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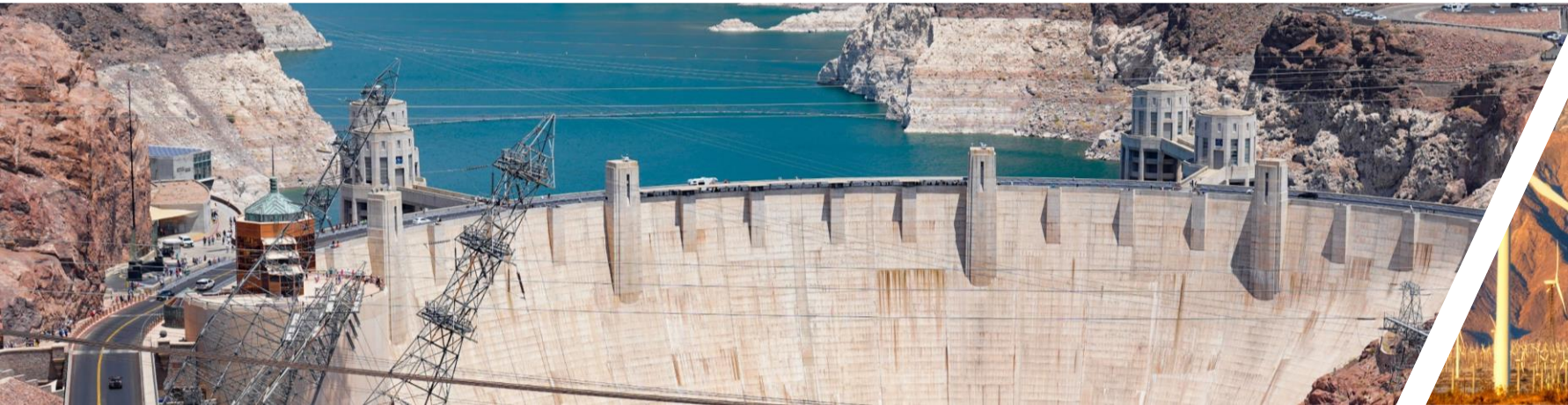


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THE CLAYTON HOUSE | SCOTTSDALE, AZ

## Doug Little U.S. Department of Energy







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## Regionalization and the Future of Transmission in the West







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## Customer Perspective: Changing Customer Loads





# Customer Perspective: Changing Customer Loads

Patrick Lee

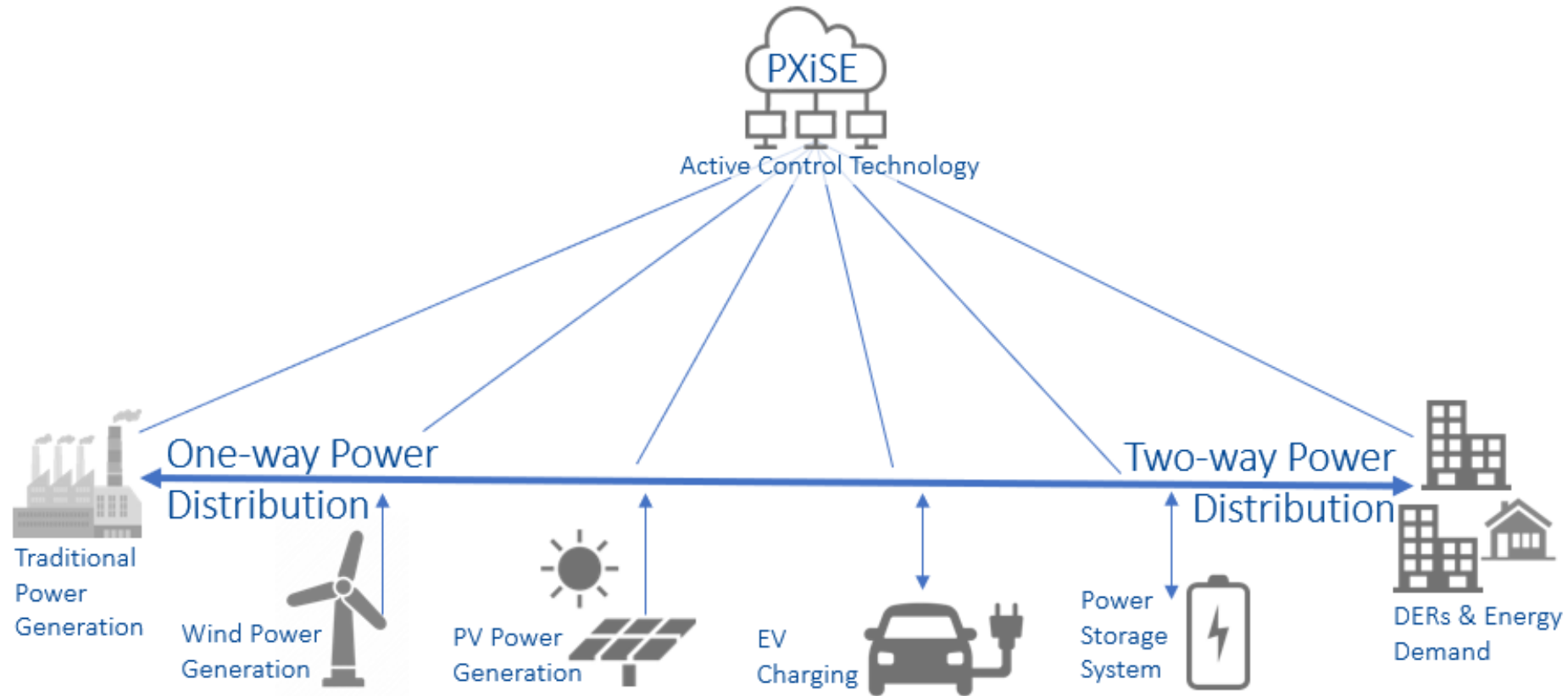
CEO PXiSE Energy Solutions

November 13, 2019



# A Changing Grid Requires New Solutions

## Advanced Controls + Energy Storage





# Western Australia DERMS

*8 1-MW natural gas-fueled generators*

*1-MW diesel-fueled generator*

*1 MW solar power generation*

*2 MW/1.25 MWh battery storage*

## Technical Objective

- Integrate hundreds of customer DERs with utility assets

## Customer Motivations

- Decrease electricity generation costs and provide more sustainable electricity
- Provide reliability and stability to the grid across the utility's vast territory







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## Customer Perspective: Changing Customer Loads







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# Coffee & Networking Break

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## Utility Perspective: Changing Load Profiles





# Changing Load Profiles

November 13, 2019

Jeff Burke  
Director, Resource Planning



# APS OVERVIEW

## Company

- Serving AZ since 1886
- AZ largest tax payer
  - \$3.4B annual economic impact
- 34,646 square mile service territory

## Customers

- 1.2 million (90% Residential)

## Peak Demand

- ~7,500 MW
- Summer peaking

## Generation and Energy Mix

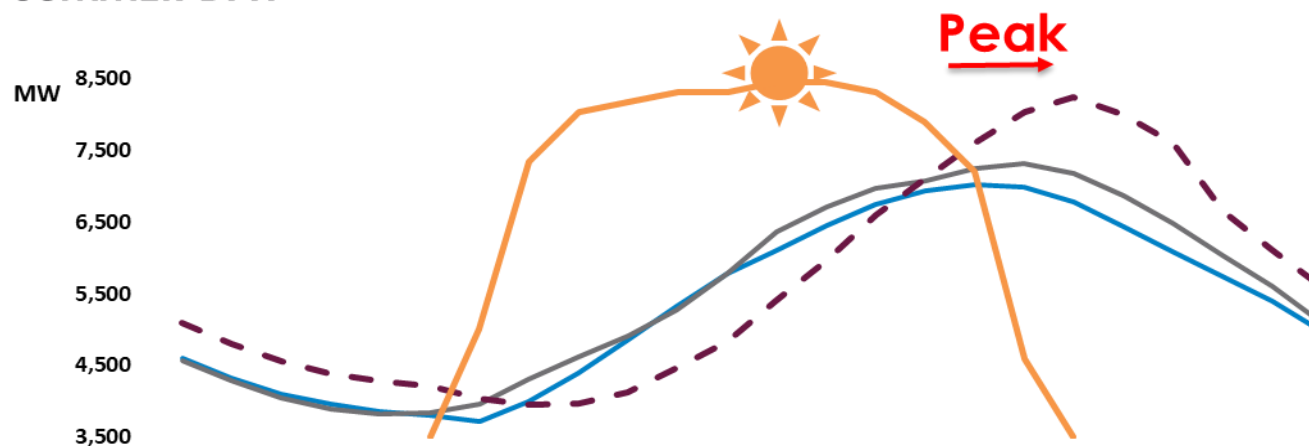
- About 6,300 MW of owned Capacity
- Approaching 2000 MW of renewables on system
- Diverse energy mix is over 50% clean





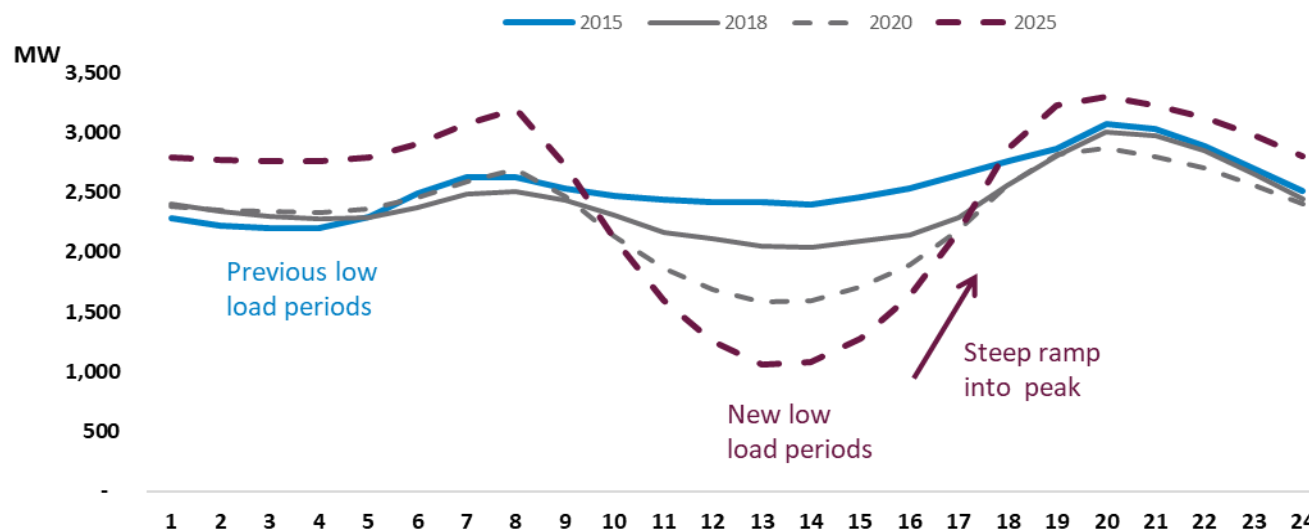
# SYSTEM LOAD SHAPE CHANGES

## SUMMER DAY



System peak is moving later in the evening

## NON-SUMMER DAY



Mid-day energy is plentiful

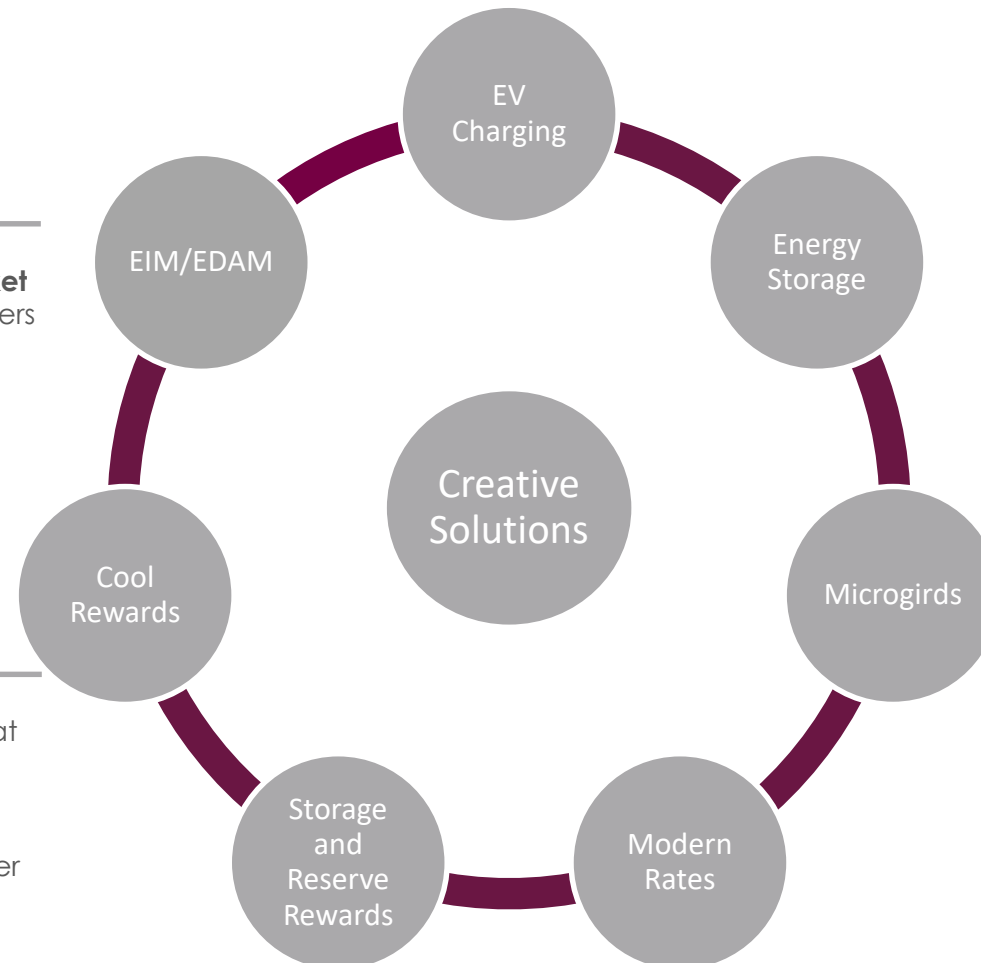
# LOAD SHAPE CHANGES CREATE OPPORTUNITIES

## Regional Market Participation

**Energy Imbalance Market (EIM)** has saved customers over \$120M to date – discussions ongoing to move to Day Ahead format (**EDAM**)

## New Customer Programs

**Cool Rewards** thermostat program & **EV charging** focused on low price periods. **Sustainable Futures** to meet customer energy objectives



## Flexible Resources

**Energy storage** will discharge clean energy during system peak and may reduce some renewable curtailment

## Rate Incentives

**Incentivizes** relieving strain on the system with rates that reflect system dynamics





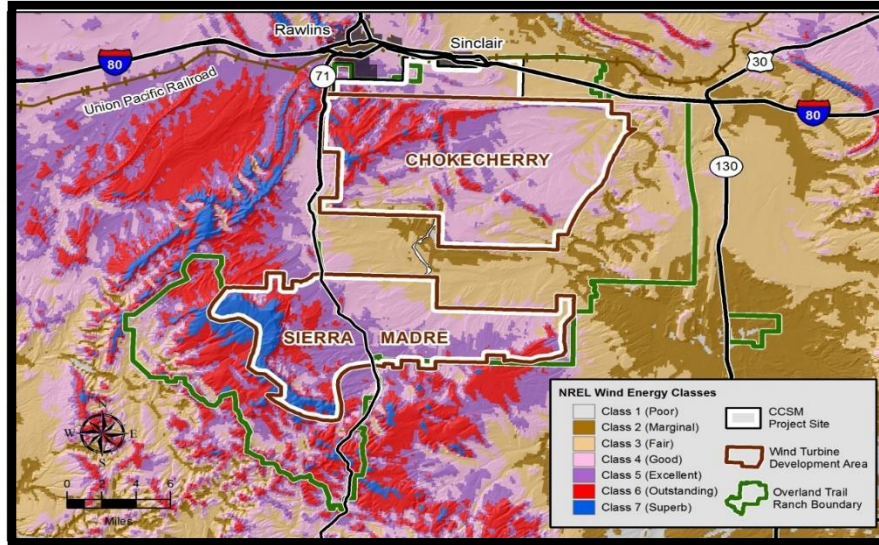
- The Anschutz Corporation is a privately held diversified company.
- TAC has successfully developed a number of large infrastructure projects:
  - Railways (Southern Pacific)
  - National fiber optic networks (Qwest)
  - Entertainment venues (Anschutz Entertainment Group)
  - Oil and gas infrastructure
  - Pipelines and processing facilities

■ **Southwestern holdings include:**

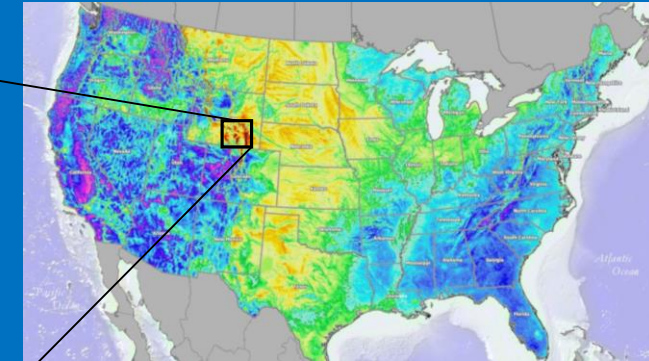
- |  |                         |
|--|-------------------------|
| — LA Live                                      | — T-Mobile Arena        |
| — Staples Center                               | — Utah Oil & Gas Assets |
| — Microsoft Theater                            | — Death Valley Oasis    |
| — JW Marriot, and Ritz-Carlton, Los Angeles CA | — Grand Canyon Railway  |
| — StubHub Center, Carson CA                    |                         |
| — Los Angeles Kings – NHL                      |                         |
| — Los Angeles Lakers - NBA                     |                         |



# Wyoming Wind Project Highlights



- ✓ Geographic diversity complements SW loads
- ✓ Provides strong night-time generation
- ✓ Reduced GHG emissions
- ✓ Fewer curtailments and exports
- ✓ Competitive price
- ✓ Net savings over other resource alternatives
- ✓ Facilitates the EIM regional energy exchange

