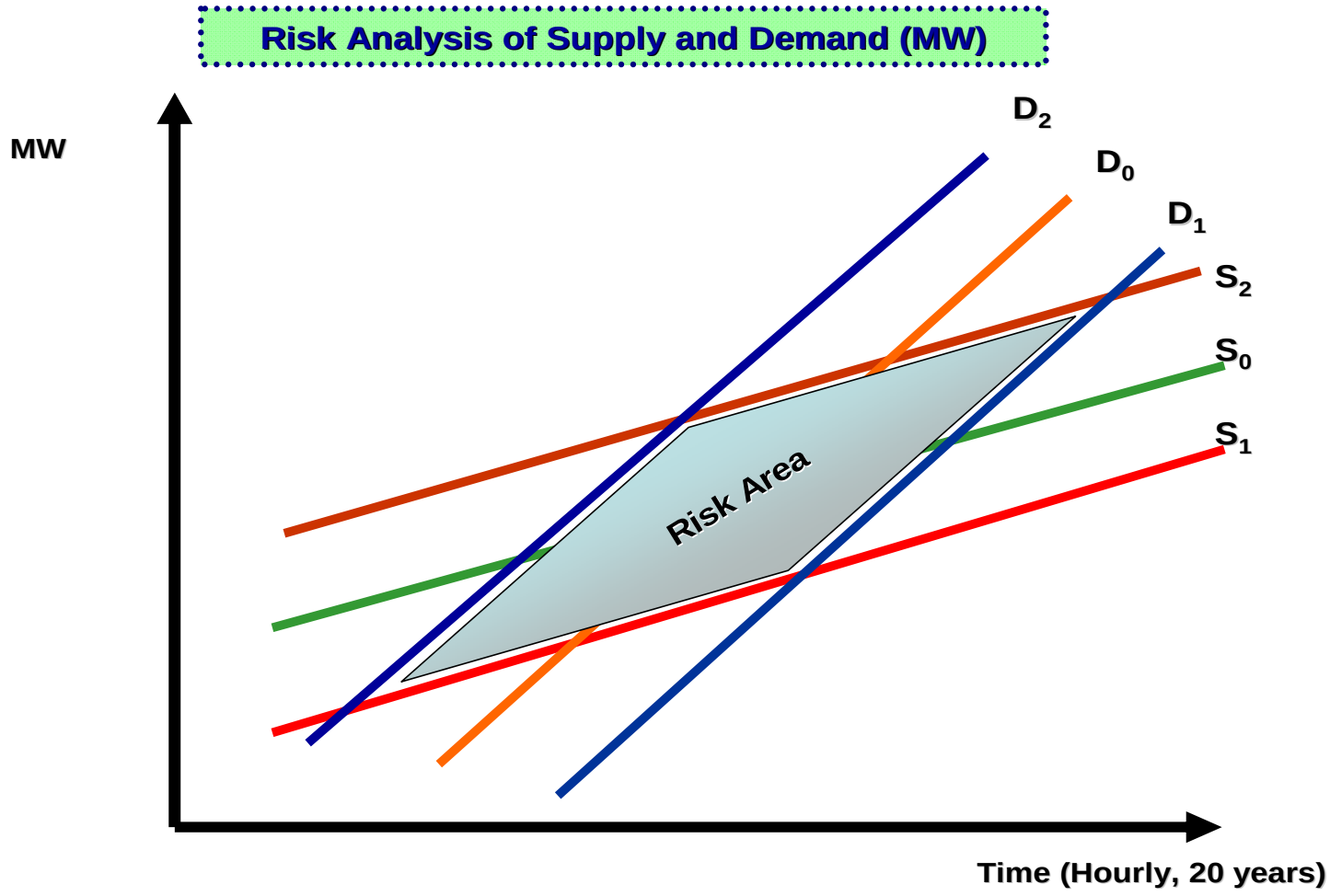
- Public Meeting
- Risk Analysis
  - Stochastic analysis by portfolio
- Scenarios
- Stakeholder Review of Next Results
  - How do we accomplish this?
- First Report to City Council in April

Why Risk Analysis?

