Agenda

• Resource Planning Overview
  – Considerations
  – Outlook
  – Sources of generation and associated tradeoffs

• 2012 IRP Filing
  – Inputs and assumptions
  – Core analytics
  – 2012 Resource Plan characteristics
  – Action Plan
  – Filing components

• Open Discussion
Resource Planning Considerations

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

Integrated Resource Plan

Affordability, Dependability, and Sustainability – Over the Long-Term
Resource Planning Outlook

- 2011 Load Forecast (Inc Reserves)
- 2007 Load Forecast (inc Reserves)

- Existing Owned Resources
  Includes Four Corners Transaction

- Existing Purchase Contracts

- New Resources

- EE and DE
Near-term Capacity Position

- **APS Power Plants and PPAs**
- **Future Renewable Resources**
- **Customer Resources (EE, DE, DR)**
- **Call Options**
- **2011 Load Requirements (Minimum Reserves and Current Load Growth)**

[Bar chart showing capacity over years with labels for each category]
Sources of Generation

Conventional Generation

1. WEST PHOENIX
   Natural Gas
   998 MW

2. OCOTILLO
   Natural Gas
   320 MW

3. NGS
   Coal
   315 MW

4. FOUR CORNERS
   Coal
   791 MW

5. CHOLLA
   Coal
   647 MW

6. PALO VERDE
   Nuclear
   1,146 MW

7. REDHAWK
   Natural Gas
   1,000 MW

8. YUCCA
   Natural Gas
   233 MW

9. SAGUARO
   Natural Gas
   386 MW

10. DOUGLAS
    Oil
    15 MW

Renewable Generation

1. SMALL-SCALE SOLAR
   (Statewide)
   6 MW

2. PERRIN RANCH
   Wind
   99 MW

3. SUNEDISON
   PRESCOTT
   Photovoltaic Solar
   10 MW
   Photo: courtesy SunEdison

4. GLENDALE LANDFILL
   Biogas
   2.8 MW

5. ARAGONNE MESA
   Wind
   90 MW

6. HIGH LONESOME
   Wind
   100 MW

7. RE AJIO 1
   Photovoltaic Solar
   4.5 MW

8. HYDER
   Photovoltaic Solar
   16 MW
   Photo: courtesy SunEdison

9. SNOWFLAKE
   Biomass
   14.5 MW

10. COTTON CENTER
    Photovoltaic Solar
    17 MW

11. PALOMA
    Photovoltaic Solar
    17 MW

12. SALTON SEA
    Geothermal
    10 MW

Photo: courtesy SunEdison
Resource Planning Horizon

- Technology Decisions
- Natural Gas
- Renewable Energy
- Energy Efficiency

- Technology Decisions

- 0 - 3 Years Ago
- 0 - 3 Years in Future
- 4 - 15 Years in Future

TODAY
# 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</td>
<td>• Requires backup sources</td>
<td>• Abundant in AZ</td>
</tr>
<tr>
<td>• No air emissions</td>
<td>• Reliable</td>
<td>• Reliable</td>
<td>resource available today</td>
<td>of power</td>
<td>• Requires backup sources</td>
</tr>
<tr>
<td>• Large water user</td>
<td>• Inexpensive</td>
<td>• Limited</td>
<td>• Dependent on customer adoption</td>
<td>of power</td>
<td>• No emissions</td>
</tr>
<tr>
<td>• Spent fuel storage issues</td>
<td>to operate</td>
<td>emissions</td>
<td>• No fuel costs but high cost to build</td>
<td></td>
<td>• No emissions</td>
</tr>
<tr>
<td>• High construction costs</td>
<td>• Higher emissions</td>
<td>• Inexpensive to build and operate</td>
<td>• Future costs uncertain</td>
<td></td>
<td>• No fuel costs but high cost to build</td>
</tr>
<tr>
<td></td>
<td>• Environmental compliance costs</td>
<td>• Variable fuel prices</td>
<td></td>
<td></td>
<td>• Remote resource</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Shorter construction time</td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>
Future Technology Cost Comparison
Relative value based on a generic resource need

Values depicted are in 2015 dollars, including Allowance for Funds Used During Construction (AFUDC)
Resource Planning & Procurement Rules

Purpose
- Establish framework and process for dialogue regarding the need for new energy resources and associated risks
- Provide for Commission acknowledgement of utility resource plan

Requirement
- File 15-year resource plan by April 1st of every even year
- Staff report by October 1st of the filing year
- Commissioners to rule by February 1st of the odd year

Evaluation Criteria
- Resource diversity
- Reliability
- Flexibility
- Cost-effectiveness
- Assessment of environmental impacts
- Consider broad spectrum of risks
- In best interests of customers
CORE ANALYTICS
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
Analytic Framework

**Portfolios**

The term “resource portfolio” refers to the entire set of resources over the planning time frame designed to meet customers’ demand for electric energy. It includes the existing generation fleet and power contracts as well as potential future conventional, renewable, and energy efficiency measures.