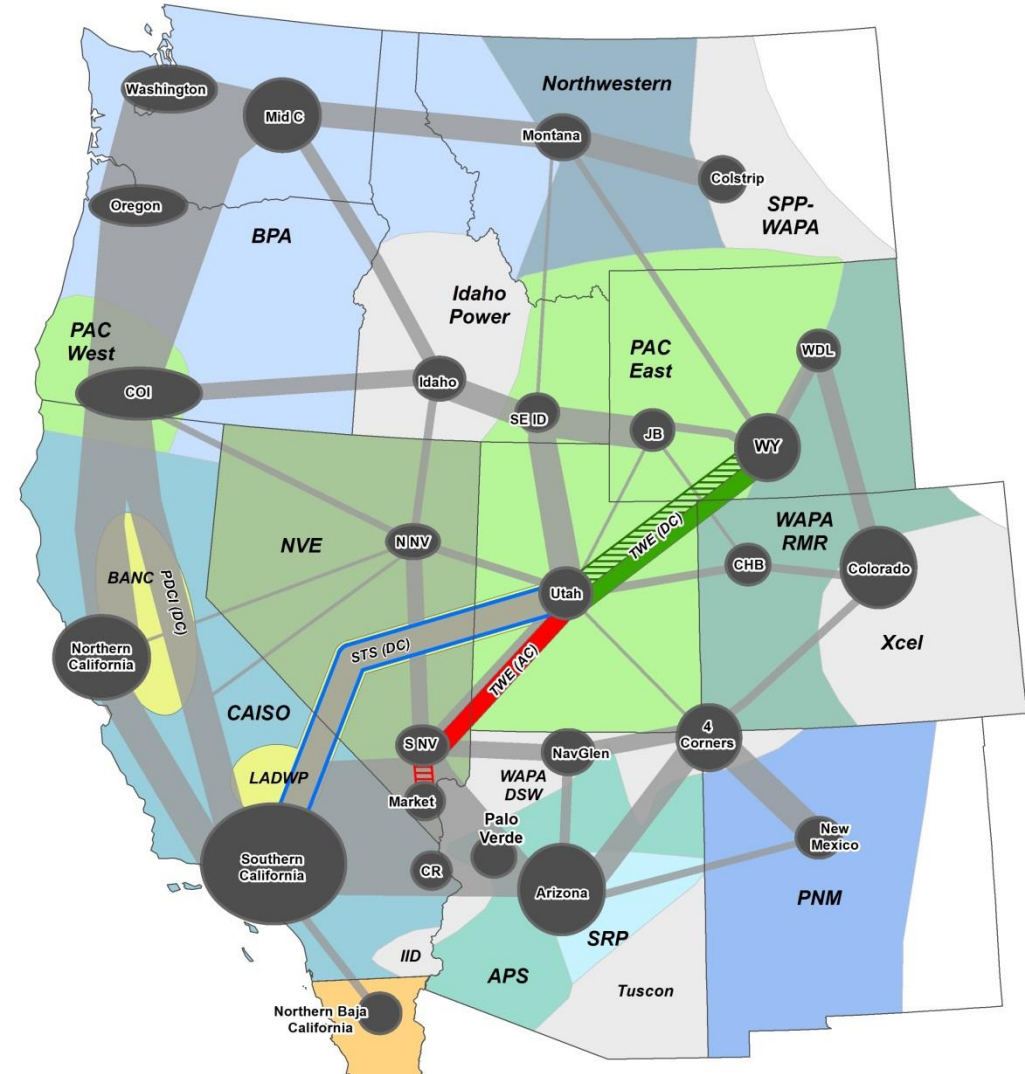


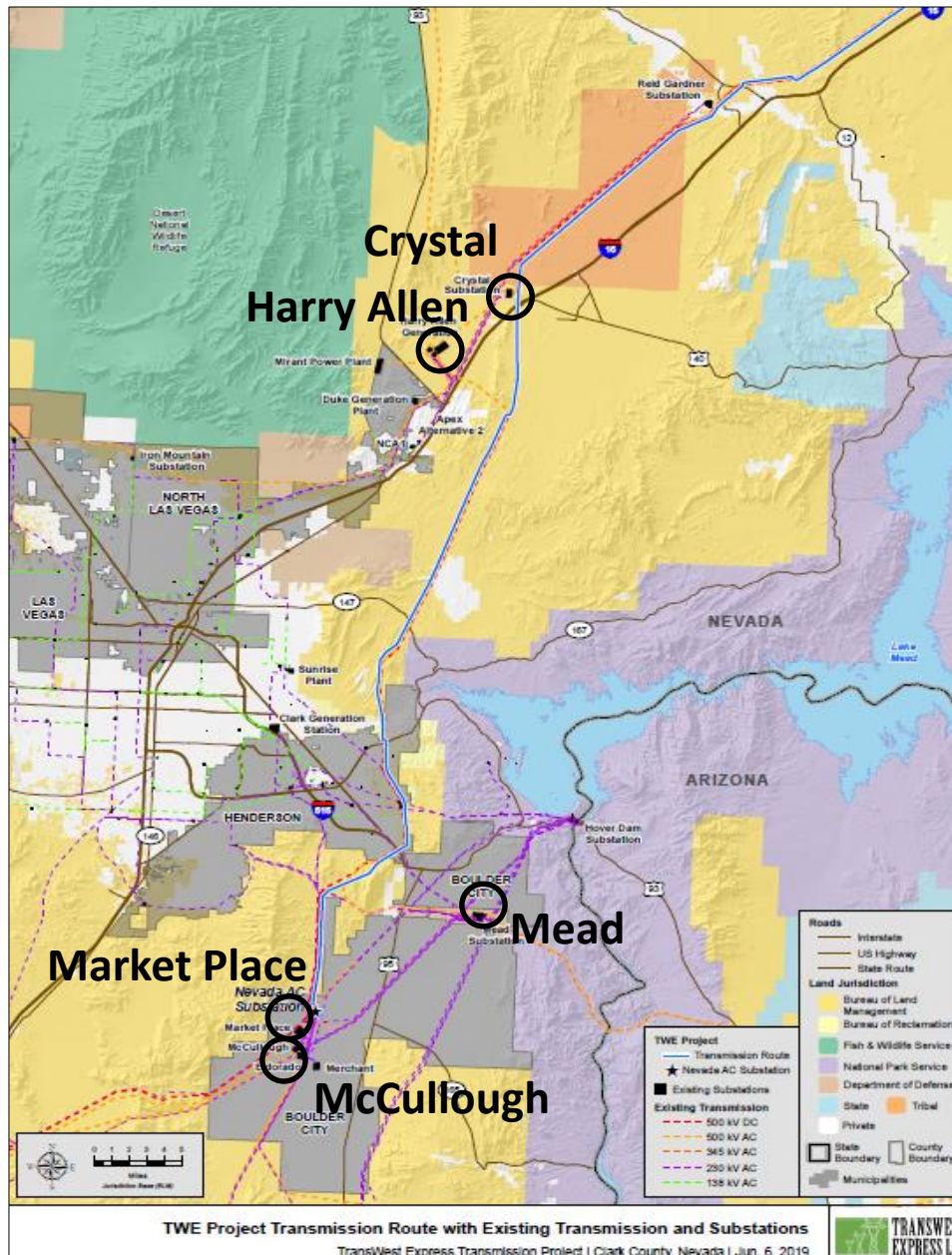
- **Highest-quality wind resources** in the Western U.S. are in the Rocky Mountain Region in **Wyoming**
- **We lack transmission** to connect CA/AZ/NV to this resource
- Economic studies consistently show WY wind plus the cost of transmission **provide a net benefit** if added to California RPS portfolios



# TransWest Express Transmission Project

- ✓ Interregional **transmission expansion** adding grid capacity and resilience
- ✓ Environmental and economic **good neighbor**
  - Approved following highest level of federal environmental analysis
  - 1,000+ mitigation measures assure resource conservation, protection
- ✓ **Federal authorization complete;** local permitting and ROW complete by the end of 2019
- ✓ Provides the market access to highly **reliable, cost-competitive, diverse, complementary** renewable energy resources available in Wyoming and Utah





# TWE Project

## Nevada Substations

Only major connection between CA/AZ/NV and geographically diverse Wyoming wind resource areas

Offers access to important substations already delivering power to CA/AZ/NV through existing transmission

Increased transfer capacity facilitates EIM and facilitates a regional market



# Changing Loads – Developer Perspective

## Changing Load Profiles

- Net load (minus solar) is turning things upside down
- Demand-side innovations are changing loads
- Electric vehicles & building electrification will change shapes

## Changing Customer Profiles

- The rise of the corporate buyer
- The customer who cares where his power comes from
- The customer who generates her own power



## Developer Response

- Develop in resource areas that compliment these changing profiles
- Develop transmission that accesses those areas and promotes intra-regional exchange of energy
- Develop new products like storage and shaped products
- Offer creative structures that help customers achieve objectives



**We're Building the Future**

**Jerome Davis, Regional Vice President, Xcel Energy—Colorado**





# What's changing?

(What isn't!)

Our customers. Our communities. Our investors. Technology. The market. Our ability to form partnerships and explore collaboration to get things done.



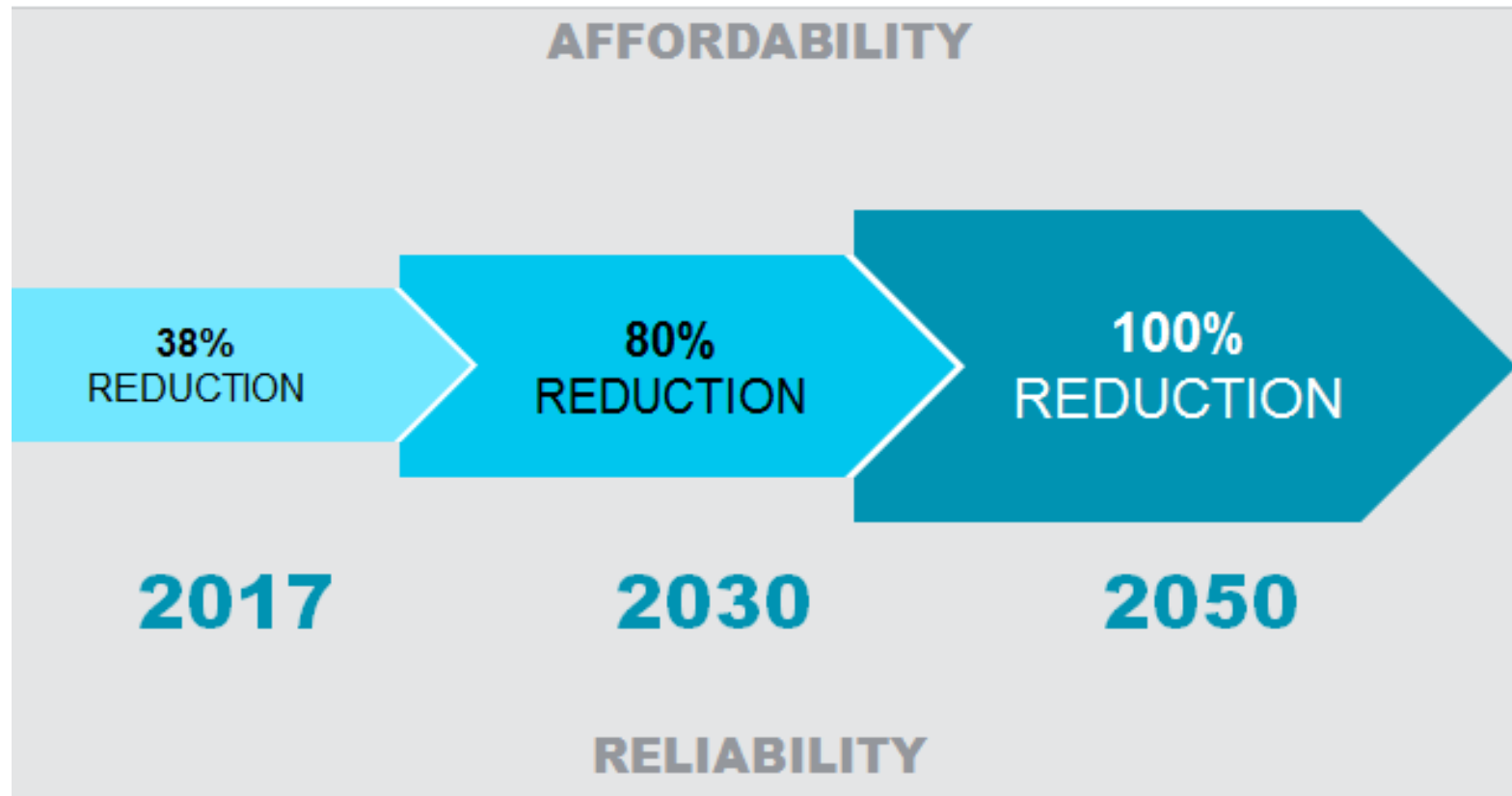
## Benefits of a healthy Utility



More choices, more services, more options to customize your experience, more ways to save, for everyone from the smallest home to the biggest manufacturer.



# Xcel Energy's carbon-free vision



# Achieving the carbon-free vision

## Shared objectives

- Protect affordability, reliability
- Reduce carbon
- Advance technology

## Plans already underway

- Coal transition
- Economic renewables (Steel for Fuel)
- Energy storage deployment
- Choices for customers

## Future initiatives

- Carbon-free 24/7 resources
- Flexible demand
- Long-duration storage
- Strategic electrification
- Financial and regulatory policy support

***Encourage and reward investment in efforts that achieve the greatest carbon reductions at the lowest cost***





Let's build the future together!

[Jerome.Davis@xcelenergy.com](mailto:Jerome.Davis@xcelenergy.com)







## AEC Southwest Energy Conference 2019

Angie Bond-Simpson

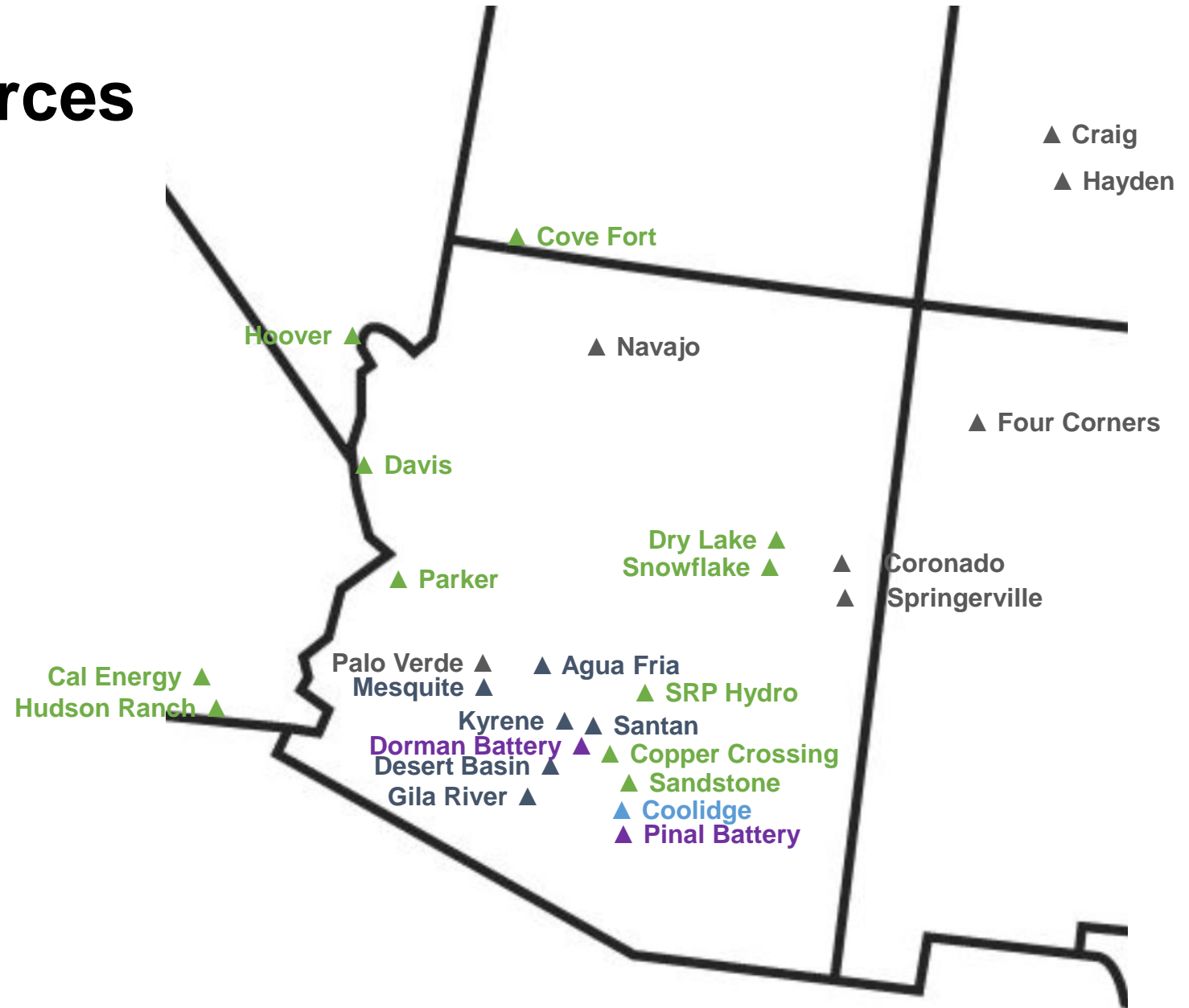
Manager, SRP Resource Analysis & Planning



Delivering water and power™

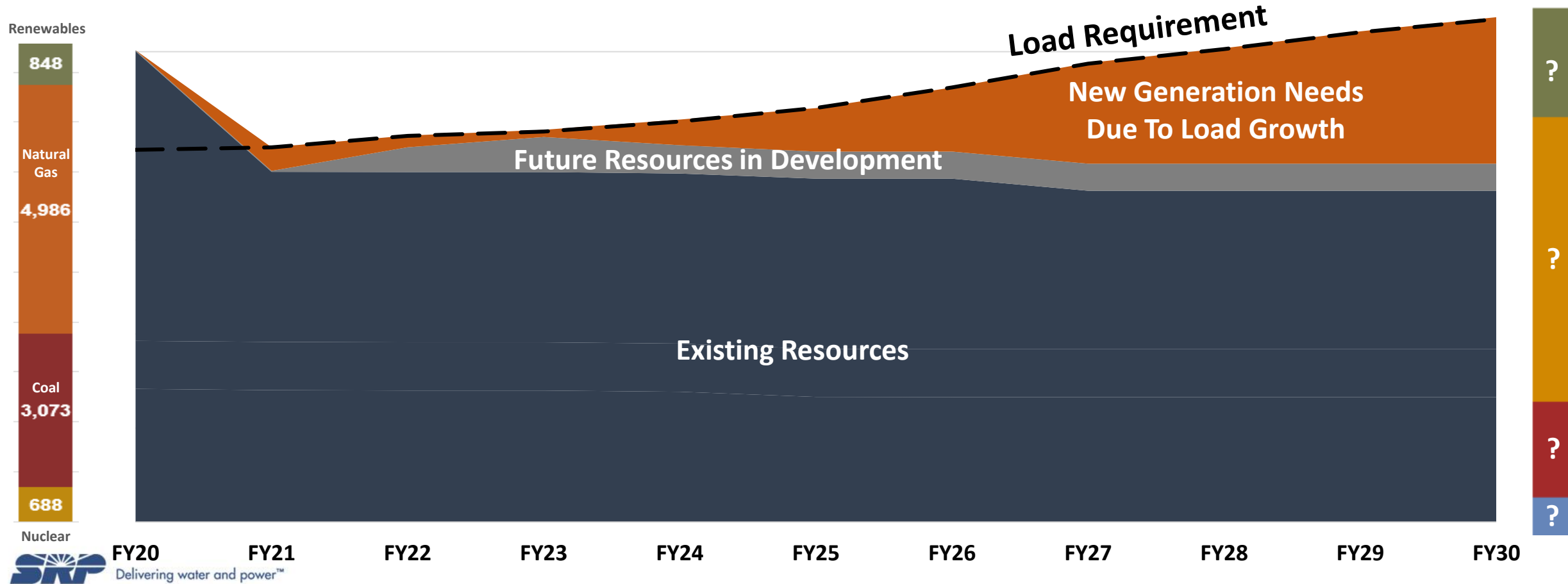
# SRP Generation Resources

- SRP meets retail load with a combination of local, state, and interstate resources
- Topography, land use, infrastructure, fuel availability and system needs contribute to the economic placement of resources
- Solar is currently the most economic renewable resource to meet Valley energy needs



# Meeting Long Term Demand

## Peak Demand & Capacity (MW)





# SRP's Resource Strategy

## Stakeholder/ Customer driven

### Resource Strategic Directions



Further reduction in coal generation; address implications for employees and communities



Grow renewables portfolio to reduce CO<sub>2</sub> intensity and manage costs; expand opportunities for customer dedicated projects



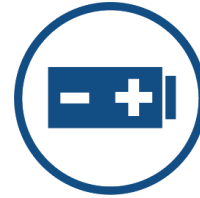
Develop and promote new customer-side demand management programs, focusing on those with peak demand reduction benefits



Preserve option for new nuclear generation in mid-to late-2030's with focus on small modular technology



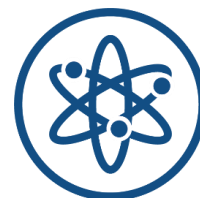
Develop flexible natural-gas generation options to meet peak demand and integrate renewables



Seek cost effective battery alternatives before making major commitments to new gas generation



Expand participation in regional transmission markets



Pursue pilot projects and research and development efforts for innovative applications of new power generation, load management, energy storage, and electrification



Delivering water and power™

# SRP's Low-Carbon Resource Path

Increasing transformation



	Major features	Reductions from FY05 (%)
<b>2005 Baseline</b>	<ul style="list-style-type: none"> <li>• <b>1,429 lbs/MWh (Intensity - actual)</b></li> <li>• 38.1 billion lbs (Mass - actual)</li> </ul>	--
<b>Fiscal Year 2021 Projection (post NGS)</b>	<ul style="list-style-type: none"> <li>• <b>870 lbs/MWh (2021 intensity projection)</b></li> <li>• 27.8 billion lbs (2021 Mass – estimate)</li> </ul>	<b>~ 39% Intensity</b> ~ 27% Mass
<b>2035 Goal: Transform with Solar, Storage and Gas</b>	<ul style="list-style-type: none"> <li>• <b>550 lbs/MWh (2035 Intensity Goal)</b></li> <li>• 21.9 billion lbs (2035 Mass estimate) <ul style="list-style-type: none"> <li>• Substantial coal reductions to ~ 400 MW equivalent</li> <li>• 1,000 MW by 2025 Solar Plan</li> <li>• Add peaking (gas, solar + storage) mid-2020s</li> <li>• Additional solar &amp; storage (2025-2035)</li> </ul> </li> </ul>	<b>~ 62% Intensity</b> ~ 42% Mass
<b>2050 Goal</b>	<ul style="list-style-type: none"> <li>• <b>143 lbs/MWh (2050 Intensity Goal)</b></li> <li>• 6.6 billion lbs (2050 Mass Estimate)</li> </ul>	<b>~ 90% Intensity</b> ~ 83% Mass

\* Projected values from FP20 forecast

# News Release



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SRPConnect on:     

Patty Garcia-Likens  
(602) 245-0047  
[Patty.Likens@srpnet.com](mailto:Patty.Likens@srpnet.com)  
Twitter: @SRPpatty

FOR IMMEDIATE RELEASE

December 17, 2018

## Commercial and Municipal Customers Sign up for Solar Energy from SRP

As part of its ongoing commitment to provide more options for commercial and municipal customers to achieve their sustainability goals and provide clean, renewable energy, Salt River Project announced that several large customers have signed agreements to get a portion of their energy from the sun.