- **Risk analysis** is a technique to identify and assess factors that may jeopardize the success of **achieving a goal**

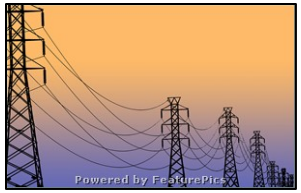
- Identifying countermeasures to successfully deal with these factors to avert possible negative effects on our goal of **reliably** meeting demand with cost-effective, environmentally-friendly resources

Risk Analysis of Supply and Demand



Risk

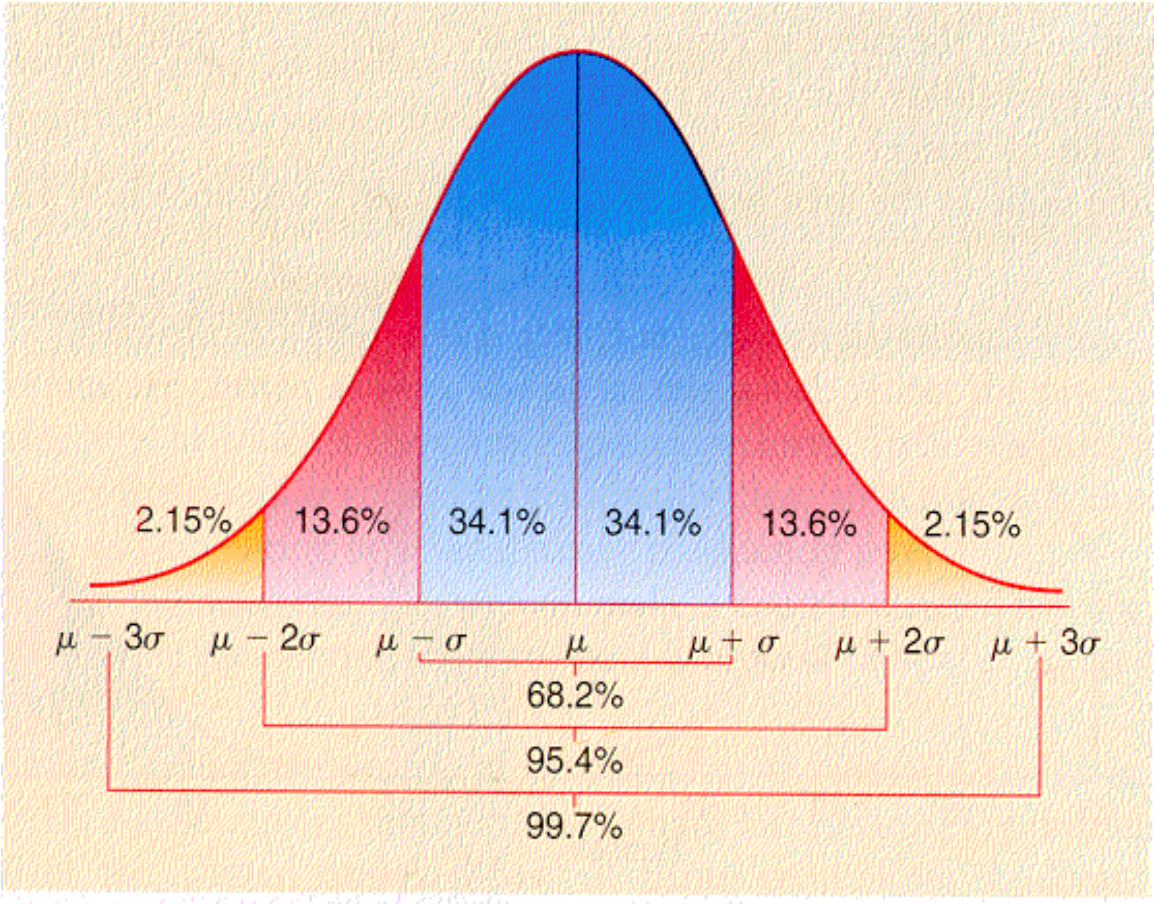
- Demand
  - Statistical analysis on Seattle's historical demand (1981-2007)
    - Measures of historical variation have been incorporated into the probability distribution analysis



