

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

Pinnacle West is a holding company that conducts business primarily through our wholly owned subsidiary, Arizona Public Service Company (APS), with approximately \$3.5 billion in annual revenues. APS's corporate vision is to create a sustainable energy future for Arizona. APS achieves this vision by operating as a vertically integrated electric utility that provides retail and wholesale electric service to most of the state of Arizona. APS generates safe, affordable and reliable electricity for nearly 1.2 million retail and residential customers in 11 of Arizona's 15 counties.

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. Because actual results may differ materially from expectations, we caution you not to place undue reliance on these statements. A number of factors could cause future results to differ materially from historical results, or from outcomes currently expected or sought by us. A discussion of some of these risks and uncertainties is contained in our annual report on Form 10-K and is available on our website at pinnaclewest.com, which you should review carefully before placing any reliance on our forward-looking statements, 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.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years	Select the number of past reporting years you will be providing emissions data for
Row 1	January 1 2018	December 31 2018	No	<Not Applicable>

C0.3

(C0.3) Select the countries/regions for which you will be supplying data.

United States of America

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your consolidation approach to your Scope 1 and Scope 2 greenhouse gas inventory.

Financial control

C-EU0.7

(C-EU0.7) Which part of the electric utilities value chain does your organization operate in? Select all that apply.

Row 1

Electric utilities value chain

Electricity generation

Transmission

Distribution

Other divisions

Smart grids / demand response

Battery storage

Micro grids

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Chief Executive Officer (CEO)	Chairman of the Board and Chief Executive Officer of Pinnacle West and Arizona Public Service Company, provides the vision and leadership to execute the Company's strategy and create shareholder value. Additionally, he has overarching responsibility for managing risk including climate change and greenhouse gas risk that directly or indirectly affects our Company's mission and vision. The Board's oversight of the company's risk management function is designed to provide assurance that the Company's risk management processes are well adapted to, and consistent with, the Company's business and strategy, and are functioning as intended. The Board focuses on fostering a culture of risk awareness and risk-adjusted decision-making. They regularly discuss and update a listing of areas of risk and a suggested allocation of responsibilities for such risks among the Board and the Board committees.
Board Chair	Chairman of the Board and Chief Executive Officer of Pinnacle West and Arizona Public Service Company, provides the vision and leadership to execute the Company's strategy and create shareholder value. Additionally, he has overarching responsibility for managing risk including climate change and greenhouse gas risk that directly or indirectly affects our Company's mission and vision. The Board's oversight of the Company's risk management function is designed to provide assurance that the Company's risk management processes are well adapted to, and consistent with, the Company's business and strategy, and are functioning as intended. The Board focuses on fostering a culture of risk awareness and risk-adjusted decision-making. They regularly discuss and update a listing of areas of risk and a suggested allocation of responsibilities for such risks among the Board and the Board Committees.
Board-level committee	The Nuclear and Operating Committee (the Committee) is responsible to the Board and reports regularly to the Board on the activities of the Committee. The Committee periodically reviews, with management, principal risks related to the Company's nuclear, fossil generation, transmission and distribution, environmental, health, and safety (EH&S) operations or other matters addressed by the Committee, and assess the effectiveness of the Company's measures to address these risks, including oversight of security policies, programs and controls for protection of cyber and physical assets.

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	Reviewing and guiding risk management policies	The Nuclear and Operating Committee is responsible for the oversight of the Company's sustainability initiatives and strategy and environmental, health and safety (EH&S) policies and practices. The Committee periodically reviews, with management, principal risks related to or arising out of the Company's nuclear, fossil generation, transmission and distribution, EH&S operations or other matters addressed by the Committee, and assess the effectiveness of the Company's measures to address these risks, including climate change and oversight of security policies, programs and controls for protection of cyber and physical assets. The Executive Risk Committee is comprised of senior level officers of the Company and is chaired by the Chief Financial Officer. Among other responsibilities, this Committee is responsible for ensuring that the Board receives timely information concerning the Company's material risks and risk management processes. The Executive Risk Committee provides the board with a list of the company's top risks on an annual basis and each Board Committee receives periodic presentations from management about its assigned risk areas, and discusses their risk reviews with the Board at least annually.

