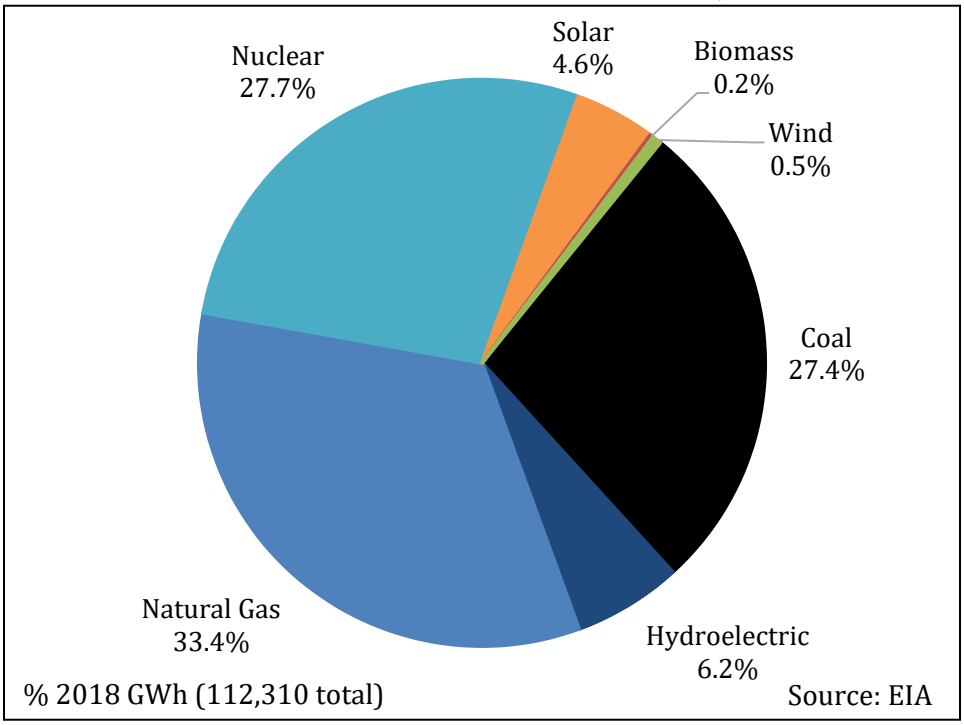
State Brief: Arizona

BACKGROUND

Arizona's electricity portfolio is dominated by natural gas, nuclear, and coal. The Palo Verde Nuclear Generating Station[1] is the largest nuclear power plant in the nation and is second only to the Grand Coulee Dam in total electric generating capacity. Annually, Palo Verde generates more than 32 million megawatt hours (MWh) of electricity. Arizona's last operating coal mine, Kayenta, located on the Navajo and Hopi reservations, closed in 2019, when its only customer, the Navajo Generating Station also ceased operations.

Arizona's Net Annual Electric Generation, 2018



% 2018 GWh (112,310 total) Source: EIA

The Glen Canyon and Hoover Dams, both located on the Colorado River in northern Arizona, provide nearly half of the Grand Canyon State's net electric generation from renewable energy resources. Arizona ranks second in the nation, behind California, in net generation from solar, and third in the nation for installed solar capacity. Arizona has the second largest solar energy potential in the U.S. (behind Nevada). While Arizona has geothermal resources, the state does not yet have utility- scale power plants using geothermal energy.

The state's renewable energy standard and tariff (REST) sets a requirement of 15% renewable energy by 2025 for investor-owned utilities and electric cooperatives.[2] A 2020 study of the benefits associated with Arizona's REST found that the standard has led to approximately $2 billion in combined benefits for the customers of Arizona Public Service (APS) and Tucson Electric Power (TEP); $11.62 billion in solar-industry investments; and annual savings of 7,129 acre feet of water. The 2020 U.S. Energy and Employment Report found that Arizona has 46,951 traditional energy workers (1.7% of total state employment) and an additional 44,782 workers employed in energy efficiency.

The Arizona Corporation Commission (ACC) regulates 17 electric utilities and six gas utilities. Unlike other public utility commissions, the ACC derives broad authority from the state Constitution to enforce public safety, but a recent court case redefined and scaled back the Commission's jurisdiction (see below: Mainstreaming Renewables). ACC commissioners are elected and four of the five members, including Chairman Robert "Bob" Burns, are Republicans. A Republican majority controls both chambers of the state legislature, and Governor Doug Ducey is also a Republican.