Participating customers include entities such as Albertsons Companies, Inc., City of Chandler, City of Mesa, City of Phoenix, CMC Steel Arizona, CyrusOne, Digital Realty Trust, Freeport-McMoRan, Mesa Public Schools and Walmart.



## Program Goals

- Collaborate with commercial customers to reduce carbon emissions and meet respective sustainability objectives
- Offer commercial customers a cost-effective, direct method to increase the renewable portion of their energy profile
- Offer a new way to share the benefits of large-scale renewable resources with SRP customers





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## Utility Perspective: Changing Load Profiles







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# NV|5

Lunch Break

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## Gary Gold Office of U.S. Senator Kyrsten Sinema







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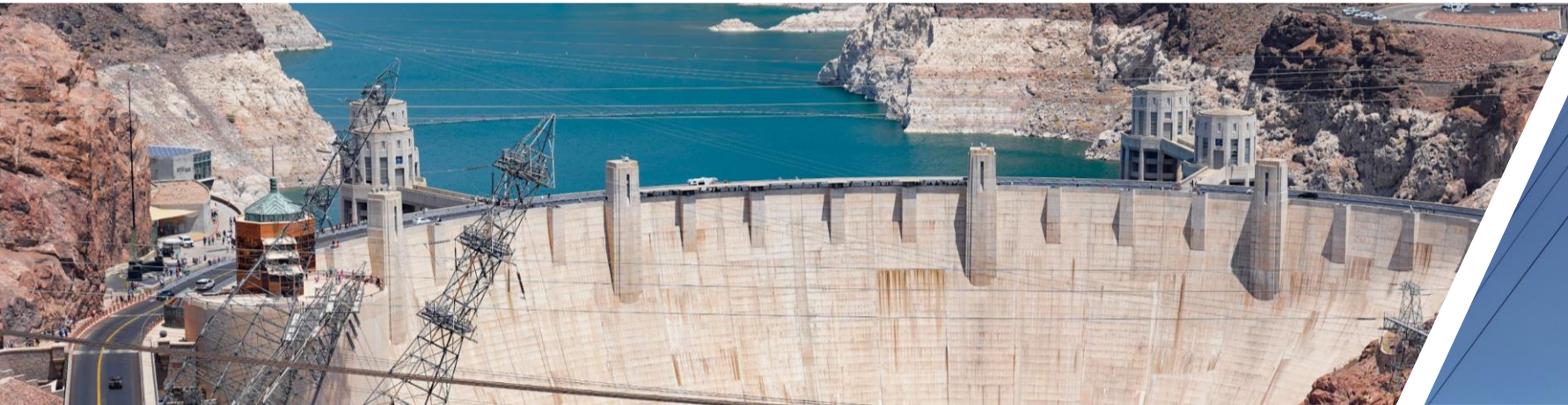


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## Commissioner Brenda Burman U.S. Bureau of Reclamation







— BUREAU OF —  
RECLAMATION

# Brenda Burman Commissioner



— BUREAU OF —  
RECLAMATION





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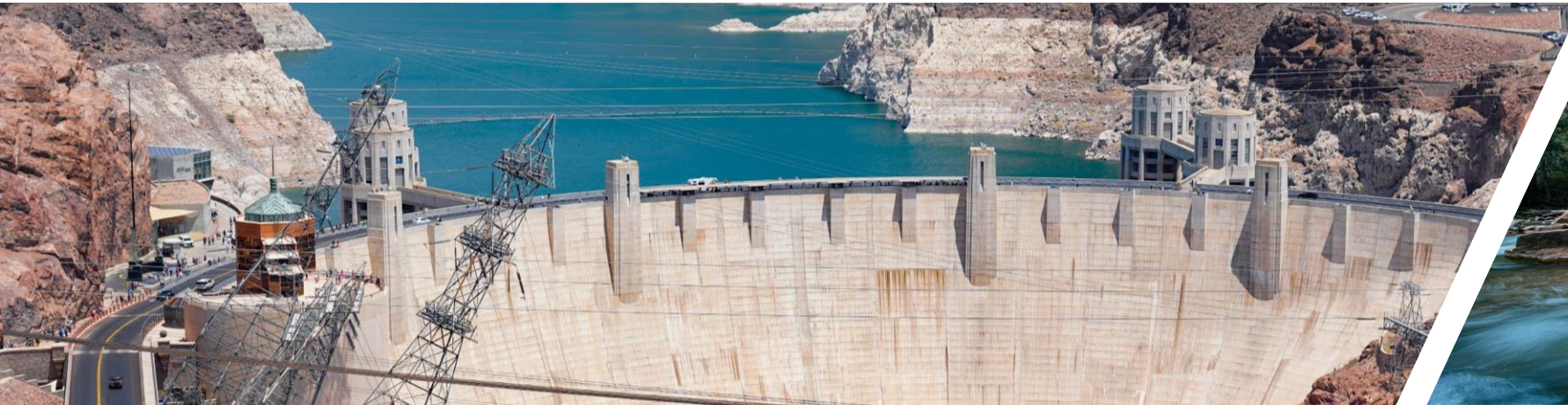


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## Energy Water Nexus & Drought Contingency Plan





# Bureau of Reclamation

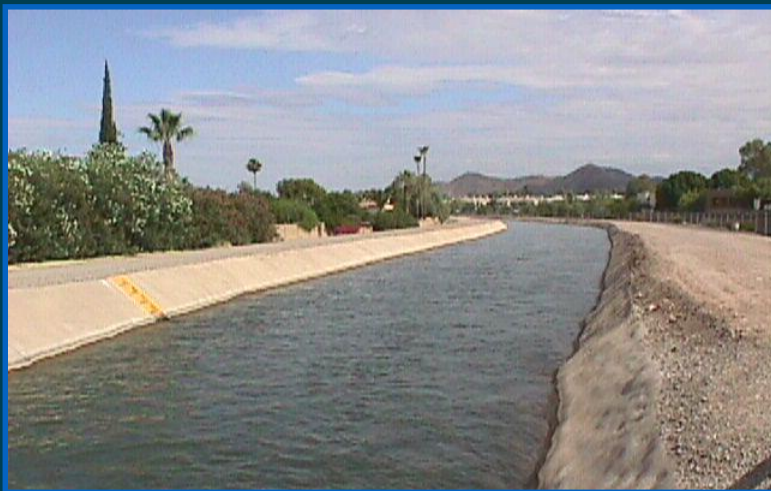
- Largest water provider in the 17 western States (479 dams and 348 reservoirs)
- Nation's second largest producer of hydroelectric power (44 bkh)
- Develops authorized facilities to store and convey new water supplies
- Committed to find ways to balance and provide a mix of water resources needed in response to changing supply and demand