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Other, please specify (Executive Vice President of Operations)	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly
Chief Sustainability Officer (CSO)	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly
Business unit manager	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly
President	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

President. The President's full title is President, Arizona Public Service Company (APS), and Executive Vice President (EVP), Public Policy, Pinnacle West Capital Corporation (PNW). The President reports directly to the Chairman of the Board, President and Chief Executive Officer (CEO) of PNW, and Chairman of the Board and CEO of APS. The President is responsible for both assessing and managing climate-related risks and opportunities as they are presented to the Energy Policy Committee (EPC) or to the Executive Risk Committee (ERC). In addition, the President is the chairperson of the Energy Policy Committee (EPC), a group of senior executive members who review, debate and decide strategic points of view on energy-related issues, inclusive of climate-related issues, risks and opportunities, while establishing policies that support our long-term corporate strategy. The EPC governs and oversees Corporate Critical Areas of Focus and support Tier 1 metrics, ensuring alignment with the Company's strategy. They provide strategic direction to business planning and assist the Officers in aligning their plans with APS strategy. In addition, they guide development of corporate strategic plan. Core strategies in 2018 that were part of our carbon reduction plans and address climate-related risks include development of low-carbon economy principles for the Company, microgrid strategy, APS-Owned customer solar, energy storage, technology platforms and clean energy infrastructure. The President is tasked with making sure the CEO is informed of material climate related risks and that mitigation measures are set in place for business continuity.

Executive Vice President of Operations (EVP). This position reports directly to the President of APS. The EVP is responsible for both assessing and managing climate-related risks and opportunities as they are presented to the Energy Policy Committee (EPC) and/or to the Executive Risk Committee (ERC). In addition, the EVP of Operations meets regularly with the Chief Sustainability Officer (CSO) to review climate-related issues that are being monitored by the Corporate Environmental business unit. The EVP of Operations is tasked with making sure the President is informed of material climate related risks and that mitigation measures are set in place for business continuity.

Chief Sustainability Officer (CSO). The CSO's full title is the Vice President of Environmental and CSO of APS, this position reports directly to the EVP of Operations. The CSO is responsible for both assessing and managing climate-related risks and opportunities that are present. In addition, the CSO is a member of the EPC and ERC, ensuring that climate-related risks and opportunities are considered during the business decision making processes. The CSO also meets monthly with the Director of Corporate Environmental (Director) to better understand or be made aware of climate-related issues. The CSO is tasked with making sure the EVP of Operations is informed of material climate related risks and that mitigation measures are set in place for business continuity.

Director of Corporate Environmental (Director). This position is equivalent to a Business Unit Manager and reports directly to the CSO. The Director is responsible for both assessing and managing climate-related risks and opportunities that are present. At least, twice a year the Director provides updates on any climate related risks and opportunities to the EPC. In addition, the Director has a team of employees that monitor daily any climate-related issues, risk or opportunities and brief the Director at least monthly or as issues and concerns arise. The Director is tasked with making sure the CSO is informed of material climate related risks and that mitigation measures are set in place for business continuity.

An example of this organizational structure being applied in 2018 to address a climate-related issue was the adoption and public posting of APS's Low-Carbon Economy Principles (Principles). The Director developed the Principles in conjunction with the CSO with feedback from other vested stakeholders within the Company. The Director then presented the Principles to the EPC to get feedback, alignment, and eventually approval for the Principles, which includes approval from the President, EVP and CSO. The Principles were created to guide our successful transition to a low-carbon economy and provide a set of operating principles that include: maintaining appropriate governance to drive management practices and decisions to achieve cleaner air and a low-carbon economy; continue to explore solutions to decarbonize our generation assets and provide the grid infrastructure that allows the adoption of low and zero carbon emission resources; maintain a high level of transparency with respect to carbon metrics and emissions reporting; and, additional principles to prepare us for moving towards a low-carbon economy.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

Yes

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).**Who is entitled to benefit from these incentives?**

Corporate executive team

Types of incentives

Monetary reward

Activity incentivized

Emissions reduction target

Comment

Our executive compensation programs focus on transparency with an emphasis on incentivizing performance. APS's compensation philosophy incorporates multiple business performance metrics including nuclear capacity factor to assess executive performance. For example, the Palo Verde Generation Station's (Palo Verde) capacity factor. Palo Verde is the country's largest source of carbon-free energy. In 2018, Palo Verde's capacity factor target was set at 90.8% and we came just short of this target with a capacity factor of 90.2%. As a result, Palo Verde generated 31.1 million megawatt-hours, and it remains the only U.S. generating station to produce more than 30 million megawatt-hours in a year, a milestone the plant has achieved ten consecutive years and a total of 14 times. Electricity generated by the plant annually displaces more than 22 million metric tons of greenhouse gas emissions that otherwise would have been produced, providing clean energy that powers about four million homes and businesses throughout the Southwest.