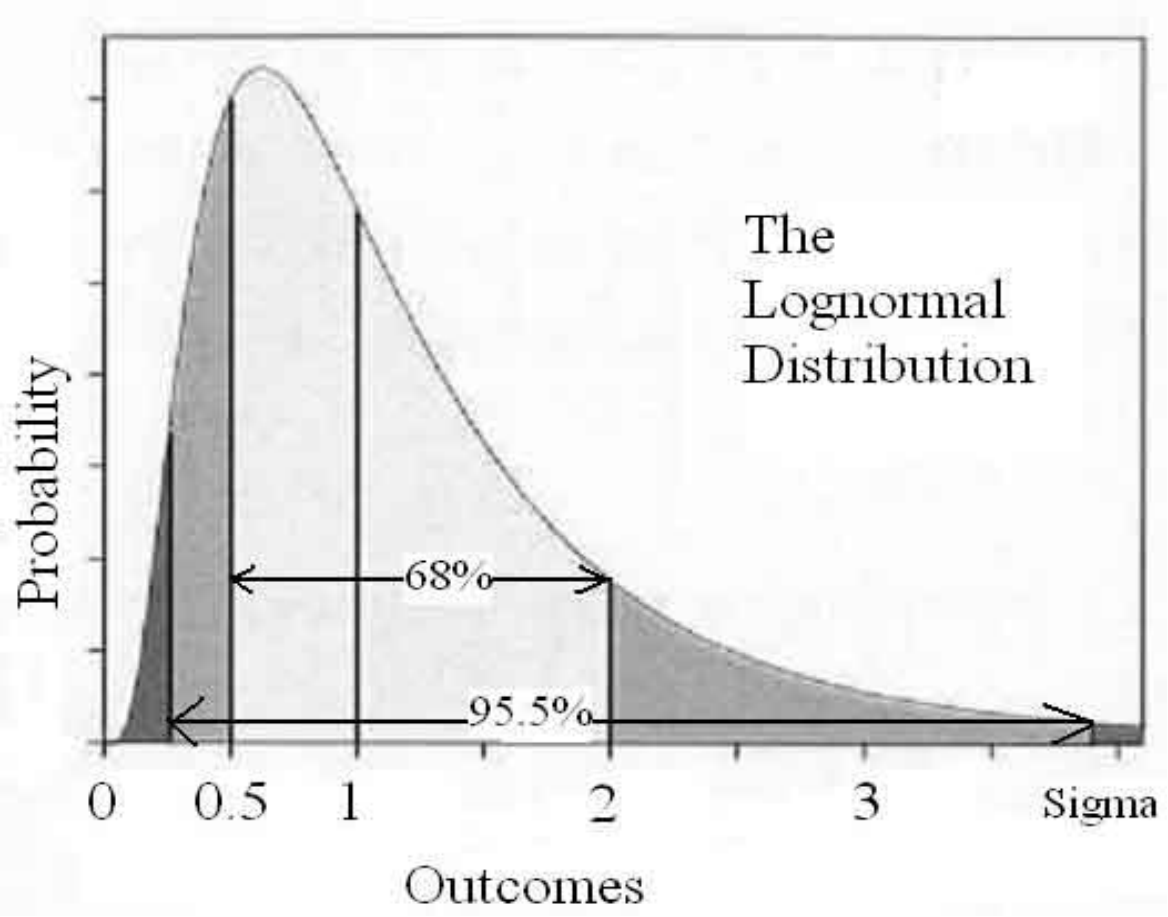
- Hydro
  - Statistical analysis on historical generation from Skagit, Boundary and BPA Slice
    - Times series and cross sectional correlations are incorporated into the probability distribution analysis

- Fuel
  - Statistical analysis on historical fuel prices
    - Henry Hub monthly prices analyzed from 1995 to 2009
    - Time series correlations are incorporated into the probability distribution analysis