## Central Arizona Project



## Salt River Project

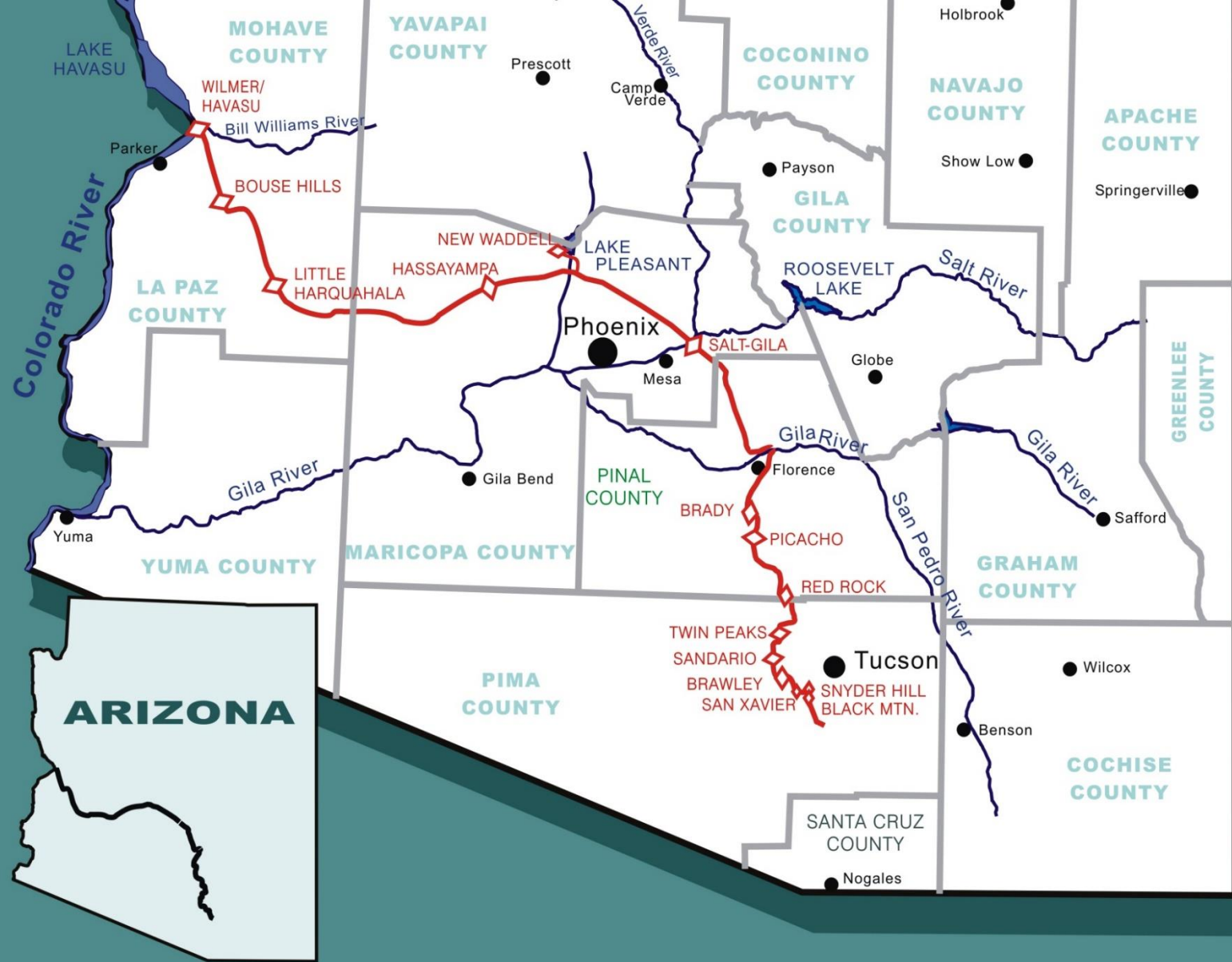






# — BUREAU OF — RECLAMATION



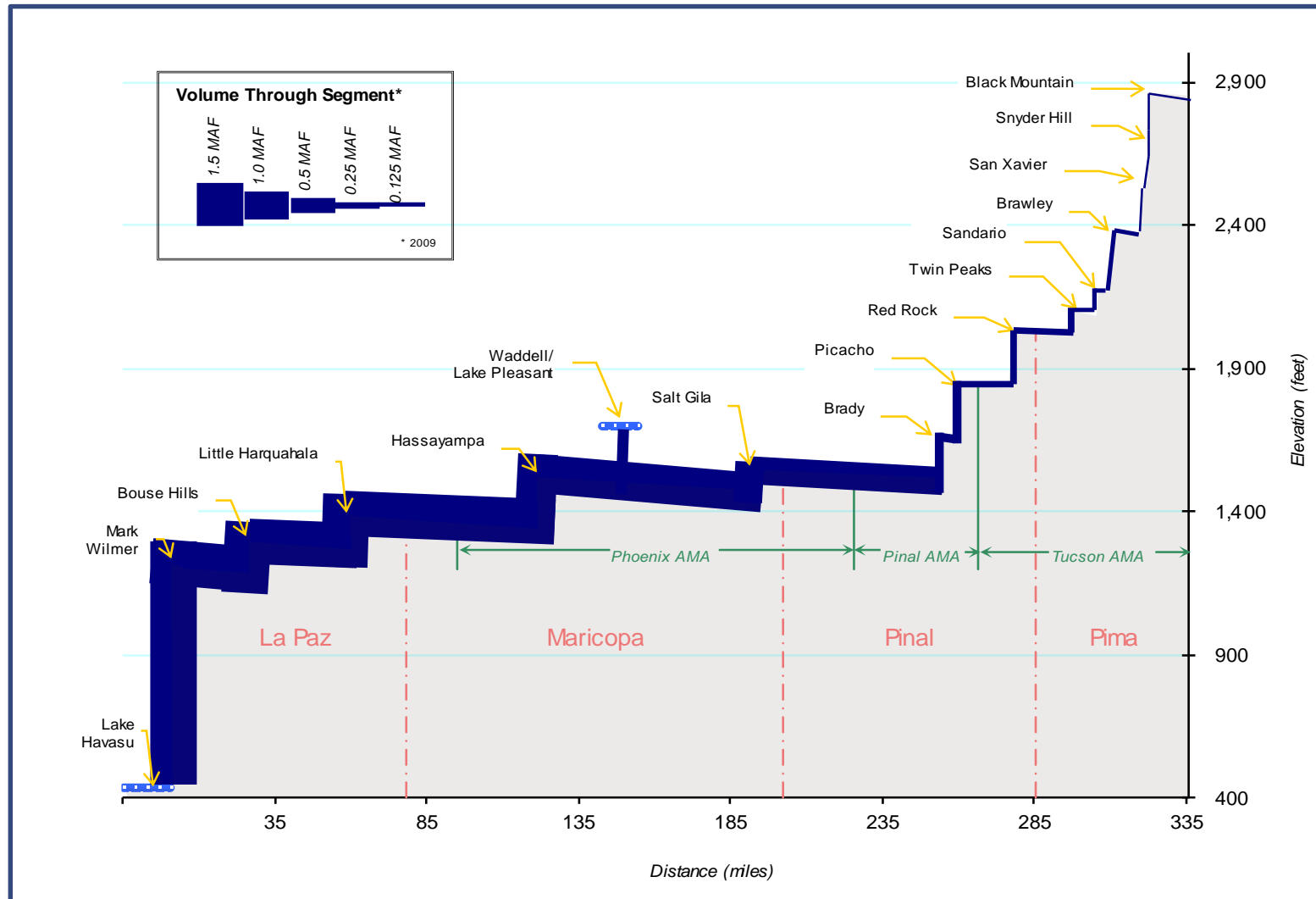




# CAP Aqueduct

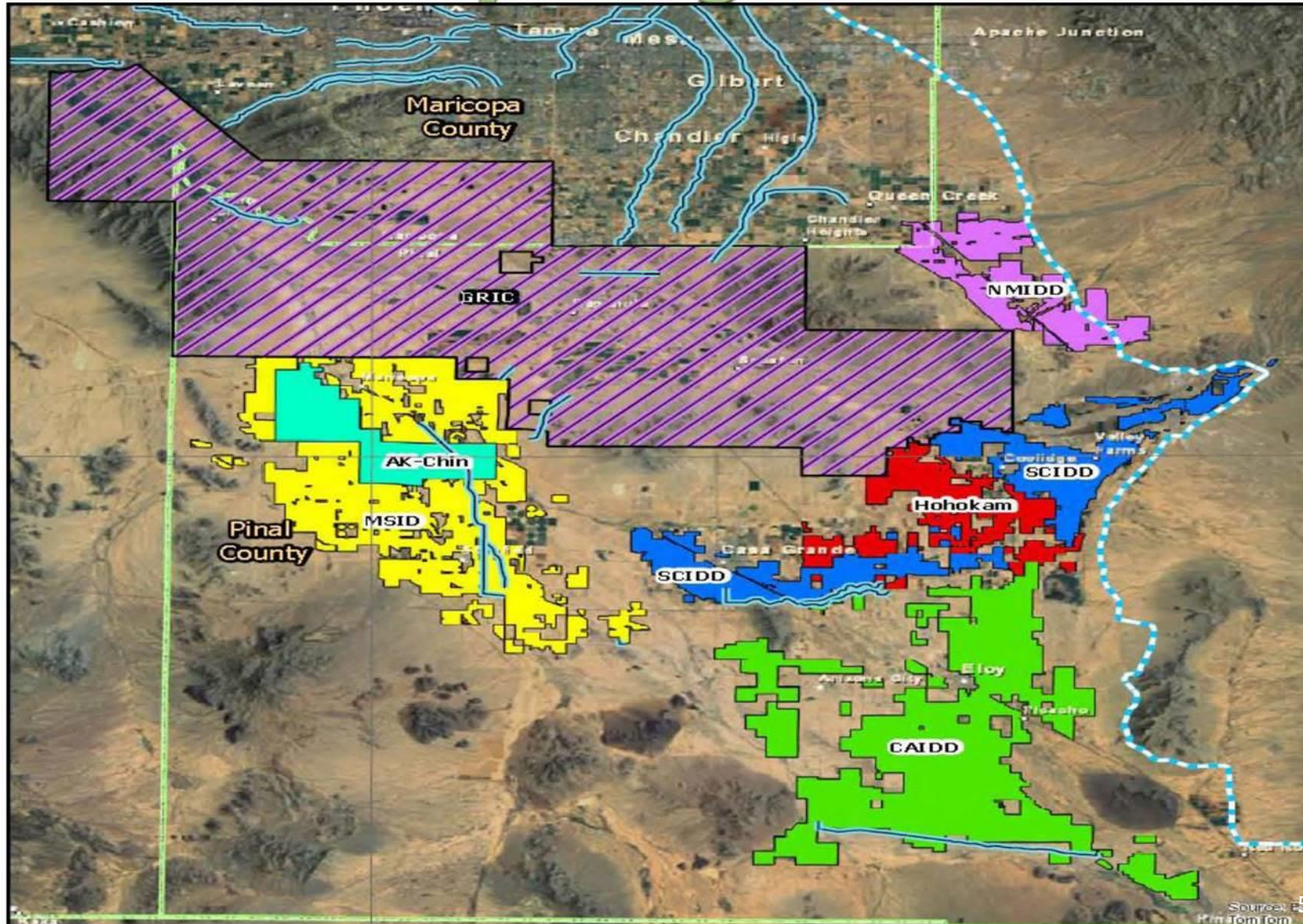


# CAP Lift Profile





# Pinal County Irrigation Districts



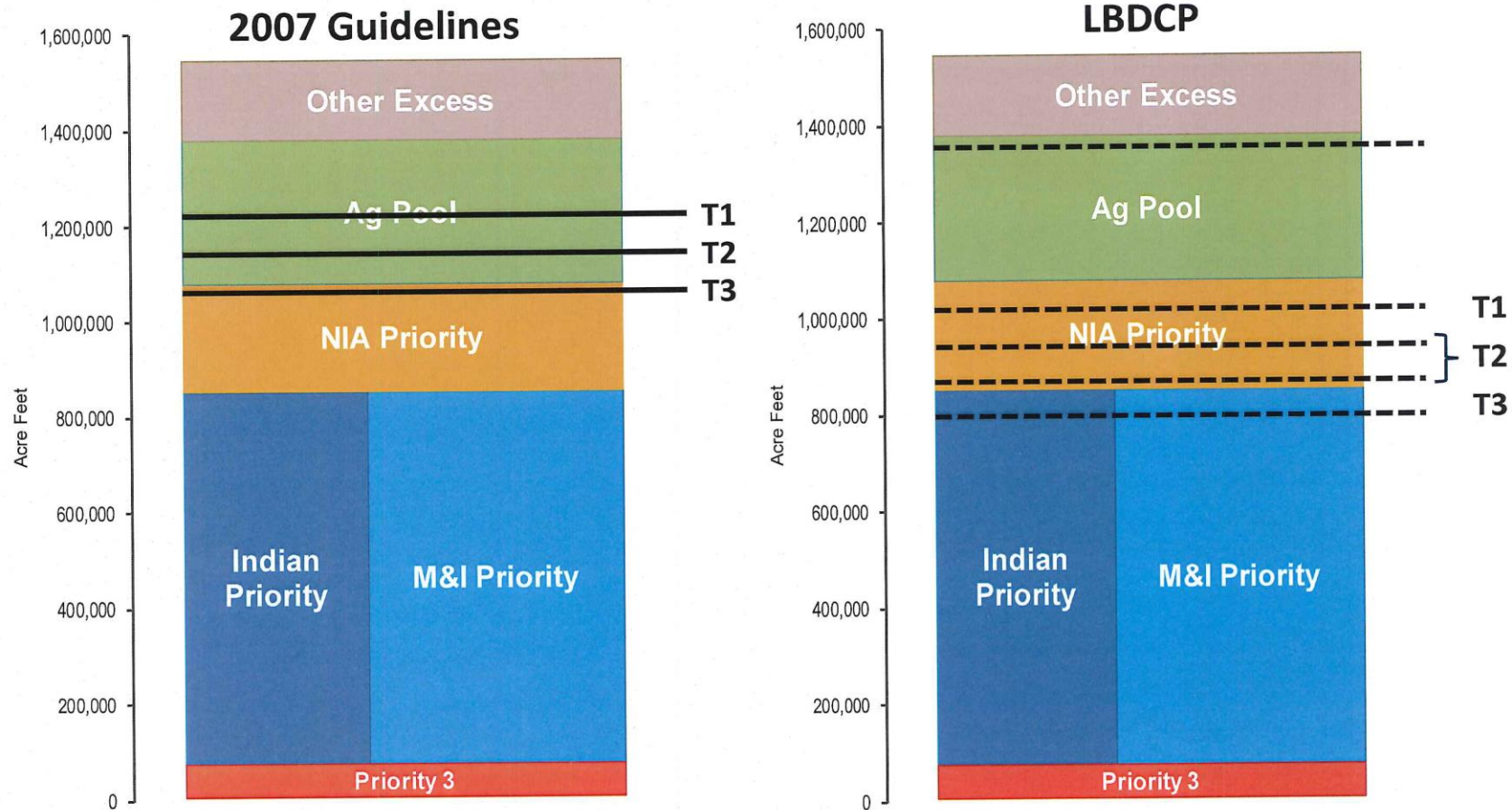


# Implementing DCP in Arizona

- These are the reductions and contributions required under the '07 Guidelines and the LBDGP:
  - “tier zero” (1090’): 192,000 acre-feet
  - Tier 1 (1075’): 512,000 acre-feet
  - Tier 2 (1050’): 592,000 acre-feet
  - Tier 2b (1045’): 640,000 acre-feet
  - Tier 3 (1025’): 720,000 acre-feet



# CAP Priority Pools & Shortage



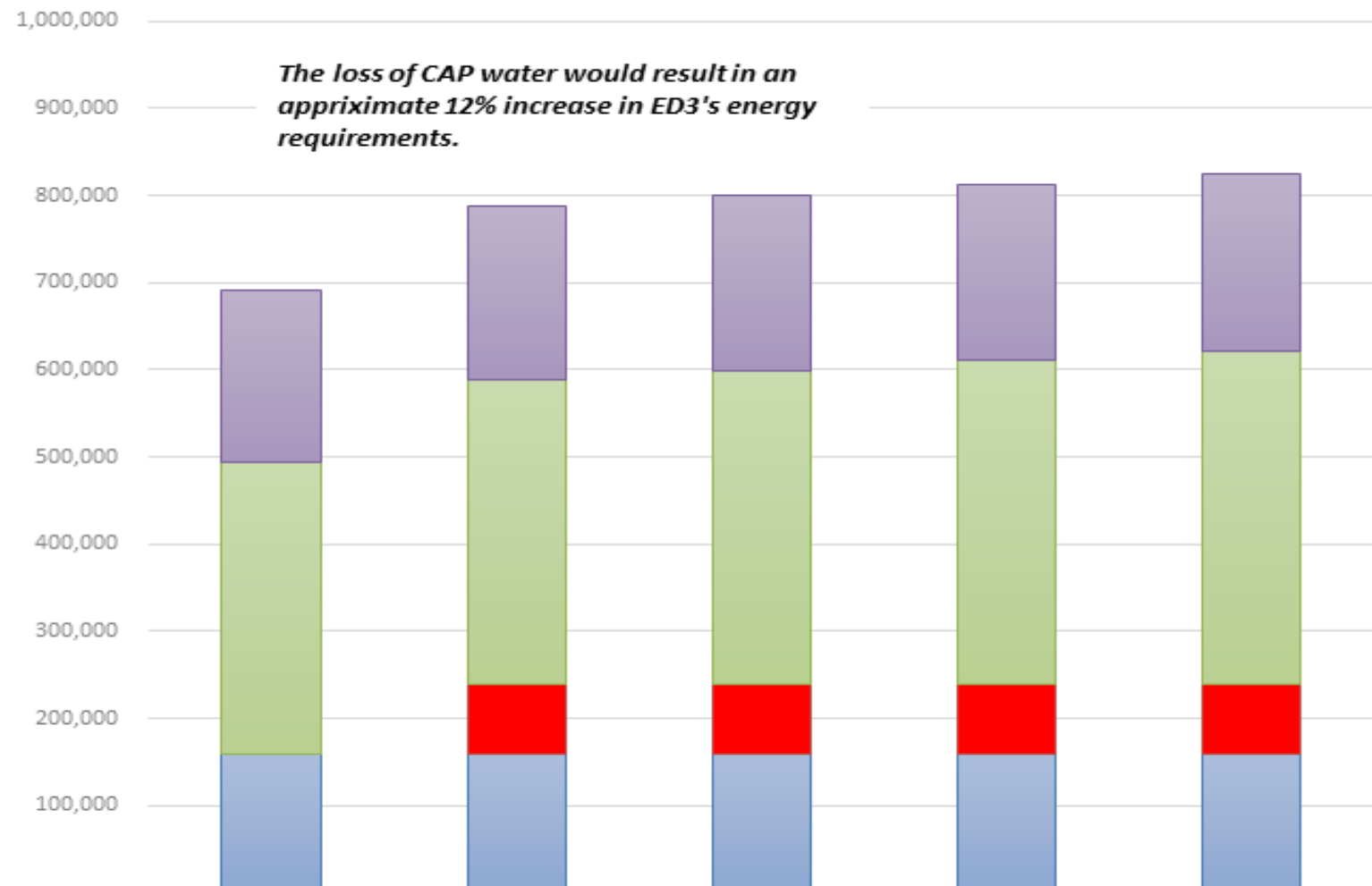
# AZ LBDCP Mitigation Projected Program Summary

	2020	2021	2022	2023	2024	2025	2026
Ag Pool	105 KAF Tier 1	105 KAF Tier 1	**	No CAP Wet Water Mitigation			
			70 KAF Tier 2a/2b	Groundwater Infrastructure Program 70 KAF / Yr			
NIA Pool	100% Tier 1/2a/2b	100% Tier 1/2a/2b	100% Tier 1/2a/2b	75%* Tier 1/2a	75%* Tier 1/2a	50%* Tier 2b	NO Mitigation  2026 or Tier 3
				* Until no supplies			



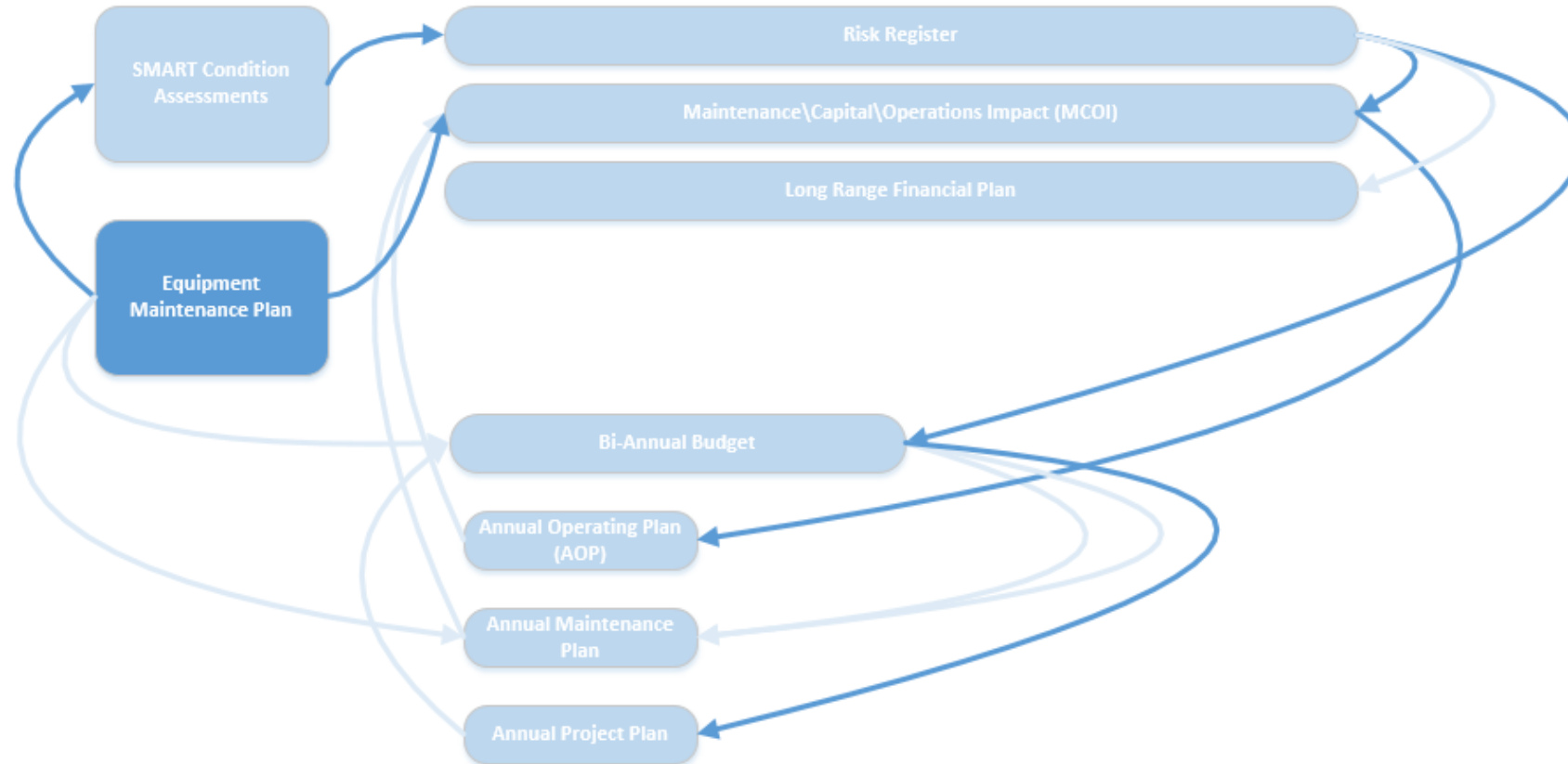


# Electrical District No 3 Forecasted Energy Requirements (MWh)



	2020	2021	2022	2023	2024
General Service	196,576	200,355	200,812	201,268	201,725
Residential	336,267	347,738	359,209	370,679	382,150
Additional Irrigation Pumping from the Loss of CAP Water		81,886	81,886	81,886	81,886
Irrigation	158,223	158,223	158,223	158,223	158,223

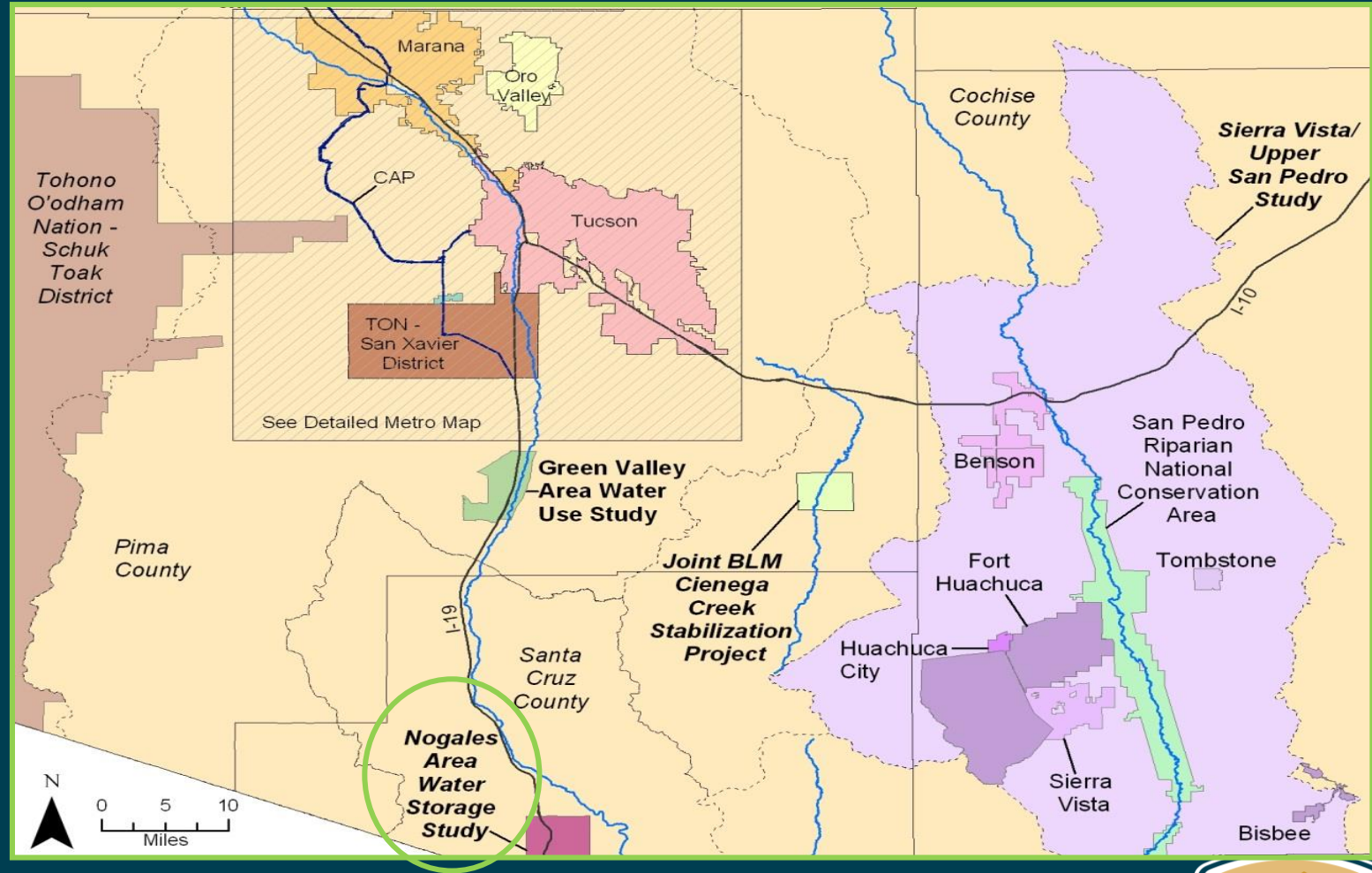
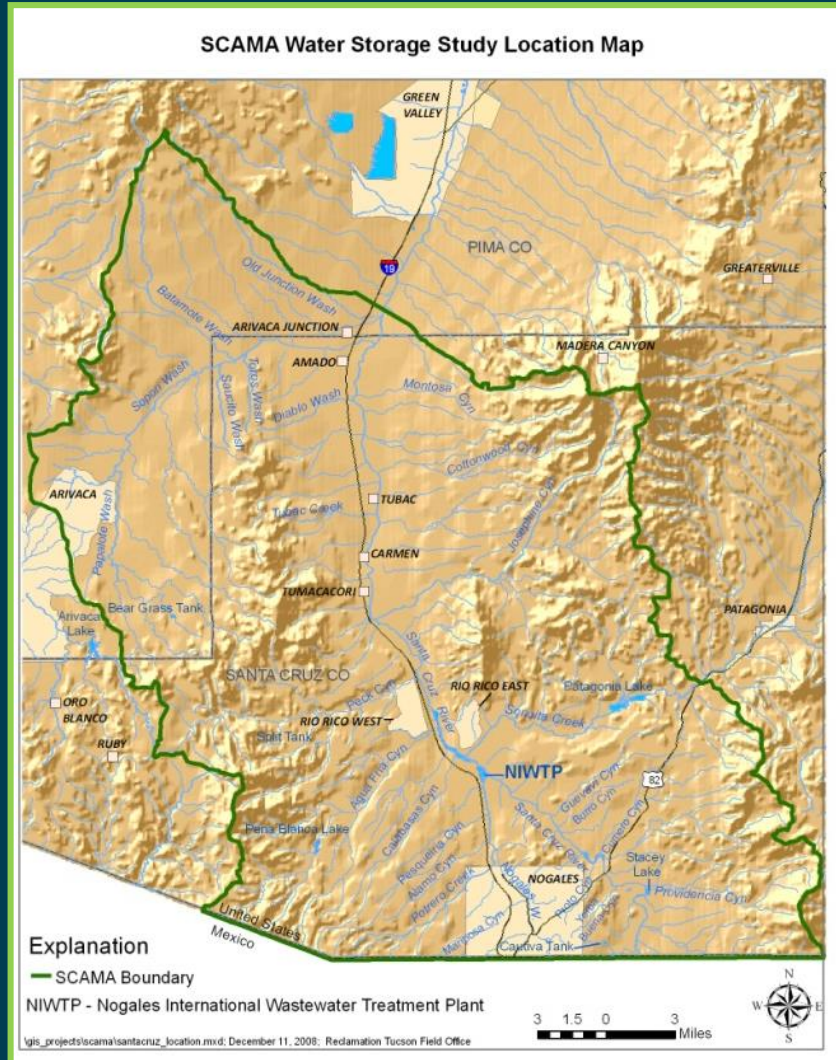
# Strategic Asset Management Plan



April, 2019 CAP Strategic Asset Management Plan



# SANTA CRUZ ACTIVE MANAGEMENT AREA WATER STORAGE STUDY





# Eloy and Maricopa-Stanfield Basin Study

Developing strategies to meet future water demands



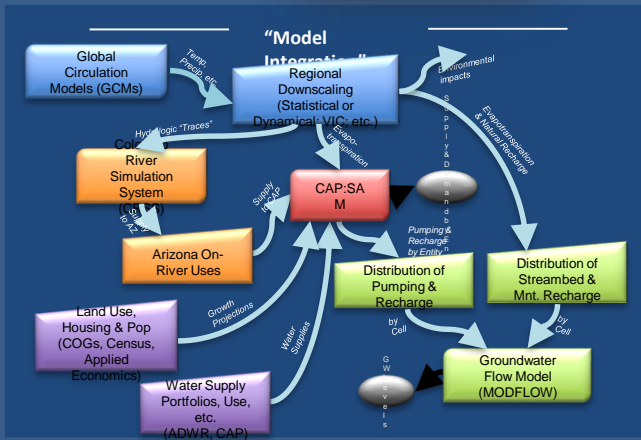
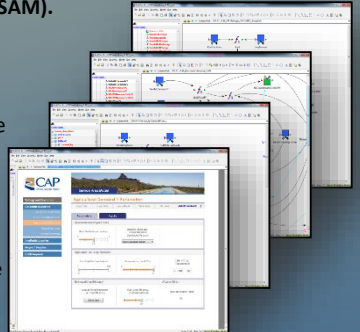
## Supply and Demand Analysis

- The EMS Basin Study will first assess the current quantity, location, and timing of current water supply including:
- Central Arizona Project (CAP) water
  - Surface water
  - Recycled water
  - Stormwater
  - Groundwater
- and demands including:
- Municipal
  - Industrial
  - Agricultural
  - Tribal
  - Other uses

The second step assess the future supply and demands to determine any imbalances using the **Central Arizona Project's Service Area Model (CAP:SAM)**.