[1] The licenses for all three units at Palo Verde will expire by the end of November 2047. Expiration dates: Unit One 6/1/2045, Unit Two 4/24/2046, and Unit Three 11/25/2047.

[2] Electric distribution companies with more than half of their customers outside of Arizona are exempt from the RES.

POLICY STRENGTHS AND OPPORTUNITIES

The National Renewable Energy Laboratory (NREL) developed the notion of "policy stacking"[3], an important framework for policymakers to consider. The basic idea behind policy stacking is that there is an interdependency and sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, market preparation policies, remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, market creation policies, create a market and/or signal state support for clean energy technologies. Tier 3, market expansion policies, create incentives and other programs in order to expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

For example, before financial incentives for combined heat and power (CHP) will be successful, two key considerations for deployment are having clear interconnection standards and favorable stand-by rates for customers who opt to add CHP. In this example, states should adopt policies to address interconnection and stand- by rates before adopting financial incentive programs.

GRID MODERNIZATION

New digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers.

Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency.

Grid modernization will require a suite of state and federal policy changes to support advancements in grid technologies, grid management, and utility regulation.

In the most recent (2018) Grid Modernization Index, Arizona ranked fourth overall. Arizona's score in the state support category (i.e. their implementation of policies that advance and encourage grid modernization) increased from tenth to sixth place. Arizona ranked eleventh in the nation for grid operations (i.e. the state's actual deployment of the technologies that support grid modernization) and sixth for customer engagement (i.e. how well the utilities involve customers in their grid modernization programs).

While Arizona is a leader in grid modernization, there are supportive policies that policymakers could adopt to increase in-state modernization efforts.

1. Require that utilities' integrated resource plans (IRPs) include plans to enhance cybersecurity, integrate distributed energy resources (including electric vehicles and energy storage) and demand response and/or demand-side management (DSM) programs, and measure and report on the results of grid modernization efforts. In October 2019, ACC Chairman Robert Burns proposed a new IRP process that would provide for greater stakeholder input and require all-source requests for proposals that would include DSM, distributed and customer-owned, and non-traditional resources in the utility procurement process.

2. Develop new utility business models. Today, non-traditional energy resources, including emerging, disruptive technologies (for example, customer-owned distributed generation, EVs, and energy storage) are increasingly cost competitive with more traditional resources. This has not only led to shifting customer

[3] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. http://www.nrel.gov/docs/fy13osti/56428.pdf.

expectations but also to new market realities confronting energy providers. In light of this, many argue that the regulated utility industry needs a new set of principles that are more sophisticated, forward-planning, and incentive-based. In February 2020, Commissioner Lea Márquez opened a docket to examine whether performance incentive mechanisms might assist the state and its utilities in meeting the challenges and changing customer expectations associated with emerging energy technologies and market realities.

3. Arizona does not have clear policies governing customer data access and privacy protections. To address this, policymakers could develop legislation or rules that, at minimum, do the following: clarify who owns the energy data associated with consumer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data possible. The state could establish customer access to energy data through the Green Button Connect program, for example. APS offers online services to provide customers with energy consumption data, but it is unclear how this program compares to the Green Button Connect program.

The adoption of incentives for or a requirement to integrate a certain amount of energy storage on the grid alongside enhancing renewable energy and electric vehicle policies would support modernization efforts and improve the chances of successful grid modernization.

ENERGY STORAGE

Energy storage offers a unique opportunity to manage supply and demand dynamically while also maximizing the value of grid resources. By deploying storage to strategic locations, utilities can more effectively manage their energy portfolios. First, storage allows utilities to manage intermittent demand – helping to flatten peak demand requirements. Second, the responsiveness of energy storage can allow utilities to implement voltage regulation and other ancillary services, which are useful for improving system efficiency. Third, storage can dispatch power to better integrate intermittent power generation resources like renewable energy to the grid. Finally, energy storage can help the commercial sector avoid costly demand charges. As utilities around the country consider implementing or extending demand charges to other sectors, energy storage will become more relevant as a customer cost-saving investment.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to several economic and environmental gains.

