

We're All In for Arizona:
Our Clean Energy
Commitment



aps.com/cleanenergy

Contents

Message from CEO Jeff Guldner	3
Our Clean Energy Commitment	4
A Changing Arizona	6
Developing the Plan	8
How We Will Get There	10
Collaboration is Key	12
Driving Energy Innovation.....	15
We're All In for Arizona	16
Appendix.....	18

About Our Company

Arizona Public Service (APS) generates clean, reliable and affordable energy for 1.3 million homes and businesses located throughout 11 of Arizona's 15 counties. As owner and operator of Palo Verde Generating Station, the nation's largest producer of carbon-free electricity, and with one of the country's most substantial renewable energy portfolios, APS' current energy mix is 50 percent clean. With headquarters in Phoenix, APS is the principal subsidiary of Pinnacle West Capital Corp. (NYSE: PNW).

NOTE: In this report, we define "clean energy" as energy derived from zero-carbon resources. Our current clean energy resource mix is comprised of renewable energy resources, energy efficiency, energy storage and other advanced technologies, and is anchored by the country's largest source of carbon-free electricity, the Palo Verde Generating Station. "Clean and carbon-free energy" refers to APS' commitment to 100 percent carbon-free electricity generation by 2050.



Message from CEO Jeff Guldner



Imagine a world with 100 percent clean energy. We are.

For more than 130 years, our company has been providing safe, affordable and reliable energy to millions of homes and businesses across Arizona. We are also at the forefront of a dramatic transition that responds to a desire expressed by stakeholders to consider impacts of climate change. Without question, the energy industry has a critical role to play in decarbonizing the U.S. economy, and APS is committed to doing our part.

We are making a commitment to Arizona. By 2050, APS will deliver 100 percent clean, carbon-free and affordable electricity to our customers. This goal includes a nearer-term 2030 target of 65 percent clean energy, with 45 percent of our generation portfolio coming from renewable energy.

We also will cease all coal-fired generation by 2031. We will make this transition in a responsible manner, working closely with the affected communities to minimize impacts and help identify new opportunities.

Our commitment is for the long term. Our immediate focus, amid the challenges presented by the COVID-19 coronavirus pandemic, is to keep our employees safe and healthy, keep the power on for our customers and move forward with the determination and optimistic spirit that have characterized this company for more than 130 years. However, we remain fully dedicated to achieving our goals and achieving a shared, sustainable vision for Arizona.

Our clean energy goal builds on our history of promoting and integrating renewables, energy efficiency, battery storage and carbon-free generation. Is it aggressive? Yes. Do we believe it is possible? Absolutely. However, we cannot do it alone. It will require a combination of the right technologies, collaborative partnerships and a supportive policy environment that understands flexibility is critical to balance the building of **clean** generation, while maintaining **affordability** and **reliability** for our customers.

Clean: Move toward a lower-carbon grid, anchored by the Palo Verde Generating Station's carbon-free nuclear power, and regulatory policy that allows us to get as clean as we can, as fast as we can.

Affordable: Capitalize on market-driven solutions, flexibility and attracting new business to grow our state's economy to maximize resources and bring costs down for customers.

Reliable: Make intelligent investments in new technologies, apply them in pioneering ways and drive research and development to embrace innovation – collaborating with universities and other thought leaders to keep our grid reliable as our generation gets cleaner.

Our plan is based on sound science, aimed at helping customers realize their own sustainability goals and attracting more employers to Arizona. While all of the solutions we need are not yet known – and some are yet to be envisioned – achieving and realizing the full benefits of a completely clean energy mix will take partnership. It's something for all of us, by all of us.

We look forward to collaborating with you, our customers, communities, employees, policymakers, shareholders and others to achieve a shared, sustainable vision for Arizona.

We are imagining a world powered by 100 percent clean energy. Join us.