Who is entitled to benefit from these incentives?

Business unit manager

Types of incentives

Monetary reward

Activity incentivized

Emissions reduction target

Comment

Our business unit manager's compensation programs focus on transparency with an emphasis on incentivizing performance. APS's compensation philosophy incorporates multiple business performance metrics including nuclear capacity factor to assess executive performance. For example, the Palo Verde Generation Station's (Palo Verde) capacity factor. Palo Verde is the country's largest source of carbon-free energy. In 2018, Palo Verde's capacity factor target was set at 90.8% and we came just short of this target with a capacity factor of 90.2%. As a result, Palo Verde generated 31.1 million megawatt-hours, and it remains the only U.S. generating station to produce more than 30 million megawatt-hours in a year, a milestone the plant has achieved ten consecutive years and a total of 14 times. Electricity generated by the plant annually displaces more than 22 million metric tons of greenhouse gas emissions that otherwise would have been produced, providing clean energy that powers about four million homes and businesses throughout the Southwest.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Monetary reward

Activity incentivized

Emissions reduction target

Comment

Eligible employees receive annual cash incentives based on the achievement of performance with a focus on transparency with an emphasis on incentivizing performance. APS's compensation philosophy incorporates multiple business performance metrics including nuclear capacity factor to assess executive performance. For example, the Palo Verde Generation Station's (Palo Verde) capacity factor. Palo Verde is the country's largest source of carbon-free energy. In 2018, Palo Verde's capacity factor target was

set at 90.8% and we came just short of this target with a capacity factor of 90.2%. As a result, Palo Verde generated 31.1 million megawatt-hours, and it remains the only U.S. generating station to produce more than 30 million megawatt-hours in a year, a milestone the plant has achieved ten consecutive years and a total of 14 times. Electricity generated by the plant annually displaces more than 22 million metric tons of greenhouse gas emissions that otherwise would have been produced, providing clean energy that powers about four million homes and businesses throughout the Southwest.

Who is entitled to benefit from these incentives?

Business unit manager

Types of incentives

Recognition (non-monetary)

Activity incentivized

Other, please specify (All of the above, based on business unit)

Comment

As part of the formula to determine performance rating, Business Units Managers receive ratings based on the achievement of performance of metrics. Some Business Unit Mangers may have metrics that are related to climate change issues, for example: carbon avoidance goals, paperless billing adoption, energy efficiency, and others. Each Business Unit has designated metrics in their annual Business Unit business plans, of which some may include climate related metrics. We believe the performance of each Business Unit is important to the success of the Company.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Recognition (non-monetary)

Activity incentivized

Other, please specify (All of the above, based on business unit)

Comment

As part of the formula to determine performance rating, all eligible employees receive ratings based on the achievement of performance of metrics. Some employees may have metrics that are related to climate change issues, for example: carbon avoidance goals, paperless billing adoption, energy efficiency, and others. Each Business Unit has designated metrics in their annual Business Unit business plans, of which some may include climate related metrics and are cascaded to the employees within the Business Unit. We believe the performance of each Business Unit is important to the success of the Company.

C2. Risks and opportunities

C2.1

(C2.1) Describe what your organization considers to be short-, medium- and long-term horizons.

	From (years)	To (years)	Comment
Short-term	0	1	Short-term horizons are used to plan for the upcoming fiscal year to track to short-term goals from each business area. Emergent risks are often identified in short-term time horizons with ultimate longer term implications.
Medium-term	1	5	Medium-term horizons are typically used for the business planning process and by the Integrated Resource Planning team.
Long-term	5	30	Long-term horizons are used by the Integrated Resource Planning team, Enterprise Risk Management and Corporate Strategy to assure the business is planning and assessing for future risks and opportunities and to assure our shareholders and customers a continued sustainable future for Arizona.

C2.2

(C2.2) Select the option that best describes how your organization's processes for identifying, assessing, and managing climate-related issues are integrated into your overall risk management.

Integrated into multi-disciplinary company-wide risk identification, assessment, and management processes

C2.2a

(C2.2a) Select the options that best describe your organization's frequency and time horizon for identifying and assessing climate-related risks.