Storage provides multiple benefits to both the customer and the utility. State planning and regulatory policies can help maximize these benefits by 1) establishing a framework for easy integration of energy storage into the grid and 2) establishing a marketplace that monetizes the benefits of energy storage for cost effective investment.

Arizona does not currently have an energy storage procurement target or goal. In November of 2019, the ACC approved new interconnection rules to standardize and fast-track the interconnection of distributed generation, including storage technologies. And, utilities in the state are actively pursuing energy storage technologies and developing storage projects. For instance: APS has two grid-scale batteries in operation, and, in April of 2019, issued requests for proposals (RFPs) to add batteries to existing rural solar plants and for a new solar-plus-storage installation. In total, the utility plans to add 850 MW of storage by 2025[4], which might be "the largest amount of announced storage by a utility to be deployed in such a short period of time [(six years)] in the United States" (Klump, 2019). APS's Storage Rewards program provides a one-time $500 bill credit to qualified residential customers that install an APS-owned battery system. The program is intended to allow APS to study the impact of battery storage during periods of peak demand. NextEra Energy Resources and Salt River Project (SRP) completed an integrated solar photovoltaic (PV) plant equipped with a 10MW lithium-ion battery storage system. SRP announced that it will build the state's first standalone energy storage plant for peak power, and in October of 2018, the utility teamed

[4] APS also plans on adding 100 MW of new solar during this time.

up with researchers from the National Renewable Energy Laboratory (NREL) to study the value of distributed storage and encourage installation by offering incentives to 4,500 customers to enroll a qualifying system in the study.

There are several opportunities for developing supportive state policies:

1. Instruct utilities to evaluate the value of energy storage in multiple strategic locations across the utility system and consider a requirement to deploy storage where it will be cost effective or identify the price point at which it will become cost effective. In 2017, the ACC issued a decision requiring APS to consider energy storage options as alternatives to transmission and distribution investments. Policymakers might consider extending such a requirement to all utilities.

   Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required that utilities evaluate the cost effectiveness of non-wires alternatives (NWAs) to large transmission and generation investments. Alternatively, states might want to require utilities to develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the greatest value.

2. Consider adding a mandatory energy storage procurement target or requirement for energy storage with a documented process for periodic review of progress towards that goal. Procurement targets can jump-start market creation, spur fast learning, and guide the development of a regulatory framework.

3. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment for storage. These incentives can also be designed to decline as the value of storage becomes more readily monetized, and/or as the cost of storage decreases. Policymakers could allow utilities that provide storage incentives to customers to also recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This should signal to customers the value of leveraging storage while better aligning customer costs with system costs. Financing energy storage installations for commercial customers could help reduce their demand charges. Policymakers might start first with a policy that provides grants to pilot projects, and/or that targets existing solar system owners. Financial incentives should be designed to ensure that the state meets other goals including emissions and peak demand reductions, and equitable access to clean energy.

MAINSTREAMING RENEWABLES

As the renewable energy industry matured, technology improved, and global production of generating equipment increased. Renewable energy is increasingly seen as the least cost, and lowest risk form of energy (excluding energy efficiency). A 2019 Bloomberg New Energy Finance report predicts that renewable resources will generate at least 60% of total global electricity and 43% of U.S. electricity by 2050. With increased deployment, utilities are learning more about how to integrate renewables effectively, investors are becoming more comfortable with the technologies, and building code officials are recognizing common standards and best practices. For these reasons, it is in the interest of policymakers to ensure that their states are well positioned to benefit from the transition to clean energy resources.

To reduce barriers to customer and utility participation in the renewable energy market, Arizona might consider several policy options.

Customer-Oriented Policies

1. Interconnection, Net Metering, and Streamlined Permitting – In general, customers want a clear, streamlined, affordable, and predictable process for connecting renewable energy systems to the grid. At the end of 2016, the ACC voted to eliminate conventional retail net metering, lower the credit residential solar customers receive for excess energy sent back to the grid, limit how long customers can keep their rates, and establish a separate rate class for solar customers. Arizona's policymakers could consider crediting net excess generation at the customer's full retail rate. Allowing aggregated net metering would be especially beneficial to the state's

agricultural operations. Other applications for aggregated net metering include commercial properties and public entities like state and local governments, universities, and schools. The state might also consider enhancing existing permitting standards to provide for streamlined permitting processes, or resources to support local governments that voluntarily implement a streamlined program, as Pima County has done. State incentives, such as tax credits, financial incentives, or loans can be tied to systems that are established within a designated streamlined permitting jurisdiction.