Our Clean Energy Commitment

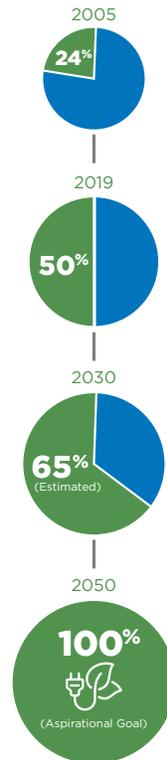
Our clean energy commitment consists of three parts:

- A **2050 goal** to provide 100 percent clean, **carbon-free electricity**
- A **2030 target** of achieving a resource mix that is **65 percent clean energy**, with 45 percent of our generation portfolio coming from renewable energy
- A commitment to **end our use of coal-fired generation by 2031**

Our Goal: 100 Percent Clean, Carbon-Free Electricity

Our customers and stakeholders want clean energy, and we are listening. Working together, we are advancing Arizona's clean energy future. We plan to achieve a fully clean, carbon-free energy mix by 2050 to ensure Arizona remains a healthy and beautiful place to live and work. This goal is science-based and supports continued growth and economic development while maintaining affordable prices for our customers.

CLEAN ENERGY PATHWAY





Innovation and new ways of thinking will be key to reaching this goal. Some of the technologies we will eventually depend on are yet to be developed, and we anticipate significant advancements in carbon-free electricity generation, delivery and storage, driven in part by our commitment.

To meet this goal, we will end our use of coal-fired generation by 2031. We will work closely with impacted employees and local communities to ease the transition and support long-term economic planning for a future beyond coal.

We cannot achieve this ambitious outcome by ourselves. Realizing the full potential and benefits of completely clean, carbon-free electricity will require collaboration and partnership with our customers and a wide variety of other stakeholders. Reaching this goal also will depend on – and ultimately contribute to – the overall strength of Arizona’s economy.

Our path to reaching 100 percent clean energy includes a shorter-term goal of making our energy mix 65 percent clean, with 45 percent of our generation portfolio coming from renewable energy, by 2030. This 2030 target will serve as a critical checkpoint for our resource planning, investment strategy and customer affordability efforts as we move toward our commitment.

Because our plan will require significant investment, it will be accompanied by a comprehensive roadmap developed in collaboration with our stakeholders and through our subsequent Integrated Resource Plans.

A Changing Arizona

Our changing climate is both a global and local issue, with effects in Arizona that could be severe. Companies moving to Arizona or expanding their business here increasingly consider the dynamic nature of the environment, including the availability of water and energy resources.



Our clean energy commitment is informed by consultations with Arizona universities and non-governmental organization experts. Their input is grounded in current, globally recognized climate science, and provides a greater understanding of the impacts of our changing climate across the state. Our 2050 target is consistent with the Intergovernmental Panel on Climate Change's recommended timeframe for limiting global warming this century to 1.5°C above pre-industrial levels (SR1.5). We will continue to monitor climate science developments to stay aligned with new research and recommendations.

The National Climate Assessment – put together by a team of more than 300 experts and led by the Federal Advisory Committee – summarizes the effects of climate change in the United States. The Fourth National Climate Assessment, Vol. II. notes that the Southwest has one of the highest levels of temperature change in the country so far (an average temperature rise of 1.5°F since 1990), significantly reduced levels of precipitation and amplified droughts (NCA).



**IN 2019,
APS USED
70%
RECLAIMED
WATER
FOR POWER
GENERATION**

Water Supply

Water is fundamental to life, and is critical to all economic activity including energy and food production. Arizona's hot, dry climate is particularly vulnerable to water supply impacts (Armstrong et al. 2018, EWF NSF Workshop 2015, DOE Basic Research Needs for Energy and Water).

Declining water reservoirs, as observed in Arizona, will require adaptation. New technological and policy solutions will need to be developed. Experts emphasize the need for energy-efficient water reuse and purification for municipal, agriculture, mining and production sectors; sensors to allow for demand response measures; and new policies for better management of water resources (EWF NSF Workshop 2015).

APS' use of reclaimed water demonstrates our awareness of the water-energy nexus. Use of reclaimed water is vital in Arizona, where groundwater (a non-renewable resource) accounts for 40 percent of statewide water use. Conversely, reclaimed water accounted for about 70 percent of the water used in APS generating facilities in 2019.

Innovative water use at the Palo Verde Generating Station – the only nuclear energy plant in the world not located on a body of water – illustrates our long-standing commitment to environmental stewardship and sustainability. The plant's cooling water comes from recycled effluent from seven municipalities in the greater Phoenix area. Previously, this wastewater was discharged into a dry riverbed. Now, this formerly discarded resource helps us provide power to four states, and nearly 70 percent of Arizona's clean energy.