Developing Risk Metrics: Normal Distribution



Developing Risk Metrics: Log Normal Distribution



Functional Form of Risk

$$Risk = \varphi(D, H, F)$$

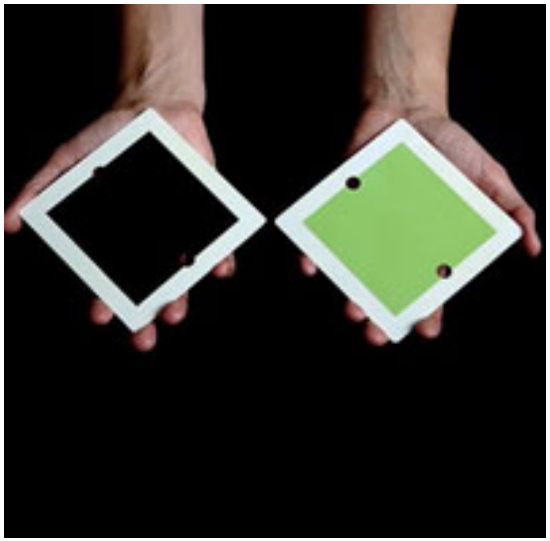
$$D = Demand(Jan, Dec)$$

$$H = Hydro(Skagit, Boundary, Slice: Jan, Dec)$$

$$F = Fuel(Jan \ldots\ldots Dec)$$

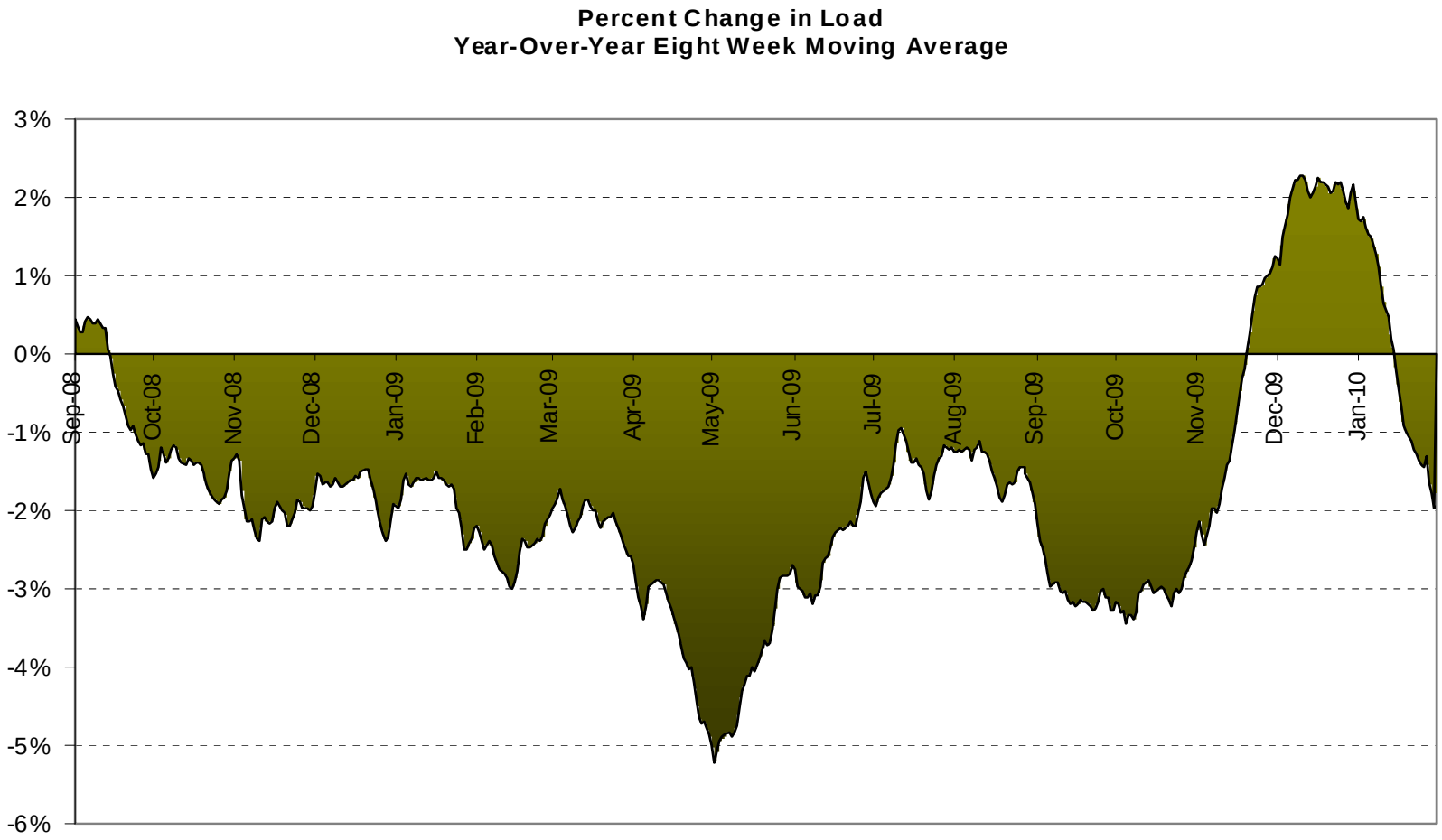
Game-Changing Technology? The Bloom Box (on “60 Minutes”)