2. Shared Renewables – Due to building and property attributes and ownership issues, many customers are unable to install renewable energy technologies. Allowing shared, or community, renewable energy projects addresses this. These projects have multiple owners or subscribers who pay for a portion of the generation provided by the system. Arizona does not have a state policy to support shared renewables, but individual utilities offer community solar programs. To support program participation, Arizona could consider adopting a policy that supports the development of shared renewable energy projects. For example, Minnesota's Solar Energy Jobs Act required utilities to purchase output from community solar gardens no larger than one MW per site and requires compensation at a value of solar tariff.[5]

   The state might also consider adopting a virtual net metering policy. Virtual net metering allows a customer to receive credits from a shared system as if the generation were on site. Virtual net metering is different from a power purchase agreement (PPA), which pays the customer for the proportion of power they produce. Because it is treated as a "credit" on the customer's bill, the customer can avoid the tax implications of a PPA payment - which can adversely affect the economics of the system (and may come as a surprise to the participant).

   Low credit ratings often deter participation in renewable energy markets; this can affect low- and moderate-income (LMI) households' adoption of renewable energy solutions. Supportive policies for shared renewables can be designed to encourage participation by LMI households; this can increase adoption of renewable technologies and reduce energy costs. Low-income participation can be encouraged either through a percentage mandate for the overall annual contracted capacity, or by offering a higher rate of payment for the portion of shared solar capacity attributed to low-income customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program to provide recipients of assistance access to participation in a shared renewable system.

   There are several additional policy options that Arizona might consider to promote renewable energy uptake by LMI consumers. Generally, successful state policies should be tailored to these customers, be cost-effective and financially sustainable, have measurable performance indicators, and be flexible enough to allow later changes in design.

3. Corporate Procurement – Many Fortune 100 and 500 companies have established either climate goals or commitments to purchase renewable energy. Over the last five years, over 20 gigawatts (GW) of renewable contracts have been announced by corporate entities. Arizona currently meets five of the six Corporate Renewable Energy Buyers' Principles. To increase corporate access to renewable energy, the state could consider allowing companies to purchase renewable energy credits or renewable energy through green tariffs. Green tariffs allow customers to source their electricity from renewable sources through a fixed rate. The ACC recently adopted a policy statement requiring regulated utilities to propose alternative generation buy-trough programs for larger commercial and industrial customers. Arizona's policymakers might also consider allowing companies to enter into onsite third-party PPAs. In addition, it is prudent to incorporate corporate renewable purchase commitments into the IRPs that utilities submit to regulators to plan for resource needs over multiple decades. By integrating these renewable purchase commitments into the IRP process, regulators can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas emissions and increase investments in clean energy resources. States might see a clean peak standard as the next step in a progression from renewable portfolio

[5] For Minnesota, compensation for distributed generation will default to the retail rate until the PUC approves a value of solar tariff.

standards (RPSs). In 2006, the ACC adopted rules to expand Arizona's Renewable Energy Standard to require investor-owned utilities and electric cooperatives serving retail customers in Arizona to obtain renewable energy credits from eligible renewable resources to meet 15% of their retail electric load by 2025 and thereafter.[6] While the ACC is authorized by the state Constitution and prior case law to impose clean energy requirements on utilities, a recent court case weakens the ACC's jurisdiction in non-ratemaking cases, potentially allowing the state legislature to override and update the ACC's renewable energy regulations. In July 2020, the Supreme Court of Arizona issued a ruling which recognized the ACC's authority to appoint an interim manager to operate Johnson Utilities due to public health concerns arising from the existing management.[7] In its decision, the court affirmed the ACC's ability to enforce public safety rules as part of its constitutional "permissive" authority, which can be superseded by the legislature. The court disagreed with the ACC that overtaking utility operations fell within its "ratemaking" authority, in which the ACC has exclusive jurisdiction from the legislature. The ruling also declared that previous cases broadly construing ratemaking authority, such as an appellate case affirming the ACC's ratemaking authority to adopt the Renewable Energy Standard, were made in error. The new case law signals that the legislature is now authorized to amend existing renewable energy requirements.