**CAP:SAM**  
Tool for projecting supply and demand in CAP's three county service area.

- Accounts for complex legal and physical characteristics of users and supplies
- Designed to easily generate "what-if" scenarios



## What is the Eloy and Maricopa-Stanfield Basin Study?

- Three year, \$1,360,000 partnership between Reclamation and the Pinal Partnership to:
- Project supply & demand imbalances (due to climate and other factors), now through 2060
  - Evaluate existing and proposed water infrastructure
  - Develop and investigate adaptation strategies (structural and non-structural)
  - Perform trade-off analysis



## Groundwater Model

- Update Arizona Department of Water Resources' Pinal Active Management Area (AMA) Regional Groundwater Flow Model to include future water supply and demand assessments
- Run updated model to include Climate Model Scenarios

## Schedule

Section 5 Tasks	Description	Year 1				Year 2				Year 3			
		Nov 2018	Feb 2019	May 2019	Aug 2019	Nov 2019	Feb 2020	May 2020	Aug 2020	Nov 2020	Feb 2021	May 2021	Aug 2021
1	Climate Change Analysis		X	X									
2	Supply and Demand Assessment	X	X	X	X								
3 & 4	Groundwater Model			X	X	X	X			X			
5	Conduct Infrastructure Analysis				X			X	X				
6	Adaptation & Mitigation Strategies								X	X			
7	Conduct Economic Analysis									X	X		
8	Basin Study Report			X	X		X	X		X	X	X	
9 - 11	Project Management / Admin	X	X	X	X	X	X	X	X	X	X	X	X

## Eloy and Maricopa-Stanfield Basins

- Eloy and Maricopa-Stanfield Basin Study area includes two of the five sub-basins within the Pinal AMA
- Pinal AMA has a statutory management goal to preserve existing agricultural economies for as long as feasible, while considering the need to preserve groundwater for future non-irrigation uses
- Agriculture and Agribusiness contribute \$2.3 billion to Pinal Counties economy
- Significant population growth in the near future
- Potential for water demand to outpace supply
- Colorado River water shortage will cause imminent reductions in surface water and CAP Agricultural Settlement Pool
- Increase in groundwater pumping to make up for loss of surface water supply may lead to an increase potential for land subsidence



Central Arizona Canal, north of Florence on AZ-79

## Planning for Alternatives

Although the EMS Basin Study is a technical assessment and will not offer policy recommendations or commitments, the development of adaptation strategies to address water supply vulnerabilities is a critical outcome of the study. As these findings could incentivize future adaptation efforts, community input will be strongly sought in this stage of the Basin Study, so as to encourage a wide array of structural and non-structural water management alternatives.

**Stay Informed, Get Involved**  
[pinalpartnership.com/ems-basin-study/](https://pinalpartnership.com/ems-basin-study/)

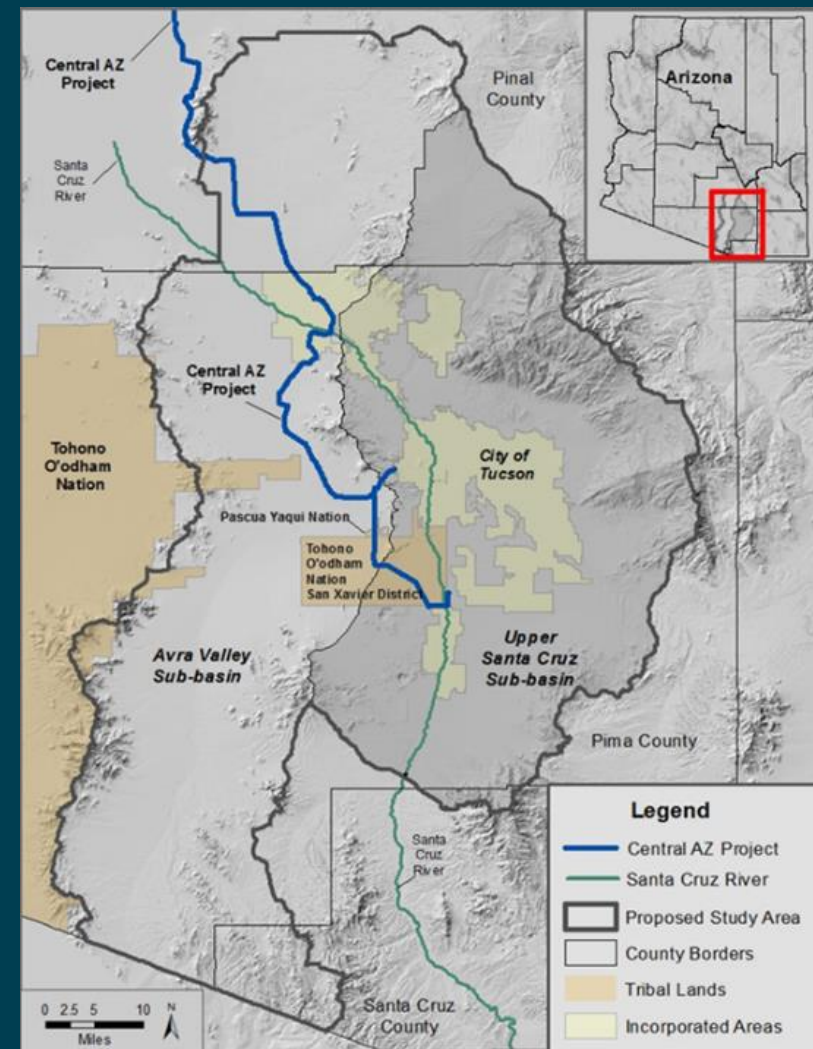
**Bureau of Reclamation**  
Valerie Swick  
Phoenix Area Office  
vswick@usbr.gov  
(623) 733-6272

**Pinal Partnership**  
Jake Lenderking  
Global Water Resources  
Jake.lenderking@gwresources.com  
(480) 719-6977



# Water Supply/Demand Imbalance in the Face of Climate Change: How will we prepare?

## *An Overview of the Lower Santa Cruz River Basin Study*





**Recharge**



**Xeriscape**



**Water Treatment**



**Wetlands**



**Irrigation Efficiencies**





### Quantifiable Water Savings

- Canal Lining/Piping
- Municipal Metering
- Irrigation Flow Measurement
- Landscape Irrigation Measures

### Energy-Water Nexus

- Renewable energy related to water management and delivery
- Increased energy efficiency

WaterSMART Grants

Water and  
Energy  
Efficiency  
Grants

### Increasing Water Supply Reliability

- Water Access and Conveyance System Improvements
- Aquifer Storage and Recovery
- Development of alternative water sources

### Improved Water Management

- Modeling
- Decision support tools
- Measurement and Monitoring

Drought Response  
Program

Drought  
Resiliency  
Projects

Cooperative  
Watershed  
Management Program

Watershed  
Management  
Projects

Small-Scale  
Water  
Efficiency  
Projects

WaterSMART Grants

### Small-scale efficiency and water management projects

- Canal Lining/Piping
- Municipal Metering
- Irrigation Flow Measurement.
- Supervisory Control and Data Acquisition (SCADA) and Automation.
- Landscape Irrigation Measures

- Improving Stream Channel Structure and Complexity
- Restoring or Enhancing Floodplains and Riparian Vegetation
- Invasive Species Prevention/Control
- Water Conservation/Management to Improve Ecological Resilience

WaterSMART  
Construction  
Opportunities

# WaterSMART Program



**Basin Study Program**

Collaborative Planning



**Title XVI Program**

Water Reclamation and Reuse



**WaterSMART Grants**

Water Conservation and Efficiency



**Water Conservation Field Services Program**

Water Conservation Planning and Design



**Drought Response Program**

Planning and Building Resiliency



**Cooperative Watershed Management Program**

Watershed Management and Restoration





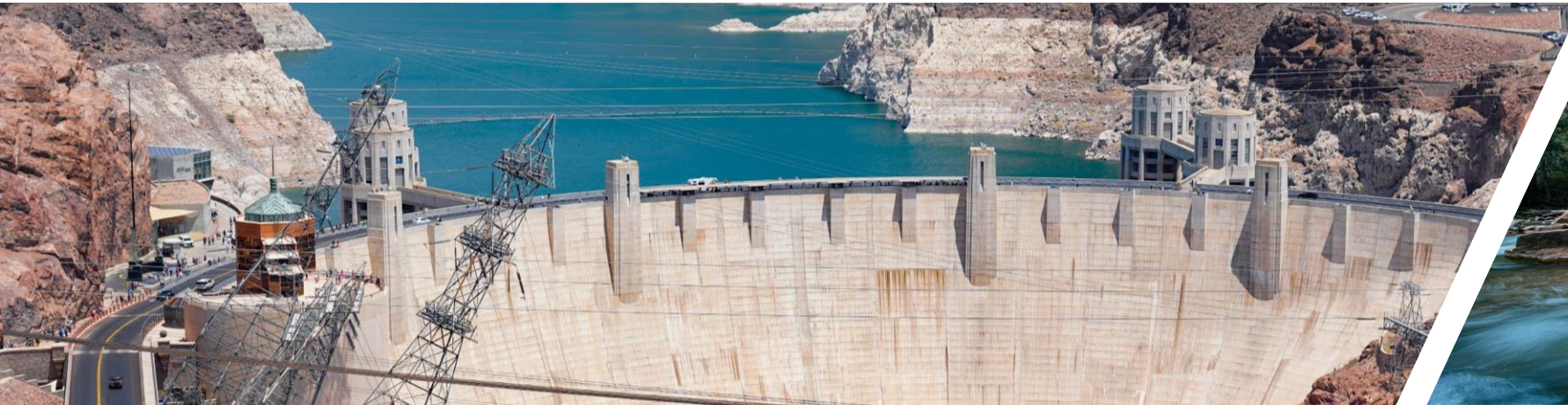


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## Energy Water Nexus & Drought Contingency Plan







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# Coffee & Networking Break

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## Tribal Energy Issues





# Tribal Communities Meeting Energy Needs

Southwest Energy Conference  
November 13, 2019

Margie Schaff  
Margaret Schaff & Associates, LLC  
[margieschaff@comcast.net](mailto:margieschaff@comcast.net) 303-443-0182

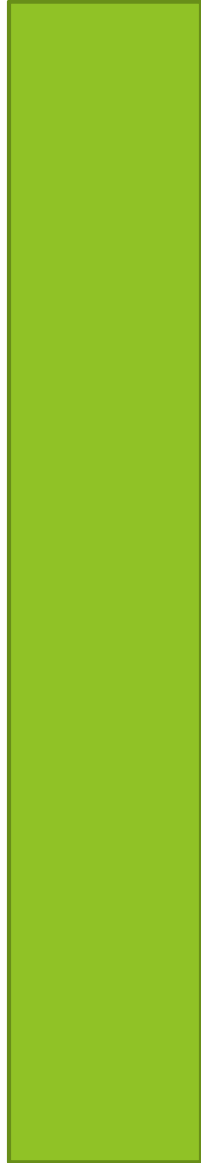
# How are Tribes Involved in the Energy Industry?

- ▶ Customers of Energy Companies
- ▶ Natural Resource Owners, Developers and Producers
- ▶ Power Generation (Small/Large; Fossil Fuels/Renewable)
- ▶ Pipelines & Transmission
- ▶ Tribal Utilities
- ▶ Tribes as Regulators



# Tribes as Consumers

- ▶ Tribal Sovereignty
- ▶ Jurisdiction & Regulation in Indian Country
- ▶ Energy Codes and Commissions
- ▶ Energy Efficiency
- ▶ Climate Resilience
- ▶ Microgrids



# Tribes as Energy Resource Owners

- ▶ Water
- ▶ Oil and Gas
- ▶ Coal
- ▶ Land
- ▶ Forestry
- ▶ Others!

# Some Example Tribal Solar Projects in the SW



- ▶ Jicarilla Apache - (Northern NM) Public Service Co of New Mexico - 50 MW solar and 20MW storage
- ▶ Moapa Band of Paiutes (Southern Nevada) 250MW to be supplied to LADWP
- ▶ Pechanga Band of Luiseno Indians Solar Parking Structure -2 MW
- ▶ Soboba 2 MW Community Solar
- ▶ Navajo Tribal Utility Authority 55MW





# Example Tribal Utility Websites

- ▶ <https://www.pechanga-nsn.gov/index.php/tribal-government/services/pechanga-western-electric>
- ▶ <http://www.umpquaindianutility.com/>
- ▶ <https://www.yakamapower.com/>
- ▶ <http://missionvalleypower.org/>
- ▶ <http://www.ahamacav.com/>
- ▶ <http://www.toua.net/>
- ▶ <http://www.gricua.net/>
- ▶ <http://www.ntua.com/index.html>
- ▶ <http://www.crit-nsn.gov/critutilities/>
- ▶ <http://www.hualapaiutility.org/>
- ▶ <http://sdutilities.com/>
- ▶ <http://ctua.net/index.html>
- ▶ <http://pci-nsn.gov/westminster/utilities.html>



Chickasaw Tribal Utility Authority



# Other Example Tribal Utilities

- ▶ San Pasqual Band of Mission Indians (CA) - Solar/Storage/Liquid Propane Microgrid
- ▶ Big Pine Paiute Tribe of the Owens Valley
- ▶ Blue Lake Rancheria - Microgrid collaboration with Humboldt State University's Schatz Energy Research Center, Siemens, Idaho National Labs
  - ▶ 500 kw solar, 950 kWh Tesla Batteries, Siemens Spectrum Power Microgrid Management System
  - ▶ Funded with \$5m California Energy Commission Electric Program Investment Charge grant



Photo: Courtesy Blue Lake Rancheria



# Tribes as Regulators

- ▶ Tribal Sovereignty! This means we are governments and can pass laws and regulate utilities and energy industries acting on Reservations.
- ▶ States have very limited jurisdiction on Indian reservations
  - ▶ Where specifically allowed by federal or tribal law.
  - ▶ Provides significant flexibility for utilities and tribes to work together without consideration of state law, state public utility commissions, or utility state approved tariffs.
  - ▶ Tribes can pass laws, regulations policies and procedures to address utility issues when necessary.

Numerous examples!

