

Arizona's Energy Grid

February 2025

Grid Background and Usage

- Arizona is part of one of the largest power grids in the U.S., The Western Interconnection. The energy grid serves 80+ million people, spans more than 1.8 million square miles, and includes about 136,000 miles of transmission lines, connecting 14 U.S. states, the Canadian provinces of British Columbia and Alberta and the northern portion of Baja California in Mexico.
 - APS operates 34,900 miles of distribution lines and 5,900 miles of transmission lines
 - SRP operates 21,700 miles of distribution lines and 2,385 circuit miles of three-phase lines at 69-500 kV
 - SunZia Southwest Transmission Project consists of two planned 500 kV transmission lines across 520mi between New Mexico and Ariz; will transport up to 4,500 megawatts of primarily renewable energy to markets in Ariz. and Calif. The project is expect to come online in 2026.
- Some of the advantages of having one of the largest power grids is the ability to more quickly restore power when outages occur, reduced frequency and duration of outages and reduced impacts from natural hazards.
- Arizona's total per capita energy consumption is the ninth lowest in the nation ([Source](#)) with residential and transportation energy consumption making up most of the usage:
 - Transportation - 36.3%
 - Residential - 27.2%
 - Commercial - 22.1%
 - Industrial - 14.4%
- Greater Phoenix residential and consumer solar penetration is at 5%, well-above the national average of 1.5%. With more than 300 days of sunshine every year, the region has nearly unlimited potential for solar generation.
 - Overall, Arizona ranks second in the nation in solar energy potential after Nevada, and in 2021 it was fifth in solar net generation after California, Texas, Florida and North Carolina.

Utility Commitments to Clean Energy

While 17% of Arizona energy generated is renewable and 45% carbon free, Arizona's largest utility providers, Salt River Project (SRP) and Arizona Public Service (APS) have projects underway to reduce carbon emissions and move toward renewable resources, enacting 15- and 30-year plans with the goal of eliminating reliance on fossil fuels.

- APS is committed to providing 100% clean, carbon-free electricity by 2050 while providing reliable and affordable energy to meet customer needs
- This goal includes a nearer-term 2030 target of achieving a resource mix that is 65% clean energy, with 45% of the generation portfolio coming from renewable energy.
- APS also plans to exit from all coal-fired generation by 2031.
- APS's current 13% renewable energy mix consists of energy from wind, solar, geothermal, biogas, biomass and customer-sited distributed generation.
- 15% of APS's energy mix is derived from demand-side management customer programs. APS manages one of the largest Virtual Power Plants (VPP) in North America.
 - The VPP includes a network of thousands of customer-owned devices such as smart thermostats and home battery storage, which serve as energy resources.

- The APS Cool Rewards program includes 72,000 customers and nearly 98,000 devices.
- When customers get energy from APS, they already start from a diverse, 51% clean portfolio including:
 - Carbon-free nuclear energy from Palo Verde Generating Station, one of the largest producers of clean energy in the U.S.
 - Produces 4,000 megawatts annually, enough power for more than 4M people
 - Supplies more than 70% of the state's clean energy
 - Renewable sources, including solar and wind, paired with battery energy storage
- SRP is committed to its carbon reduction goals including cutting its carbon intensity 82% by 2035 (compared to 2005 emission levels) and to reach net-zero carbon use by 2050.
 - SRP also intends to achieve energy savings through greater efficiencies and support the adoption of 1 million electric vehicles in its service territory while managing the charging of 90% of them.
 - SRP's renewable portfolio consists of solar, wind, geothermal, hydro and biomass. These variable sources are bolstered by traditional sources – coal, gas and nuclear – and batteries to allow SRP to meet demand.
 - As part of its “Customer and Grid Enablement” sustainability goal, SRP is working to add a significant quantity of resources, more than doubling its total installed capacity by 2035 relative to today. This includes adding:
 - 7,000 MW of new renewables
 - 1,000 MW of new long-duration pumped hydro energy storage
 - 1,500 MW of new battery storage
 - 2,00 MW of new firm natural gas*(goals revised March 2024, go into effect May 2025)*

In 2023, coal fueled 10% of the state's total net generation, down from 38% in 2013. Renewable resources, mostly solar and hydroelectric power, supplied almost all the rest of Arizona's in-state electricity generation in 2023.