A few utilities have adopted clean energy goals beyond the Renewable Energy Standard. TEP has a goal of 70% renewable energy by 2035, and APS' has a 65% clean energy by 2030 target and a 100% clean energy by 2050 goal. In March 2020, the ACC directed staff to develop rules to implement a 100% clean energy by 2050 target.

To increase utility adoption of clean energy technologies, Arizona's policymakers might consider adopting a clean peak standard. Clean Peak Standards aim to increase the share of clean energy resources used to meet peak demand and decrease energy bills over the long-term by reducing peak demand in the hours when energy costs are highest. These objectives can be met through different policy options, including: planning and procurement that focuses on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units; incentives – including carve-outs in states with RPSs – for clean energy resources delivered during peak times; and/or adopting a new clean peak standard that sets a target for clean energy deliveries during peak times.

In 2016, Arizona's Residential Utility Consumer Office (RUCO) submitted a proposal for a clean energy standard with Commissioner Andy Tobin's support. In January 2018, Tobin proposed Arizona's Energy Modernization Plan to the ACC, which contains a Clean Peak Standard. If implemented, the standard would require utilities to determine how much renewable electricity they deliver during peak demand hours and then increase that baseline figure by 1.5% per year until 2030. In July 2018, Tobin released draft rules to implement the Energy Modernization Plan, which seeks to nest the existing Renewable Energy Standard and Tariff (REST) within a new Clean Resource Energy Standard and Tariff (CREST) policy framework. In addition to the Clean Peak Standard, the proposal would expand the state's RES by requiring 80% of electric generation to be supplied by zero-carbon resources by 2050. Following July 2018 meetings regarding Tobin's proposal, the ACC opened a new rulemaking in August. While Commissioner Tobin resigned in May 2019, the proceeding is ongoing.

PATHWAYS TO A LOW CARBON FUTURE

The international scientific community has determined that steep and rapid reductions in global greenhouse gas (GHG) emissions are needed to avoid the worst impacts of global warming and climate change. Federal and state policy interventions are necessary to transform our energy systems and rapidly reduce GHG emissions in the U.S. In general, effective policies will:

1) Establish performance standards and place enforceable limits on carbon pollution;
2) Provide financial incentives for individuals, businesses, and industry to choose clean energy and greatly improve energy efficiency;
3) Spur public and private investment in clean energy infrastructure, including investment in advanced transportation systems for the movement of people and goods; and

[6] Of this percentage, 30% (i.e. 4.5% of total retail sales in 2025) must come from distributed renewable resources by 2012. Half of the distributed renewable energy requirement must come from residential applications and the remaining half from non-residential, non-utility applications.

[7] Johnson Utilities vs. Arizona Corporation Commission et al., Case No. CV-19-0105-PR. 31 July 2020

4) Provide funding for research, development, and demonstration of technologies that will underpin the de- carbonization of the U.S. economy.

Arizona's utilities have taken the lead in setting GHG emissions reductions goals. APS will not use coal-fired generation after 2031, and has set a 100% carbon free by 2050 goal. SRP has goals to reduce CO_2 emissions per MWh by 62% from 2005 levels by 2035 and 90% by 2050. TEP will stop using coal by 2032, and plans to reduce carbon emissions by 80% by 2035. To compliment this, Arizona's policymakers might consider the following:

1. GHG Emissions Monitoring and Reporting – To effectively implement policies that reduce emissions, a mandatory system for monitoring, reporting, and verifying GHG emissions must be put in place. While the U.S. EPA has GHG reporting requirements, the federal reporting requirements focus on major industrial sources, leaving significant gaps in the information states need to fully understand their emissions profile. Policymakers might consider legislation similar to Colorado's SB19-096, which requires annual GHG reporting and establishes emissions baselines from which to measure progress.

2. Emissions Targets – Emissions targets can take a technology neutral approach that looks at the total emissions of the utility portfolio and drive emissions down with a combination of renewables, traditional fuels, efficiency, and technological advances. Emissions reductions can be achieved through a carbon portfolio standard approach, under which a state sets an emissions reduction target to be achieved over time, for example, 40% below 1990 levels by 2040. This can be implemented through the IRP or other long-term planning process or by establishing a maximum allowable rate of emissions per unit. Such a standard can also be designed to address other concerns such as pollution, asthma risk, environmental justice, and water use.