# Tribal Renewable Power Program Development and Overview

Dr. Karin Wadsack

Southwest Energy Conference - November 2019





# NREL Program Goals



Diversify Tribal  
Revenue Streams



Create an inclusive  
transition to a  
clean Energy  
Economy



Enhance the  
exercise of tribal  
sovereignty



Catalyze diverse  
investment in  
Tribal energy  
projects



Unlock the  
potential of clean  
energy in Indian  
Country



# Program Development



## Pilot Initiatives

NREL initiated pilot partnerships with Hopi Tribe & Navajo Nation



## Listening Sessions

April 2019  
3 listening sessions with 19 interested tribes



## Grid-scale Analysis

Summer 2019  
NREL created analytical model for evaluating potential projects



## Partnerships Workshop

October 2019  
NREL convened foundations to evaluate and make recommendations



## Continuous Evaluation

Solicit feedback from Cohort members on program improvement



## Direct Benefits

Technical validation  
and resource maps

Access to energy expertise

Relationship building with offtakers,  
investors, and government

Expanded peer professional group

Internal policy clarification  
or development

Educational opportunities

## Indirect Benefits

Economic and land-use  
planning collateral

Environmental risk  
mitigation and  
identification

Non-energy economic  
development opportunities

Additional infrastructure



Sustained Technical  
Assistance



Information  
Repository



Partner  
Development



Enhanced Energy  
Leadership



Peer Mentorship



**2019 Arizona Energy Consortium**

**Southwest Energy Conference**



**GILA RIVER INDIAN COMMUNITY UTILITY AUTHORITY  
(GRICUA)**

**PLANNING FOR THE FUTURE**

**NOVEMBER 13, 2019**

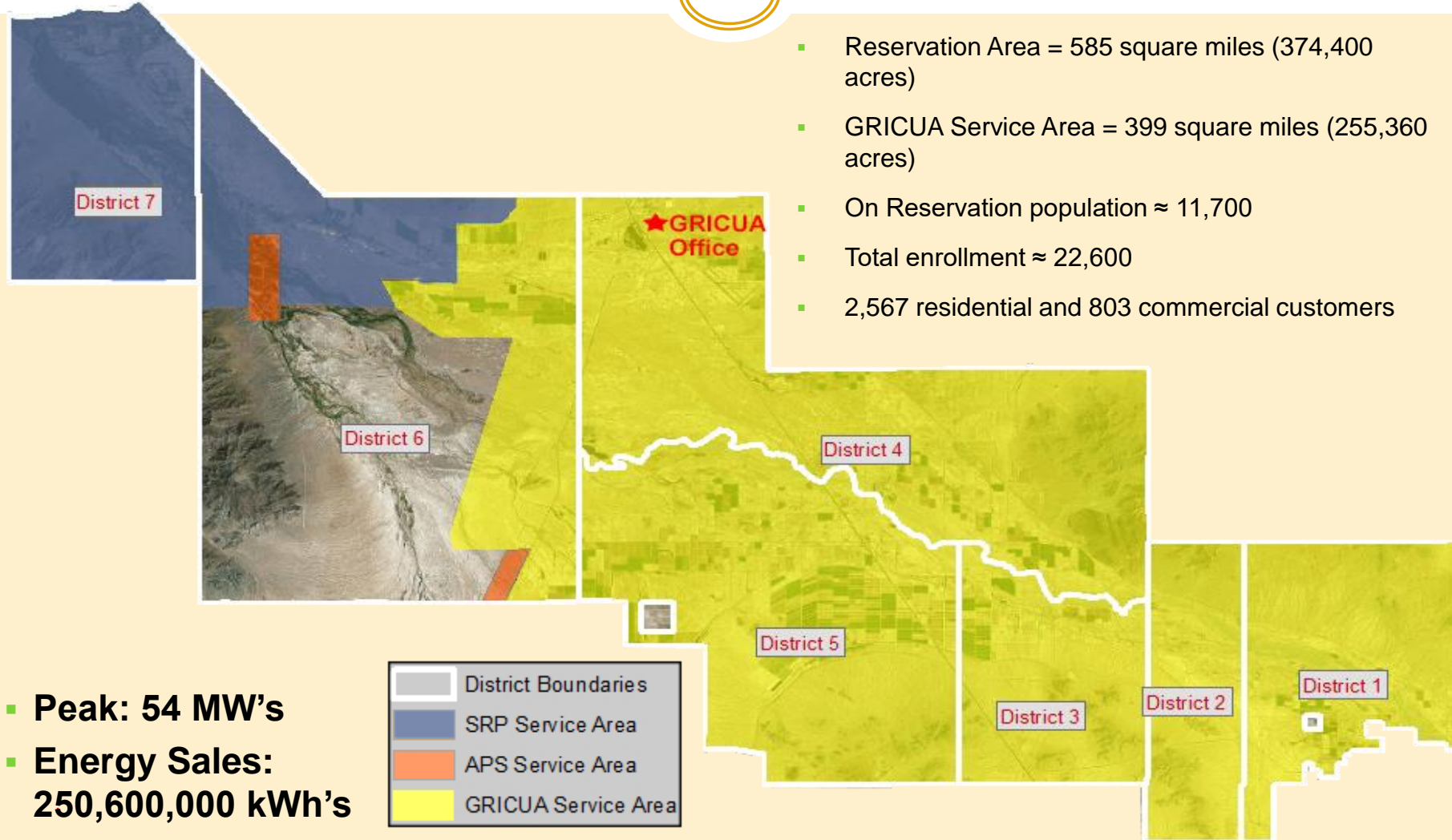
**LEONARD S. GOLD, GENERAL MANAGER**



# Who We Are...

## Gila River Indian Community Utility Authority (GRICUA)

### An Entity of the Gila River Indian Community (GRIC or Community)



# In The Beginning..... GRICUA



## □ History

- 1998
  - GRICUA established by GRIC Council Resolution:
    - ✓ to retain ownership of new infrastructure,
    - ✓ to address reliability concerns and
    - ✓ for Self Governance.
- 1999
  - Plan of Operation approved
  - Initial service area defined as the Wild Horse Pass area
  - **GRICUA begins providing service to customers in the Wild Horse Pass area**





# In The Beginning.....

## GRICUA



### □ **Mission**

- To plan for, provide and furnish utility services
- To promote and encourage the conservation of electricity
- To improve the health and welfare of the residents of GRIC
- To acquire, construct, operate, maintain and expand utility services
- To promote economic development and employment opportunities

# GRICUA Statistics - Then and Now



Description	FY2000 [1]	FY2005 [1]	FY2010 [1]	FY2015 [1]	FY2018 [1]
Total Number of Employees	2	4	22	23	27
Number of Customers	12	20	2,400	2,595	3,370
Billing Done By	GRICUA Staff	Consultant	GRICUA Staff	GRICUA Staff	GRICUA Staff
Substations (GRICUA & SCIP)	0	1	7	8	9
Number of GRICUA Lineman	0	0	7	7	8
Peak Load At Customer Meter - MW	3 MW	6 MW	26 MW	32 MW	54 MW
Energy Sold At Customer Meter - MWh	5,500 MWh	28,100 MWh	118,800 MWh	160,000 MWh	250,600 MWh
GRICUA Owned Facilities O&M	SRP Contract	3 <sup>rd</sup> Party Contract	GRICUA	GRICUA	GRICUA
SCIP Facilities O&M – 638 Contract			GRICUA	GRICUA	GRICUA
Respond To Outages	SRP Contract	3 <sup>rd</sup> Party Contract	GRICUA Staff	GRICUA Staff	GRICUA Staff
GRICUA Provides Retail Service In SCIP Area	No	No	Yes	Yes	Yes
GRICUA Serves All SCIP Reservation Customers	No	No	No	No	Yes
Purchase Power Contracts	1	2	3	3	4
[1] Fiscal Year October 1 – September 30.					



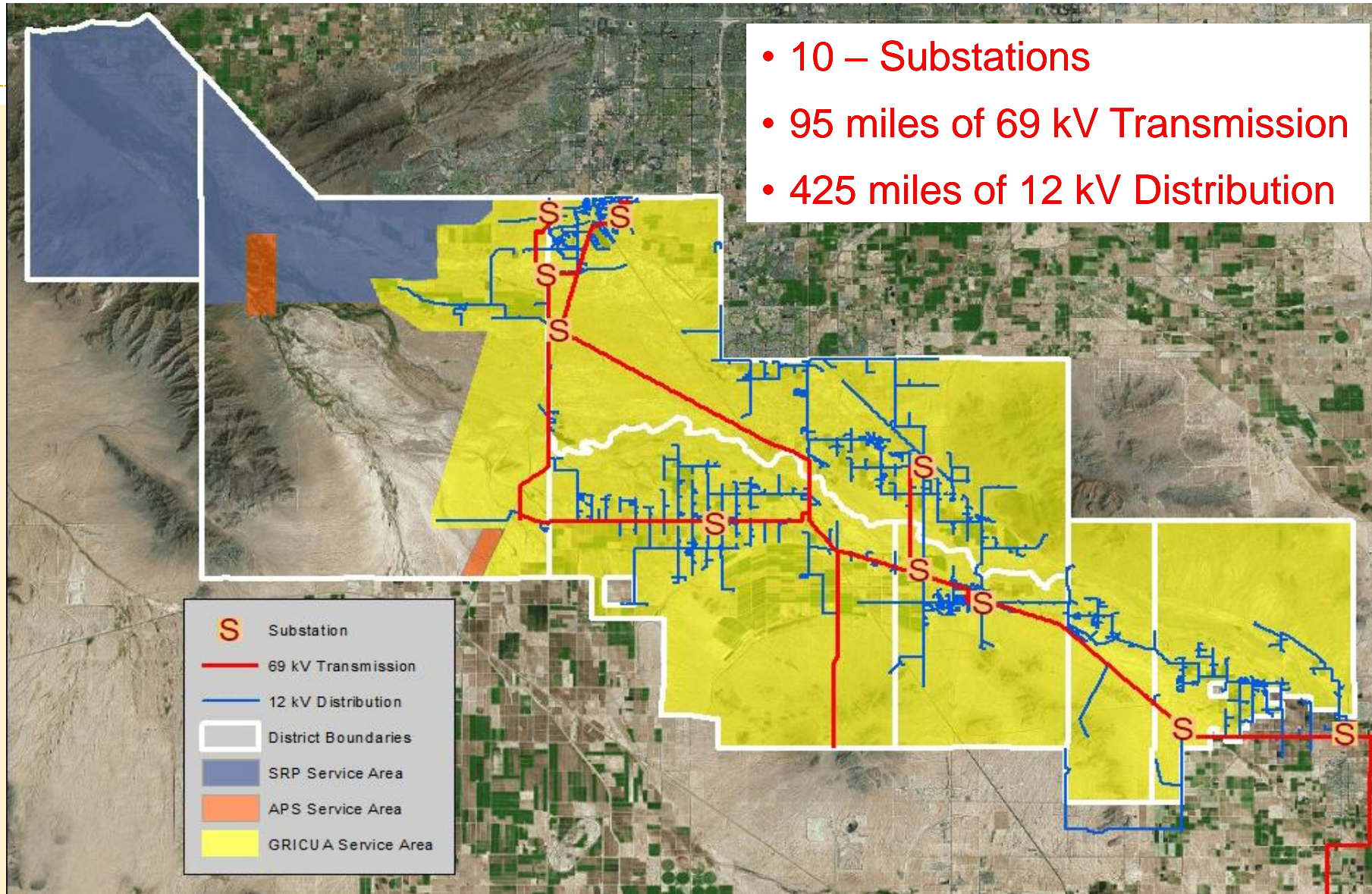
# Background



- GRICUA's service area overlaps with the service area of the San Carlos Irrigation Project (SCIP), an agency of the United States Department of the Interior, Bureau of Indian Affairs
- SCIP owns significant infrastructure within the Community
- GRICUA and SCIP negotiated an agreement that allowed for
  - the orderly transition of SCIP on-Reservation customers to GRICUA
  - GRICUA to assume responsibility for O&M of SCIP On-Reservation electric system via a 638 Contract
  - GRICUA staff to respond to all SCIP On-Reservation customer outages

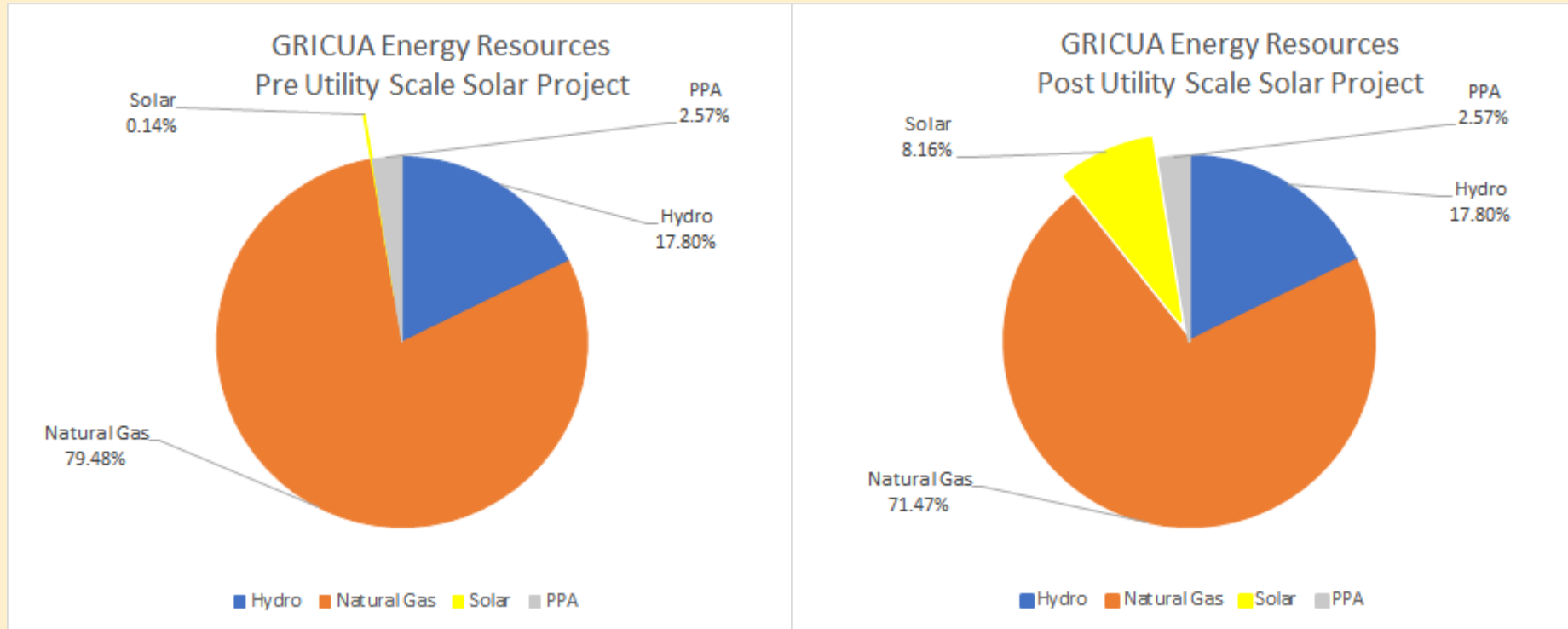
# GRICUA Electric System

- 10 – Substations
- 95 miles of 69 kV Transmission
- 425 miles of 12 kV Distribution





# GRICUA Existing & Future Resources



# GRICUA's Home Today



48 kW Covered Parking  
Lifetime Energy = 409,220 KWh  
Lifetime CO2 Saved = 311.1 tons





# GRICUA Board



- John Lewis, Chairman
- Felicia Kaufman, Vice-Chairwoman
- Neil Banketewa, Treasurer
- Belinda Nelson, Secretary
- Pamela Thomas, Board Member

# Questions?



**Please contact  
GRICUA General Manager Leonard Gold  
at (520) 796-0600 or [manager@gricua.net](mailto:manager@gricua.net).**



Gila River Indian Community Utility Authority  
6636 W. Sundust Rd., Box 5091  
Chandler, AZ 85226  
[www.gricua.net](http://www.gricua.net)







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## Tribal Energy Issues





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## Impact and Future of EIMs as Regional Markets





# AN INTRODUCTION TO SOUTHWEST POWER POOL

CARL A. MONROE

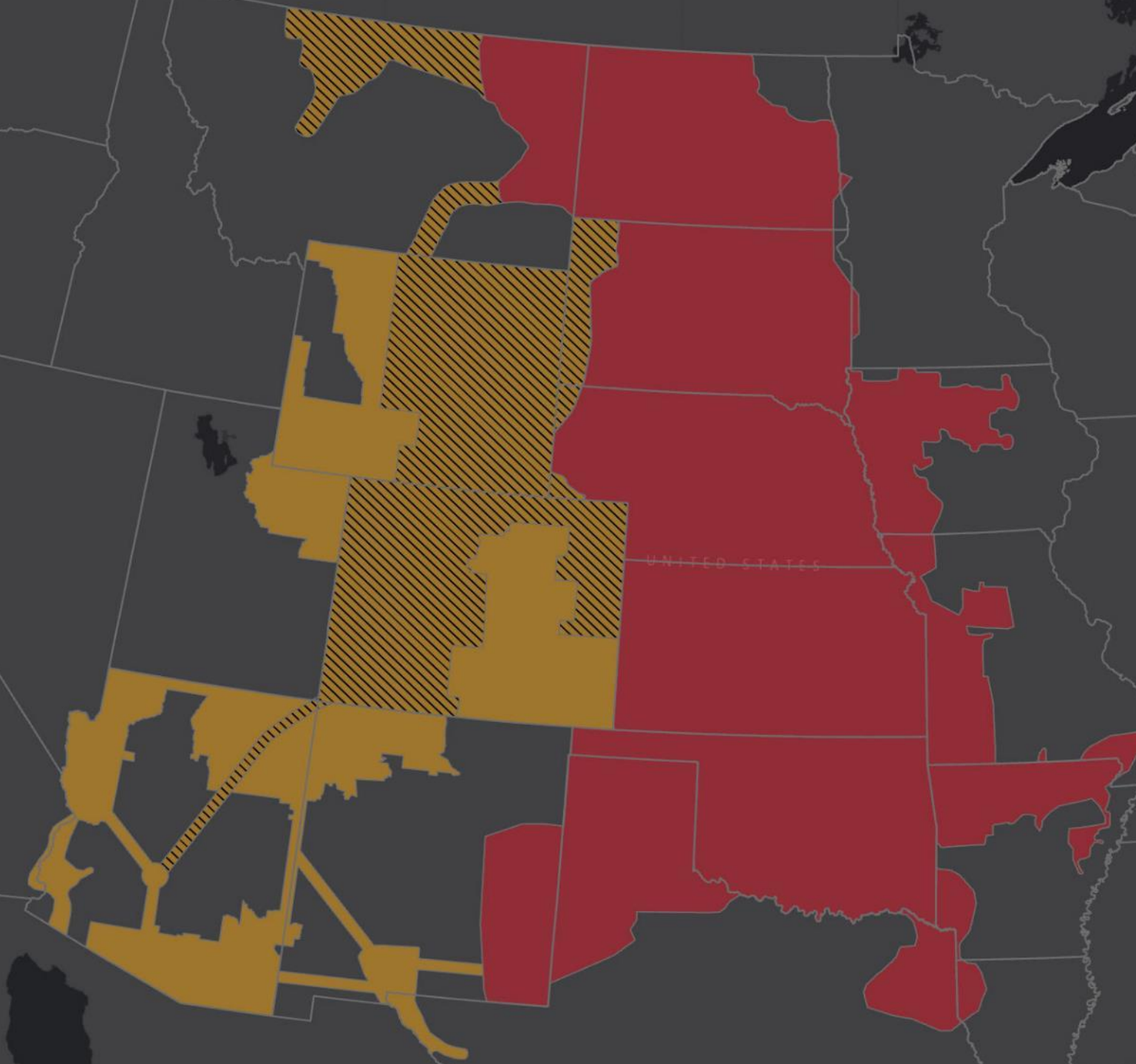
The image shows two large, lattice-structured high-voltage power line towers. They are silhouetted against a clear, bright blue sky. Multiple power lines stretch across the frame, connecting the towers. The perspective is from a low angle, looking up at the towers. In the bottom left corner, there is a dark, semi-transparent rectangular box containing white text.


**OUR MISSION:  
HELPING OUR MEMBERS WORK TOGETHER TO KEEP  
THE LIGHTS ON ... TODAY AND IN THE FUTURE.**








# RTO, RC AND WEIS FOOTPRINTS



 Integrated Marketplace

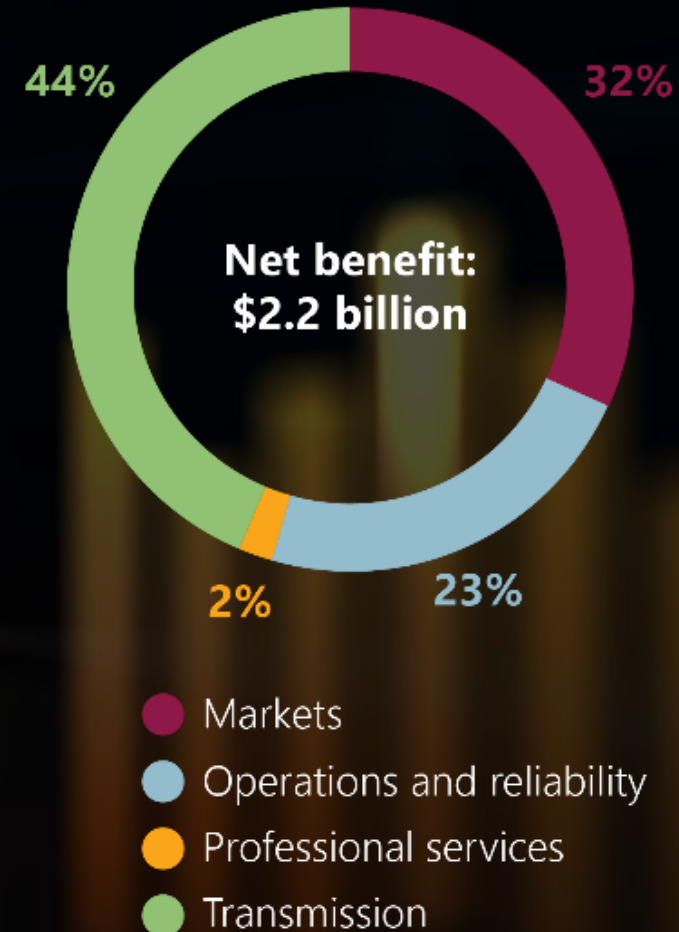
 WEIS Footprint

 Western RC



# THE VALUE OF SPP

- Transmission planning, market administration, reliability coordination, and other services provide net benefits to SPP's members in excess of more than \$2.2 billion annually at a benefit-to-cost ratio of 14-to-1.
- A typical residential customer using 1,000 kWh saves \$7.63/month because of the services SPP provides.







