• Serves 11 of 15 counties in Arizona - 35,000 sq. mi.
• About 1.1 million customers
• 400 substations
• 34,000 line miles
• 54 generation units
• 2009 Peak Load 7,200 MWs
• 2009 Est. Energy 32,600 GWHs
PROJECTED ENERGY MIX 2009

38% Coal
31% Natural Gas
27% Nuclear
2% Renewable
2% New EE
# APS RENEWABLE GENERATION

## Current Portfolio

Current Capacity Contracted -> 500 megawatts (MW) – enough for over 125,000 homes

<table>
<thead>
<tr>
<th>Projects Online</th>
<th>Capacity</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aragonne Mesa</td>
<td>90 MW</td>
<td>Wind</td>
<td>In operation</td>
</tr>
<tr>
<td>2. Salton Sea</td>
<td>10 MW</td>
<td>Geotherm</td>
<td>In operation</td>
</tr>
<tr>
<td>3. Prescott Airport</td>
<td>3.5 MW</td>
<td>Solar</td>
<td>In operation</td>
</tr>
<tr>
<td>4. STAR Center</td>
<td>2.0 MW</td>
<td>Solar</td>
<td>In operation</td>
</tr>
<tr>
<td>(and other AZ sites)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Saguaro</td>
<td>1 MW</td>
<td>CSP</td>
<td>In operation</td>
</tr>
<tr>
<td>6. City of Glendale Landfill</td>
<td>3 MW</td>
<td>Biogas</td>
<td>In construction</td>
</tr>
<tr>
<td>7. Snowflake White Mt.</td>
<td>15 MW</td>
<td>Biomass</td>
<td>In operation</td>
</tr>
<tr>
<td>8. Solana</td>
<td>280 MW</td>
<td>CSP</td>
<td>Under development</td>
</tr>
<tr>
<td>9. High Lonesome</td>
<td>100 MW</td>
<td>Wind</td>
<td>In operation</td>
</tr>
</tbody>
</table>

Current Capacity Contracted - > 500 megawatts (MW) – enough for over 125,000 homes
APS RENEWABLE GENERATION – WIND

**Aragonne Mesa**
- 90 MW wind
- Began operation Dec 2006
- Long term contract
- 40 miles SW of Santa Rosa, NM

**High Lonesome**
- 100 MW wind
- Began operation July 2009
- Long term contract
- 55 miles SE of Albuquerque, NM
Snowflake White Mountain Power

- 24 MW biomass near Snowflake, AZ
- Began operation April 2008
- Long term contract
Solana Generating Station

- Concentrating Solar Power (CSP)
- Thermal energy storage ensures solar production at peak demand
- 2,700 parabolic trough collectors covering 3 square miles
- 280 megawatts – enough for 70,000 homes
- Abengoa Solar will own and operate
- Largest solar plant in the world if operating today
What type of energy infrastructure will be needed to power Arizona in 2025?

Consider that:

- APS customers will grow from 1.1 million today to 1.7 million in 2025
- Peak customer electric demand will grow from 7,300 MW today to 11,400 MW in 2025
- Key fuel and construction commodity prices remain volatile
- Climate legislation may add millions of dollars to customer costs and affect resource options
CUSTOMER NEEDS IN 2025
Growing Resource Needs

Capacity Needs - Summer Requirement

(MWs)

Resource Need
Existing Resources

CUSTOMER NEEDS IN 2025

Peak Load Day Comparison (MWs)

2025 Peak Capacity Required: 11,400 megawatts

Projected Growth of Peak Capacity Needs

Projected Growth of Baseband Capacity Needs
**APS RESOURCE PLAN**

**Renewables**
- Rapidly accelerates adoption of renewables
- 1,650+ MW
- Doubles the RES by 2015
- 50% more energy than required by the RES through 2025

**Energy Efficiency**
- Seizes opportunity to partner with customers on energy future
- 587 MW of energy offset
- 3,100 GWHs
- Substantial increase in annual customer incentives

**Nuclear**
- Carbon emission free baseload resource
- 800 MW of 2022-23 capacity
- 6,400 GWHs/year

**Gas Combined Cycle**
- Limit natural gas consumption to within 10% of 2009 level
- Realigns resources more towards peaking role
- 3,500 MW (about 70% replacing expiring contracts)
- Wholesale market or demand response opportunities

**Gas Combustion Turbine**

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*Exceeding the RES*

*Increased Energy Efficiency*

*Managing CO2 Emission*

*Replacing Expiring Contract Capacity*
PROJECTED ENERGY MIX 2025

32% Nuclear
24% Coal
21% Natural Gas
16% Renewable
7% New EE
Considerations for Renewable Deployment

- Arizona – Renewable Energy Landscape:
  - Wind – available but lower quality and distant from load center
  - Biomass – limited due to arid climate
  - Geothermal – Salton Sea, must compete with California
  - Solar – some of the best conditions in the world

- Considerations for Renewable Deployment:
  - What provides the best value for our customers?
  - Consider factors such as:
    - Cost of renewable energy
    - Energy production pattern (seasonal, time-of-day)
    - Contribution to meeting peak loads
    - Distance from load center (transmission cost)
    - System integration cost
Solar Resources – Value Considerations

Typical July Day
(7/16/2018)

- System Load
- Fixed PV
- PV One Axis Tracker
- Parabolic Trough – 6 hrs storage
FOLLOW-UP QUESTIONS?

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