RESOURCE PLANNING CONSIDERATIONS

- Customer Resources
- New Generation Options
- Regulations
- Existing Generation Resources
- Stakeholder Engagement
- Load Forecast
- Cost Projections

Affordability, Dependability, and Sustainability – Over the Long-Term
Peak Demand Forecast

![Graph showing the increase in total load requirements, EE/DE impact, and net load requirements from 2012 to 2027.](image)
# Sources of Power

<table>
<thead>
<tr>
<th>Nuclear</th>
<th>Coal</th>
<th>Natural Gas</th>
<th>Energy Efficiency</th>
<th>Wind</th>
<th>Solar</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reliable</td>
<td>• Abundant</td>
<td>• Abundant</td>
<td>• Most economic resource available today</td>
<td>• Requires backup sources of power</td>
<td>• Abundant in AZ</td>
</tr>
<tr>
<td>• No air emissions</td>
<td>• Reliable</td>
<td>• Reliable</td>
<td>• Dependent on customer adoption</td>
<td>• No emissions</td>
<td>• Requires backup sources of power</td>
</tr>
<tr>
<td>• Large water user</td>
<td>• Inexpensive to operate</td>
<td>• Limited emissions</td>
<td>• Future costs uncertain</td>
<td>• No fuel costs but high cost to build</td>
<td>• No emissions</td>
</tr>
<tr>
<td>• Spent fuel storage issues</td>
<td>• Higher emissions</td>
<td>• Inexpensive to build and operate</td>
<td></td>
<td>• Remote resource</td>
<td>• No fuel costs but high cost to build</td>
</tr>
<tr>
<td>• High construction costs</td>
<td>• Environmental compliance costs</td>
<td>• Variable fuel prices</td>
<td></td>
<td>• Shorter construction time</td>
<td>• Shorter construction time</td>
</tr>
</tbody>
</table>
Capacity Utilization at Peak

- Conventional generators allow APS to follow load or bring on generation at time of peak
- Renewable resources are “must take” and do not correlate perfectly to when APS customers use the most energy

*Capacity Utilization is a measure of the unit’s output at hourly intervals compared to its maximum capable output, and does not represent a resource stack.*
2012 IRP Analytics

Inputs and Sensitivities
- Natural Gas Prices
- CO₂ Costs
- EE Costs
- Load Forecast
- Externalities
- Tax Credits
- Technology Costs

Portfolios
- Base Case (2012 Resource Plan)
- Four Corners Contingency
- Enhanced Renewable
- Coal Retirement

Key Metrics
- Fuel Diversity
- Revenue Requirements
- Capital Expenditures
- Natural Gas Burn
- Water Use
- Emissions
Composition of Portfolios

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<tr>
<th>Description</th>
<th>Base Case (2012 Resource Plan)</th>
<th>Four Corners Contingency</th>
<th>Enhanced Renewable</th>
<th>Coal Retirement</th>
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<tr>
<td>Description</td>
<td>Plan includes APS closing Four Corners units 1-3 and purchasing SCE’s share of units 4-5; continues the current trajectory of EE and RE compliance</td>
<td>Contingency plan depicting the retirement of the Four Corners coal-fired plant; energy replaced by additional natural gas resources</td>
<td>Assumes 30% (after EE/DE) of energy needs met by renewable resources; includes the consummation of the Four Corners transaction</td>
<td>Assumes APS retires all coal-fired generation; energy replaced with a combination of natural gas and renewable resources</td>
</tr>
</tbody>
</table>

*Measured as a percentage of total resources, not retail sales which is used for energy efficiency and renewable energy calculations.
## Comparative Analysis:
Differences from Base Case Portfolio in 2027

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### Delta from Base Case

<table>
<thead>
<tr>
<th>Description</th>
<th>Cumulative CapEx ($M)</th>
<th>NPV Rev. Req. ($M)</th>
<th>Gas Burn (BCF)</th>
<th>CO₂ (MM Metric Tons)</th>
<th>Water (000 Acre-Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>$8,726</td>
<td>$26,917</td>
<td>99</td>
<td>17</td>
<td>59</td>
</tr>
<tr>
<td>Four Corners Contingency</td>
<td>$990</td>
<td>$388</td>
<td>48</td>
<td>(3)</td>
<td>(8)</td>
</tr>
<tr>
<td>Enhanced Renewable</td>
<td>$3,914</td>
<td>$636</td>
<td>(18)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>Coal Retirement</td>
<td>$4,543</td>
<td>$981</td>
<td>76</td>
<td>(8)</td>
<td>(23)</td>
</tr>
</tbody>
</table>
Sources of Energy Growth

• APS already has plans in place to meet near-term needs
  – In the near term, renewable energy and energy efficiency additions meet APS resource needs

• Several options exist for future resource decisions
  – In the longer term, renewable energy and natural gas will play key roles
  – Renewable energy additions will help mitigate natural gas price uncertainty
  – New technology, such as new nuclear, will continue to be monitored
www.aps.com/resources
Technology Cost Screen

Forecasted costs in 2015 dollars, including Allowance for Funds Used During Construction (AFUDC)

- **$7,000**: Installed Cost $/kW
- **$5,000**: Installed Cost $/kW
- **$160**: Delivered (Levelized)
- **$3,000** - **$4,000**: Energy Efficiency Gas Solar PV (SAT) Wind Coal Nuclear

<table>
<thead>
<tr>
<th>Technology</th>
<th>Installed Cost $/kW</th>
<th>Delivered (Levelized) $/kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficiency</td>
<td>$7,000</td>
<td>$0</td>
</tr>
<tr>
<td>Gas</td>
<td>$5,000</td>
<td>$160</td>
</tr>
<tr>
<td>Solar PV (SAT)</td>
<td>$1,000</td>
<td>$80</td>
</tr>
<tr>
<td>Wind</td>
<td>$1,000</td>
<td>$40</td>
</tr>
<tr>
<td>Coal</td>
<td>$1,000</td>
<td>$120</td>
</tr>
<tr>
<td>Nuclear</td>
<td>$6,000</td>
<td>$160</td>
</tr>
</tbody>
</table>

- **% Peak Availability**
  - Energy Efficiency: 100%
  - Gas: 100%
  - Solar PV (SAT): 70%
  - Wind: 20%
  - Coal: 100%
  - Nuclear: 100%

- **Transmission & Losses**
  - Energy Efficiency: $0
  - Gas: $0
  - Solar PV: $0
  - Wind: $0
  - Coal: $0
  - Nuclear: $0

- **Integration**
  - Energy Efficiency: $0
  - Gas: $0
  - Solar PV: $0
  - Wind: $0
  - Coal: $0
  - Nuclear: $0

- **Emissions**
  - Energy Efficiency: $0
  - Gas: $0
  - Solar PV: $0
  - Wind: $0
  - Coal: $0
  - Nuclear: $0
Technology Cost Uncertainty

Note: Prepared in response to Commissioner Burns letter dated Aug. 17, 2012