2013
Integrated Resource Plan

Updated PaR Results & Draft Preferred Portfolio
Draft Action Plan

April 5, 2013
Agenda

• Updated PaR Analysis

• Draft Preferred Portfolio Update

• Action Plan

• Next Steps
Updated PaR Analysis
Review of PaR Results

- The Company continued to review and validate the draft PaR results presented at the March 21, 2013 public input meeting
  - Anomalous energy not served (ENS) results
  - Standard review and validation of system resources

- The review and validation exercise uncovered PaR model setup problems that were related to the transfer of data between the System Optimizer model and the PaR model
  - Prior to the 2013 IRP, the System Optimizer and PaR models were decoupled (two distinct tools with separate databases and unique interfaces)
  - Modeling for the 2013 IRP is being implemented using an integrated version of the System Optimizer and PaR models (one database and interface for both models)
  - Legacy configuration of some data inputs caused information to be lost when the integrated system transferred data from System Optimizer to PaR (this transfer was historically done manually)

- Anomalous energy not served (ENS) results were influenced by the information lost in the transfer from System Optimizer to PaR
  - Energy Gateway transmission topology was not transferred into PaR
  - Third quarter, on-peak FOT resources were transferred as annual, flat resources into PaR
  - Class 2 DSM resources were treated as “dispatchable” resources in PaR, given programming logic in the model, (rather than as “must-run” resources) that lead to understated energy levels
Updated PaR Analysis

- PaR studies for EG1 and EG2 core cases have been updated to correct for the data that was lost in the transfer of information from System Optimizer to PaR and that implemented a script to enable must run settings on Class 2 DSM resources
  - 37 Core Case Portfolios
  - 3 CO₂ scenarios
  - 111 updated PaR studies
  - The updated PaR studies include results for case C17, which had not yet been completed at the time of the March 21, 2013 public input meeting

- Results of the updated PaR studies have been compared to the original draft PaR results
  - Given similarities in the portfolios among most core cases, the change in stochastic mean PVRR and upper tail risk PVRR results across many of the portfolios is similar
  - Those cases that were identified as extreme outliers in the draft PaR results remain extreme outliers in the updated PaR studies as can be seen in the updated scatter plot handout (Cases C05, C09, C14, and C18)
  - Case C15 (accelerated DSM and exclusion of base load natural gas resources) continues to show cost and risk benefits
  - With Energy Gateway transmission properly captured in PaR, the benefits of Energy Gateway Segment D have increased

- Updated PaR results continue to support selection of case EG2-C07 as the basis for the preferred portfolio

- The Company intends to limit its review and discussion of PaR results in the 2013 IRP report to the updated PaR studies completed for EG1 and EG2 cases
  - System Benefit Tool (SBT) analysis has not yet been completed for Energy Gateway segments included in scenarios EG3, EG4, and EG5
  - The draft action plan addresses further review and development of the SBT for use in future IRP analysis
ENS Implications

- The updated PaR results show that ENS in the original draft results was dampened by the model's representation of third quarter, on-peak FOTs as flat, annual resources.

- When Energy Gateway transmission is transferred into PaR, the out year ENS anomalies observed in the original draft results are corrected.

- Absent the anomalous out year ENS results, assessment of the risk adjusted PVRR among portfolios without ENS is no longer required.

![Annual Stochastic Mean ENS (EG1-C03 and EG2-C03): Medium CO2](chart.png)
Comparison of Original Draft and Updated PaR Scatter Plot Results

• Updated cases are identified by the blue highlighted area
• Original cases are identified by the red highlighted area
• Each chart focuses on those cases not pre-screened as extreme outliers
• The updated PaR results show reduced costs with slightly higher risk as compared to the original draft PaR results
• The cost/risk shift is similar among core case portfolios
• Case C15 continues to show cost/risk benefits, but the gap has narrowed in the updated PaR study results
• Similar trends are observed among EG1 cases
Draft Preferred Portfolio Update
Initial Screen (Updated PaR Results)

Medium CO2

- Upper Tail Mean PVRR less Stochastic Mean PVRR ($ billion)
- Stochastic Mean PVRR ($ billion)

- Portfolios within the dashed redline are selected as least cost/least risk candidates (2% of least cost threshold applied)

Core Cases | Energy Gateway Scenario
--- | ---
C03 | EG1, EG2
C07 | EG1, EG2
C11 | EG1, EG2
C15 | EG1, EG2
C16 | EG1, EG2
C17 | EG1, EG2
Final Screen: Risk Adjusted PVRR with ENS (Updated PaR Results)

