



UNS Energy Corp.

2012 TEP Integrated Resource Plan

Mike Sheehan

Director, Resource Planning

August 2012

TEP & UNSE IRP Reports

The screenshot displays the Tucson Electric Power (TEP) website. At the top, there is a navigation bar with links for Home, News, Careers, About Us, and Contact Us, along with a search bar. Below this is a main menu with categories: Customer Care (Manage Your Account), Energy Efficiency (Save Energy & Money), Renewable Energy (Solar & More), Resources (Safety & Education), and Community (Supporting Arizona). A large banner image shows a city at night with the text 'Utility Projects' overlaid. Below the banner is a breadcrumb trail: Home / Utility Projects / Resource Planning / Workshops.

The main content area is titled 'UTILITY PROJECTS' and includes a sidebar with links for Transmission Line Projects, Substation Projects, and Resource Planning (which is highlighted). The main heading is 'Resource Planning' and 'Integrated Resource Plan (IRP)'. A sub-heading reads: 'The IRP for Tucson Electric Power (TEP) and UniSource Energy Services (UES) informs regulators, customer interest groups and other interested stakeholders on the assumptions used to develop the company's resource strategy.'

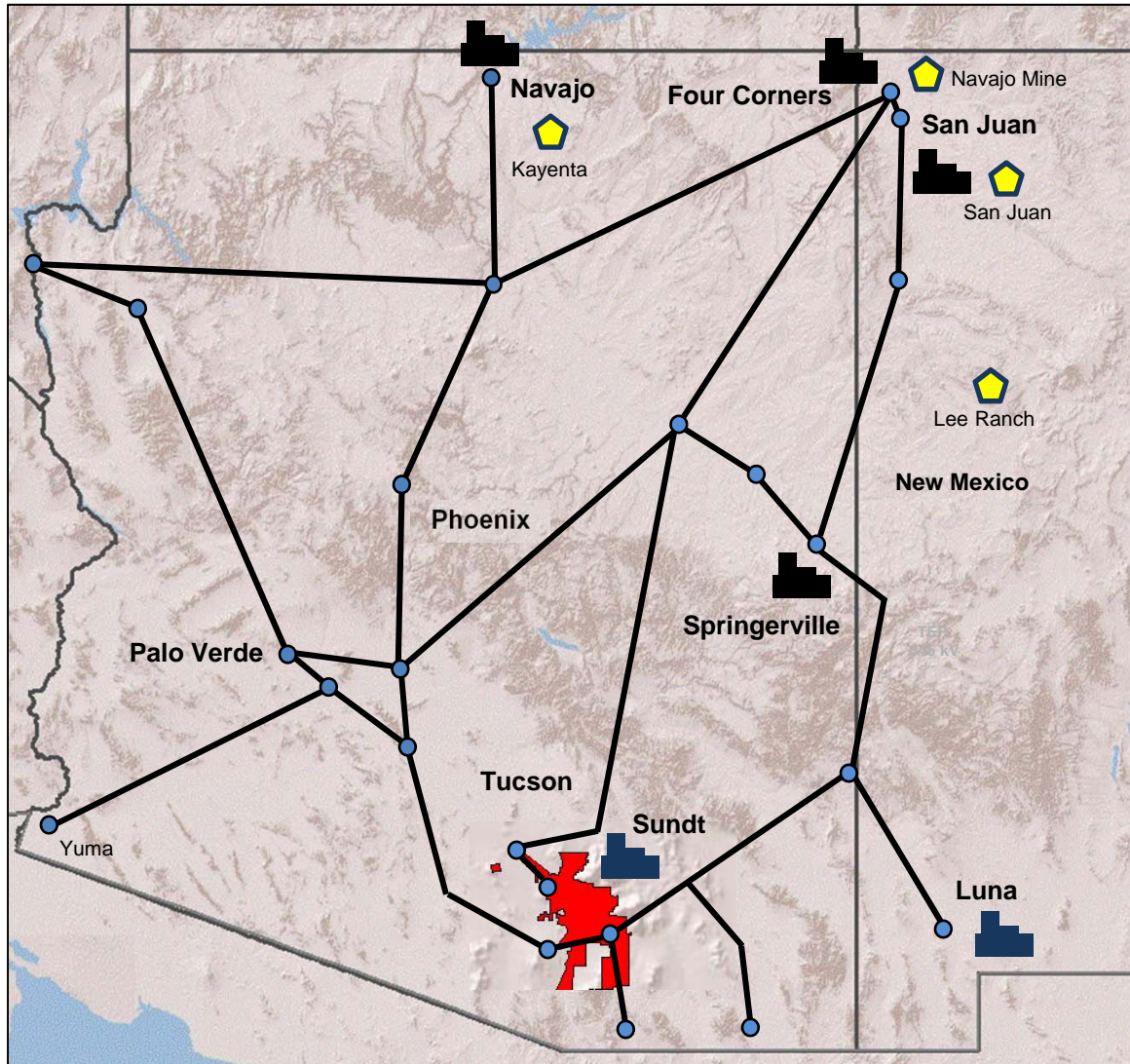
Below this text are three tabs: '2012 IRP', '2011 WORKSHOP', and '2008 WORKSHOP'. The '2012 IRP' tab is active, showing two PDF documents for download: 'TEP Integrated Resource Plan -- PDF 17.6 MB' and 'UniSource Energy Services (UES) Electric Integrated Resource Plan -- PDF 13.3 MB'.

At the bottom of the page, there are three promotional boxes: 'The EV Project' (Tucson is picked to help launch EV pilot program), 'Teachers and Students' (Educational programs and services), and 'Discounted CFLs' (Energy-efficient bulbs available at local retailers).

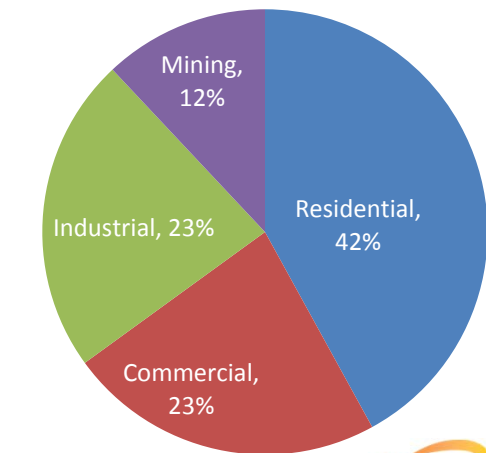
The footer contains a grid of links organized into five columns: Manage My Account, Green Energy, Community, Safety and Education, and About TEP. Each column lists various services and resources available to users.

<https://www.tep.com/Projects/Planning/>

TEP Loads & Generation Resources



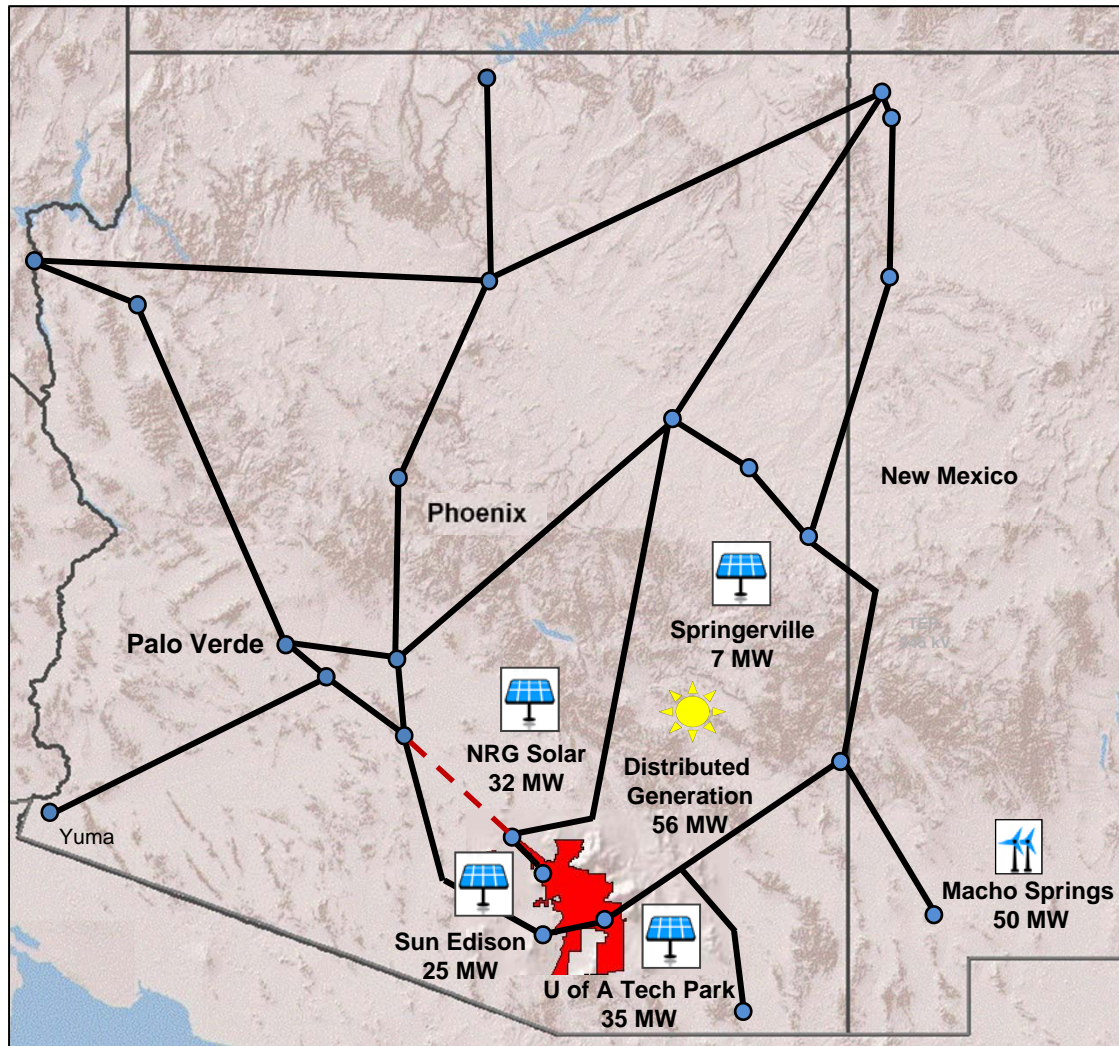
Planning Capacity	MW
Four Corners	110
Navajo	168
San Juan	340
Springerville	777
Sundt 1-4	422
Luna Energy Facility	190
DeMoss Petrie CT	75
North Loop CT 1-4	94
Sundt CT 1-2	48
Thermal Resources	2,224



Retail Sales Mix



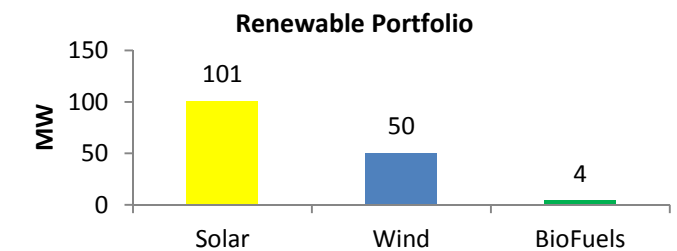
TEP Renewable Resources



Project	In-Service	Technology	Capacity, MW
Sundt-Los Reales	Operational	Biogas	4
SGS -Springerville	Operational	Fixed PV	6
UASTP I -Solon	Operational	SAT PV	2
UASTP II -Amonix	Operational	CPV	2
UASTP III -Solon	Operational	Fixed PV	5
UASTP IV -AstroSol	Operational	Fixed PV	6
SunPower	Operational	Fixed PV	1
Macho Springs	Operational	Wind	50
Total Operational			76