- Brick-sized Solid Oxide Fuel Cell
  - Invented by former NASA scientist
  - Layers of 64 thin ceramic plates
  - Two can power a typical house, using natural gas or biogas as a feedstock
- Demonstration Projects
  - FedEx, Google, Wal-Mart, and EBay, have been using refrigerator-sized Bloom Boxes
  - The refrigerator-sized units each cost businesses $700 to $800 thousand
- Estimated Future Residential Cost is About $3,000 per Unit (Two at $6,000)
- Bloom Box Competition:
  - There are over 100 fuel cell start-ups. Panasonic has a promising combined solar - fuel cell



- Customers Forecast to Save About Half On Power Bills
- Envisioned to Disconnect Customers from the Grid

Recession and SCL Load



Recovery

- Mixed Signals = Sign of Imminent Recovery?
- Regional Economic Forecast
  - Region will lag nation
  - Employment begins to grow in Q2 2010

Scenarios

- Eventualities That Might Affect Portfolio Performance
  - Aurora Model Runs
    - Load Growth: Slower Recovery
    - Natural Gas Prices: Higher & Lower
    - Carbon Dioxide Emissions Costs

Other Analyses

- Plug-In Hybrids & Electric Vehicles
  - Modify assumptions used in 2008 IRP, consistent with EPRI/NRDC
- Climate Change?
- REC Price Uncertainty
- Rate Cap Sensitivity to REC Prices
- Bloom Box Technology

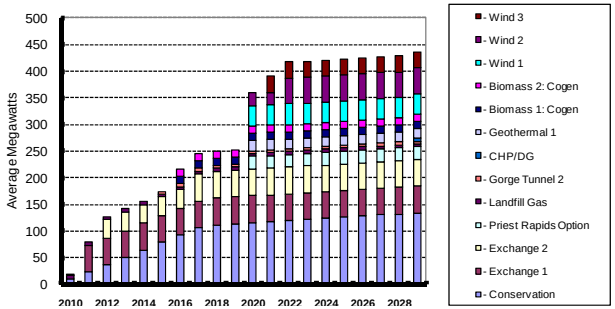
Questions or Comments?

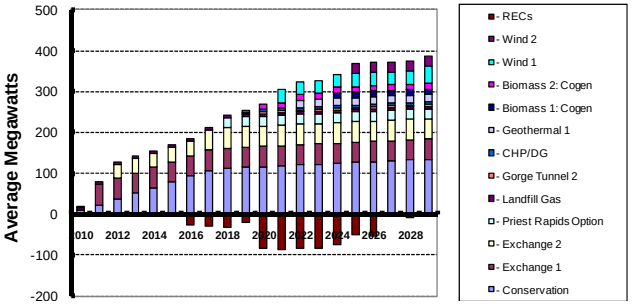
IRP Website Address:
http://www.seattle.gov/light/news/issues/irp/
E-Mail: SCL.IRP@Seattle.gov

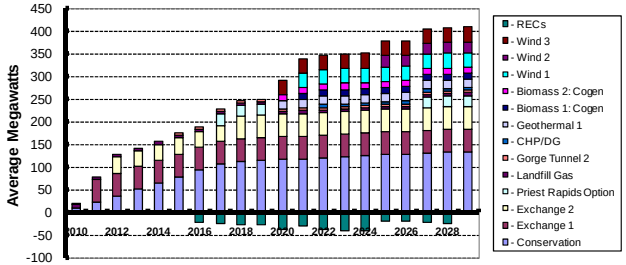
David Clement
(206) 684-3564, Dave.Clement@Seattle.gov

Portfolios

- Lo-RECs
  - Mostly resources for I-937 and reliability
- Hi-RECs
  - Resources for reliability; RECs for I-937
- Med-RECs
  - Mix of RECs and resources for I-937