<table>
<thead>
<tr>
<th>Case</th>
<th>Zero CO2 Risk Adjusted PVRR ($m)</th>
<th>Change from Lowest Cost Portfolio ($m)</th>
<th>Rank</th>
<th>Medium CO2 Risk Adjusted PVRR ($m)</th>
<th>Change from Lowest Cost Portfolio ($m)</th>
<th>Rank</th>
<th>High CO2 Risk Adjusted PVRR ($m)</th>
<th>Change from Lowest Cost Portfolio ($m)</th>
<th>Rank</th>
<th>CO2 Scenario Average Risk Adjusted PVRR ($m)</th>
<th>Change from Lowest Cost Portfolio ($m)</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td>EG1-C03</td>
<td>$28,719</td>
<td>$306</td>
<td>7</td>
<td>$32,717</td>
<td>$245</td>
<td>4</td>
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<td>$612</td>
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<td>$33,924</td>
<td>$630</td>
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</tbody>
</table>

- EG1-C15 and EG2-C15, with accelerated DSM assumptions, continue to rank high on a risk adjusted PVRR basis
- Beyond the C15 cases, Case EG2-C07 has the highest risk adjusted PVRR ranking
Final Screen: Stochastic Mean ENS (Updated PaR Results)

• Annual stochastic mean ENS data from PaR are nearly identical among portfolios through 2019

• EG1-C15 deviates from other portfolios over the period 2020 – 2025
  – 168 MW of Class 1 direct load control between 2020 and 2025
  – Addition of west side Class 1 resources appear to correlate with reduced ENS (21 MW in 2020 with additional 25 MW in 2023)
  – Note, EG2-C15 does not add west side Class 1 resources until 2025 (and then it is only 16 MW)

• Among all other portfolios, stochastic mean ENS variation occurs beyond 2025 – timing and amount of west side commercial curtailment appears to be a driver along with the timing and location of other system resources
As noted on the previous slide, differences in stochastic mean ENS rankings are largely driven by changes in portfolios beyond 2025.

The high ranking of EG1-C15 is largely influenced by west side Class 1 DSM resources over the period 2020 – 2025.
### Final Screen: Upper Tail Mean ENS (Updated PaR Results)

<table>
<thead>
<tr>
<th>Case</th>
<th>Zero CO2</th>
<th>Medium CO2</th>
<th>High CO2</th>
<th>CO2 Scenario Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Annual ENS, 2013-2032 (GWh)</td>
<td>Change from Lowest ENS Portfolio</td>
<td>Rank</td>
<td>Average Annual ENS, 2013-2032 (GWh)</td>
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<tr>
<td>EG1-C07</td>
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<td>56.1</td>
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<td>77.3</td>
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<tr>
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<td>89.3</td>
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<td>24.1</td>
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<td>99.2</td>
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</table>

- Rankings for upper tail ENS results are similar to the stochastic mean ENS portfolio rankings.
Final Screen: CO₂ Emissions (Updated PaR Results)

- Annual CO₂ emissions are similar among all portfolios through the planning horizon.

- EG1-C15 is slightly lower beginning 2017 (early coal retirement), but emissions are higher longer-term given absence of base load CCCT resources.
Final Screen: CO₂ Emissions (Updated PaR Results)

- As noted on the previous slide, while there are differences in total CO₂ emissions among portfolios, those differences are quite small over the 20-year planning horizon.

- The difference between average annual emissions in the highest ranking portfolio and the lowest ranking portfolio in the medium CO₂ scenario is 1.3 million tons (approximately 3% of average annual system CO₂ emissions among all portfolios).

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
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<tr>
<td>EG1-C03</td>
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<td>836,154</td>
<td>4,773</td>
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<td>803,958</td>
<td>2,917</td>
<td>3</td>
<td>837,365</td>
<td>4,990</td>
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<tr>
<td>EG1-C07</td>
<td>884,725</td>
<td>21,962</td>
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<td>13,680</td>
<td>6</td>
<td>811,879</td>
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<td>847,222</td>
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<td>848,008</td>
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<td>EG2-C11</td>
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</table>
Basis for the Preferred Portfolio

• The Company continues to have concerns in choosing EG1-C15 or EG2-C15 as the preferred portfolio
  – Implementation costs for accelerated DSM are uncertain
  – Absent a ramp rate in the accelerated DSM assumed in this case, there are potentially significant acquisition challenges
  – However, the Company has included in its draft action plan specific action items targeting accelerated acquisition of DSM resources