**Sensitivities**

Sensitivity analysis refers to a series of single-variable sensitivities designed to test the robustness of each portfolio. This testing illustrates how the portfolio costs move comparatively with these relatively uncertain variables, and also provides an indication of whether or not the portfolios have any dispatch discretion between resources affected by those variables.

**Scenarios**

Scenario analysis refers to the grouping together of a set of sensitivity assumptions that would all likely occur in tandem. The goal of scenario analysis is to illustrate the impact to the portfolios of multiple sensitivities being stressed in a plausible manner.
Major Assumptions

- **Load forecast**
  - Average annual growth rate of 3% per year, or 55% cumulative over the planning horizon

- **Reserve requirements**
  - All portfolios maintain at least 15% reserve margin

- **Inflation**
  - Assumed future inflation rate of 2.5% per year

- **Compliance with standards**
  - All portfolios either meet or exceed compliance with RES and EE Standard

- **Cost curves**
  - Natural gas cost curve based on forward market prices as of the end of Q3-2011
  - Carbon cost curve based on guidance from Charles River Associates

- **APS financial assumption**
  - After-tax WACC of 7.95%
Gas Curves

Natural Gas Price Sensitivities

$/mmBTU Delivered


Base Curve
Historical Fossil Fuel Prices

Source: EIA Monthly Energy Review

Cost of Natural Gas Delivered to Electric Generating Plants
Cost of Coal Delivered to Electric Generating Plants
CO$_2$ Curves

See “Greenhouse Gas Legislative Review and CO2 Price Outlook”, Charles River Associates, at Appendix A
Composition of Portfolios

**Base Case (2012 Resource Plan)**
- 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.

**Four Corners Contingency**
- Contingency plan depicting the retirement of the Four Corners coal-fired plant; energy replaced by additional natural gas resources.

**Enhanced Renewable**
- Assumes 30% (after EE/DE) of energy needs met by renewable resources; includes the consummation of the Four Corners transaction.

**Coal Retirement**
- Assumes APS retires all coal-fired generation; energy replaced with a combination of natural gas and renewable resources.

**2012 Energy Mix**
- **Base Case**: 29% Nuclear, 14% Coal, 4% Natural Gas, 12% RE, 46% EE.
- **Four Corners Contingency**: 26% Nuclear, 13% Coal, 40% Natural Gas, 19% RE, 22% EE.
- **Enhanced Renewable**: 19% Nuclear, 19% Coal, 23% Natural Gas, 20% RE, 21% EE.
- **Coal Retirement**: 19% Nuclear, 19% Coal, 19% Natural Gas, 19% RE, 5% EE.

**2027 Energy Mix**
- **Base Case**: 5% Nuclear, 15% Coal, 26% Natural Gas, 19% RE, 19% EE.
- **Four Corners Contingency**: 26% Nuclear, 14% Coal, 40% Natural Gas, 15% RE, 23% EE.
- **Enhanced Renewable**: 19% Nuclear, 19% Coal, 22% Natural Gas, 19% RE, 21% EE.
- **Coal Retirement**: 19% Nuclear, 19% Coal, 19% Natural Gas, 19% RE, 5% EE.

*Measured as a percentage of total resources, not retail sales which is used for energy efficiency and renewable energy calculations*
Resource Additions & Timing

- RE & EE program trajectories eliminate need for other resources through 2015 regardless of portfolio
- Natural gas and renewable energy expanded through planning period
Comparative Analysis: Differences from Base Case Portfolio in 2027

- **Base Case Portfolio** represents the least cost resource plan.
- Each portfolio provides distinct tradeoffs between cost and other key metrics.

### Metric | Base Case Value
--- | ---
Revenue Requirement (NPV 2012-2027) | $26,917 million
Capital Expenditures (cumulative) | $8,726 million
Gas Burn (2027) | 99 billion cubic feet
CO₂ Emissions (2027) | 17 MM metric tons
Water Use (2027) | 59,000 acre-feet
Sensitivity Analytics

Revenue Requirement Range
NPV 2012-2027

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Base Case</th>
<th>Four Corners</th>
<th>Enhanced Renewable</th>
<th>Coal Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Requirements</td>
<td>7.0%</td>
<td>11.8%</td>
<td>5.9%</td>
<td>12.2%</td>
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<tr>
<td>Natural Gas Burn (2027)</td>
<td>52.3%</td>
<td>23.7%</td>
<td>55.4%</td>
<td>0.1%</td>
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<tr>
<td>CO₂ Emissions (2027)</td>
<td>27.4%</td>
<td>23.3%</td>
<td>27.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Water Use (2027)</td>
<td>19.0%</td>
<td>19.6%</td>
<td>16.4%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

Variability from Base Assumptions due to Sensitivity Analyses

Natural Gas Burn Range - 2027

BCF

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Base Case</th>
<th>Four Corners</th>
<th>Enhanced Renewable</th>
<th>Coal Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas Burn (2027)</td>
<td>155.6 BCF</td>
<td>146.7 BCF</td>
<td>160.2 BCF</td>
<td>150.1 BCF</td>
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Scenario Analytics