3. Cap-and-Trade / Cap-and-Invest – These policies place enforceable limits on carbon emissions that cannot be exceeded by regulated entities without penalty. Emissions allowances are allocated or sold to companies by the state and sources must hold an allowance for each ton of carbon they emit in a given year. Emissions caps and available allowances are reduced every year, requiring that industries reduce their emissions or pay higher market prices for available allowances. States might choose to invest the revenue associated with emissions allowances in renewable energy, public transportation, zero-emission vehicles, environmental restoration, sustainable agriculture, recycling, and other actions.

   States might consider joining an existing program like the Western Climate Initiative (WCI) or the Regional Greenhouse Gas Initiative (RGGI), as joining an established network can remove administrative barriers to entry.

4. Carbon Tax – Carbon taxes impose a price on each ton of carbon emitted and are levied on the purchase and use of fossil fuels by business and industry. That cost is subsequently reflected in consumer prices. If carbon taxes are levied at a high rate, they will discourage the use of GHG emitting resources and technologies, encouraging a market switch to new technology. Alternatively, carbon taxes can be set at a lower rate, which will have a limited impact on market behavior, but the revenue can be substantial and that revenue can be invested in energy efficiency and emission reduction technologies which will result in lower emissions. States considering this option might examine British Columbia's existing tax structure or the federal proposals from the Citizen's Climate Lobby and the Climate Leadership Council.

5. Emissions Performance Standards – Transportation sources now emit more GHGs than any other sector, and rapid reductions from all types of vehicles, engines, and equipment is critical to achieving carbon reduction goals. The Low Carbon Fuel Standard (LCFS) implemented by both Oregon and California is another example of a flexible, market-based approach to regulating carbon emissions at the state level. LCFSs regulate the carbon intensity of transportation fuel in order to reduce the use of petroleum-based fuels and promote investment in low-carbon options (electrification, biofuels, hydrogen, etc.). The market mechanism LCFSs use is a crediting system where each fuel type is assigned a carbon intensity (CI) score. The allowable CI score is decreased yearly, requiring a switch to lower CI fuels. Entities who provide fuel below the regulated CI score earn credits. These credits can be sold to providers who operate at a deficit (above the mandated CI score), creating a market incentive for investment in cleaner fuels.

ELECTRIFICATION OF THE TRANSPORTATION SECTOR

Bloomberg New Energy Finance estimates that 58% of all new passenger vehicle sales will be electric by 2040 and that price parity with conventional vehicles will be met for most segments in the mid-2020s. Therefore, a key part of building a modernized grid involves designing infrastructure that will facilitate easy connection of electric vehicles (EVs) to the grid. One of the most important barriers to increased adoption of EVs is the consumer's awareness of the availability of EV charging stations. Ultimately, drivers want to be sure that their car will get them where they need to go. Another important barrier to increased adoption of EVs is their higher up-front cost as compared to similar conventionally fueled vehicles. The good news is that both supportive policies for developing charging infrastructure and technological advancements have eased range anxiety.

Arizona offers some incentives for the owners of EVs, including a high occupancy vehicle lane exemption, a parking incentive, and a reduced license tax. SRP and TEP offer rebates and charging rate incentives for plug-in EVs. TEP's and APS' most recent DSM Plans include incentives and programs to support EVs including rebate programs for EV pre-wiring in residences, a pilot managed EV charging program, an electric school bus pilot program, and rate plans to incentivize off-peak charging. The ACC has also taken interest in EVs. In August 2018, Commissioner Dunn opened a transportation electrification docket to investigate charging infrastructure ownership, barriers to EV adoption, and time-of-use rates. In December, the ACC voted to adopt a policy to encourage IOUs to invest in infrastructure, develop new rates, and create pilot programs to facilitate transportation electrification. Utilities were required to file comprehensive EV plans by the end of 2019.

