Energy Planning & Trading
2017 Q2

• Portfolio Overview (Gregg Carrington)

• Operations and Planning (Janet Jaspers)
  – Snowpack, Streamflow and Pricing update
  – Net Wholesale Revenue Forecast update

• Market Update (Janet Jaspers)

• Energy Efficiency Update (Andrew Grassell)
Key Message Points

• The District’s 2017 Net Wholesale Revenue and other energy related revenue forecast ($124.2 Million) is slightly higher than the budget amount for 2017 ($121.9 Million).

• Specified Source energy sales contributed $3.8 Million to the Net Wholesale Revenue which is $700,000 higher than budget.

• Energy Efficiency programs have met the compliance target, stretch goals are still behind but actions have been taken.
District’s Load/Resource Balance (average MW)

Generation Use (aMW)

- 2018:
  - 38 Remaining Surplus
  - 555 Block Market Based Contracts
  - 555 Market Based Slice
  - 202 Long-term Cost Plus Contracts
  - 194 Canadian Entitlement
  - 194 Local Load

- 2019:
  - 35 Remaining Surplus
  - 555 Block Market Based Contracts
  - 555 Market Based Slice
  - 202 Long-term Cost Plus Contracts
  - 198 Canadian Entitlement
  - 198 Local Load

- 2020:
  - 31 Remaining Surplus
  - 552 Block Market Based Contracts
  - 552 Market Based Slice
  - 202 Long-term Cost Plus Contracts
  - 202 Canadian Entitlement
  - 202 Local Load

- 2021:
  - 46 Remaining Surplus
  - 58 Block Market Based Contracts
  - 58 Market Based Slice
  - 207 Long-term Cost Plus Contracts
  - 206 Canadian Entitlement
  - 206 Local Load

- 2022:
  - 95 Remaining Surplus
  - 57 Block Market Based Contracts
  - 57 Market Based Slice
  - 155 Long-term Cost Plus Contracts
  - 155 Canadian Entitlement
  - 155 Local Load

Hedge Max
Hedge Min
### Current Market Position - Market Based Slice Products

<table>
<thead>
<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
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<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
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<tbody>
<tr>
<td>Long Term Slice</td>
<td>Avista</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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<td>Slice Product 14</td>
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</table>
Recent slice transactions have reduced wholesale revenue uncertainty

Net Wholesale Revenue Projections

*with and without recently executed slice contracts*

<table>
<thead>
<tr>
<th>Years</th>
<th>NWR including recent slice contracts</th>
<th>NWR not including recent slice contracts</th>
</tr>
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<tbody>
<tr>
<td>2017</td>
<td>$111</td>
<td>$111</td>
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<tr>
<td>2018</td>
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<td>2019</td>
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<td>2020</td>
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<td>2021</td>
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<td>2022</td>
<td>$117</td>
<td>$59</td>
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<tr>
<td>2023</td>
<td>$142</td>
<td>$33</td>
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 Millions

$0 $20 $40 $60 $80 $100 $120 $140 $160 $180


www.chelanpud.org
Recent slice transaction terms and results

**Avista Corporation Contract Terms:**
Contract Term: 1/1/2021 to 12/31/2030, 10 years
Product: 5% Rocky Reach/5% Rock Island Slice

**Avangrid Renewables LLC Contract Terms:**
Contract Term: 1/1/2019 to 12/31/2023, 5 years
Product: 5% Rocky Reach/5% Rock Island Output

**Overall Expected Net Wholesale Revenue Projection increase associated with these two slices:**
+$40.7 Million for the period 2019-2030
## Columbia River Flow Update for 2017