	Frequency of monitoring	How far into the future are risks considered?	Comment
Row 1	Six-monthly or more frequently	>6 years	Company risks are reviewed on a quarterly basis by executive management. The Executive Risk Committee provides the Board of Directors with a list of the Company's top risks on an annual basis. APS faces potential financial risks resulting from climate change litigation and legislative and regulatory efforts to limit greenhouse gas emissions, as well as physical and operational risks related to climate effects. Enterprise-wide the identification and assessment of risks are reviewed for short, medium and longer term risks. For example, APS evaluates risks on a longer term horizon (i.e.; 10 yrs.) with relation to regulatory drivers such as carbon regulation.

C2.2b

(C2.2b) Provide further details on your organization's process(es) for identifying and assessing climate-related risks.

The Enterprise Risk Management (ERM) Department facilitates the establishment and implementation of committee(s) and process(es) for the identification, assessing and reporting of material risks inherent to the Company's business, inclusive of climate-related risks. Risks are identified, defined, assessed, and prioritized based on the likelihood and impact of their occurrence. Due to the complexity of operational, financial, and regulatory environments, APS has numerous risk objectives and obligations, which are addressed by policies, controls, processes, and programs. Risks are identified, defined, assessed, and mitigated at an asset level.

APS identifies and assesses climate-related risks in a manner consistent with our overall ERM framework. The ERM Framework is a depiction of the Company's efforts to identify, assess, mitigate, and control risks. The (ERM) Process is one of the Company's efforts within this framework. The (ERM) Process at APS is a formal process by which Business Areas (BAs) and the ERM Group support the Executive Risk Committee (ERC) as it carries out responsibilities set forth in the ERC Charter. This includes the following that can all be applied to climate-related risks:

No less than annually, and in conjunction with the ERM Group, develop an enterprise risk management profile of the organization based on risk identification and assessments from the organization's business areas and ERM Group.

The Chairperson of the ERC or his designee shall present that profile to the Chairman of the Board & Chief Executive Officer (CEO).

Business areas maintain an inventory of their most significant risks and associated risk response plans. Annually, business areas record this information in a prescribed format, for analysis, categorization, and prioritization of risks to support development of an enterprise risk profile.

APS uses a Planning Committee to identify and evaluate opportunities, including opportunities associated with climate-related risks, at the Company and business area level. The Planning Committee, using input from informed stakeholders and subject matter experts, provides strategic direction, business planning and management method recommendations consistent with the Company

business direction from the CEO and Board of Directors.

Risk prioritization can include an assessment of likelihood, impact, risk direction, velocity, external evidence, feasibility and cost of mitigation. Quantitative correlation analysis is used for Company projects and business scenarios to provide probability distributions of cost contingencies and schedule uncertainties for multiple risk drivers. This type of sensitivity analysis is used to identify factors affecting the budget and timing of projects, leading to more effective and efficient mitigation strategies. The Planning Committee reviews Company metrics, financial performance and business plans on a quarterly basis to ensure corporate targets are met. Opportunities are prioritized based on their ability to assist in meeting or exceeding targets.

While the ERM Process receives input from and provides output to the execution and implementation of the Company's risk policies and controls, the Business Planning process, and Business Areas' specific risk management programs, the ERM Process does not direct or control these policies, processes, or programs, as they are exclusively within the control and purview of the responsible Business Areas.

When assigning values to risks enterprise risk management has assigned 4 thresholds, levels 03 and 04 are considered substantial, determining financial impact:

- 04- Major means an impact of greater than \$25M;
- 03- Significant means an impact between \$15M and \$25M;
- 02- Moderate means an impact between \$5M and \$15M;
- 01-Limited means an impact between \$2M and \$5M
- 00-Very Limited means impact \$0 to \$2M

C2.2c

(C2.2c) Which of the following risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	One example of a current regulation climate-related risk is compliance with regional and national regulation. This risk is considered in our ERM process based on assessments conducted by business area manager and the ERM group. There are numerous financial and operation risks inherent in managing mandatory compliance with the Company's vast and continually evolving regional and federal regulatory requirements. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (01) rating in terms of financial significance. Another example of a current regulation of a climate-related risk are national and regional reporting requirements of Greenhouse Gas emissions, such as US EPA Part 98 reporting. APS maintains an internal system that tracks reporting requirements and assigns tasks to individual's responsible for reporting to keep in compliance. In addition, the Environmental Policy expert monitors for changes in regulation so that we are in compliance and do not miss updates to potential rule changes. Potential financial impact for not remaining in compliance can be up to \$100k per day per violation.

