Ketchikan Public Utilities

Load Forecasting

Whitman Dam
KPU Electric

- Serves Ketchikan (City and Borough), approximately 13,000 people

- 7,600 Customer Accounts/Meters
  - 5,000 Residential
  - Large customers – Alaska Ship and Drydock, Coast Guard, fish processors, School District, Navy

- Generation:
  - 12 MW KPU Hydro, 26 MW KPU Diesel
  - 40% self-generated, 60% purchased from SEAPA
  - 170 million kWh annually, 31 mW peak
The 2009 – 2010 Situation

- KPU was beginning to hear discussion of significant commercial and industrial development to come on-line

- “Plug and Play”

- Anecdotal reports of heating conversions over recent years but no knowledge of “how many” or the impact

- KPU did not have a handle on measuring or forecasting load growth to plan for supply needs or address infrastructure upgrades
KPU’s Load Forecasting

• Track and trend Ketchikan daily consumption in kilowatt-hours vs. heating degree day

• Inventory/track “identified” large, new commercial and industrial load
KPU’s 5 Year Load Growth
(no temperature correction)

Slope: 23.8 kWh/day
Area: 1.6 million kWh/year (Lower Limit)
Average Daily Temperature @ Ketchikan Airport

<table>
<thead>
<tr>
<th>Year</th>
<th>Temp. (°F)</th>
<th>Diff from Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>43.7</td>
<td>-1.8</td>
</tr>
<tr>
<td>2007</td>
<td>44.2</td>
<td>-1.4</td>
</tr>
<tr>
<td>2008</td>
<td>43.9</td>
<td>-1.7</td>
</tr>
<tr>
<td>2009</td>
<td>44.2</td>
<td>-1.3</td>
</tr>
<tr>
<td>2010</td>
<td>46.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

51 Year Average Temp: 45.5 Deg. F
KPU’s 5 Year Load Growth
(no temperature correction)
Heating Degree Day (HDD)

✓ The number of degrees that a day's average temperature is below 65º Fahrenheit (18º Celsius), the temperature below which buildings need to be heated.

✓ HDD is a measurement designed to reflect the demand for energy needed to heat a home or business.

✓ If the temperature averaged 45 degrees F across the 24 hour period, the HDD would be 20.
  
  \[(65-45 = 20)\]

✓ www.degreedays.net
KPU’s 5 Year Load Growth
(temperature correction, HDD=35)

Slope: 48.2 kWh/day
Area: 3.2 million kWh/year (Upper Limit)
HDD Slopes

![Graph showing HDD slopes with a line indicating HDD = 35 = 30 Deg F]
KPU’s 5 Year Load Growth
(no temperature correction)

Fish Processing “W”
# Inventory

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>SERVICE CAPACITY</th>
<th>FEEDER</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>KGB Pool (in addition to Rec Center)</td>
<td>1000</td>
<td>Ketchikan 3</td>
<td>Construction</td>
</tr>
<tr>
<td>KGB Whitman Booster Station</td>
<td>100</td>
<td>Mtn Pt 2 South</td>
<td>Complete</td>
</tr>
<tr>
<td>KIC A&amp;T Facility</td>
<td>100</td>
<td>Ketchikan 2</td>
<td>Complete</td>
</tr>
<tr>
<td>Northland - Tongass Ave</td>
<td>225</td>
<td>Bethe 2 Tongass</td>
<td>Construction</td>
</tr>
<tr>
<td>Pioneer Heights</td>
<td>300</td>
<td>Ward Cove 1 South</td>
<td>Construction</td>
</tr>
<tr>
<td>Saxman Elder Housing</td>
<td>300</td>
<td>Mtn Pt 1 North</td>
<td>Construction</td>
</tr>
<tr>
<td>OceansAlaska (Phase I)</td>
<td>No Data Yet*</td>
<td>Mtn Pt 2 South</td>
<td>Construction</td>
</tr>
<tr>
<td>AP&amp;T Warehouse</td>
<td>No Data Yet*</td>
<td>Ward Cove 1 South</td>
<td>Construction</td>
</tr>
<tr>
<td>Ketchikan Mechanical Warehouse</td>
<td>200</td>
<td>Ketchikan 3</td>
<td>Construction</td>
</tr>
<tr>
<td>Marble Construction</td>
<td>300</td>
<td>Ward Cove 2 North</td>
<td>Design</td>
</tr>
<tr>
<td>USCQ Barracks</td>
<td>120</td>
<td>Ketchikan 4</td>
<td>Design</td>
</tr>
</tbody>
</table>

Yellow reflects completed service connections.
2011-2012

2,645 kVA * 24 hours/day * 365 days * 25% = 5.8 million kWh

2012-2013

9,195 kVA * 24 hours/day * 365 days * 25% = 20.1 million kWh

Alaska Ship & Drydock

3.0 million kWh

28.9 million kWh

Assumptions:
• kVA approximates kW
• Load Factor = 25%
Questions?