NRG Solar	October 2012	Fixed PV	32
SunEdison	December 2012	SAT PV	25
EMCORE Solar	December 2012	CPV	2
Foresight Solar	December 2012	SAT PV	6
Foresight Solar	December 2012	SAT PV	14
Total 2012			79

2012 Expected Renewable Capacity	155
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Solar Electric Power Association (SEPA) named TEP 2012 Investor Owned Utility of the Year



Single Axis Tracking Systems 45 MW

- U of A Science & Tech Park
- Foresight & Sun Edison Projects



**Sundt
Power Boost
CSP Project 5MW
Future 2013**



Flat Panel PV 40 MW

- Springerville
- NRG Solar

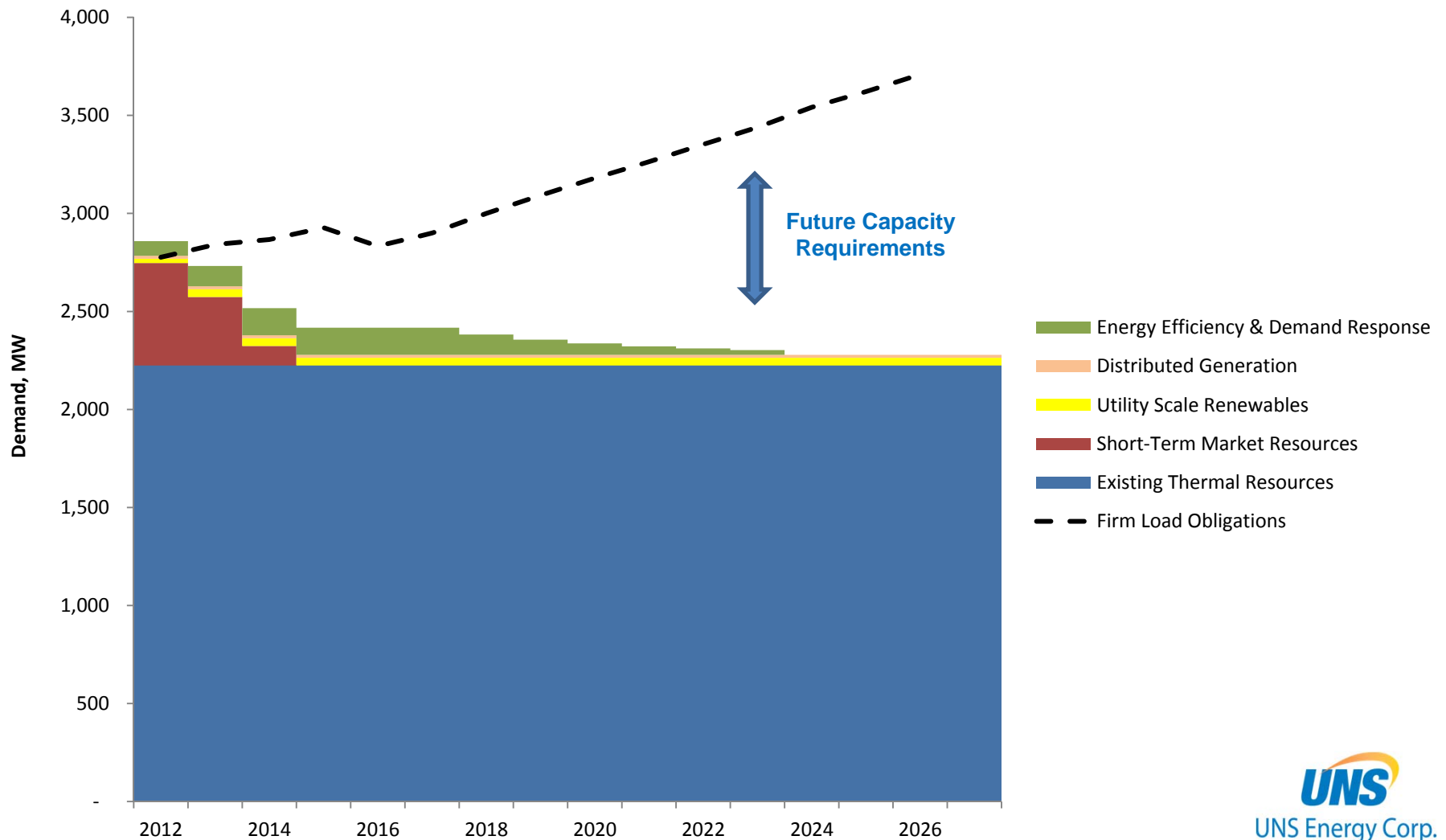


Concentrated PV 4 MW
• U of A Science & Tech Park
• Emcore

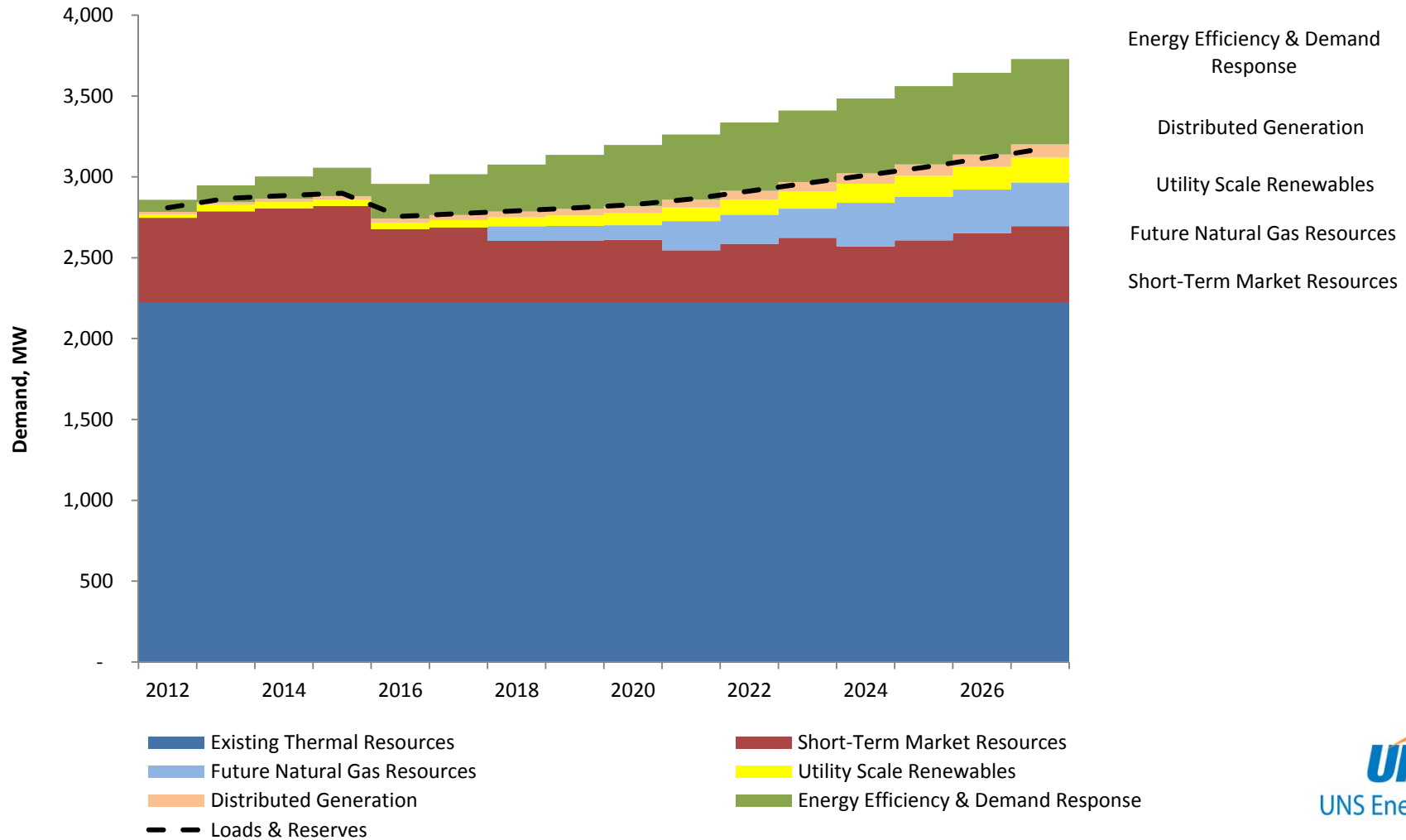


Wind 50 MW
•Macho Springs

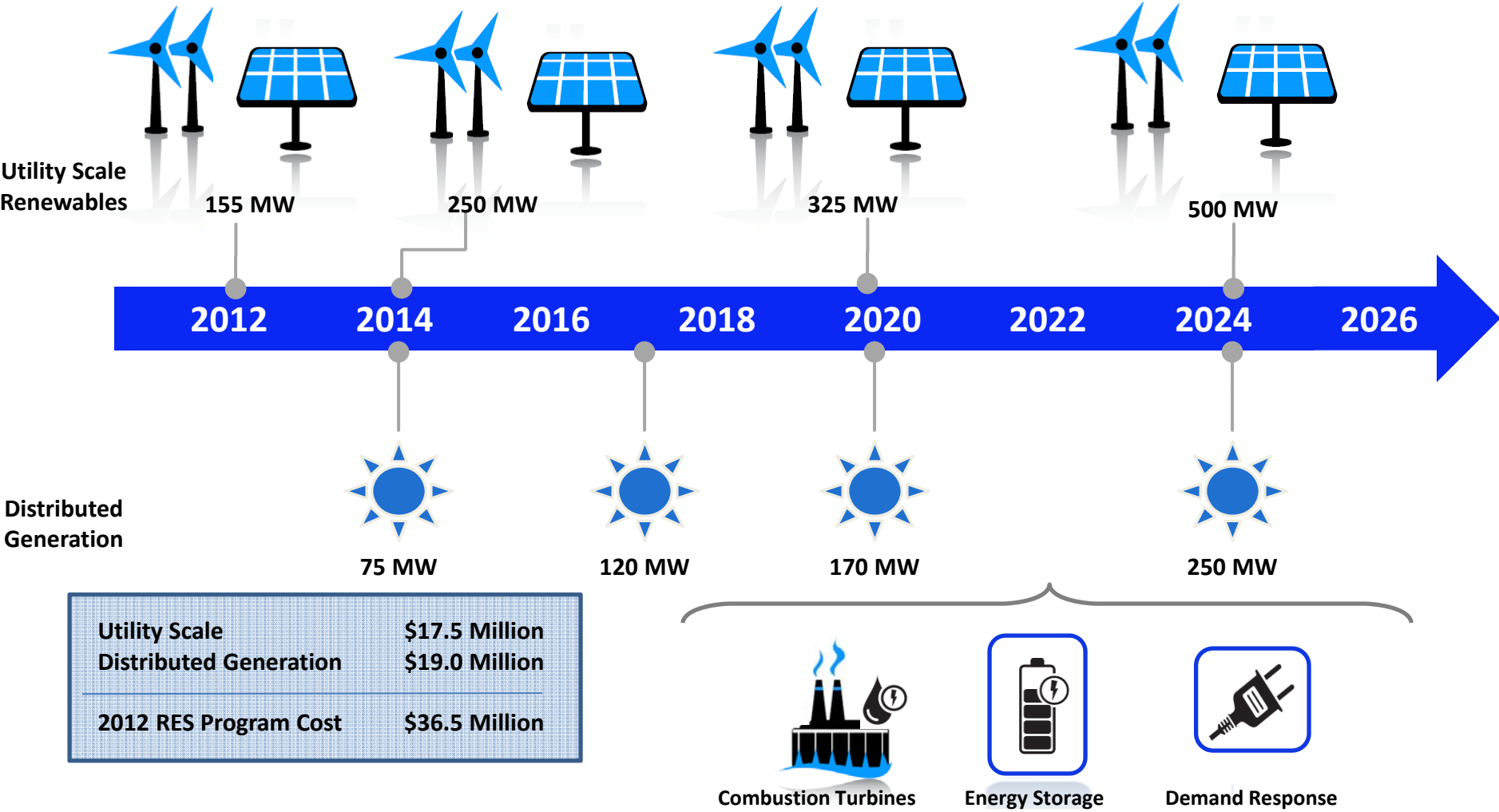
TEP Resource Planning Outlook



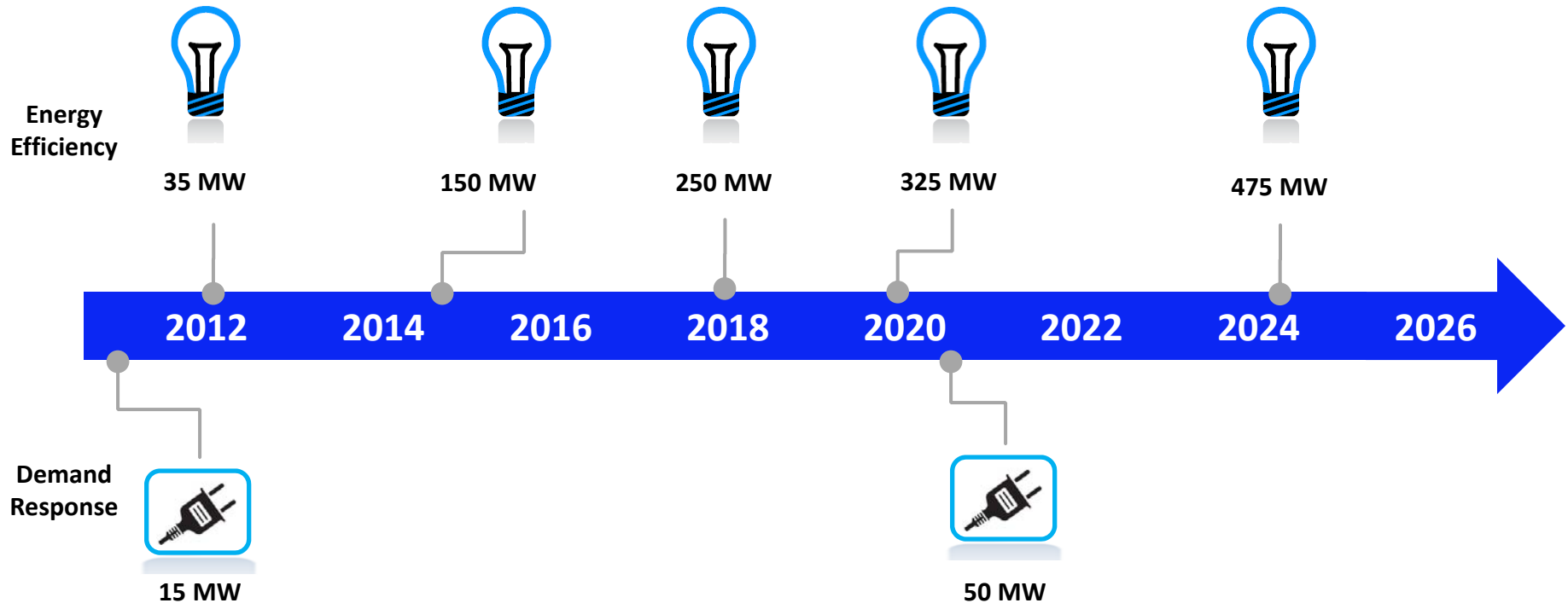
TEP Resource Planning Outlook