	Relevance & inclusion	Please explain
Emerging regulation	Relevant, always included	One example of an emerging climate-related regulation risk is from climate change litigation and legislative and regulatory efforts to limit GHG emissions. This risk is considered in our ERM process based on assessments conducted by our business area director and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. Another example of an emerging climate-related regulation risk is the potential of a carbon tax or cap and trade program. Carbon tax costs are challenging to forecast because, despite numerous efforts, the federal government has not reached policy consensus on the magnitude, timing, or need for a carbon tax. It is difficult to forecast what final form that regulation may take; nonetheless, APS has included in its analysis the potential for carbon pricing in its 2017 Integrated Resource Plan (IRP). The CO2 cost included in the IRP analysis was based on the California market Cap and Trade 2016 CO2 cost of \$12.80, escalated at 2.5% beginning in 2023. The potential cost is about \$1,195M million nominal (\$528M million net present value) making this a 04 level risk. APS maintains a specialized Environmental Policy expert who works with the various APS business areas to ascertain, review and track local, state and federal environmental regulations that have the potential to impact APS's current and future operational goals. APS engages with the regulatory community in order to understand and become aware of environmental regulations that may impact our current and future operational goals.
Technology	Relevant, always included	The technology risk of the impact of disruptive technologies is considered in our ERM process based on assessments conducted by our business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. Risk associated with new technologies remains a particularly acute concern for APS. These technology risks may cause potential resource substitutions and diversification that may impact our ability to operate in various conditions as demand for electricity shifts and diversifies. To address this shift to new technologies, APS is deploying a wide array of new Distributed Energy Resource (DER) technologies to provide clean, reliable, affordable energy to its customers. These include battery storage, thermal storage, load management, electric vehicles, and other beneficial electrification technologies that have the potential to increase the value of intermittent generation resources as well as increase grid reliability and stability. Besides simply storing and dispatching power, they have the ability to provide other ancillary services such as voltage regulation, frequency response, and support for intermittent renewable resources. DERs can also potentially help defer investments in more traditional transmission and distribution infrastructure, allowing system reliability to be maintained at lower overall cost. With respect to renewable resources, energy storage makes these intermittent resources more useful for the utility system by better aligning the availability of power with the system's peak energy demand. APS has a number of current and future planned initiatives that utilize DER technologies. Given the array of potential applications for energy storage, APS evaluates storage technologies on an ongoing basis. APS recently completed two battery systems, at 2 MW each, in order to advance its knowledge of energy storage performance in a variety of distribution support use cases.
Legal	Relevant, always included	The legal risk of carbon related litigation is considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. There are several legislative and regulatory carbon related actions that may impact future strategic resource decisions and are considered potential transitional risks that may impact operating costs. APS is closely monitoring the Clean Power Plan (CPP) and the actions that are occurring to rescind and/or replace the CPP. There is also a current proposal from the Arizona Corporation Commission (ACC) to require Arizona to be powered by clean energy sources that make up at least 80% of the state's electricity generating portfolio, by 2050, with the ultimate goal of being 100% clean. Accordingly, the future of GHG limitations is far from settled. However, for years APS has been transitioning its energy assets away from high carbon intensity assets (coal) to low or no carbon intensity assets (natural gas, renewables, storage). This is driven by many different factors including, the market forces of fuel and energy prices, and the cost of technology. While Arizona does not have any pending legislation or proposed agency rules regulating GHGs in Arizona, the California legislature enacted AB 32 and SB 1368 in 2006 to address GHG emissions. APS sells energy into California and in 2013 California passed cap-and-trade legislation that requires APS to hold carbon allowances for all associated electricity sales. This cost has also been factored into the decision to sell energy into the California market.
Market	Relevant, always included	The market risk of potential water supply shortage and increased demand is considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. One potential shift in the market in the desert Southwest is potential water supply shortage and increased demand. This is one of the largest physical risks driven by physical climate parameters is water supply which may result in increasing operating costs. Water in the Southwest is a very limited resource. However, since its inception over a century ago, APS has been diligent and forward-looking in its efforts to find and secure sufficient water for current and future power generation. Since water is a scarce resource in the Southwest, any change in precipitation or extended droughts driven by climate change bring with them inherent risks for APS and could materially impact on our business and operations. Fortunately, APS has an entire unit dedicated to assessing and addressing our current and future water needs. At the opposite end of the spectrum from droughts are higher than normal precipitation events. Climate change forecasts do not anticipate a wetter Southwest, but should that change occur, there is no indication that it would adversely impact APS operations.
Reputation	Relevant, always included	The reputation risk of wildfire safety is considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. APS has taken great care to build our reputation over many years. Our commitment to our mission of creating a sustainable energy future for Arizona is a driving force in maintaining our reputational risk. For this reason, reputational risk is always considered when evaluating enterprise risks. We pride ourselves on delivering clean, reliable and affordable energy for our customers. One way that we can provide reliable power for our customers is to strengthening our system by staying focused on wildfires at all times, planning year-round and continually so that customers can feel confident in our ability to serve them power. Fire risk is a climate related physical risk due to precipitation patterns and extreme variability in weather patterns with a potential financial impact to operating costs. In addition, a safety or environmental event could negatively impact the company's reputation or standing in the community. Through proactive fire-mitigation measures, APS works to reduce the likelihood of fire in and around electrical equipment. Mitigation initiatives include the deployment of infrastructure systems technology as well as mobile technology to track and report fires. These technological innovations allow us to be more proactive and nimble in our efforts to provide for first responders and the safety of our customers.