In December 2019, Governor Ducey signed the revised Intermountain West EV Corridor Memorandum of Understanding (MOU).[8] The mutual intention of the signatories (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming) is to update their Regional Electric Vehicle Plan for the West (REV West Plan) based on progress to date. Under the MOU, the signatory states agree to create best practices and procedures that will enhance EV adoption; create voluntary minimum standards for EV charging stations; identify and develop opportunities to incorporate EV charging station infrastructure into planning and development processes; encourage EV manufacturers to stock and market a wide variety of EVs in the states; and identify, respond to, and where possible, collaborate on funding opportunities to support the development of the REV West Plan.

A study prepared by M.J. Bradley and Associates at the end of 2018 found that if one million EVs were registered in Arizona by 2050, the state's utility customers would save $200 million through reduced electricity bills, cumulative gasoline use would be reduced by 2.1 billion gallons, and cumulative net GHG emissions would be reduced by 22 million metric tons. In total, the study found that "cumulative net benefits from greater [plug-in EV (PEV)] use in Arizona could exceed $3.7 billion state-wide by 2050." Other studies in other states have found that greater market penetration of PEVs "can generate up to $570,000 in additional economic impact for every million dollars of direct savings, resulting in up to 25 additional jobs in the local economy for every 1,000 PEVs in the fleet" (M.J. Bradley and Associates 2018).

There are opportunities to expand the market for EVs in Arizona:

1. EV and EVSE Financing and Financial Incentives – Providing additional financial incentives and innovative financing options can increase market penetration of EVs. Sales, property, and income tax credits are some of the simplest methods for addressing the up-front costs of EVs and EVSE. While sales tax credits are typically applied at the time of purchase, property and income tax credits may do less to address upfront cost barriers as receipt of the credit is typically removed in time from the purchase.[9] Some states have adopted other financial incentives including low-interest loans, grants, vouchers, and rebates. A handful of states qualify EVSE under their property assessed clean energy (PACE) programs. A simple solution is to increase and expand existing tax credits to incentivize commercial, publicly available charging stations.

[8] Governor Ducey signed the original Intermountain West EV Corridor Memorandum of Understanding (MOU) in 2017.

[9] A study by the Congressional Budget Office however suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles.

2. Charging Infrastructure Plan – Locating charging infrastructure is different from locating conventional fueling stations. While some drivers will need to charge more quickly, others will refuel when they are parked for longer periods of time, for example when shopping, eating at a restaurant, or going to work. Charging infrastructure plans should attempt to pair the appropriate level of charging (level 2 or direct current fast charging) with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop an infrastructure plan through a stakeholder process. States with existing registration fees for EVs could use a portion of this revenue to fund charging infrastructure development efforts, as Washington has done.

3. Parking Infrastructure Requirements – In tandem with the development of a statewide plan, legislation could set requirements for EV parking infrastructure. Some states have adopted permitting standards for parking lots. Hawaii, for instance, requires that for every 100 parking spaces, there must be at least one EV charging space. States and local governments are also updating building standards and codes to require that new buildings be EV ready, meaning that all conduit and wiring are able to accommodate EVSE. States can also implement programs to provide parking incentives for owners of EVs. Typically, these programs provide access to carpool parking, preferential spaces, reduced fees, and/or access to charging stations.

NEWS

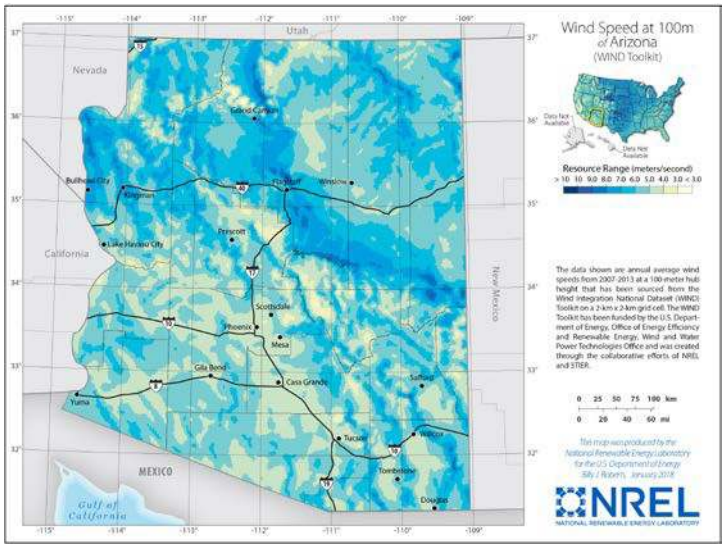
- August 12, 2020: Arizona-made Electric Car to get 500-Plus Miles on a Single Charge, Manufacturer Says
- August 7, 2020: Salt River Project: 21 Arizona Companies Sign Solar Agreements
- August 7, 2020: University of Arizona Researchers Develop Solar-Powered Desalination System
- July 7, 2020: Tucson Electric Power Plans to End Use of Coal-Generated Electricity by 2032
- June 30, 2020: Arizona Public Service Lays Out Its Options for Reaching Zero-Carbon Energy by 2050
- June 29, 2020: 2 More Western Utilities Move to Close Coal Plants Early, Shifting to Renewables and Storage
- May 27, 2020: Land Swap Leads to Massive Arizona Solar Project
- May 22, 2020: Electric Cars Are About to Start Rolling Out of the Arizona Desert