TEP Renewable Resources



TEP Energy Efficiency & Demand Response



Energy Efficiency Programs	\$21.0 Million
Demand Response	\$ 3.5 Million
<hr/>	
2012 EE Program Cost	\$24.5 Million

- Compact Fluorescent Lighting (CFL)
- New Construction Programs
- Appliance Recycling
- Commercial & Industrial Direct Install
- Direct Load Control

2012 TEP Reference Case Plan

Transmission Upgrade



Pinal Central
Tortolita
500kV EHV

Coal Resource Decisions



Environmental
Upgrades at
San Juan,
Four Corners & Navajo

Future Support for Intermittent Resources



100 MW
Combustion
Turbines



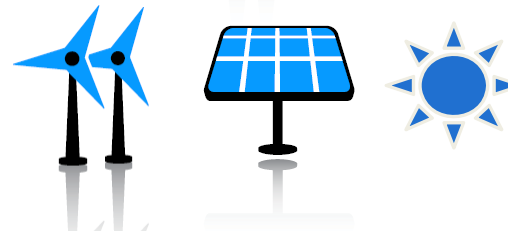
100 MW
Combustion
Turbines



100 MW
Combustion
Turbines



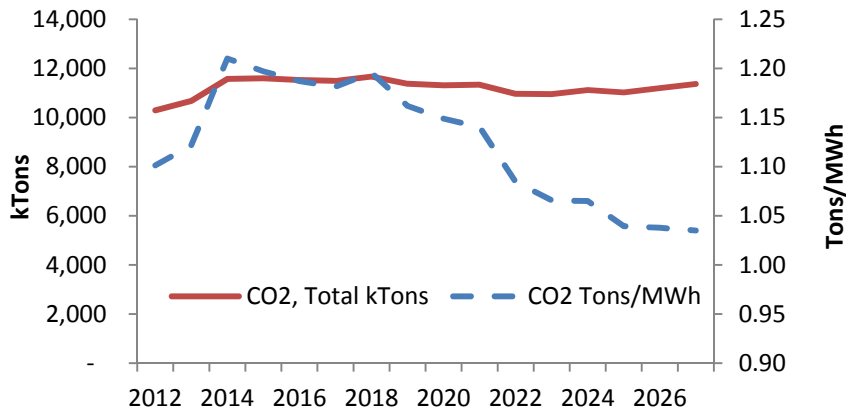
Fully Compliant with
Arizona Energy
Efficiency Standard
22% by 2020



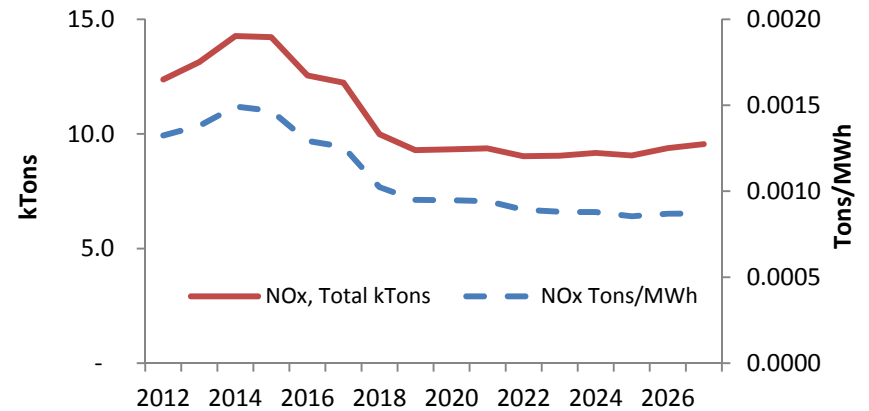
Fully Compliant with
Arizona Renewable
Energy Standard
15% by 2025