	Relevance & inclusion	Please explain
Acute physical	Relevant, always included	The acute physical risk of wildfires due to changes in physical climate parameters are considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. Catastrophic fire events were identified as an enterprise top risk in 2017-2019. Due to extended drought over the past decade, forests and vegetation have been stressed from the lack of regular and sufficient moisture, compounded by shorter, drier winters and longer, warmer summers. These changes in weather patterns pose a fire risk to the communities we serve. To effectively respond to this risk, we work to reduce wildland fire risk and create defensible space throughout Arizona. With over 35,000 miles of transmission and distribution wires throughout the state, the potential threat to our system from wildfires is very real. APS is focused on wildfires at all times, planning year-round and continually strengthening the system so that customers can feel confident in our ability to serve them power. Through proactive fire-mitigation measures, APS works to reduce the likelihood of fire in and around electrical equipment. Mitigation initiatives include the deployment of infrastructure systems technology as well as mobile technology to track and report fires. We also have proactively increased our system resiliency, implemented forest management programs to mitigate the risk of wildfires, and developed rapid-response plans to promptly restore power after storms. We also work to mitigate the threat of fire to our transmission system. To reduce risk to our power lines and first responders working during wildfires, we make a priority of creating defensible space to address vegetation around equipment poles. Our goal is to remove combustible material within a minimum of 10-foot radius around equipment poles. Our right-of-way, which is cleared of vegetation, is used by firefighters to stop, anchor and suppress wildfires. Our Company also practices Integrated Vegetation Management to promote the growth of lush, low-growing shrubs, grasses, and forbs in communities such that vegetation does not interfere with overhead power lines, pose a fire hazard, or impede access.
Chronic physical	Relevant, always included	The chronic physical risk of water supply is considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. One of the largest inherent risks driven by change in physical climate parameters is water supply. APS Water Resource Management (WRM) is responsible for securing primary, secondary, and contingent water supplies for nine power plants, through a combination of water rights (groundwater and surface water), water contracts, and agreements. WRM also constructs and maintains reliable pumping, delivery, and water storage infrastructure. The APS generation fleet consists of the Palo Verde Generating Station (nuclear), Cholla and Four Corners Power Plants (coal), and six natural gas-fired plants; Redhawk, West Phoenix, Ocotillo, Sundance, Yucca, and Saguaro Power Plants. These plants use three sources of water primarily for cooling water, but also for drinking water and high-purity process water; treated effluent (70%), surface water (14%), and groundwater (16%). WRM manages water conservation programs and a strategy for all plants, designed to reduce water consumption and improve efficiency over time, and manages other programs such as the well and pumping equipment reliability program that ensures the water supplies can be reliably delivered to the plants, when needed. Water in the Southwest is a very limited resource. However, since its inception over a century ago, APS has been diligent and forward-looking in its efforts to find and secure sufficient water for current and future power generation. Since water is a scarce resource in the Southwest, any change in precipitation or extended droughts driven by climate change bring with them inherent risks for APS and could materially impact on our business and operations. Fortunately, APS has an entire unit dedicated to assessing and addressing our current and future water needs. At the opposite end of the spectrum from droughts are higher than normal precipitation events. Climate change forecasts do not anticipate a wetter Southwest, but should that change occur, there is no indication that it would adversely impact APS operations.
Upstream	Relevant, sometimes included	The upstream risk of water supply and demand is considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. Arizona's water challenges are balanced between two realities: increasing demand for water due to high growth rates and limited supply of water given the arid conditions of the desert southwest. One of the largest inherent risks driven by change in physical climate parameters is water supply. This is one of the largest physical risks driven by physical climate parameters is water supply which may result in increasing operating costs. The state's electric utility industry has long recognized these challenges and continuously engages in water conservation efforts that have resulted in Arizona power plants consuming less than 3% of the state's water supply. APS's achievements in this effort include the largest water/energy project in Arizona's history: Palo Verde Generating Station became the first nuclear power plant in the world not bordering a large body of water to use reclaimed water. APS continues to explore innovative solutions in pursuit of the "right water for the right use." The Company's current water strategy focuses on three areas – quantity, quality, and cost. APS has put measures in place to mitigate the potential impact of water shortages. These measures include identification and acquisition of alternative water supplies, contract extensions, shortage sharing agreements, and infrastructure maintenance. In addition, we continue to use reclaimed water, a renewable and reliable resource, which can be used to meet certain municipal and industrial needs.
Downstream	Relevant, sometimes included	The downstream risk of proper land use and maintaining biodiversity is considered in our ERM process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. One example is that with more than 34,000 square miles in the APS service territory, proper land use and maintaining biodiversity are important factors in our operations. We ensure the conservation and sustainable use of biodiversity and ecosystems by employing an integrated vegetation management ("IVM") approach to habitat management. IVM allows us to implement optimal vegetation management methods for transmission rights-of-way and along our distribution lines, based on environmental impact and anticipated effectiveness combined with site characteristics and social, economic and land-use factors.