Land Use Change



Metropolitan areas are particularly affected by temperature increases, as these areas are shown to absorb more heat due to the nature of materials and pollutants, and the density of the population (Hoehne 2019, Wang 2018). By mid-century, Phoenix is expected to experience extreme summer heat events six times more frequently (Grossman-Clarke et al. 2014).

Extreme heat events include multiple factors, such as air temperature, humidity and air pollution in both outdoor and indoor spaces. The impacts of these events on resource availability, namely water, will be amplified as Arizona's population grows (Overpeck and Udall 2010). In addition, Arizona has a large agricultural sector at risk of declining crop yields due to the impacts of climate change (Berardy et al. 2017). Our state is one of the nation's largest suppliers of winter lettuce and vegetables, and a large producer of feed and livestock, so climate change could impact food security.



**THE SOUTHWEST
HAS ONE OF THE
HIGHEST
LEVELS OF
TEMPERATURE
CHANGE
IN THE COUNTRY**

Developing the Plan

APS realizes affordability and reliability are “must haves” for our current and future customers. Clean energy goals must be achieved without compromising these essentials. In addition, we expect APS and Arizona to continue to experience population growth and increased electricity usage, which will drive significant investment needs. APS retained the consulting firm Energy and Environmental Economics (E3) to study how different clean energy policies and strategies could impact our ability to maintain reliability and affordability. Here is a summary of E3’s findings:

- Achieving substantial carbon reductions will require **significant investment** in clean energy resources.
- Broadly defined policies that **encourage clean energy and carbon reductions** provide more affordable and flexible options than prescriptive targets for specific technologies (e.g., renewable portfolio standards).
- **Maintaining Palo Verde Generating Station** is critical to meeting future clean energy goals affordably.
- **Ceasing our use of the coal-fired Four Corners Power Plant** will deliver carbon benefits but also will require replacement investments in the next decade to maintain reliability.
- **Natural gas generation** capacity is critical for reliability in the near term.
- **Energy storage technology** will be an important part of any longer-term solution.



340,000
RESIDENTIAL CUSTOMERS
ADDED BY 2035

(1.7% ANNUAL GROWTH)



270 MILLION
SQUARE FEET OF
COMMERCIAL & INDUSTRIAL
SPACE ADDED BY 2035

(2.0% ANNUAL GROWTH)





**PALO VERDE GENERATING STATION IS THE NATION'S
LARGEST PRODUCER OF ELECTRICITY AND ITS
LARGEST SOURCE OF CARBON-FREE ENERGY**



**BATTERY
STORAGE
TECHNOLOGY**
DELIVERS SOLAR
AFTER SUNSET, WHEN
APS CUSTOMERS
NEED IT MOST

How We Will Get There

THESE ARE THE FUNDAMENTAL ELEMENTS OF OUR CLEAN ENERGY COMMITMENT



Increasing Renewable and Clean Energy Resources

Renewable energy is integral to this commitment and will require substantial ongoing investment by APS. We currently rank fifth among all U.S. investor-owned utilities for overall solar capacity. We're also a recognized industry leader in researching and deploying technologies to deliver the sun's energy to people when they need power the most. Our plan supports the continued addition of rooftop solar as an important option for customers. In addition to depending on solar energy, we will further diversify our energy mix by investing in wind, energy storage, demand response and demand-side management resources, including energy efficiency - all of which contribute to a cleaner grid.



Counting on Palo Verde

The Palo Verde Generating Station is the nation's largest producer of electricity and its largest source of carbon-free energy. As the heart of our generation fleet, Palo Verde also provides the foundation for the reliable and affordable service customers in four Southwestern states count on. Experts agree, the plant's continued operation is vital to a clean, reliable, affordable energy future for Arizona, and it is a significant contributor to the local economy. Nuclear power provides certain climate and grid resiliency advantages over other energy sources, and produces a predictable and steady amount of power continuously.



Promoting Customer Technology and Energy Efficiency

Technologies such as rooftop solar, LED lighting and on-site energy management devices have given residential and commercial customers more power to control their energy usage and potentially reduce their costs. New APS programs are incentivizing customers to incorporate advanced technologies in their homes and businesses to help maximize the value of abundant solar energy. In addition, we are encouraging the widespread adoption of modern energy efficiency technologies, including smart thermostats, electric vehicle charging infrastructure, energy storage and more.