Portfolio Emissions & Water Consumption

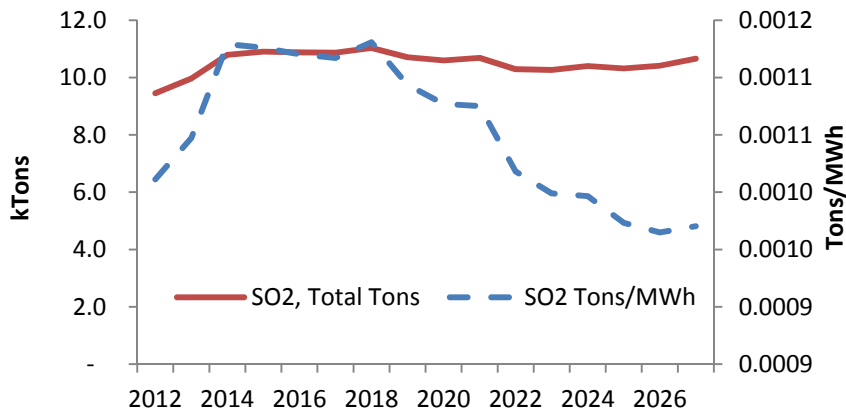
CO₂ Portfolio Emissions



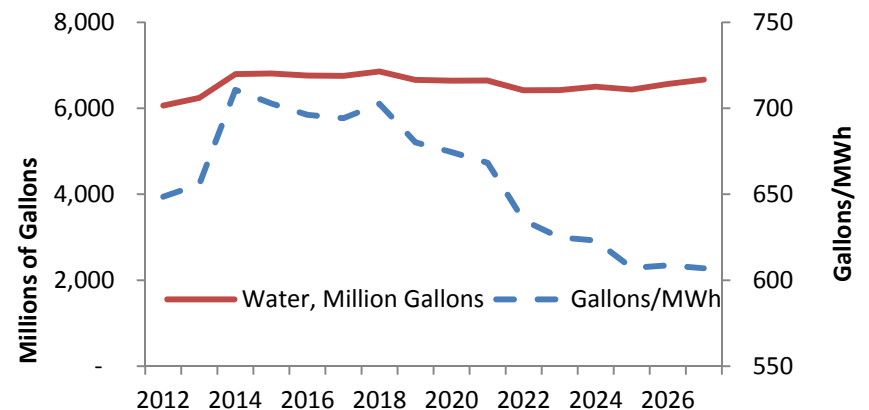
NO_x Portfolio Emissions



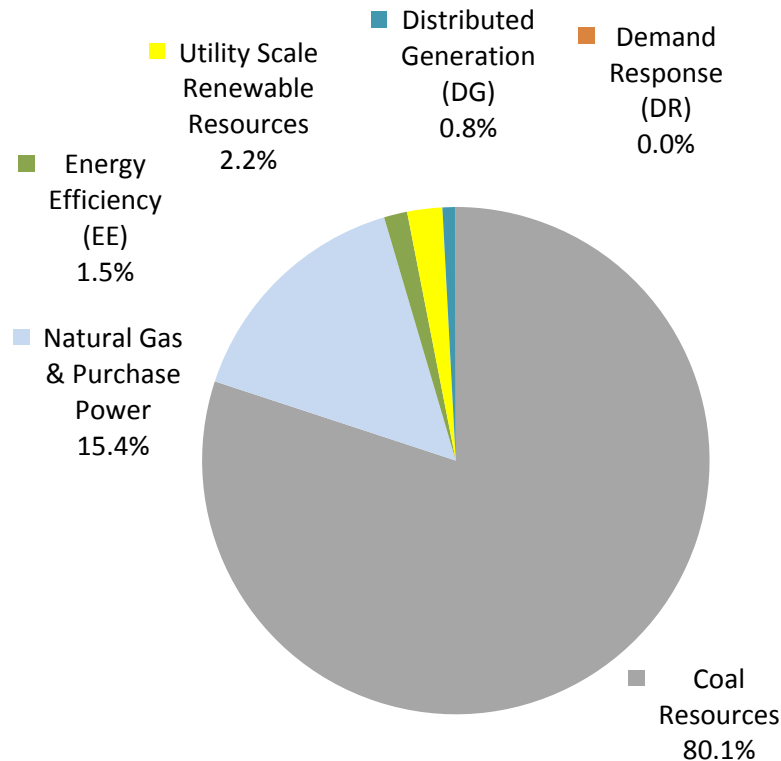
SO₂ Portfolio Emissions



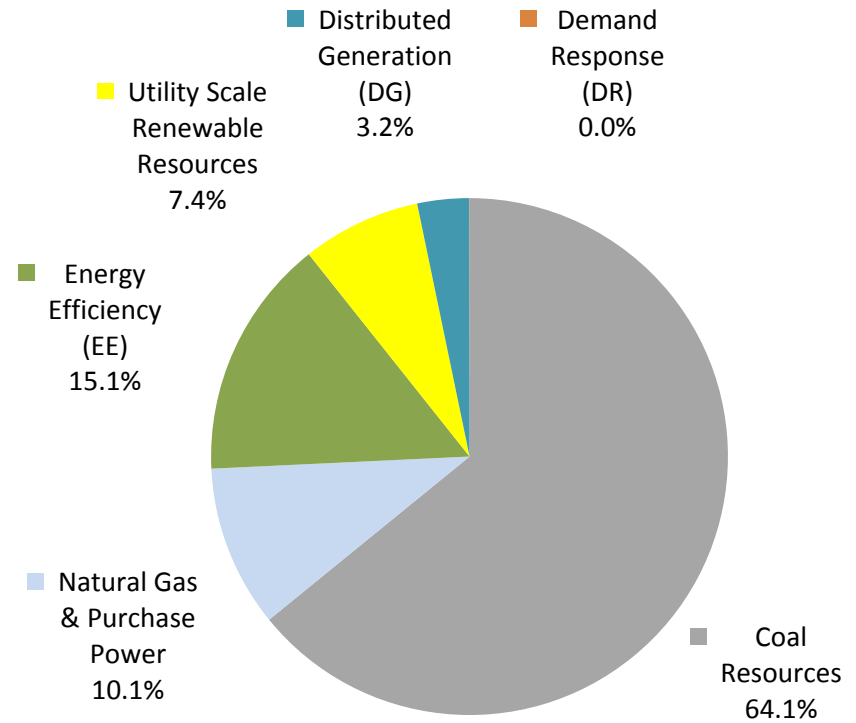
Portfolio Water Consumption



TEP Resource Portfolio



Forecast Year 2012



Forecast Year 2027

- *Environmental upgrades result in a 23% reduction in NOx emissions and a 70% reduction in Mercury emissions by the year 2018*
- *Displacement from energy efficiency and renewables, keep CO2 emissions, SO2 emissions and water consumption flat though 2027.*



UNS Energy Corp.

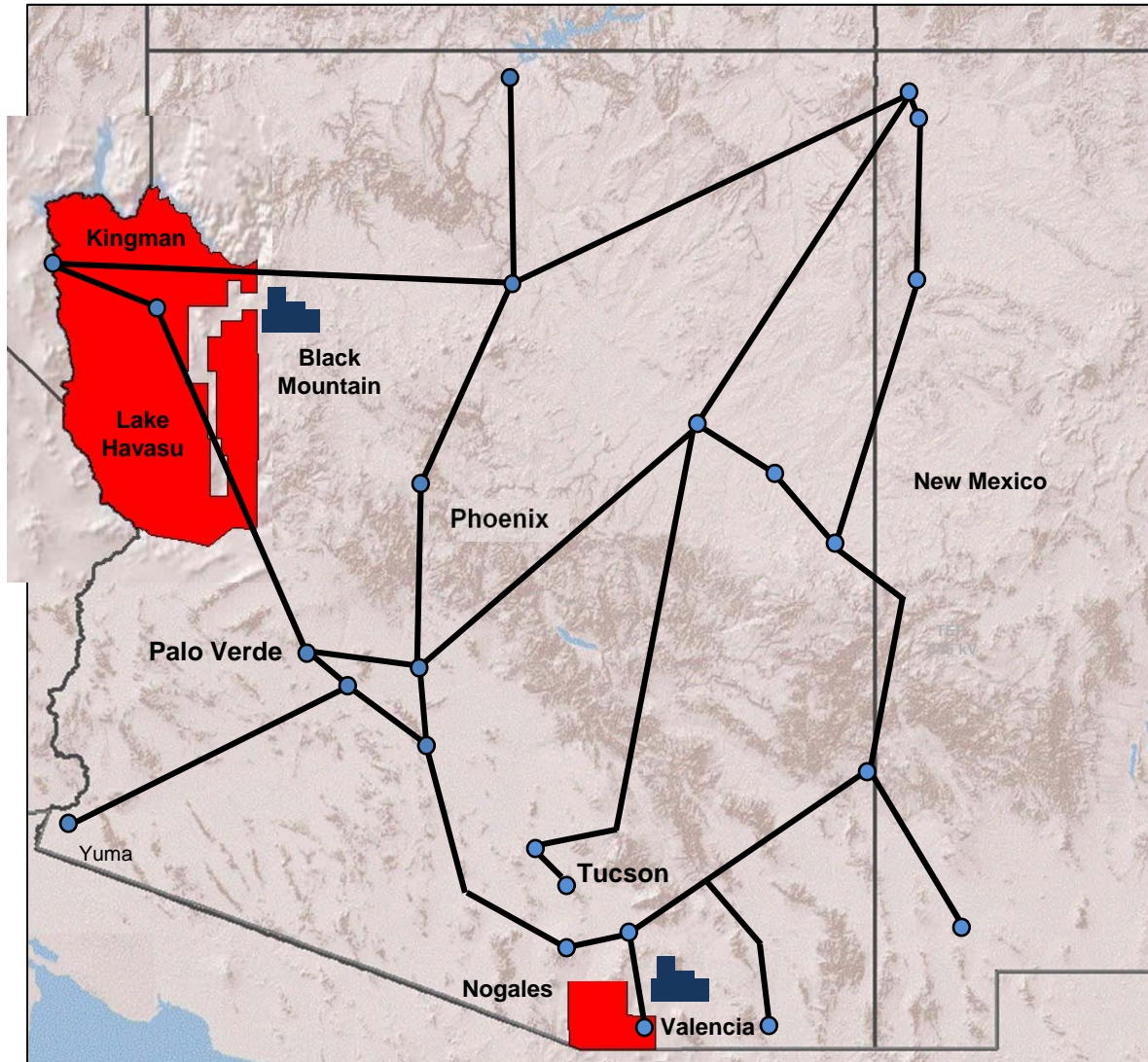
2012 UNSE Integrated Resource Plan

Mike Sheehan

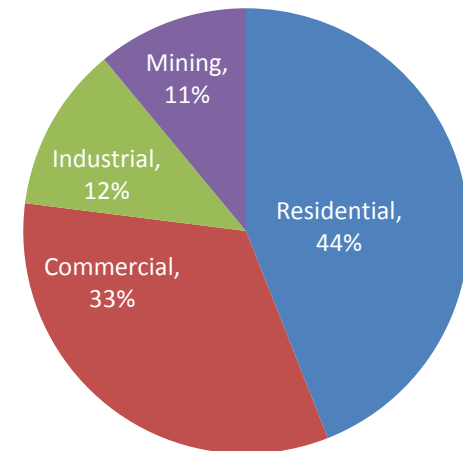
Director, Resource Planning

August 2012

UNSE Loads & Generation Resources



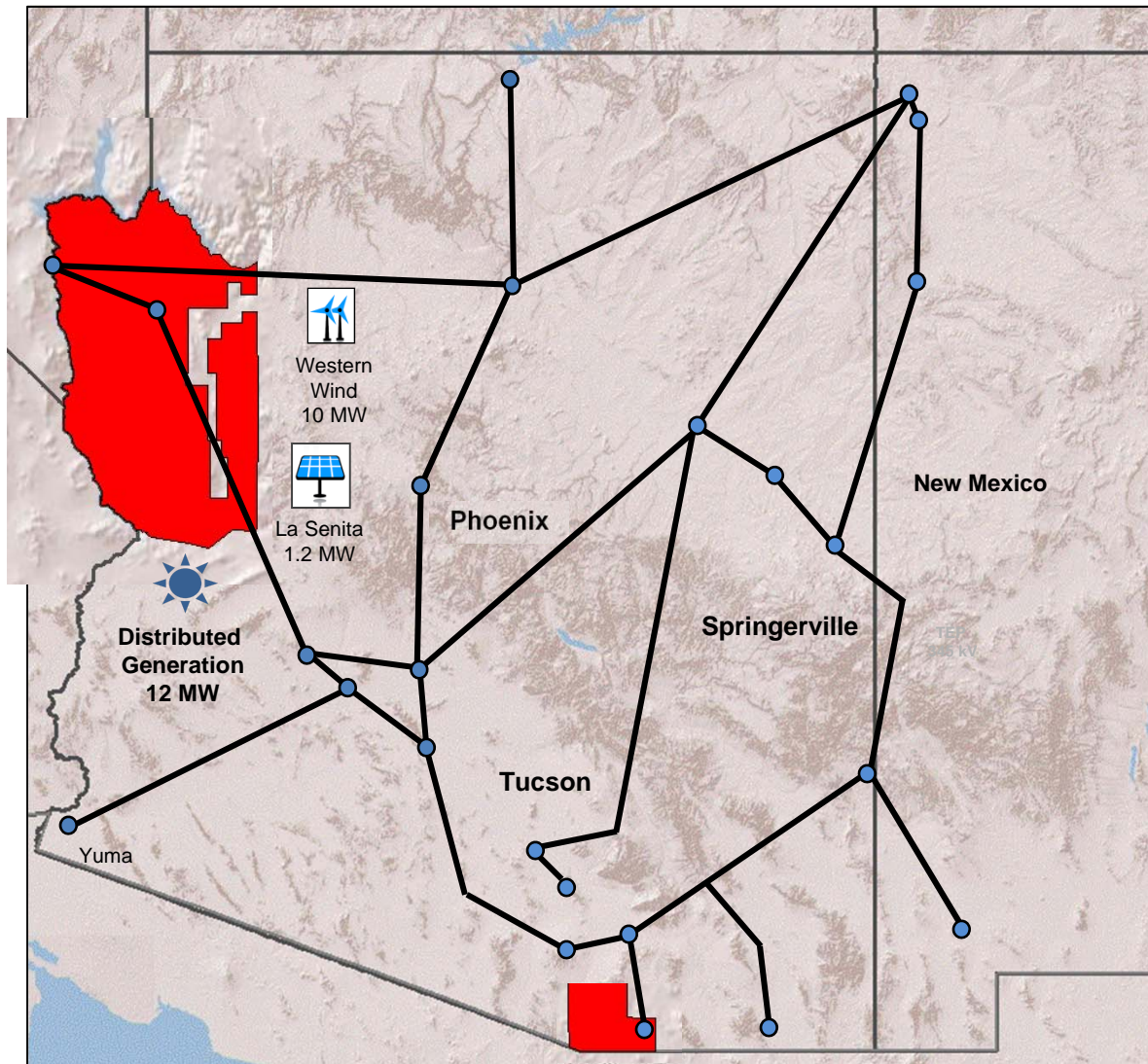
UNS Electric	Capacity, MW
Black Mountain	90
Valencia	63
Total Resources	153