Revenue Requirement Range

Scenario Results: NPV 2012-2027

- Base Assumptions

<table>
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<tr>
<th>$ Millions</th>
<th>Revenue Requirement Range</th>
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<tr>
<td>$22,000</td>
<td>Base Case</td>
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<tr>
<td>$23,000</td>
<td>Four Corners Contingency</td>
</tr>
<tr>
<td>$24,000</td>
<td>Enhanced Renewable</td>
</tr>
<tr>
<td>$25,000</td>
<td>Coal Retirement</td>
</tr>
</tbody>
</table>

- **Low Cost Scenario**
  - Low natural gas, CO₂, and EE cost curves, plus extension of ITC/PTC

- **High Cost Scenario**
  - High natural gas, CO₂, and EE cost curves
Environmental Intensity

**CO₂ Emissions**
- 26% reduction in rate of emission

**Water Usage**
- 27% reduction in rate of consumption

- Total CO₂ Emissions (Metric Tons)
- CO₂ Emission Rate (Metric Ton/MWh)
- Water Usage
- Water Rate (Gallons/MWh)
Composition of Energy Mix by Resource (GWh)

Nuclear | Coal | Natural Gas | Renewable | Energy Efficiency

2012:
- Nuclear: 9,300 GWh
- Coal: 12,300 GWh
- Natural Gas: 7,700 GWh
- Renewable: 1,600 GWh
- Energy Efficiency: 1,500 GWh

2027:
- Nuclear: 9,300 GWh
- Coal: 12,900 GWh
- Natural Gas: 13,100 GWh
- Renewable: 6,800 GWh
- Energy Efficiency: 7,600 GWh

65% of growth met by clean resources
Costs to Produce Electricity

New resources will nearly double the cost to produce electricity for customers compared to existing lower cost assets.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost ($/MWh)</th>
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</thead>
<tbody>
<tr>
<td>2012</td>
<td>$66</td>
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<tr>
<td>2017</td>
<td>$89</td>
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<tr>
<td>2022</td>
<td>$103</td>
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<tr>
<td>2027</td>
<td>$123</td>
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</table>
ACTION PLAN
Sources of Energy Growth

Planned additions to resource portfolio may shift over time, as changing conditions dictate.

- APS already has plans in place to meet near-term needs
  - In the near term, renewable energy and energy efficiency additions meet APS system needs
- Several options exist for future resource decisions
  - In the intermediate term, renewable energy and natural gas tradeoffs will drive resource decisions
  - Over the long term, natural gas will become the most prevalent fuel source
    - Renewable energy will be the most viable alternative to mitigate natural gas volatility and provide resource diversification
    - New technology, such as new nuclear, will continue to be monitored over the long term to meet load growth
**Action Plan**

<table>
<thead>
<tr>
<th>Action</th>
<th>Project</th>
<th>MW</th>
<th>Technology</th>
<th>Agreement</th>
<th>In-Service</th>
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<tbody>
<tr>
<td>2011 Photovoltaic</td>
<td>Yuma</td>
<td>35</td>
<td>Solar PV</td>
<td>EPC/Own</td>
<td>2013</td>
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<tr>
<td>2011 RE Small Gen</td>
<td>Maricopa County</td>
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<td>Solar PV</td>
<td>PPA</td>
<td>2013</td>
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<td>Solar PV</td>
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<td>2012 Photovoltaic</td>
<td>Hyder II</td>
<td>14</td>
<td>Solar PV</td>
<td>EPC/Own</td>
<td>2013</td>
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<tr>
<td>2012 Photovoltaic</td>
<td>TBD</td>
<td>32</td>
<td>Solar PV</td>
<td>EPC/Own</td>
<td>2014</td>
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<tr>
<td>2012 RE Small Gen¹</td>
<td>TBD</td>
<td>TBD</td>
<td>All RE Source</td>
<td>PPA</td>
<td>TBD</td>
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<td>2013 Photovoltaic</td>
<td>TBD</td>
<td>50</td>
<td>Solar PV</td>
<td>EPC/Own</td>
<td>2015</td>
</tr>
<tr>
<td>2013 Conventional²</td>
<td>TBD</td>
<td>TBD</td>
<td>Natural Gas</td>
<td>EPC/Own/PPA</td>
<td>2016</td>
</tr>
</tbody>
</table>

1. Need (MW) and timing will be driven by the level of DE achieved
2. In the event capacity does not materialize (e.g., the Four Corners transaction is not consummated or EE does not achieve targeted participation levels) natural gas resources would be required
Composition of IRP

2012 IRP Discussion
- Executive Summary
- Background
- Assessing Needs & Resources
- Portfolio & Sensitivity Analytics

Response to Rules
- Section C – Demand
- Section D – Supply
- Section E – Risk
- Section F – 2012 IRP
- Section H – Action Plan
- Section I – Other Factors

Additional Information
- Table of Acronyms
- Glossary
- Attachments
- Appendices

1. Attachment names align with the applicable IRP Rule