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## Impact and Future of EIMs as Regional Markets







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# FENNEMORE CRAIG

## ATTORNEYS

Conference Reception

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## James Ogsbury Western Governors' Association







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GOVERNORS'**  
ASSOCIATION

# **JIM OGSBURY**

## **Executive Director**



# THE WGA REGION



**NORTHERN  
MARIANA  
ISLANDS**



**GUAM**



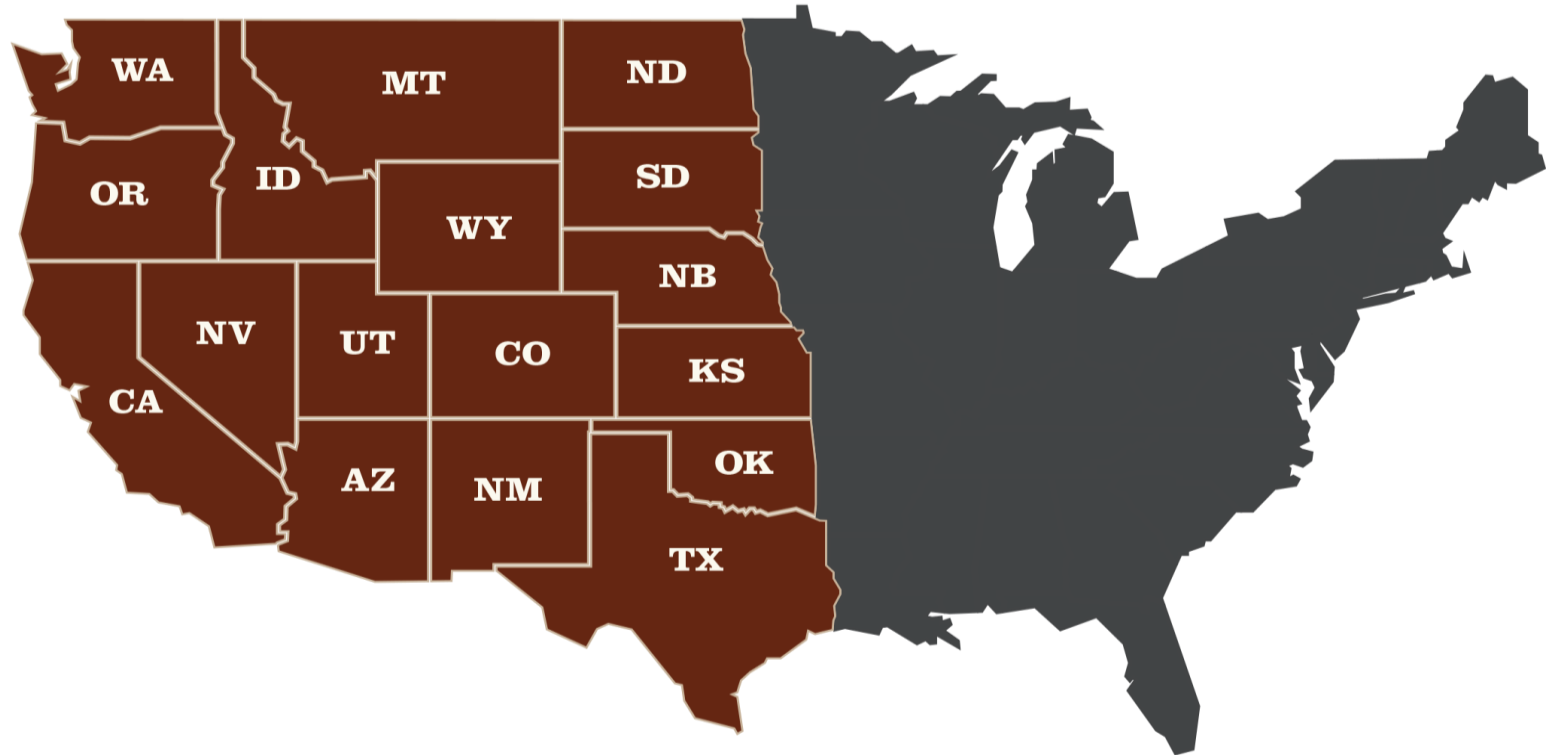
**AMERICAN  
SAMOA**



**AK**



**HI**



# THE GOVERNORS



Gov. David Ige,  
Hawaii





#WGA17














**States are**  
**NOT**  
**stakeholders**



# CHAIRMAN'S INITIATIVE





# WORKING LANDS ROUNDTABLE





# SHARED STEWARDSHIP





# CHEATGRASS





# VEGETATION MANAGEMENT





# POST-DISASTER RECOVERY





# COLLABORATIVE CONSERVATION





# REIMAGINING THE RURAL WEST





# OPPORTUNITY





# CONNECTIVITY





# COMMUNITY







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# REIMAGINING THE RURAL WEST INITIATIVE

## WORKSHOP SERIES

Fargo, ND – Oct. 1

Santa Fe, NM – Nov. 4-5

Post Falls, ID – Dec. 3

Contact Lauren DeNinno ([ldeninno@westgov.org](mailto:ldeninno@westgov.org)) with questions





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ASSOCIATION

# 2019 WINTER MEETING

DEC. 13-14, 2019 • LAS VEGAS, NEVADA





# 2020 ANNUAL MEETING

June 29 – July 2, 2020





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## Future of Energy Innovation





Photo: Tyler Bolken/Creative Commons

# **Arizona Thrives:**

## **Working together to change the conversation**







# Lever

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Mobility

EVs

Reduce Auto Emissions

Increase Tree Cover/  
Natural Solutions

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Clean Portfolio

Energy Efficiency /Built Environment

Industry & Commercial  
Transportation

Forest Health/ Biomass



Build a case for action, a framework and coalition that supports collaboration across sectors and engages Arizonans in creating a future where attaining **cleaner air** and access to reliable and affordable **clean energy** fuels a growing, **prosperous economy**.

**November 14, 2019**

# **Southwest Energy Conference Decarbonization**

**Gerry DaRosa**  
Director, Energy Innovations





# Decarbonization – How can we accomplish this?

Timely decarbonization requires that we rapidly expand deployment in 3 areas:

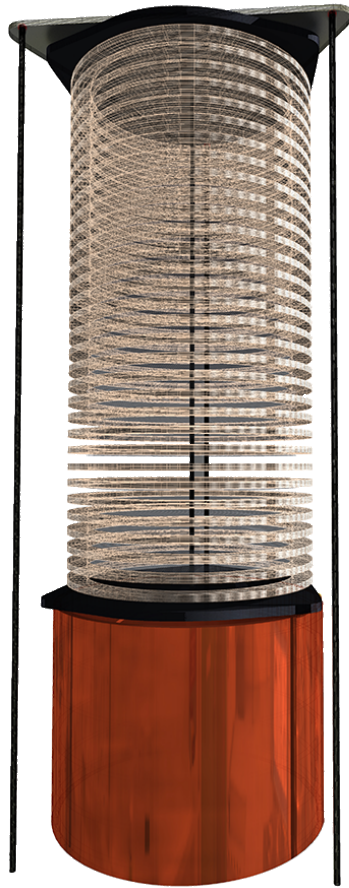
- Clean energy
- Energy efficiency / conservation
- Carbon capture / sequestration

Policy changes are critical to enable implementation.

# Direct Air Capture

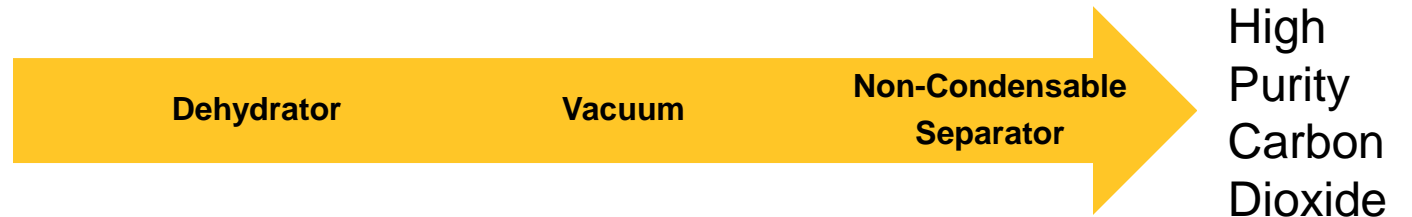


Early prototype



Next generation

- Utilizes anionic exchange resin that adsorbs CO<sub>2</sub> when dry and releases it when wet
- Passive introduction of CO<sub>2</sub> to resin
- Tiburio design has few moving parts

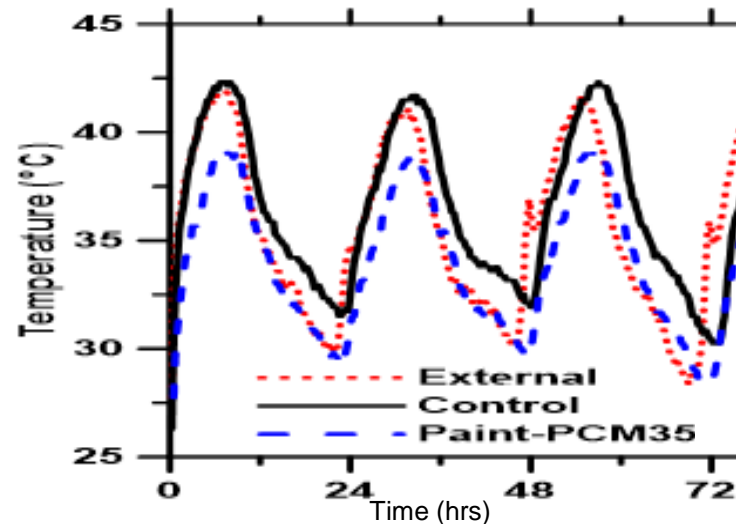
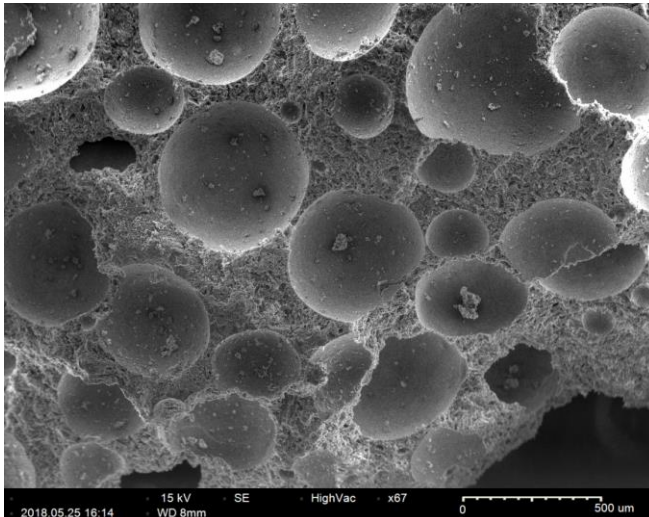
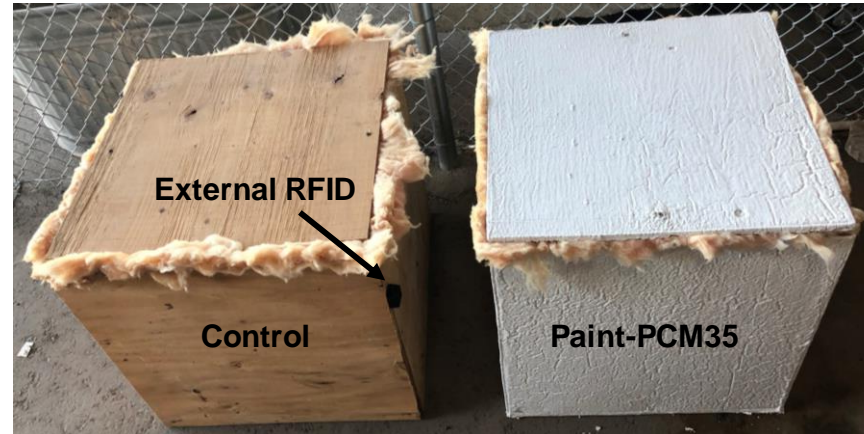




# Encapsulated Phase Change Material

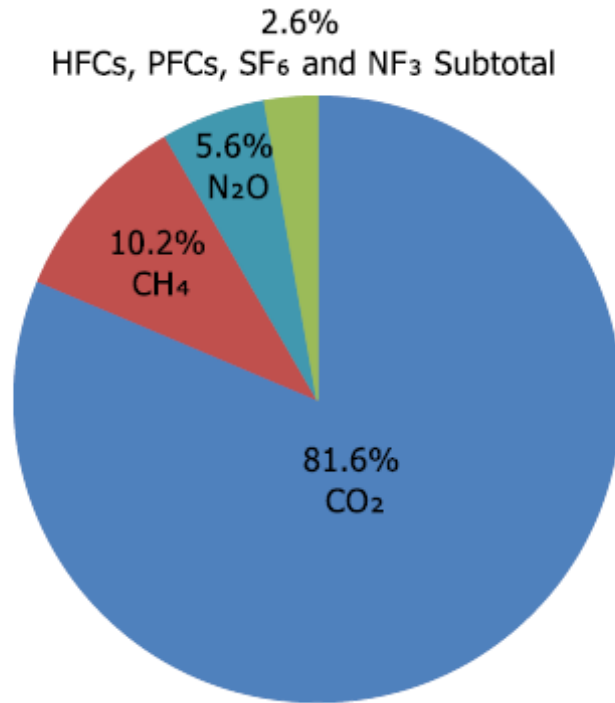
## Phase change material

- Stores energy – allowing peak shaving
- Exploits diurnal temperature swings – allowing reduction in electrical use
- By encapsulating into building material, the number of applications expand

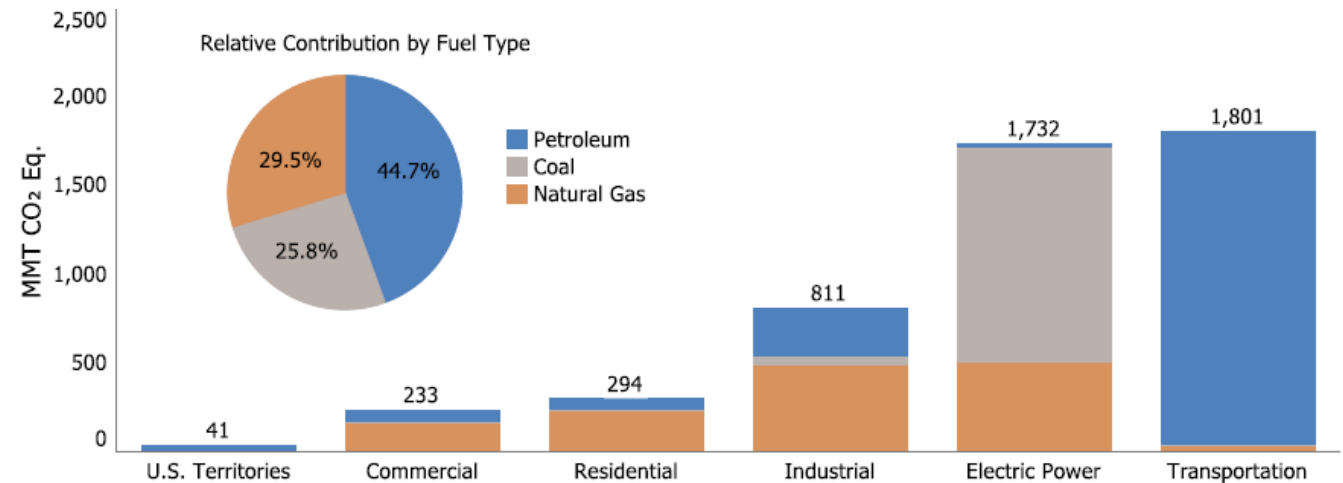


# Emissions Inventory

**2017 U.S. Greenhouse Gas Emissions by Gas  
(Percentages based on MMT CO<sub>2</sub> Eq.)**



**2017 CO<sub>2</sub> Emissions from Fossil Fuel Combustion by  
Sector and Fuel Type (MMT CO<sub>2</sub> Eq.)**







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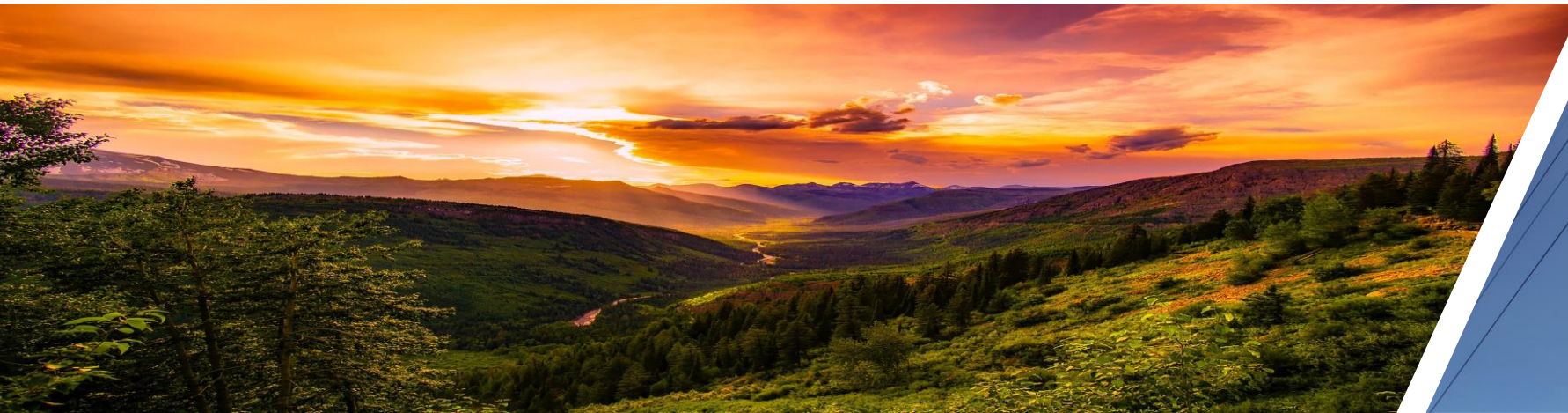


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## Utility Safety in the Wake of PG&E





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## Southwest Energy Conference Overview

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# Utility Safety in the Wake of PG&E





(b) An action may be brought by the Attorney General, the district attorney, or the local or state agency that issued the permit to excavate, for the enforcement of the civil penalty pursuant to this section in a civil action brought in the name of the people of the State of California.





Some cautionary points for those who have exposures to projects involving excavation(s).



Any operator of a service (gas, phone, electrical, etc.) or excavator who **negligently** violates this article is subject to a civil penalty in an amount not to exceed ten thousand dollars (\$10,000).

Any operator or excavator who knowingly and willfully violates any of the provisions of the Safe Dig Act of 2016 is subject to a civil penalty in an amount not to exceed fifty thousand dollars (**\$50,000**).

(o) **“Operator”** means any person, corporation, partnership, business trust, public agency, or other entity that owns, operates, or maintains a subsurface installation.

In addition, contractors that are found being negligent in following the guidelines established by Dig Safe Act 2016 can be subject to review by the State Contractors Licensing Board and have their license revoked.







