2014 Integrated Resource Plan

Arizona Department of Environmental Quality
Stakeholder Meeting

June 2, 2015

Paul Smith
Resource Planning
2014 IRP Summary

• Natural gas generation will play increasingly important role
  – Economics
  – Operational flexibility

• Cleaner energy mix
  – Customer resources such as roof-top solar and energy efficiency projected to triple
  – Environmental regulations

• Advanced technology will change the electricity grid
  – Integration of renewable energy
  – Communication and automation
Planning Considerations

Load Forecast

Existing Resources

Customer Resources

Future Resource Options

Reliability and Safety

2014 IRP

Regulation

Stakeholders

Cost

Environmental Impact

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2014 IRP Filing*

• APS filed its IRP with the ACC April 1, 2014

• On September 17, APS filed a supplement to its IRP
  • Modified its chosen portfolio from the Selected Portfolio (April 2014 Selected Portfolio) to the Coal Reduction Portfolio (September 2014 Selected Portfolio)

• The Coal Reduction Portfolio included the following modifications:
  − Retire Unit 2 in 2016
  − Retire Units 1 and 3 in mid-2020’s (at end of coal contract) or convert to natural gas

• Modification based on economics of required environmental upgrades to comply with MATS and Regional Haze
  − Similar to Four Corners 1-2-3, environmental upgrades cannot be supported given lack of economies of scale

• On May 8, 2015, the ACC acknowledged APS IRP and approved the retirement of Cholla 2

*APS’s 2014 IRP and its supplemental filing may be found at www.aps.com/resources
• Growth in customer energy requirements expected to resume

• Customer resources expected to triple over planning horizon

• Expiring purchase contracts means APS will need additional resources by 2017

• Additional resource needs anticipated to be met by increasingly diverse and efficient technologies
Expected Future Resources
Sept 2014 Selected Portfolio

2014-2029 (Forecast)

Future Additional Resources
7,267 MW Expected at Peak

a. New Utility-Scale Resources
   - Natural Gas
     4,817 MW
   - Renewable Energy
     467 MW (1,018 MW nameplate capacity)

b. New Customer Resources
   - Energy Efficiency
     1,447 MW
   - Distributed Energy
     261 MW (722 MW nameplate capacity)
   - Demand Response
     275 MW

2014
8,124 MW peak requirement
100% met with existing resources

2029
12,982 MW peak requirement
45% met with existing resources
Diverse Energy Mix

- Over 50% of energy growth planned to be supplied by zero emission resources
- Growth in natural gas generation to meet peak demand and integrate renewable energy resources
Evolving Customer Demand

- Growth of solar PV changes customer energy consumption patterns
- Generators must be able to start and stop multiple times per day
- Fast starting and ramping capability is required in responding to intermittent output of renewable resources
Future Technology Drivers
Transition Towards Integrating Evolving Energy Resource Portfolio

• **System Drivers**
  – Increasing amounts of intermittent generation
  – Need for peaking resources and summer time capacity
  – Cost of compliance with environmental regulations
  – Stable natural gas prices

• **Potential Benefits**
  – Increased resource diversity
  – Flexible gas generation meets peak needs and enables renewable energy integration
  – Reduced environmental impacts

• **Potential Risks**
  – Cost of resource diversity for newer technologies
  – Technology maturity and uncertain reliability
  – Maintaining balance between variable/inflexible resources and flexible resources
Ocotillo Modernization Project

- Retire aging, large steam units constructed in 1960
- Replace steam units with modern technology

- Maintain Valley reliability
- Responsive unit operations
- Environmental attributes
- In-service planned for summer 2018
Proliferation of Distributed Generation Demands A More Advanced Grid