Investing in Energy Storage

Continued advances in energy storage create opportunity. APS' investments in energy storage will help support a clean energy future by enabling intermittent renewable energy to be stored when it is produced and used later at more advantageous times. Storage technologies help us reduce peak demands and use regional excess solar generation frequently available at low or even negative prices.

THESE ARE THE FUNDAMENTAL ELEMENTS OF OUR CLEAN ENERGY COMMITMENT



Managing Demand with a Modern Interactive Grid

A modern interactive grid powered by new technologies can increase our ability to match customer energy demand to the availability of renewable resources. Interactive integrated devices in homes and businesses, sensors and automated switches on power lines, and intuitive energy management systems work together to allow us to operate our system more cleanly and efficiently.



Retiring Existing Coal Plants

We have committed to end the use of coal at the Cholla Power Plant by 2025 and at the Four Corners Power Plant by 2031 – seven years earlier than originally planned. We will work closely with impacted employees and local communities to ease the transition and support long-term economic planning for a future beyond coal.



Optimizing Regional Resources

The ability to use excess clean energy from nearby states already provides significant savings to APS customers. Many clean energy resources produce power intermittently, and solar and wind power are frequently curtailed (used at lower levels) when there is not enough customer need for the energy. However, there are times when solar or wind power not needed in neighboring states can be used in Arizona. APS began participating in such an energy exchange – the Western Energy Imbalance Market – in 2016, and the gross benefits to customers totaled more than \$140 million by the end of 2019. We expect savings from this program to continue increasing each year. This exchange, and potentially others like it, will continue to be an effective tool for integrating the region’s growing clean energy resources while creating savings for customers.

Clean Energy Investments Depend on a Financially Healthy APS

APS investors must have confidence in our future plans. We must ensure our company remains financially healthy as we transition to a cleaner energy portfolio, invest in new infrastructure to serve a growing customer base while building a modern grid, and invest in APS-owned clean energy resources. Shareholders, the owners of our company, will support this plan by investing the necessary capital if we demonstrate the ability to grow earnings and the opportunity to earn a competitive return on their investment.

Collaboration is Key

Reaching 100 percent clean, carbon-free energy by 2050 will depend upon critical input, support and partnership with a variety of stakeholders, including the following:

APS Customers

We will enhance and extend our communication and partnerships with residential and business customers. This includes supporting their sustainability goals and providing expert advice on ways they can affordably reduce their carbon footprints. We also will help customers understand the advantages of using clean energy when it is readily available and more affordable, and help them leverage energy-saving technologies to reduce their electricity use and lower their monthly bills. Many of our industrial and commercial customers are responding to direction from their customers, investors and boards to improve their sustainability profiles. APS can draw upon our own experience and our industry's research to assist these businesses in reducing their carbon emissions and meeting their goals.

Governmental Partners

APS and Arizona's cities are aligned in our ambition to make our communities livable, attractive spaces for residents and businesses. As electricity consumers, the counties, cities and towns APS serves have a stake in the reliability of, and prices for, the products and services we provide. APS' commitment to clean energy can accelerate the ability of municipalities to attain their renewable energy goals and increase their capacity to focus on other areas such as energy efficiency and overall sustainability.

Transportation and Building Sectors

Transportation represents a significant emissions source, and the electrification of that economic sector can help achieve overall carbon-reduction and air-quality goals. APS has developed electric vehicle programs to educate customers and encourage the development of the electric vehicle industry. We will continue to encourage electric vehicle adoption in Arizona and provide incentives for customers to charge their vehicles at optimal times in order to maximize the use and viability of carbon-free renewables and benefit the grid. Electrification



GETTING TO 100 PERCENT WILL REQUIRE A SUPPORTIVE POLICY ENVIRONMENT

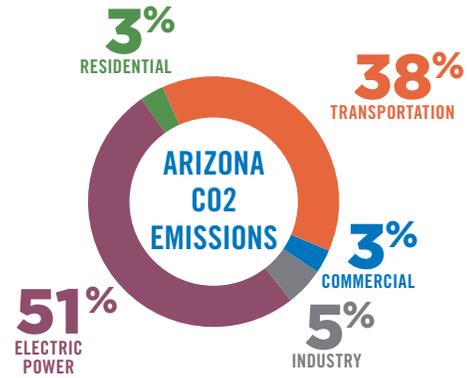
A regulatory environment that encourages clean technologies, innovation and investment is beneficial for customers, the communities we serve and our shareholders. Our plan is predicated on the continuation of the current Arizona regulatory structure, which represents the best opportunity to achieve a clean energy future without compromising reliability or affordability.