<table>
<thead>
<tr>
<th></th>
<th>Rocky Reach Flow (kcfs)</th>
<th>Budget Rocky Reach Flow (kcfs)</th>
<th>% of Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>128</td>
<td>115</td>
<td>111%</td>
</tr>
<tr>
<td>Feb</td>
<td>119</td>
<td>110</td>
<td>108%</td>
</tr>
<tr>
<td>Mar</td>
<td>158</td>
<td>102</td>
<td>155%</td>
</tr>
<tr>
<td>Apr</td>
<td>207</td>
<td>114</td>
<td>182%</td>
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<tr>
<td>May</td>
<td>236</td>
<td>147</td>
<td>161%</td>
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<tr>
<td>Jun</td>
<td>209</td>
<td>167</td>
<td>125%</td>
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<tr>
<td>Jul</td>
<td></td>
<td>131</td>
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<td>Aug</td>
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<td>Sep</td>
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<td>Oct</td>
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<td>Nov</td>
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<td>92</td>
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<tr>
<td>Dec</td>
<td></td>
<td>108</td>
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<tr>
<td>YTD Average</td>
<td>176</td>
<td>126</td>
<td>140%</td>
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</tbody>
</table>

*Budgeted Rocky Reach flow is the median year from the 1929-2011 data set*
Water Supply Forecast

COLUMBIA - GRAND COULEE DAM
Period APR to JUL -- Water Year 2017

Water Supply Forecasts

30yr Normal
ESP10

COLUMBIA - GRAND COULEE DAM (GCDW1)
Forecasts for Water Year 2017

Official Forecast

10 days QPF: Ensemble: 2017-07-24 Issued: 2017-07-24

<table>
<thead>
<tr>
<th>Forecast Period</th>
<th>90 %</th>
<th>50 %</th>
<th>% Average</th>
<th>10 %</th>
<th>30 Year Average (1981-2010)</th>
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<tr>
<td>APR-SEP</td>
<td>68288</td>
<td>68865</td>
<td>115</td>
<td>70330</td>
<td>60110</td>
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<td>APR-JUL</td>
<td>60963</td>
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<td>APR-AUG</td>
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<td>116</td>
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<tr>
<td>JAN-SEP</td>
<td>82177</td>
<td>82754</td>
<td>120</td>
<td>84219</td>
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<td>JAN-JUL</td>
<td>74852</td>
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<td>126</td>
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<td>59599</td>
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<td>OCT-SEP</td>
<td>96544</td>
<td>97121</td>
<td>126</td>
<td>98587</td>
<td>76824</td>
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</tbody>
</table>

Most Recent Forecast for ESP10: Issued Date 07/24/2017
Plot Created 07/24/2017 03:59 PDT

30yr Normal -- 51.0 MAF
NOAA Aug-Oct Climate Forecast
Canadian Jul-Sep Forecasts

Temperature and Precipitation Deterministic Forecasts

Red = Above (wetter)
Blue = Below (drier)

Red = Above (warmer)
Blue = Below (colder)
Aug 2017 Henry Hub natural gas contract

4/12/17: $3.36
7/25/17: $2.94
Aug 2017 Henry Hub natural gas contract
Mid-C Flat Annual Wholesale Electricity Prices

Red = Historical prices
Blue = Forward price curve
MIDC Flat Forward Price Curve
(ICE DA index prices for previous months)
<table>
<thead>
<tr>
<th>2017 NWR and Other Energy-Related Revenue</th>
<th>Budget</th>
<th>Forecast**</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Wholesale Revenue*</td>
<td>$114,138,098</td>
<td>$115,530,474</td>
<td>$1,392,377</td>
</tr>
<tr>
<td>Specified Source</td>
<td>$3,091,960</td>
<td>$3,823,680</td>
<td>$731,720</td>
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<tr>
<td>Other</td>
<td>$615,896</td>
<td>$629,668</td>
<td>$13,772</td>
</tr>
<tr>
<td>Alcoa PSC Revenue</td>
<td>-</td>
<td>$1,796,135</td>
<td>$1,796,135</td>
</tr>
<tr>
<td>Frequency Response</td>
<td>$282,750</td>
<td>$282,750</td>
<td>-</td>
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<tr>
<td>Renewables</td>
<td>$458,090</td>
<td>$436,884</td>
<td>$(21,206)</td>
</tr>
<tr>
<td>Real-Time Revenue</td>
<td>$7,000,000</td>
<td>$7,941,641</td>
<td>$941,641</td>
</tr>
<tr>
<td><strong>NWR and Other Energy-Related Revenue</strong></td>
<td>$121,878,938</td>
<td>$124,191,749</td>
<td>$2,312,812</td>
</tr>
</tbody>
</table>