Clean Options for Businesses

Each utility provides clean options for large-scale users with flexible solutions designed to fit the needs of businesses as they scale:

- APS Green Power Partners: Businesses receive a contracted amount of green power at a specified price in addition to the normal rate with three solutions:
 - Connect to an existing facility producing clean energy
 - Choose where APS locates and builds a new facility to meet business energy needs
 - Make a long-term financial commitment for a new facility at a location that meets needs and goals
- APS Green Choice
 - For residents and business customers that want a mix of renewable energy resources to help them reach their sustainability goals. Benefits of the program include:
 - A consistent, predictable price for renewable energy
 - A pathway to achieving 100% renewable energy goals
 - Support for local renewable energy



- SRP: Offers two programs for solar and renewable energy
 - Solar Choice and Solar Choice Select gives all sizes of businesses options to offset energy usage with utility-scale solar power. Businesses can offset up to 20% of energy usage with solar to take advantage of solar energy without construction or operational impacts to business
 - REC Select helps large businesses reduce carbon footprint with market-purchased renewable energy certificates. Users can gain an exclusive claim of carbon-free power through each REC, representing 1 MWh of renewable energy generated and delivered by the grid

Major Generation Assets

Palo Verde Generating Station

- One of the largest producers of clean energy in the nation
- Capacity of nearly 4,000 MW
- Serves 4 million people
- Creates \$2B in economic impact to Arizona annually
- Serves neighboring CA, NM and TX
- Is the largest net generator of electricity in the nation. By capacity, it is the second-largest power plant of any kind in the U.S.

Hydroelectric

- Generating about 5% of Arizona's in-state net generation, hydroelectric is the state's second largest source of renewable energy
- Hoover and Glen Canyon Dams have a power capacity of about 3,000 MW
- One of 18 states with pumped storage hydroelectric generation
- At least 37,000 MW of potential installed capacity identified for the state

Natural Gas Power Plants

- 17 gas- and oil-fired peaker plants across AZ help meet statewide peak demand
- 4,062 MW nameplate capacity

Four Corners

- Two generating units – Majority owned by APS with several other utility companies also holding shares, including SRP
- Generates 1,540 MW of coal-fired power near Fruitland, NM
- APS plans to exit the plant by the end of 2031

Grid Resiliency and Reliability

Population Growth

- Arizona saw the seventh largest increase in population in the US from 2022-2023
- Greater Phoenix has seen a 4% population increase, or 200,000 people, since 2020. This is compared to the nationwide average of 1% ([Source](#))

Top-Ranked Utilities

- APS is ranked as a top business service provider by J.D. Power & Associates; named one of the world's Top 100 Green Utilities



- SRP is ranked as a top business service provider by J.D. Power & Associates; ranked No. 1 in customer satisfaction in the west large segment for 20 years in a row; ranked No. 1 in the nation for reliability

SAIDI Stats

- The System Average Interruption Duration Index (SAIDI) in the U.S. for 2022 was 335 minutes while Arizona had 139.7 minutes, the 9th best in the country
- The System Average Interruption Frequency Index (SAIFI) was 1.405 incidences per customer in the U.S. in 2022 compared to Arizona's average of 1.05 incidences

Reliability

- An April 2024 [report](#) from Climate Central found Arizona experienced only six power outages caused by extreme weather between 2000 and 2023, and saw no major outages during 2023's historic heat wave, despite record electricity use ("major" outage defined as impacting at least 50,000 homes or businesses, or that cuts service of at least 300 megawatts)
- While extreme heat increases power demand, it doesn't damage utility infrastructure the way that storms and other natural weather events can

News and What's Next

Demand Forecast: APS and SRP predict energy use will increase 40% over the next seven years and the grid will need to double in size in the next 15 years to maintain its current output

Nuclear Expansion: The region's utilities are collaborating to explore nuclear energy expansion to meet the region's growing energy demands. The partnership includes evaluating emerging nuclear technologies and securing grants to support the expansion of nuclear energy.

- APS, SRP and TEP are working together to expand nuclear generation in Arizona by evaluating emerging nuclear technologies including small modular reactors (SMR) and large reactors.
 - SMR generate 300 MW; in comparison, each unit at Palo Verde Generating Station generates about 1,400 MW.
 - 1 MW of electricity is enough to power 160 homes in the region.
- The three utilities applied for a grant from the DOE to begin expanding nuclear energy sites throughout the region. This would provide them with a 3-year site selection process and possible preparation of an early site permit application to the U.S. Nuclear Regulatory Commission.
- The partnership could result in the selection of a preferred nuclear site in the late 2020s, at the earliest, potentially enabling additional nuclear to be in operation in the early 2040s.