At APS, we believe robust public discussion promotes transparency and encourages sound public policy outcomes. We also believe constructive outcomes on energy, cost recovery and utility investment opportunities are essential to achieving a clean energy future for Arizona.

also can address carbon emissions from on-site energy use in buildings. APS works with builders to develop programs that incentivize opportunities to electrify homes and businesses, and we expect to keep expanding these programs as the benefits of building electrification develop.

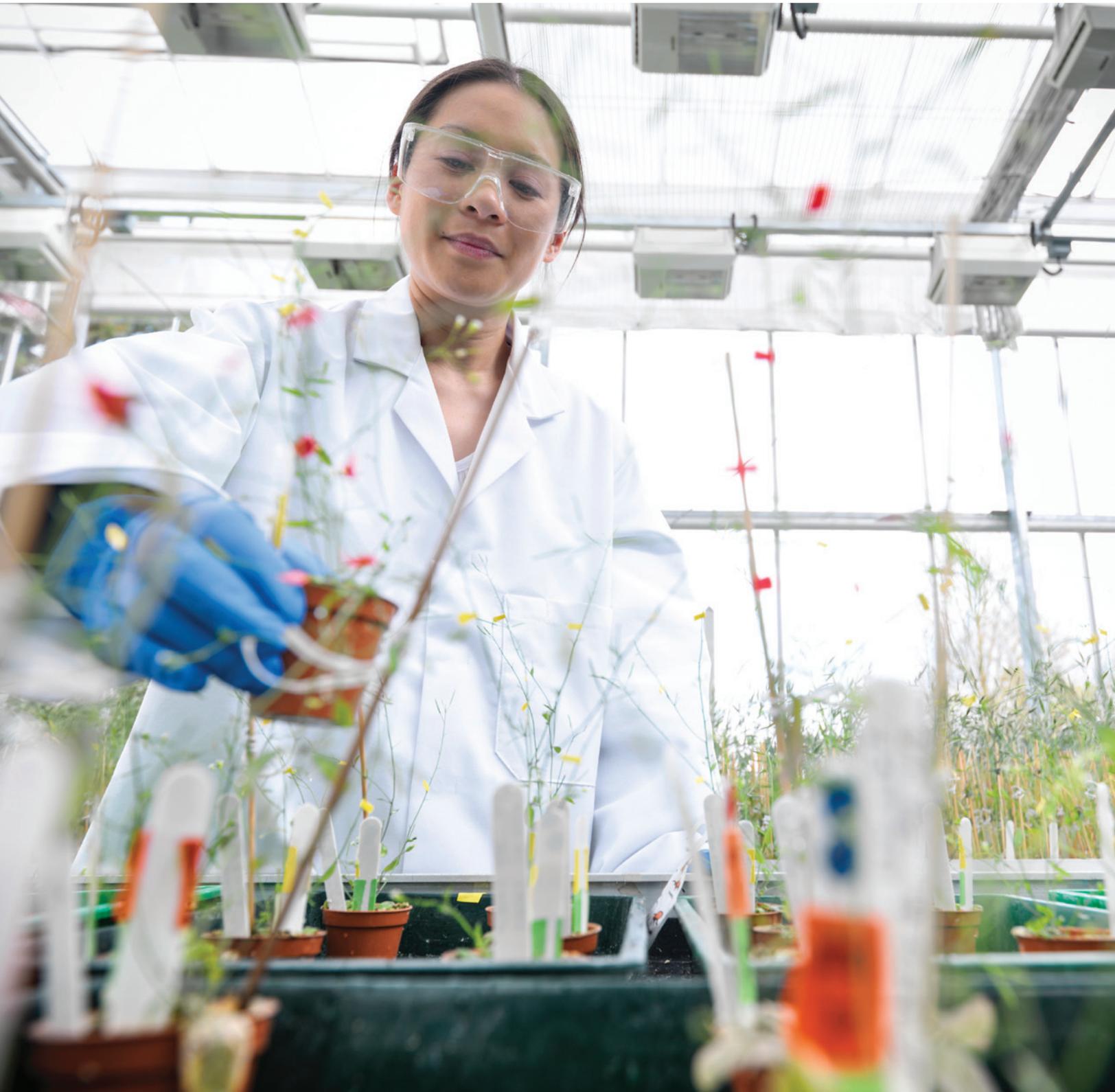
We have been collaborating with other Arizona electric utilities, regulatory agencies, policymakers, automakers, third-party charging service providers and other stakeholders in the development of a Statewide Transportation Electrification Plan for Arizona. This strategic plan will provide a roadmap for electrifying transportation in Arizona, focused on realizing the associated benefits for all residents in the state.

