UNS Energy’s Resource Diversification Strategy

Erik Bakken
Sr. Director, Transmission Strategy & Corporate Environmental Services

June 2015
UNS Energy Overview

- Vertically integrated electric utility
- 415,000 retail customers
- UNS Electric - 93,000 retail customers
- UNS Gas - 150,000 retail customers

2,000 employees
Rulemakings by the U.S. Environmental Protection Agency

- **Regional Haze Best Available Retrofit Technology (BART)**
  - Reduce visibility impairment (haze) in national parks and wilderness areas
  - Compliance in 2016-2018

- **Mercury and Air Toxics Standards (MATS) rule**
  - Emission standards for hazardous air pollutants (HAPs)
  - Final rule issued February 2012
  - Compliance in 2015/2016

- **Coal Combustion Residuals (CCR) rule**
  - Regulates handling and disposal of coal ash and other combustion residuals
  - Final rule issued April 2015
  - Compliance in 2015-2018

- **Air Quality Standards for Ozone**
  - Proposed revision to standard issued December 2014
  - Final rule due in October 2015
  - Compliance beginning in 2018

- **Greenhouse Gas 111(d) Regulation**
  - Proposed rule issued June 2014
  - Applies to existing coal-fired and combined-cycle gas-fired units
  - Final rule expected August 2015
  - Compliance timeframe 2020 – 2030

- **Regional Haze 2018-2028 Planning Period**
  - Demonstrate Reasonable Progress
  - Compliance in 2021-2023
**Resource Diversification Strategy**

**2013 Portfolio Energy Mix**
- Coal Generation, 80%
- Natural Gas/Purchase Power, 14%
- Utility Scale Renewables, 3%
- Distributed Generation Resources, 1%
- Energy Efficiency Programs, 2%
- Demand Response, 0.03%

**Estimated 2020 Portfolio Energy Mix**
- Coal Generation, 57%
- Natural Gas/Purchase Power, 28%
- Utility Scale Renewables, 4%
- Distributed Generation Resources, 2%
- Energy Efficiency Programs, 10%
- Demand Response, 0.02%

**TEP 2014 Integrated Resource Plan**
<table>
<thead>
<tr>
<th><strong>Resource Diversification Strategy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>33% Reduction in Coal Capacity</strong></td>
</tr>
<tr>
<td><strong>25% Reduction in CO₂ Emissions</strong></td>
</tr>
<tr>
<td><strong>Springerville Unit 1</strong> – Reduced Coal Capacity by 200 MW</td>
</tr>
<tr>
<td>• TEP currently owns 49.5% or 192 MW</td>
</tr>
<tr>
<td><strong>San Juan Unit 2</strong> – Planned Closure of 170 MW of Coal Capacity</td>
</tr>
<tr>
<td>• Planned shutdown of Unit 2 by 2018</td>
</tr>
<tr>
<td>• Part of New Mexico Regional Haze Plan</td>
</tr>
<tr>
<td><strong>Gila River Unit 3</strong> – 550 MW Natural Gas Facility</td>
</tr>
<tr>
<td>• Purchased in Dec. 2014</td>
</tr>
<tr>
<td>• Ownership 75% TEP / 25% UNS Electric</td>
</tr>
<tr>
<td><strong>Sundt Unit 4</strong> – Switching 120 MW of Coal Capacity to Natural Gas</td>
</tr>
<tr>
<td>• Switching to natural gas post 2017</td>
</tr>
<tr>
<td>• Part of Arizona Regional Haze Plan</td>
</tr>
<tr>
<td>• Currently dual fuel (coal and natural gas)</td>
</tr>
</tbody>
</table>
TEP’s Emission Profiles
Historical and 2014 IRP Reference Case Plan

CO₂ Emissions
- Peak
- Today
- 2020: 15% vs. Today, 29% vs. System Peak

NOₓ Emissions
- Peak
- Today
- 2020: 34% vs. Today, 68% vs. System Peak

SO₂ Emissions
- Peak
- Today
- 2020: 9% vs. Today, 80% vs. System Peak

Water Consumption
- Peak
- Today
- 2020: 16% vs. Today, 32% vs. System Peak
TEP and UNS Electric Renewable Resources
2015 Projected Energy and Capacity

300 MW of Utility Scale and Distributed Generation
Renewable Capacity (MW)

700 GWh or 5% of Energy
Utility Scale and Distributed Generation

- Utility Scale Wind
- Utility Scale Solar
- Distributed Generation
- Biogas

Utility Scale Wind: 61 MW
Utility Scale Solar: 154 MW
Distributed Generation: 90 MW
Biogas: 4 MW

300 MW Utility Scale and Distributed Generation

- 25% Utility Scale Wind
- 50% Utility Scale Solar
- 20% Distributed Generation
- 5% Biogas
Areva Solar - Sundt Generating Station
5 MW Solar Boost Project
Macho Springs in New Mexico
50 MW Project
TEP’s Distributed Solar Resources
Utility Scale Renewables and Distributed Generation Resource Capacity