Retail Sales Mix



UNSE Renewable Resources



Project	In-Service	Technology	Capacity, MW
Western Wind	Operational	Wind/Solar	10.5
La Senita	Operational	Solar SAT	1.22
Operational Renewable Capacity			11.7

UNSE Renewable Resources



**Western Wind
Wind & Solar Project 10.5 MW**

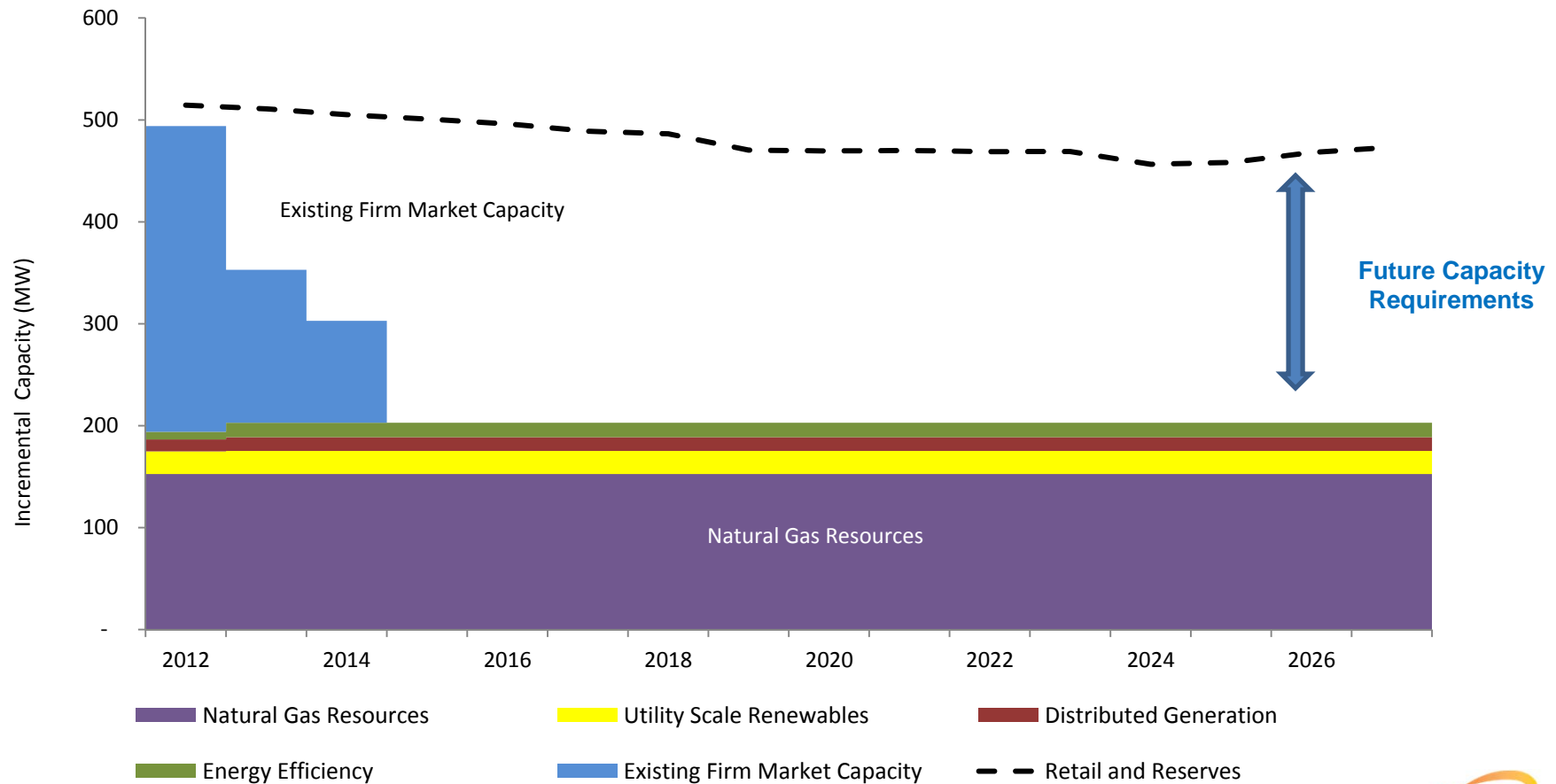


**La Senita Solar
Solar Project 1.2 MW**

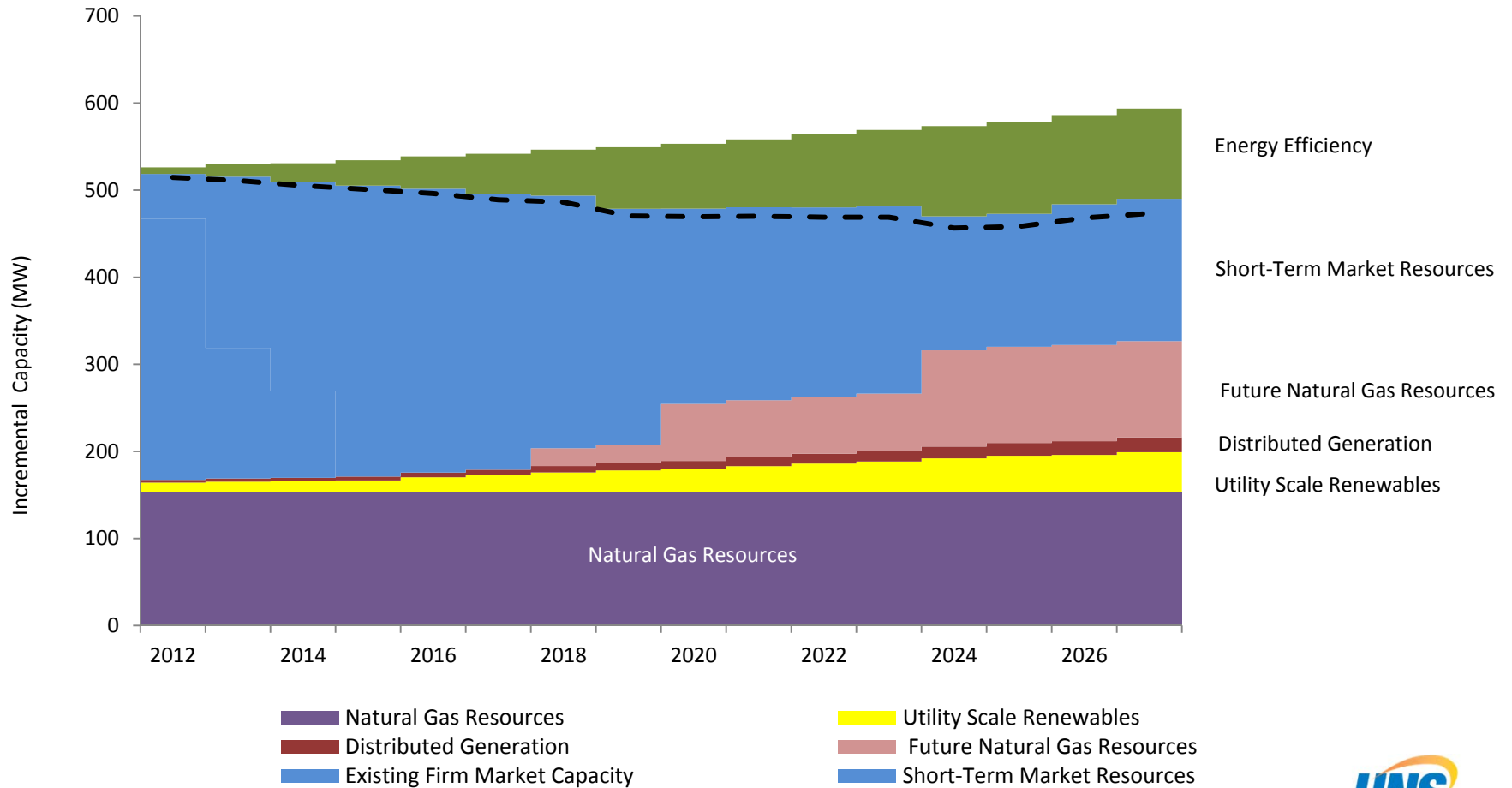


**Black Mountain
Solar Project 10 MW
October 2012**

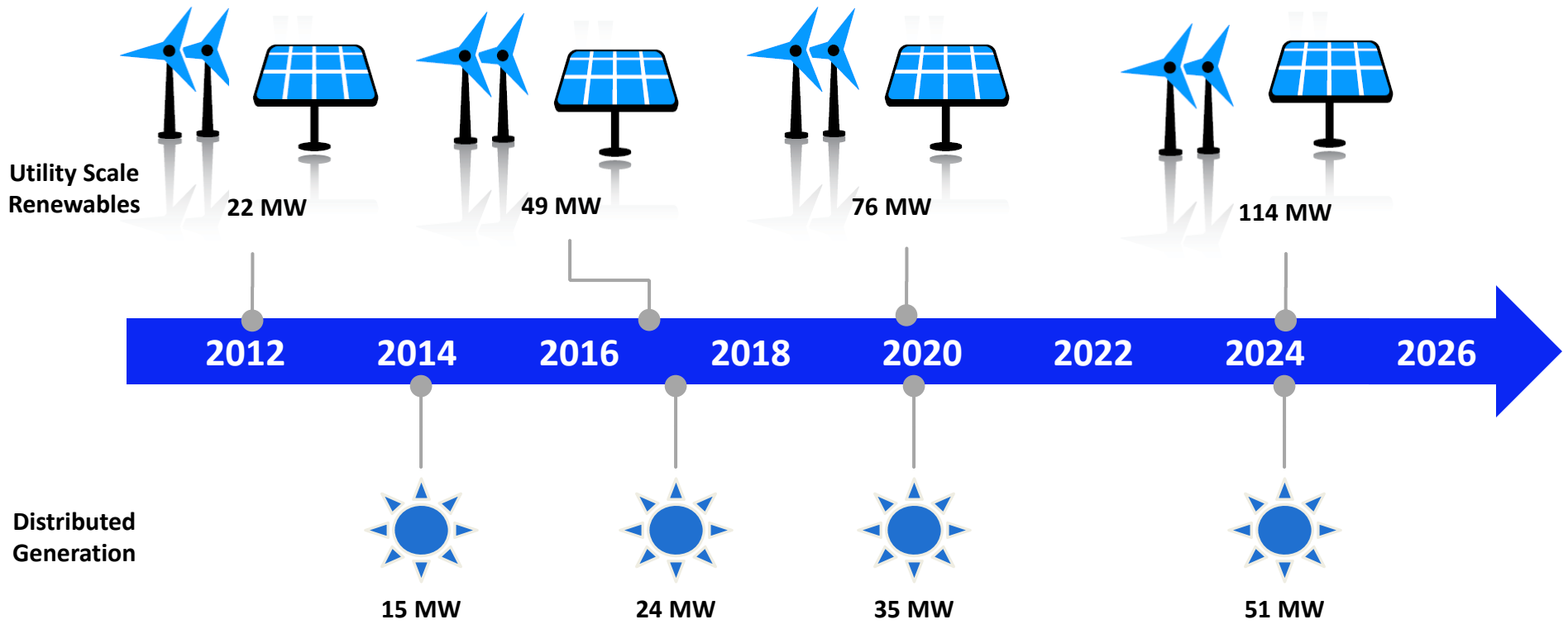
UNSE Resource Planning Outlook



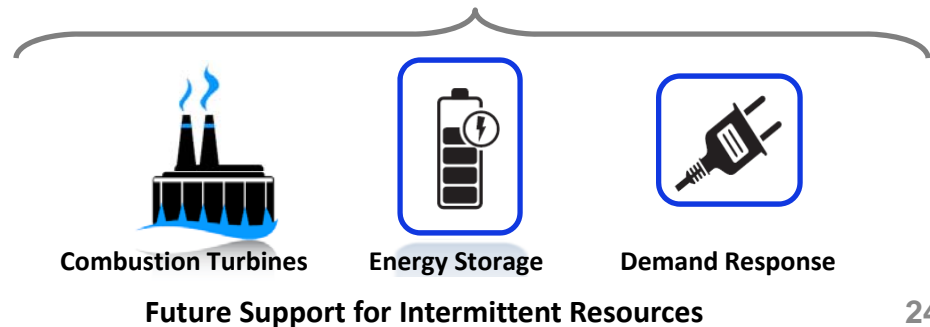
UNSE Resource Planning Outlook



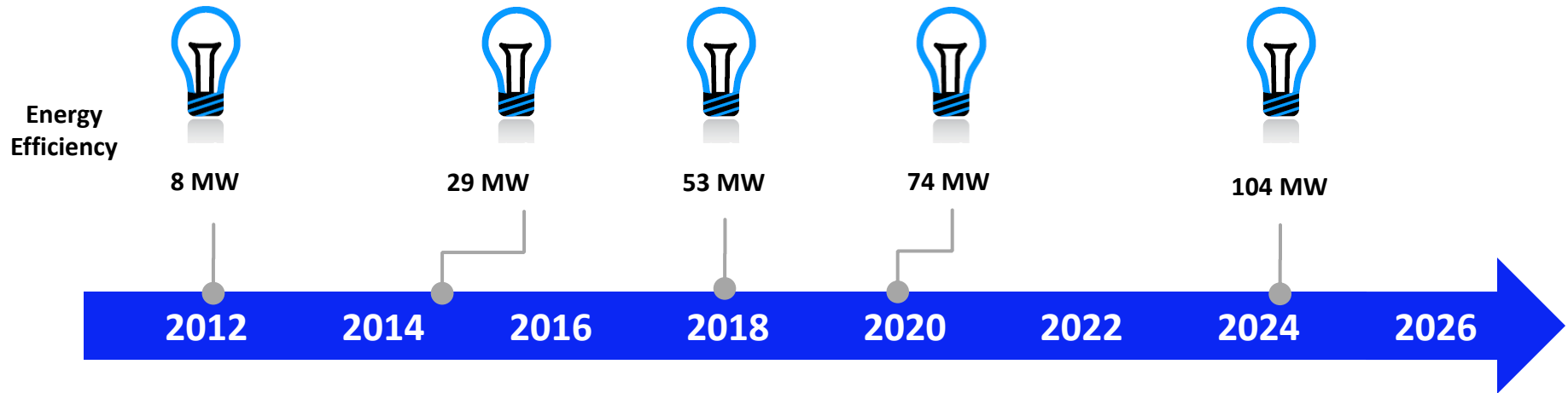
UNSE Renewable Energy Standard



Utility Scale	\$2.9 Million
Distributed Generation	\$6.4 Million
2012 RES Program Cost	\$9.3 Million



UNSE Energy Efficiency Standard



2012 EE Program Cost \$5.4 Million

- New Construction Programs
- Compact Fluorescent Lighting
- Appliance Recycling
- Commercial & Industrial Direct Install

2012 UNSE Reference Case Plan

Market Resources

200-300 MW of Purchase Power Agreements



Vail to Valencia
115kV – 138kV
Conversion



21 MW
Combustion