## Real World Consequences



# Causes, Impacts and Costs

## Strikes Involving Underground Utility Assets

- In the United States it is estimated there is a utility strike event 1,440 times per day
- Underground utility conflicts and relocations are the #1 cause of project delays for street and road construction
- 4,000,000 (est.) Utility Strikes Annually

### Common Ground Alliance

	<u>YES</u>	<u>Respondents</u>	<u>NO</u>
Do you quantify the direct cost of utility strikes on a regular basis?	57%	300	43%
Do you track and quantify other costs (indirect and/or social) incurred during service strikes?	29%	300	71%
Do you have a separate program or project for determining and recording the location of underground utilities?	14%	300	86%
Does your field crews use a formal utility detection system?	14%	300	86%
Do you think underground utilities would still be damaged during excavation if your staff used a detection system?	0%	300	100%

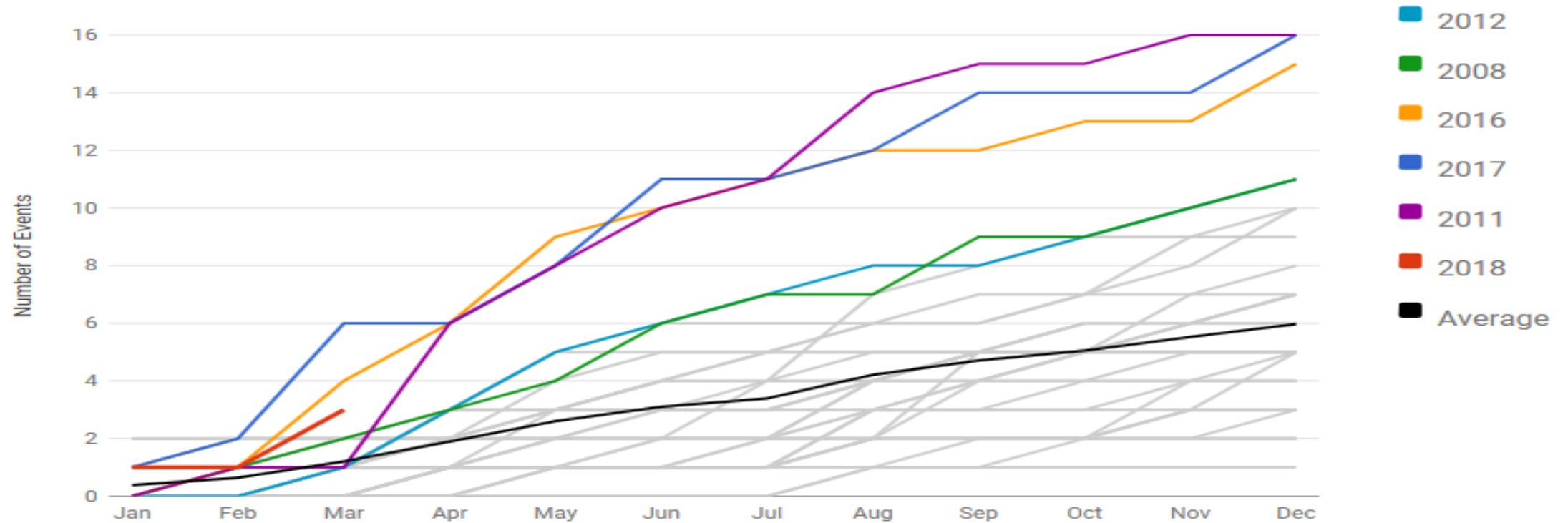
### Statistical Analysis

	# of Strikes		
Strikes where pre-excavation scans were conducted and those cases showing that utility had been detected prior to the strike.	255		52%
Strikes where utility plans/drawings (as-builts) had been reviewed prior to excavation and those cases supporting the utilities were shown on the plans.	187	3,348	48%
Strikes where plans/drawings (as- builts) showed the utility and those cases respondents reporting that the location of the utility was inaccurately plotted.	89		84%

<u>Utility</u>	<u>Direct Cost</u>	<u>Indirect Cost</u>	<u>Total Cost</u>	<u>Allocated</u>
Electricity	\$ 1,455,000,000	\$ 509,250,000	\$ 1,964,250,000	17%
Gas	\$ 727,500,000	\$ 254,625,000	\$ 982,125,000	9%
Telecom	\$ 600,000,000	\$ 210,000,000	\$ 810,000,000	7%
Fibre-Optic	\$ 4,200,000,000	\$ 1,470,000,000	\$ 5,670,000,000	50%
Water	\$ 1,470,000,000	\$ 514,500,000	\$ 1,984,500,000	17%
	<b>\$ 8,452,500,000</b>	<b>\$ 2,958,375,000</b>	<b>\$ 11,410,875,000</b>	<b>100%</b>



# 1980-2018 Year to Date U.S. Billion-Dollar Disaster Event Frequency (CPI-Adjusted)



Statistics valid as of April 6, 2018.

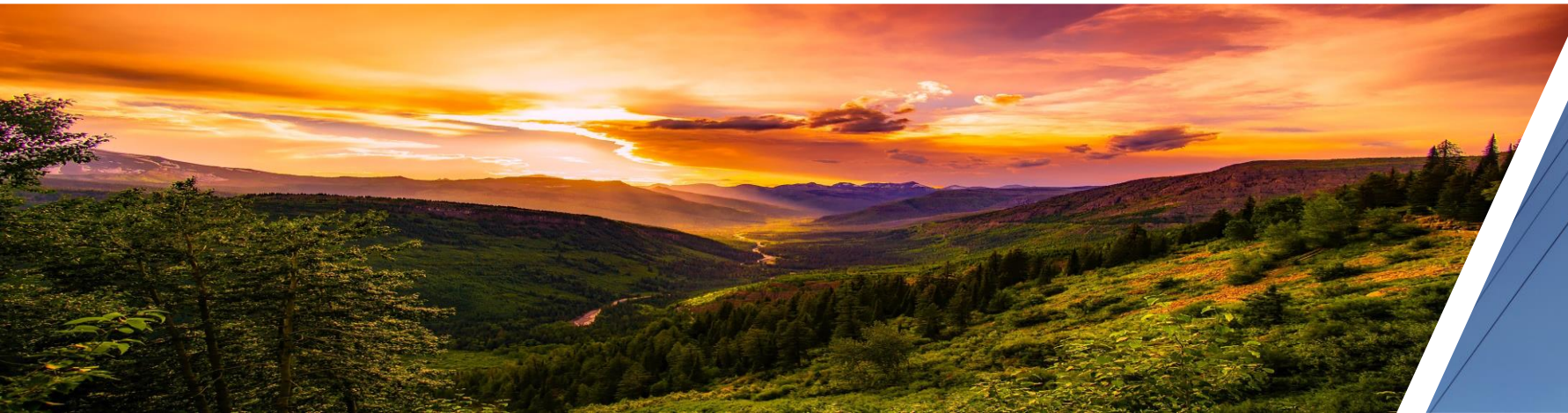


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# Coffee & Networking Break

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## Energy and National Security







# Defense Critical Electric Infrastructure DCEI

Doug Little  
Senior Advisor  
DOE – Office of Electricity (OE)  
November 14, 2019



# DCEI - Background

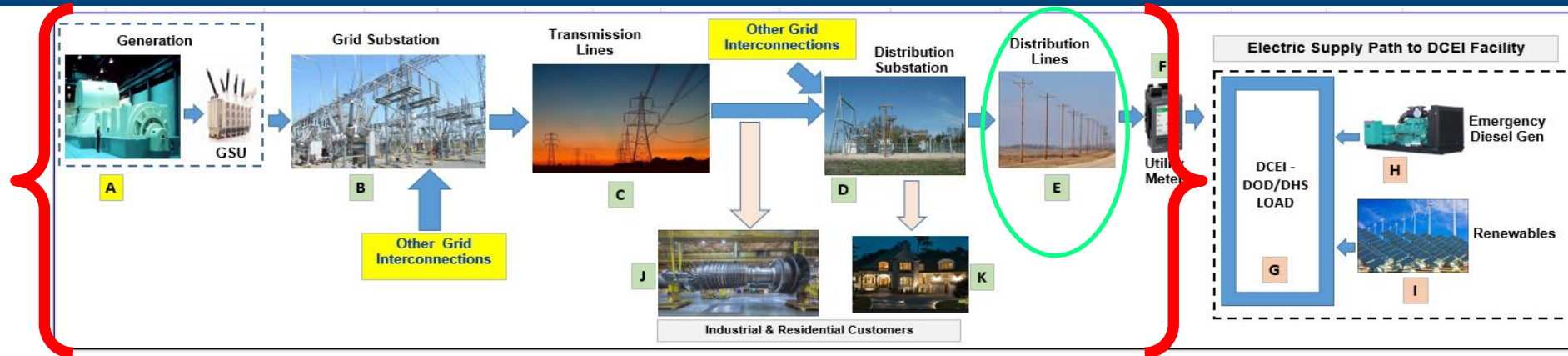
- **Fixing America's Surface Transportation (FAST) Act (Public Law 114-94-Dec 4 2015):**
  - Defines DCEI: Any electric infrastructure that serves a facility
    - Critical to the defense of the United States
    - Vulnerable to a disruption of the supply of electric energy provided by an external provider
  - Requires Secretary of Energy, in consultation with Federal agencies and owners and operators of infrastructure, to designate DCEI
  
- **Identification of DCEI a key building block to leveraging interagency roles/resources/authorities to strengthen security and resilience of electric power grid**
  - Reference: Joint U.S.-Canada Electric Grid Security and Resilience Strategy (Dec 2016) and National Electric Grid and Security Resilience Action Plan (Dec 2016)

## Goals

- DOE led (DoD supported) effort to strengthen security and resilience of the electric power grid supporting **Mission Assurance** Priority Installations
- DHS led (DoD supported) effort to strengthen security and resilience of other commercial infrastructure sectors supporting **Mission Assurance** critical functions
- DOE/FERC technical assistance (and if appropriate programs) for enhancing energy resilience at these facilities



# DCEI - External electrical supply hardening



## ➤ Approach to DCEI

- **Lead the DCEI effort:** Lead a team involving DoD, DHS, FERC, Utilities, other stakeholders as appropriate.
- **Assess Systems:** Review the Grid's electric supply system.
  - Conduct physical and cyber security assessments.
  - Conduct critical interdependency analyses.
- **Offer technical advise/programmatic support to DoD:** Only if called for by DoD - Review electric system inside the DCEI facility to propose energy resilience upgrades to fulfill the Mission Assurance objective.
  - Facilitate expectations - 3 to 5 days onsite generation Vs. Grid supply recovery time.
- **Define mechanisms:** For efficient and effective recovery from a physical or cyber event.
- **Prioritize near term and long term solutions:** Propose interim measures before the final improved design is implemented.
  - What coordination and information exchange should be encouraged between Critical Infrastructure facilities and Utilities.

# DCEI – Request for Data

- **Information DOE anticipates requesting from Mission Assurance Priority Installations includes:**
  - DCEI - Critical electric load need in MWs.
  - DCEI site voltage support need in MVARs.
  - Single point of failure analysis – DOE assistance if required.
- **Information requested by DOE**
  - May already be known / have been collected (!)
  - Must be designated U/FOUO.
  - DOE has designated this type of information with a Critical Electric Infrastructure Information (CEII) designation.
  - CEII Designation
    - Statutory designation and procedures for how shared information will be protected.
    - Information will be stored in a secure manner.
    - The information supplier can only view their submissions.
    - Only a few pre-authorized persons can view all of the data.



# DOE – Tactical & Strategic thinking

## ➤ **Protect it from getting out in the public space – Security (CEII\*\*)**

- Convert it into actionable information – Informed decisions
  1. Traditional & proven system hardening approaches.
  2. Integration of new age electrical supply sources.

## **A. Battery Storage**

- Add battery storage to the on site DCEI renewables.
- Add battery storage just outside the fence connected to the grid.

## **B. Micro Grids**

- Install micro-grids with electricity generation either inside or outside the DCEI fence line.
- Micro-grid connected either to the Utility supply lines that feed DCEI and/or directly to the DCEI mission assurance facilities.

## **C. Cyber & other solutions**

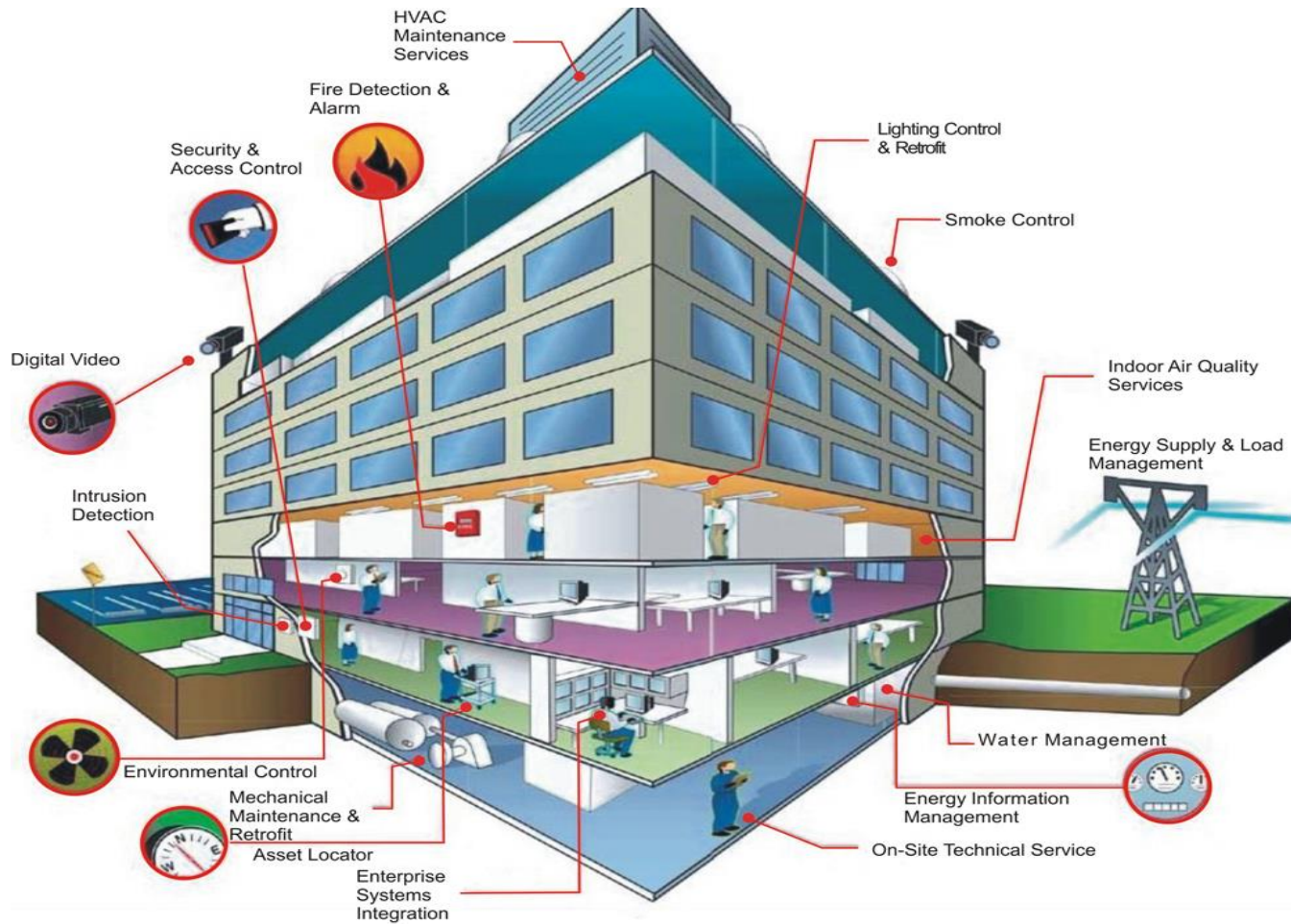
- Cyber monitoring

**\*\*CEII – Critical Electric Infrastructure Information**



U.S. AIR FORCE

# Cyber Vulnerabilities Embedded in AF Infrastructure



**Operational Technology (OT)** - Programmable systems or devices that interact with the physical environment (or manage devices that interact with the physical environment). These systems/devices detect or cause a direct change through the monitoring and/or control of devices, processes, and events. Examples include industrial control systems, building management systems, fire control systems, and physical access control mechanisms. (NIST SP 800-53 r5)

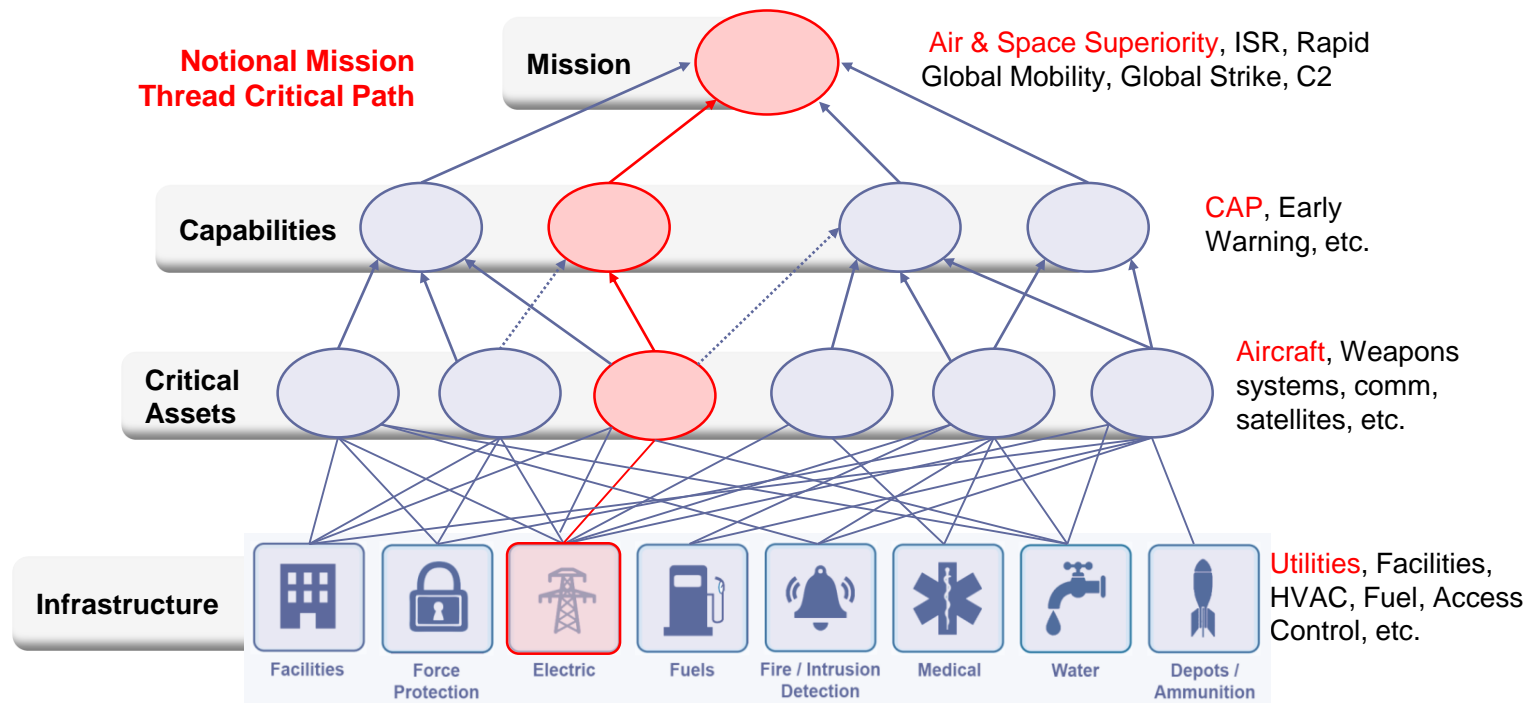




U.S. AIR FORCE

# Mission Impact

“The foundation of Air Force readiness and lethality is an integrated network of resilient installations that enable advanced-generation, multi-domain operations...”  
- *Infrastructure Investment Strategy (I2S)*, Dec 2018



An adversary could disrupt, degrade, or deny a mission by targeting the foundational assets that underpin the “system of systems.”



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