2017 ARIZONA CO2 ENERGY-RELATED EMISSIONS BY ECONOMIC SECTOR



Data based on 2017 U.S. Energy Information Administration (State Carbon Dioxide Emissions Data)





Driving Energy Innovation

Achieving our clean energy commitment will require continued advances in energy technology. To help drive clean energy investment and innovation, APS will encourage policies that enable market-based solutions, and serve as a driving force behind energy research and development. APS will continue to pursue the advancement of new and emerging technologies. Given the research, incubator labs, startups and investment involved in clean energy, we are confident emerging technologies will become proven and commercially available at competitive prices. These could include:

Energy Storage: Energy storage (including pumped hydroelectric, compressed air, flywheel systems, hydrogen technologies and various types of batteries) will play a crucial role in harnessing the intermittency of most renewable resources for the clean energy needs of our customers.

Hydrogen: Industrial methods of manufacturing hydrogen produce CO₂ as a byproduct. However, when hydrogen is produced by electrolysis using clean electricity (such as nuclear, solar or wind energy), the resulting hydrogen is a carbon-free fuel. Producing hydrogen when there is an excess of zero-carbon electricity effectively creates another energy storage technology for meeting peak demand with carbon-free electricity. Currently, Palo Verde is partnering with Idaho National Laboratory and two other utilities on a project funded by the Department of Energy to evaluate the use of zero-carbon nuclear energy to produce hydrogen through electrolysis.

Carbon Capture and Storage: As the electricity business becomes increasingly carbon free, carbon capture technologies offer the potential to keep in operation existing generators that otherwise would need to be retired. A number of carbon-capture projects currently being tested on power plants show promise. Direct air capture, an emerging technology, can isolate atmospheric CO₂ and either trap it permanently in geologic formations or convert it for use in products. We will continue to monitor these emerging technologies.



CLEAN ENERGY INVESTMENTS WILL PROPEL A POWERFUL ECONOMY

In addition to providing our customers with clean energy, we believe the pursuit of our carbon-free goal will produce exciting economic development opportunities for our state. We are confident our initiative will encourage economic development in clean and innovative industries, create jobs and advance a healthy environment while maintaining our commitment to affordable, reliable service for our customers.

We're All In for Arizona

At APS, we are expecting more incredible things ahead for Arizona. Here's what Arizona can expect from us:

We are putting our customers first. We are here to power their lives, businesses and communities. They can count on our energy to remain affordable, and our service to be flexible and reliable.

We are working with our customers and other stakeholders to deliver a 100 percent clean energy future.

We are delivering electricity Arizona can depend on. We invest in, and work tirelessly to maintain, our electric system so Arizona's homes and businesses have the safe, reliable electricity they need.

We're all in for Arizona. We are investing our time and resources to support and develop communities throughout our state to ensure as Arizona grows bigger, it also grows better.





Appendix

Acknowledgements

APS would like to thank the following individuals for their assistance in reviewing and providing input for this report:

- From Arizona State University: William Brandt, Harvey Bryan, Gary Dirks, Gina Gillies, Stephen Goodnick, Katherine Hofland, Christiana Honsberg, Nathan Johnson, Travis Johnson, Kris Mayes, Martin Pasqualetti, Ellen Stechel and Dave White
- From Northern Arizona University: Tom Acker and George William Koch
- From National Renewable Energy Laboratory: David Ginley
- From University of Arizona: Neal R. Armstrong, Andrea Kristen Gerlak and Diana M. Liverman

Bibliography

Armstrong, Neal R. et al. "Challenges and opportunities at the nexus of energy, water, and food: A perspective from the southwest United States." *MRS Energy & Sustainability: A Review Journal* 5 (2018).