Turbine
(Santa Cruz)



45 MW
Combustion
Turbine
(Mohave)



45 MW
Combustion
Turbine
(Mohave)

2012

2014

2016

2018

2020

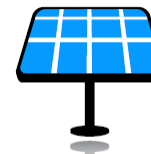
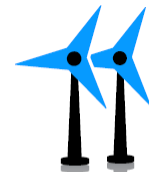
2022

2024

2026

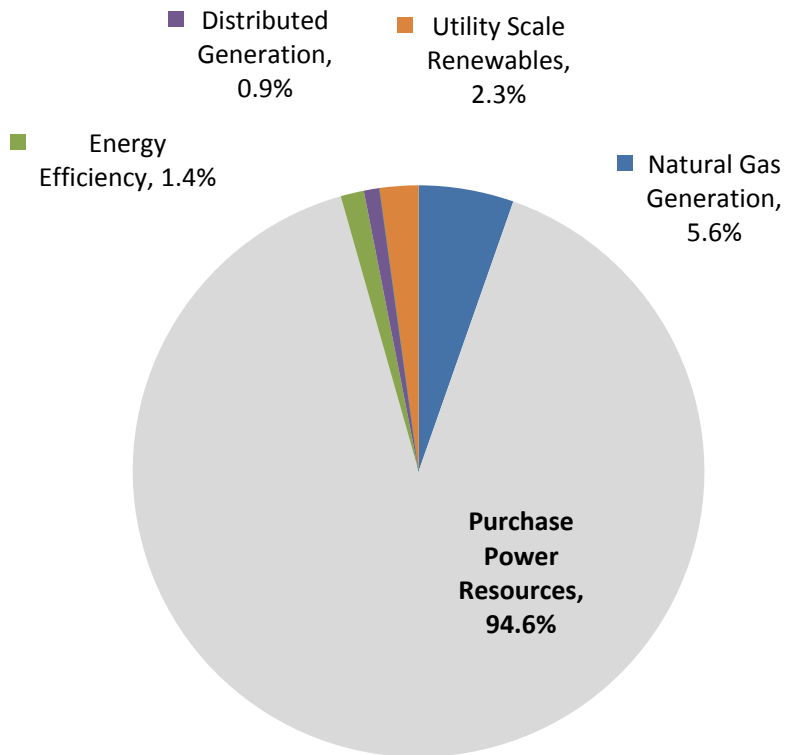


Fully Compliant with
Arizona Energy
Efficient Standard
22% by 2020

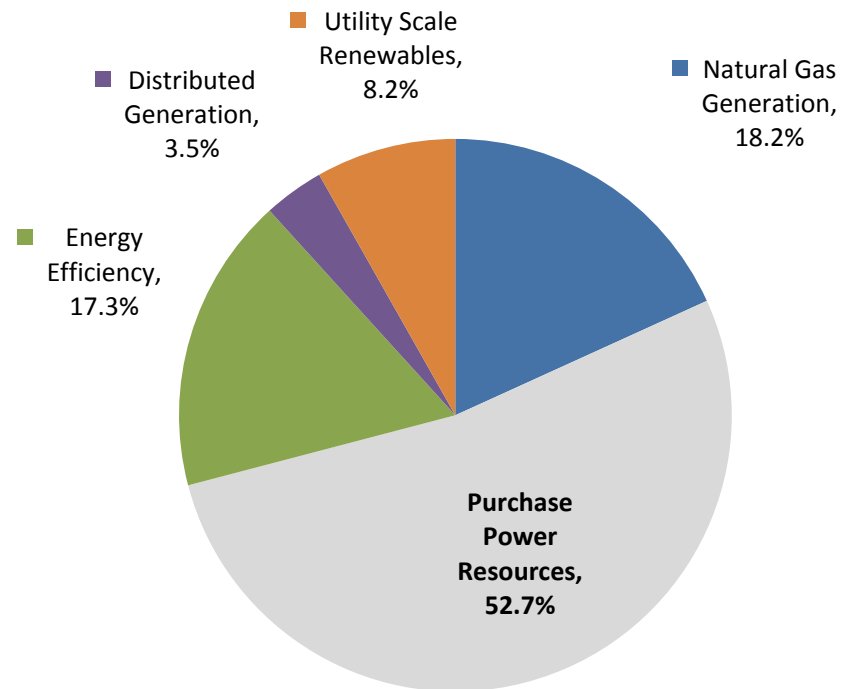


Fully Compliant with
Arizona Renewable
Energy Standard
15% by 2025

UNSE Resource Portfolio



Forecast Year 2012



Forecast Year 2027

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The footer contains a grid of links organized into five columns: 'Manage My Account' (Pay My Bill, View My Bill, etc.), 'Green Energy' (Rebate Programs, Home Energy Audit, etc.), 'Community' (Events Calendar, Corporate Giving, etc.), 'Safety and Education' (Resources for Teachers, Classroom Materials, etc.), and 'About TEP' (Employment, Contact Us, etc.).

<https://www.tep.com/Projects/Planning/>



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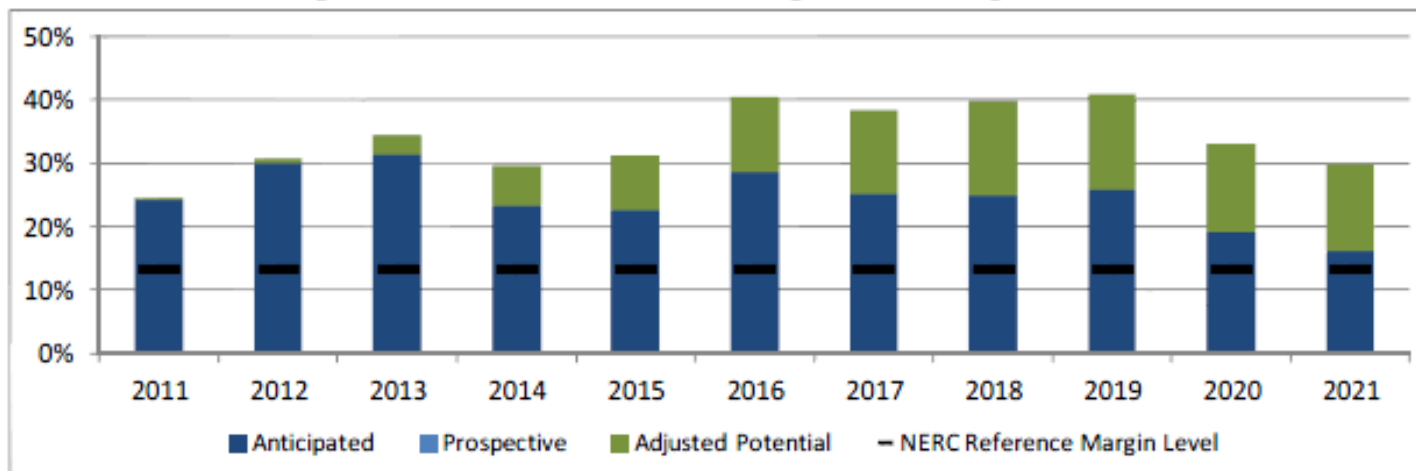
Appendix

Desert Southwest Reserve Margins

Desert Southwest (DSW)