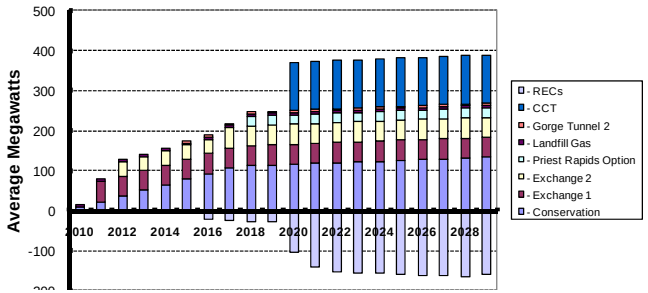




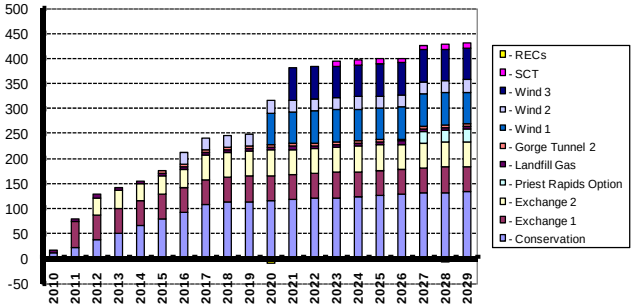


Portfolios *(Continued)*

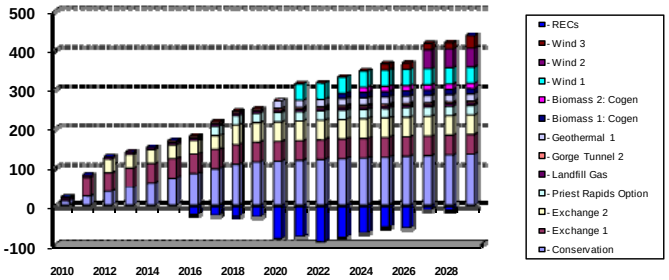
- Gas, Max-RECs
  - Combined-cycle turbine (CCT) for reliability; all RECs for I-937



- Wind-Gas
  - Lots of wind; single-cycle turbine (CT) for integration

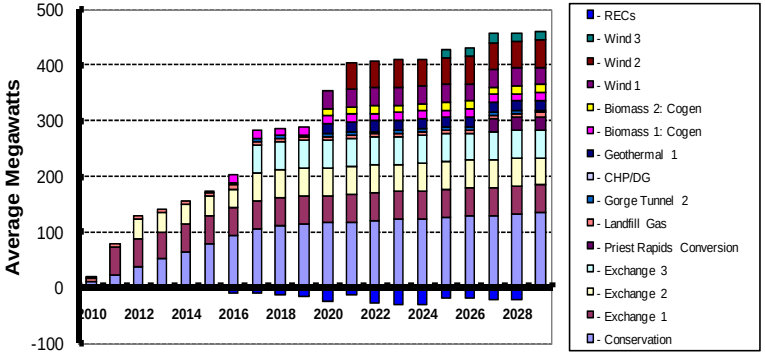
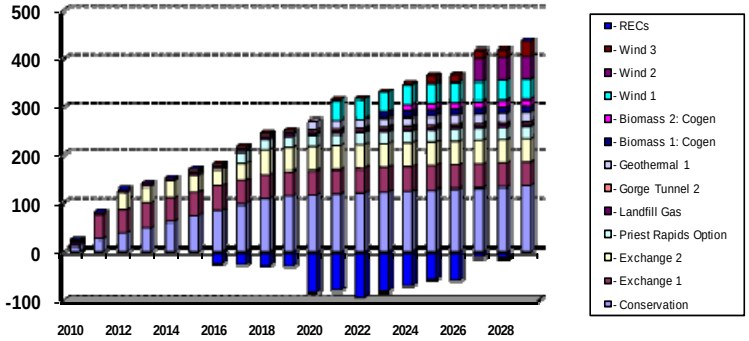


- Hi-Cons.
  - Original Cons. 5-yr. Plan; RECs for I-937



Portfolios *(Continued)*

- Max-Exch.
  - Up to 150 MW of exchanges; more resources than RECs for I-937



- L.G. Cons.
  - Conservation at 12 aMW for load growth, RECs to meet I-937; resources for reliability