Berardy, Andrew and **Mikhail V. Chester**. "Climate change vulnerability in the food, energy, and water nexus: concerns for agricultural production in Arizona and its urban export supply." *Environmental Research Letters* (2017).

Grossman-Clarke, Susanne et al. "Extreme summer heat in Phoenix, Arizona (USA) under global climate change (2041-2070)." *Die Erde: Journal of Geographical Society of Berlin* 145 (2014).

Hoehne, Christopher G. *Urban Heat and Transportation: Human Exposure and Infrastructure*. PhD dissertation, Arizona State University, 2019.

Intergovernmental Panel on Climate Change. *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. October 2018. [SR1.5]

Overpeck, Jonathan and **Bradley Udall**, "Dry Times Ahead." *Science* 328 (2010).

University of Arizona. *Enabling Resiliency in Energy, Water, and Food Systems for Society: Addressing the Scientific, Technological and Societal Challenges of the Energy, Water, and Food Nexus*. Report on National Science Foundation-sponsored workshop. Tucson, AZ, April 2015. [EWF NSF Workshop]

U.S. Department of Energy (DOE). *Basic Research Needs for Energy and Water*. Report of the Office of Basic Energy Sciences: Basic Research Needs Workshop for Energy and Water. Washington, D.C., January 2017.

U.S. Global Change Research Program. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, D.C.: USGCRP, 2018. [NCA]

Wang, Chuyuan. *The Long-term Impact of Land Use Land Cover Change on Urban Climate: Evidence from the Phoenix Metropolitan Area, Arizona*. PhD dissertation, Arizona State University, 2018.

Forward-Looking Statements

This report contains forward-looking statements based on current expectations. These forward-looking statements are often identified by words such as “estimate,” “predict,” “may,” “believe,” “plan,” “expect,” “require,” “intend,” “assume” and similar words. Forward-looking statements are neither historical facts nor assurances of future performance. Instead, they are based only on our current beliefs, expectations and assumptions regarding the future of our business, future plans and strategies, projections, anticipated events and trends, the economy and other future conditions. Because forward-looking statements relate to the future, they are subject to inherent uncertainties, risks and changes in circumstances that are difficult to predict and many of which are outside of our control. Our actual results and financial condition may differ materially from those indicated in the forward-looking statements. Therefore, we caution readers not to place undue reliance on these statements. Important factors that could cause our actual results and financial condition to differ materially from those indicated in the forward-looking statements include, among others, the following: (i) our ability to manage capital expenditures and operations and maintenance costs while maintaining reliability and customer service levels; (ii) variations in demand for electricity, including those due to weather, seasonality, the general economy or social conditions, customer and sales growth (or decline), the effects of energy conservation measures and distributed generation, and technological advancements; (iii) competition in retail and wholesale power markets; (iv) regulatory and judicial decisions, developments and proceedings; (v) new legislation, ballot initiatives and regulation, including those relating to environmental requirements, regulatory policy, nuclear plant operations and potential deregulation of retail electric markets; (vi) our ability to meet renewable energy and energy efficiency mandates and recover related costs; (vii) current and future economic conditions in Arizona, including in real estate markets; (viii) the development of new technologies which may affect electric sales or delivery; (ix) the cost of debt and equity capital and the ability to access capital markets when required; (x) generation, transmission and distribution facility and system conditions and operating costs; (xi) the ability to meet the anticipated future need for additional generation and associated transmission facilities in our region; (xii) restrictions in Arizona Corporation Commission Orders; and the potential effects of the continued COVID-19 pandemic, including on demand for energy, economic growth, our employees and contractors, supply chain, expenses, capital markets, capital projects, operations and maintenance activities, uncollectable accounts, liquidity, cash flows, or other unpredictable events. These and other factors are discussed in the Risk Factors described in Item 1A of our Annual Report on Form 10-K, and in Item 7 — “Management’s Discussion and Analysis of Financial Condition and Results of Operations” of our Annual Report on Form 10-K and in Part II, Item 1A of our Quarterly Report on Form 10-Q for the quarter ended March 31, 2020, which readers should review carefully before placing any reliance on our financial statements or disclosures. We assume no obligation to update any forward-looking statements, even if our internal estimates change, except as may be required by applicable law.





aps.com/cleanenergy