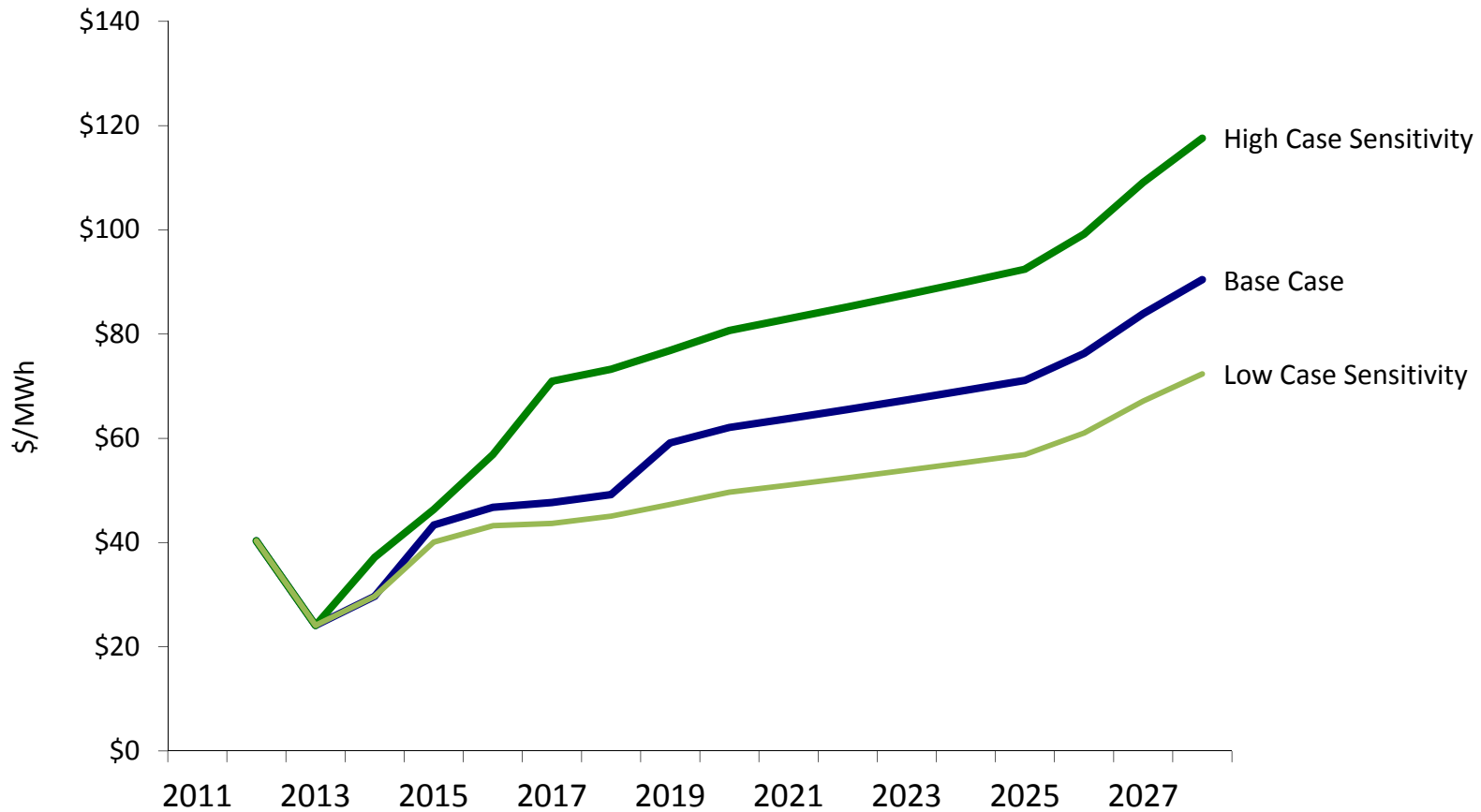
The Desert Southwest (DSW) subregion target Reserve Margins are 13.5 percent for the summer and 13.0 percent for the winter. The Anticipated Resources Reserve Margins are not projected to fall below the target Reserve Margins during the assessment period (Figure 131).

Figure 131: Annual On-Peak Planning Reserve Margins – DSW

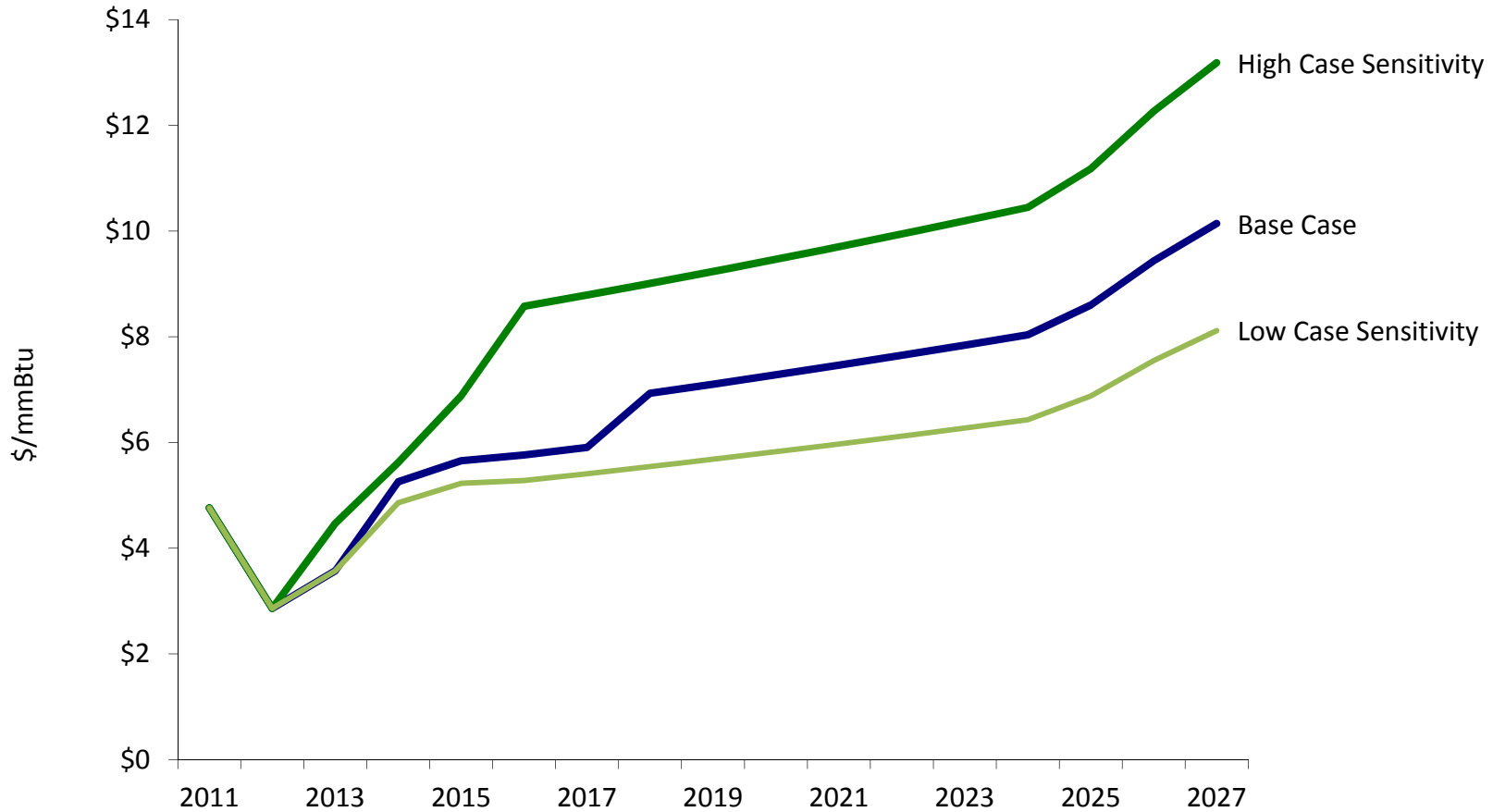


Source: NERC 2011 Long Term Reliability Assessment

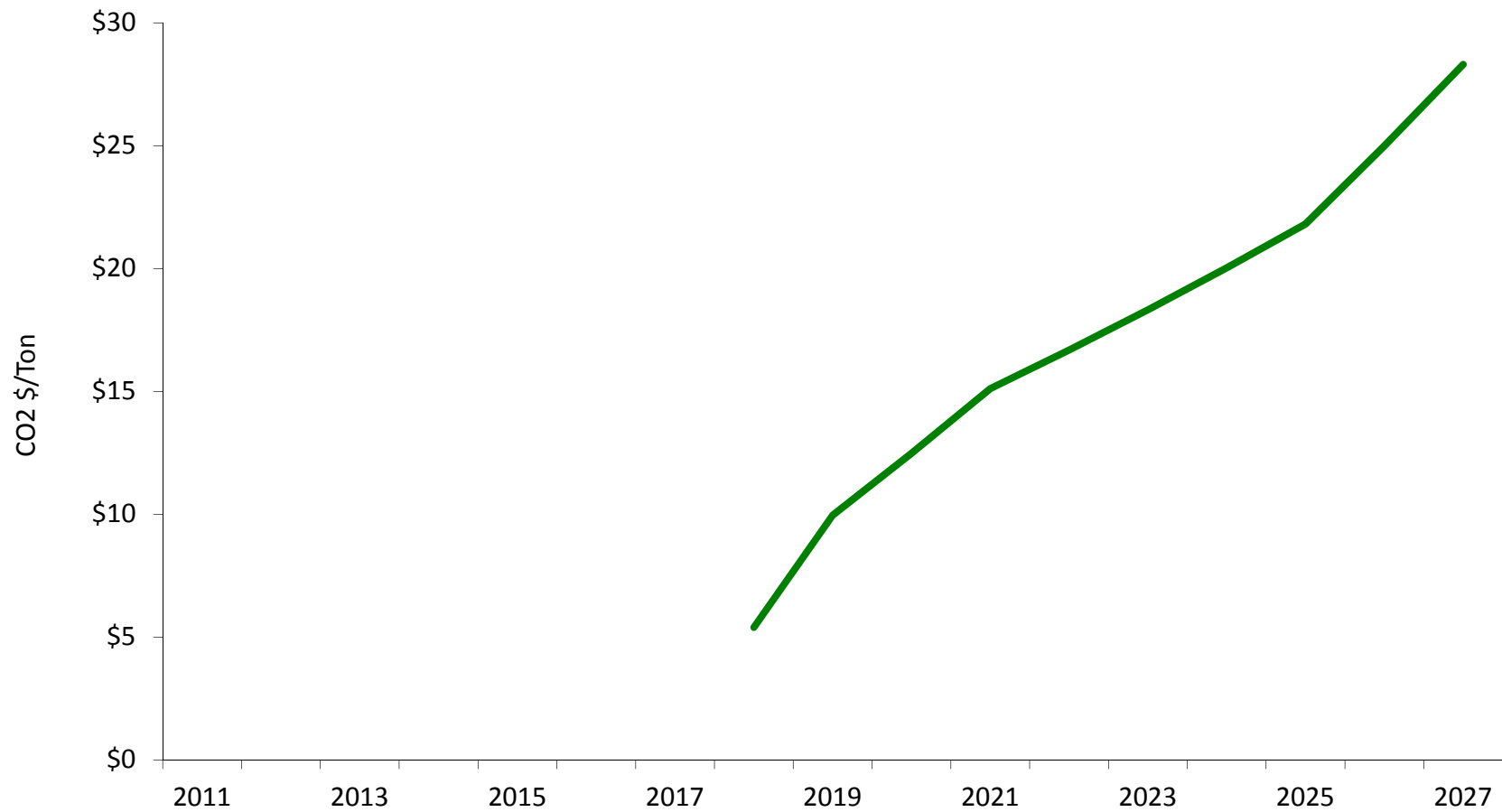
Palo Verde (7x24) Market Price Sensitivities