• The updated PaR results continue to support EG2-C07 as the basis for the draft preferred portfolio
  – High risk adjusted PVRR ranking
  – Updated PaR results improve favorable economics of the Windstar-Populus Energy Gateway investment
  – Benefits identified in the System Benefit Tool (SBT) support continued pursuit of the Windstar-Populus Energy Gateway investment
  – The Company has included in its draft action plan specific action items that address continued refinement of the SBT and on-going financial analysis of Energy Gateway investments
Additional Analysis (RPS Compliance)

- Incremental wind resources in Case EG2-C07 prior to 2024 are included to achieve compliance with Washington state RPS requirements
  - Case EG2-C06 (which excludes RPS assumptions) does not have any RPS-eligible renewable resources
  - Absent the RPS requirement these resources would not be included in the portfolio

- For purposes of developing resource portfolios in System Optimizer, it was assumed that RPS compliance would be achieved with eligible renewable assets

- However, there are potentially lower cost alternatives to meeting the Washington RPS requirement through the use of unbundled RECs

- The 2011 IRP action plan included an action item to evaluate the role of REC purchases/sales in meeting RPS requirements

- The Company has completed an analysis that evaluates the use of unbundled RECs in meeting Washington RPS compliance requirements
  - Wind resources in the EG2-C07 portfolio used to meet Washington RPS compliance requirements were removed (situs assigned generation) totaling 208 MW over the period 2016 through 2023
  - The System Optimizer model was used to produce an alternative version of the EG2-C07 portfolio (EG2-C07a) that replaces the Washington situs assigned wind generation with alternative resources
  - The EG2-C07a portfolio was analyzed in PaR (zero, medium, and high CO₂ price scenarios) to assess the change in portfolio costs
  - The change in portfolio costs (stochastic mean) between the EG2-C07 and the EG2-C07a portfolios was divided into the change in the Washington situs assigned wind generation between the two portfolios
RPS Compliance Analysis: Updated Draft Preferred Portfolio

<table>
<thead>
<tr>
<th>Reduction in Stochastic Mean PVRR with Removal of Wind ($m)</th>
<th>Real Levelized Reduction in Stochastic Mean PVRR per MWh of Wind Removed ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero CO₂</td>
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<td>Medium CO₂</td>
<td>$200</td>
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<tr>
<td>High CO₂</td>
<td>$132</td>
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• Results
  – The stochastic mean PVRR in case EG2-C07a is lower than the stochastic mean PVRR in case EG2-C07
  – The change in system costs between the two portfolios divided by the change in Washington situs assigned wind generation ranges between $33/MWh and $61/MWh (2016 real levelized dollars escalating at 1.9% per year)

• Conclusions
  – These results show that if unbundled RECs could be procured at costs below a range of $33/MWh to $61/MWh (depending upon CO₂ price assumptions), the Washington RPS compliance requirement could be achieved at lower cost as compared to an alternative that relies on wind assets
  – With current unbundled REC prices trading at approximately $1/MWh, the Company has updated its draft preferred portfolio consistent with the resources portfolio in EG2-C07a (see handout) and included unbundled REC RFP action items in the draft action plan
Draft Action Plan
Draft Action Plan Discussion

• The 2013 IRP draft action plan has been provided as a separate handout

• Consistent with the preferred portfolio and additional analyses completed for this IRP

• Focus on specific actions the Company will take over the next 2 – 4 years

• Action items do not cover things the Company is expected or otherwise required to do through the normal course of business (i.e. “…monitor market prices)

• We appreciate any feedback that you can provide today and request any written recommendations or comments be provided to the Company by April 15, 2013
Next Steps
Next Steps

• April 16th Stakeholder Meeting
  – Confidential meeting to discuss draft Volume 3 results
  – No dial-in, in-person only

• April 17th Stakeholder Meeting
  – Review of non-confidential sensitivities
  – Additional discussion, close out (recommended topics)

• Draft Report
  – The Company will distribute as much of the draft report materials as possible prior to the April 17th meeting
  – With modeling delays, there will be a short turn around time for stakeholders to provide preliminary feedback
  – We request any comments be submitted by April 22, 2013

• Deterministic Risk Analysis
  – The Company does not intend to complete a deterministic risk analysis for the 2013 IRP
    • Similarities among top performing portfolios
    • Varying topology among portfolios (EG1 vs. EG2)

• Decrement Study
  – Current modeling focus is on Confidential Volume 3 and other sensitivities
  – We are initiating analysis required to report decrement values for DSM resources
  – We will target completing the analysis with the April 30, 2013 filing
  – If the analysis is not completed, we will make file an IRP Supplement