TEP’s 2014 IRP Reference Case Plan

- **2014**: 208 MW, 373 GWh
- **2016**: 258 MW, 564 GWh
- **2018**: 326 MW, 664 GWh
- **2020**: 529 MW, 1038 GWh
- **2022**: 78 MW, 134 GWh
- **2024**: 157 MW, 270 GWh
- **2026**: 229 MW, 395 GWh
- **2028**: 259 MW, 446 GWh
Energy Efficiency and Demand Response
Equivalent Energy and Capacity Reductions

TEP’s 2014 IRP Reference Case Plan

- 2014: 693 GWh, 80 MW
- 2016: 1202 GWh, 164 MW
- 2018: 1639 GWh, 229 MW
- 2020: 1665 GWh, 238 MW
- 2022: 1795 GWh, 259 MW

Energy Efficiency
- New Construction Programs
- Compact Fluorescent Lighting
- Appliance Recycling
- Commercial & Industrial Direct Install
- Residential & Commercial Demand Response

Demand Response
- 2014: 15 MW
- 2016: 35 MW
- 2018: 45 MW
- 2028: 50 MW
EPA’s Proposed Clean Power Plan
Arizona Carbon Reductions

- EPA 2030 Goal: 702 lb/MWh
- EPA Interim Goal (2020-2029 Average): 735 lb/MWh
- EPA assumes all in-state coal-fired generation will be replaced by other generation resources by 2020

- Proposal June 2014
- Final Rule June 2015
- EPA Takes Action on State Plan 2017-2018

- Final Rule June 2015
EPA’s Proposed Clean Power Plan
Overview

Nationwide 30% reduction in CO₂ emissions from existing power plants from 2005 levels by 2030

- 2012 emission rates used as baseline year for individual state reductions
- State-by-state Goals
- Progress measured beginning in 2020
- Arizona has highest unplanned coal capacity reductions
- Rule to be finalized later this summer
- State implementation plans due 2016-2017

EPA Proposed Carbon Reduction by State
(CO₂ lbs / MWh)

<table>
<thead>
<tr>
<th>State</th>
<th>2012 Rate</th>
<th>2020 Goal</th>
<th>2030 Goal</th>
<th>Reduction from 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>756</td>
<td>264</td>
<td>215</td>
<td>72%</td>
</tr>
<tr>
<td>Arizona</td>
<td>1,453</td>
<td>735</td>
<td>702</td>
<td>52%</td>
</tr>
<tr>
<td>S. Carolina</td>
<td>1,587</td>
<td>840</td>
<td>772</td>
<td>51%</td>
</tr>
<tr>
<td>Oregon</td>
<td>717</td>
<td>407</td>
<td>372</td>
<td>48%</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>905</td>
<td>546</td>
<td>486</td>
<td>46%</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1,634</td>
<td>968</td>
<td>910</td>
<td>44%</td>
</tr>
<tr>
<td>Georgia</td>
<td>1,500</td>
<td>891</td>
<td>834</td>
<td>44%</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>907</td>
<td>822</td>
<td>782</td>
<td>14%</td>
</tr>
<tr>
<td>Hawaii</td>
<td>1,540</td>
<td>1,378</td>
<td>1,306</td>
<td>15%</td>
</tr>
</tbody>
</table>
EPA’s Proposed Clean Power Plan
Arizona’s Proposed Alternative Plan

Current (2012) Emissions
1,453 lb/MWh

EPA Interim Goal
(2020-2029 Average)
735 lb/MWh

EPA 2030 Goal
702 lb/MWh

Alternative Plan
963 lb/MWh
Adapted from ADEQ Fact Sheet

Comparison of CO₂ emissions (lbs.)/state electricity generation in megawatt-hour (MWh)

Arizona

Renewables 1.6%
Natural Gas 27.3%
Coal 36.2%
Nuclear 28.8%

REDUCTION:
51.7%
GOAL:
702 lbs./MWh
2012 Actual:
1,453 lbs./MWh

NEW MEXICO: 34.0%
COLORADO: 35.4%
UTAH: 27.1%
TEXAS: 39.1%
NEVADA: 34.5%
NORTH DAKOTA: 10.5%

Source: http://cleanpowerplanmaps.epa.gov/CleanPowerPlan/
Publication Number: C-14-28
Ozone Regulation

 Counties Where Measured Ozone is Above Proposed Range of Standards (65 – 70 parts per billion)

- 358 counties would violate 70 parts per billion (ppb)
- 200 additional counties would violate 65 ppb for a total of 558

Based on 2011 – 2013 monitoring data
Ozone Regulation

Figure 1: Core-Based Statistical Areas (CBSAs) and Rural Counties That Would Violate a 60 ppb Ozone Standard Based on 2011–2013 Data

- Monitored CBSAs and Rural Counties That Would Be Violating a 60 ppb Standard
- Unmonitored Areas That Have Estimated Ozone Levels That Would Be Violating a 60 ppb Standard (Based on Spatial Interpolation)