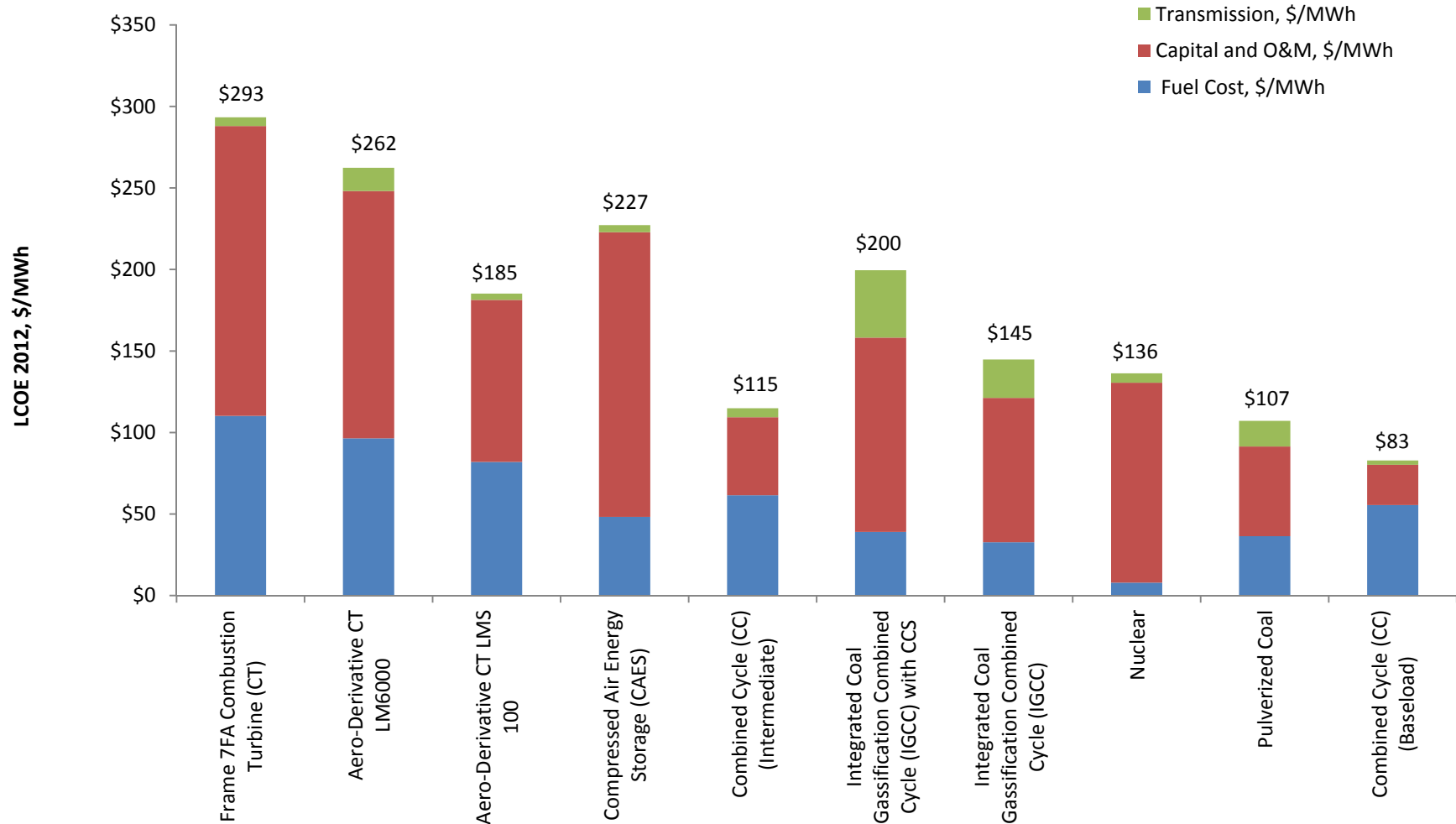
Permian Natural Gas Price Sensitivities



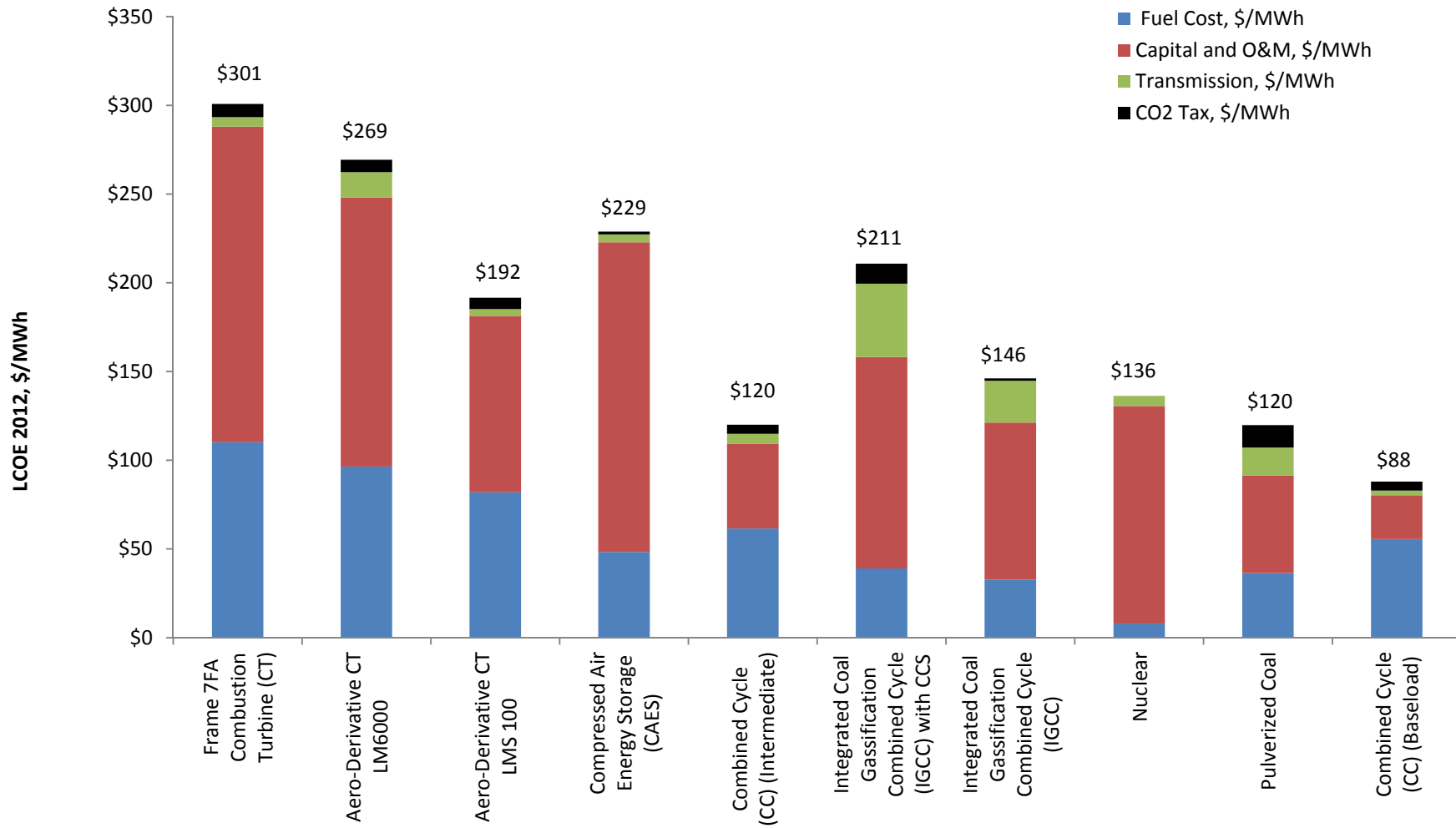
CO₂ Emission Prices, \$/Ton



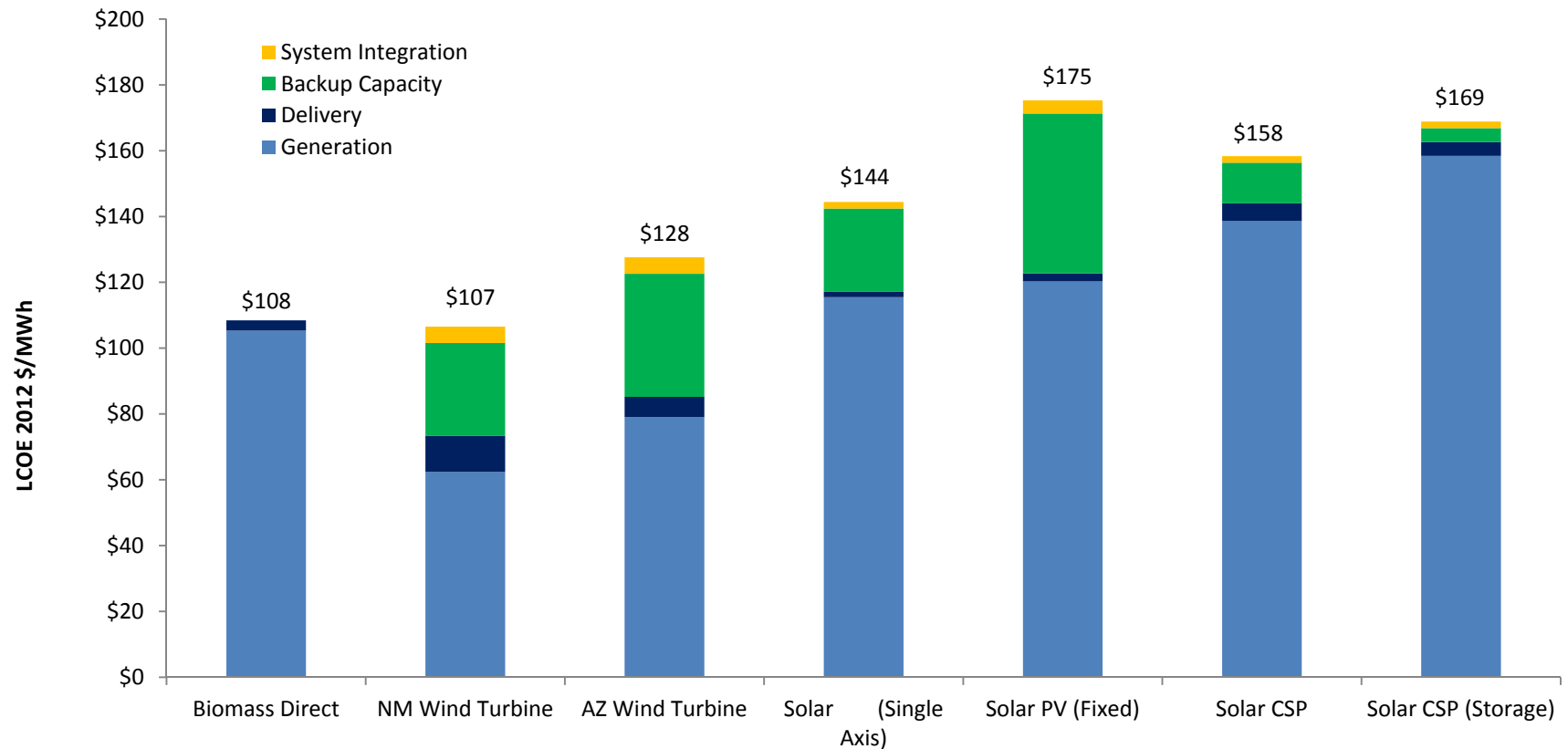
Levelized Cost of Conventional Resources



Levelized Cost of Conventional Resources with CO2 Tax



Levelized Cost of Renewable Resources



All resources assume 30% federal investment tax credit (ITC).