*Net Wholesale Revenue (NWR) includes all premiums from specified source and other premium products as well as slice sales and standard forward / pre-schedule energy trading activity. Alcoa PSC surplus proceeds are also included in the NWR forecast. Other premium products include hubbing, system delivery, scheduling services, Lake Chelan reserves and super peak products.

**2017 forecast based on Jan-Jun unaudited actuals and Jul-Dec estimates.
Net Wholesale Revenue Forecast

Blue dashed line: NWR forecast using 11/22/16 ICE prices ‘17-’21 and E3 View for ’22-’27

Black solid line: NWR forecast using ICE prices for ’17-’27

Filled squares= prob. model
White squares= det. model

Q1 2017 update
Q2 2016 update
Q3 2016 update
Q4 2016 update

NWR Forecast (7/7/17)
NWR Forecast (2017 Budget)
### Hydro One to Acquire Avista for $5.3 Billion
- The price represents $53/share, a 24% premium over the July 18 closing price.
- Hydro One is the largest electricity transmission and distribution company in Ontario, Canada.
- Avista will retain its headquarters and management staff.
- Avista will operate with a 9 member board of directors made up of 5 designated by Hydro One and 4 by Avista.
- Deal Pending approval – expected in 2018.

### Buffet’s BHE to buy EFH and Oncor for $9B
- Berkshire Hathaway Energy said it has an agreement to buy Energy Future Holdings and its Texas transmission subsidiary, Oncor Electric Delivery, for an estimated $9 billion.
- BHE owns ten separately managed businesses, including the utilities PacifiCorp and NV Energy, the Canadian regulated electricity transmission company AltaLink.

### BPA rate changes
- BPA is planning a 175% rate hike for hourly service on major transmission lines that export power to California.
- Overall, BPA is planning to increase its wholesale power rates by 5.5%, up from an initial 3.5% proposed hike, according to the draft rate case decision released last week.
- The pending jump in power rates for BPA’s customers is driven by decreasing customer loads and lower market price forecasts for the sales of excess generation, the federal power marketer said.
Q2 Energy Efficiency Results

Two-Year Compliance Target 1.66 aMW-this was met in 2016
Annual 2017 Stretch Target is 2.1 aMW

<table>
<thead>
<tr>
<th>Year-to-Date Energy Savings (aMW)¹</th>
<th>Incentive and Labor Cost</th>
<th>$/MWh over Life</th>
<th>Estimated Value over Life²</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.52</td>
<td>$ 1,200,000</td>
<td>$ 17.56</td>
<td>$ 1,555,662</td>
</tr>
</tbody>
</table>

1. Pending metering and verification and based on expected NEEA savings
2. Based on weighted average life and 7% discount
Other items of interest

• LED Streetlight
  – Received additional State Commerce grant
  – Almost ready for Transportation Improvement Board request

• Enhancing customer experience
  – Mobile rebate application capabilities
  – Upload receipts, information, etc.
Summary

• The District’s 2017 Net Wholesale Revenue and other energy related revenue forecast is higher than the budget amount for 2017 by $2.3 Million.

• Specified Source energy sales contributed $3.8 Million to the Net Wholesale Revenue which is $700,000 higher than budget.

• Energy Efficiency programs have met the ~1.7 aMW 2016/2017 compliance goal. Year-to-date savings are behind pace to meet 2017 stretch goal. Actions are being implemented to change this.
Questions?