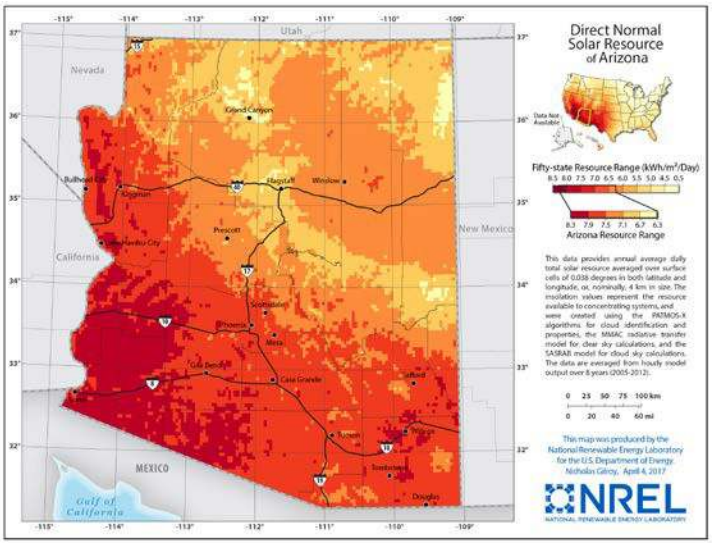
OTHER RESOURCES

- American Wind Energy Association (AWEA), Arizona: https://www.awea.org/Awea/media/Resources/StateFactSheets/Arizona.pdf
- The American Council for an Energy-Efficient Economy State and Local Policy Database, Arizona: https://database.aceee.org/state/arizona
- The Database of State Incentives for Renewables and Efficiency, Arizona: https://programs.dsireusa.org/system/program?fromSir=0&state=AZ
- U.S. Energy Information Administration, Arizona: https://www.eia.gov/state/?sid=AZ
- SPOT for Clean Energy, Arizona: https://spotforcleanenergy.org/state/arizona/
- Plug-in Electric Vehicle Cost-Benefit Analysis – Arizona: https://westernresourceadvocates.org/publications/plug-in-electric-vehicle-cost-benefit-analysis-arizona/
- National Renewable Energy Laboratory Biomass Maps: https://www.nrel.gov/gis/biomass.html
- The Rocky Mountain Institute, From Gas to Grid – Building Charging Infrastructure to Power Electric Vehicle Demand: https://rmi.org/wp-content/uploads/2017/10/RMI-From-Gas-To-Grid.pdf
- The GridWise Alliance, EVs - Driving Adoption, Capturing Benefits: http://gridwise.org/evs-driving-adoption-capturing-benefits/
- The Regulatory Assistance Project, Performance-Based Regulation: https://www.raponline.org/event/performance-based-regulation-the-power-of-outcomes-part-1/
- The Interstate Renewable Energy Council, A Playbook for Modernizing the Distribution Grid, Volume 1: https://irecusa.org/publications/a-playbook-for-modernizing-the-distribution-grid-volume-1/

ARIZONA'S WIND AND SOLAR RESOURCES

WIND https://windexchange.energy.gov/states/az





Our Resources

CNEE Homepage: https://cnee.colostate.edu/

The SPOT for Clean Energy: https://spotforcleanenergy.org/

The Advanced Energy Legislation (AEL) Tracker: https://www.aeltracker.org/

CNEE Contact Information

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