RFPs:

- APS: As of November 2024, has signed agreements to add new energy supplies to its energy mix totaling nearly 7,300 megawatts of renewable power, battery energy storage and natural gas, representing its largest-ever planned addition of new power sources.
- SRP: seeking 700 MW of capacity during peak demand periods in the summer to be online by Dec. 1, 2028, plus 500 MW or more of peak generation by Dec. 1, 2029. Additionally, the utility is seeking 2,500 MW of new carbon-free resources by Dec. 1, 2029.
- SRP: also seeking a non-lithium-ion inverter based long duration energy storage (LDES) pilot facility with a capacity of 5 MW and a duration of 10 hours to be placed at its Copper Crossing Energy and Research Center in Florence, AZ. The utility is also seeking a non-inverter based



LDES pilot facility with a capacity of 5-50 MW and duration of 10 hours to be located at its coal-fired Coronado Generating Station in St. John's, AZ, scheduled to be decommissioned in 2032.

APS Receives \$70M in DOE Grants

- The U.S. Department of Energy (DOE) Grid Deployment Office announced in October 2024 it awarded Arizona Public Service Company (APS) two grants, totaling \$70 million, for projects to strengthen smart grid resilience, expand wildfire prevention and mitigation measures and help meet customers' growing energy needs.
 - The funds are part of the DOE's Grid Resilience and Innovation Partnerships (GRIP) program, which is focused on enhancing and improving electric systems in rural, tribal and disadvantaged communities across the country. Grant details:
1. **Strengthening Arizona's Wildfire Mitigation Efforts – \$50 Million Grant**
APS fire mitigation experts, meteorologists and field crews work year-round to protect communities, first responders and electrical infrastructure from Arizona's growing fire risk and dry, hot summers. This grant will help fund new projects that expand APS's industry-leading wildfire mitigation program.
 2. **Enhancing Arizona's Smart, Resilient Grid – \$20 Million Grant**
APS is building smarter energy infrastructure to increase resilience against extreme weather, address growing customer demand and integrate more clean energy resources. This grant will help fund the construction of new smart grid technology projects to increase APS's ability to efficiently and safely reroute electricity during outage situations to improve restoration times.

SRP Deploys State's Largest Battery System

- SRP has partnered with Plus Power LLC on two new industrial-scale battery storage systems – Sierra Estrella Energy Storage in Avondale, and Superstition Energy Storage in Gilbert, which both went online in June 2024.
- Together, the two facilities will add 340 megawatts to SRP's system – enough to power 76,000 homes for four hours.
- Facility construction and the lithium-ion battery systems, which were designed and manufactured in the U.S. by Tesla, were both supported by federal tax credits under the Inflation Reduction Act.
- SRP's partnership with Power Plus, which will operate the systems, will provide flexibility and resource diversity to help maintain reliable power during Arizona summers.
- The two systems will generate no emissions and will not consume water for cooling or other operations.
- SRP expects to bring more than 1,100 MW of additional battery storage online by the end of 2024.

SRP Pumped Storage Hydropower Project

- Expand capacity to store power generated in the daytime to be used at night when solar power generation is not available.
- The utility is considering two sites near Apache Lake to construct a new dam and flood a portion of the desert to create an upper reservoir to create what would be the state's largest pumped storage hydropower system.



- SRP currently has a pumped storage hydro capacity of 150 MW between its two facilities at Mormon Flat Dam and Horse Mesa Dam – the proposed project would have a 1,000-2,000 MW capacity.
- Pumped storage is a long-term solution, and more sustainable compared to battery systems which consistently need to be replaced. Batteries last about four hours per charge, while the proposed pumped storage system could generate enough power for about 450,000 homes for 10 hours each pump cycle.
- Following engineering feasibility assessments and environmental permitting, SRP could begin construction in 2027. This timeline would allow SRP to construct the facility for an online date of 2033 to help meet SRP's significant resource need in early 2030.

South Mountain Transmission Project

- New power infrastructure project proposed to facilitate future planned development in Laveen, which will include offices, residential, industrial, tech, and retail.
- New 500/230/69 kV substation on Elliot and 59th Ave, on the border of the Gila River Indian Community
- Approximately 5.5 miles of transmission lines.

ACC REST Elimination

The Arizona Corporation Commission's (ACC) February 6, 2024 motion to eliminate the Renewable Energy Standard and Tariff (REST) rules requiring utilities to deliver at least 15% renewables by 2025 was a first step in sunsetting the efficiency and renewable energy regulations, but the full process may take upwards of a year. A public comment period and second vote by the commission will be required to finalize the move.

The REST rule of 15% renewable by 2025 is already surpassed by APS and SRP, the region's major providers that remain steadfast towards their clean and renewable energy goals. Together, the utilities are maintaining a sustainable grid and aggressive renewable and clean energy commitments that continue to serve growing industries and remain competitive and more reliable compared to peer markets.