C2.2d

(C2.2d) Describe your process(es) for managing climate-related risks and opportunities.

The President is responsible for both assessing and managing climate-related risks and opportunities as they are presented to the Energy Policy Committee (EPC) or to the Executive Risk Committee (ERC).

The President is the chairperson of the Energy Policy Committee (EPC), a group of senior executive members who review, debate and decide strategic points of view on energy-related issues, inclusive of climate-related issues, risks and opportunities, while establishing policies that support our long-term corporate strategy. Opportunities are identified, defined, assessed, and prioritized based on the likelihood and impact of their occurrence and alignment with the business strategy. The EPC governs and oversees Corporate Critical Areas of Focus and support Tier 1 metrics; ensure alignment with the Company's strategy; provide strategic direction to business planning and assist the Officers in aligning their plans with APS strategy; and guide development of corporate strategic plan.

The Enterprise Risk Management Department facilitates the establishment and implementation of committee(s) and process(es) for the identification and reporting of material risks inherent to the Company's business. Risks are identified, defined, assessed, and prioritized based on the likelihood and impact of their occurrence. Due to the complexity of operational, financial, and regulatory environments, APS has numerous risk objectives and obligations, which are addressed by policies, controls, processes, and programs. Business areas maintain an inventory of their most significant risks and associated risk response plans. Annually, business areas record this information in a prescribed format, for analysis, categorization, and prioritization of risks to support development of an enterprise risk profile.

Risk prioritization can include an assessment of likelihood, impact, risk direction, velocity, external evidence, feasibility and cost of mitigation. Quantitative correlation analysis is used for Company projects and business scenarios to provide probability distributions of cost contingencies and schedule uncertainties for multiple risk drivers. This type of sensitivity analysis is used to identify factors affecting the budget and timing of projects, leading to more effective and efficient mitigation strategies.

As an example of how this process is applied to transitional opportunities is the Company's strategy to implement new products and services to address the risk of disruptive technologies in our service territory. To mitigate this risk, APS conducts extensive research in technologies and products available and presents these opportunities to the EPC. As a result, APS has made strategic investments in metering, communications, cybersecurity, and a distributed energy resource management system (DERMS) operating platform that provides remote telemetry and control of distributed energy resources. The design of these plans and the technologies that APS is deploying are helping to reduce peak demand and improve system resiliency while also shifting energy use into the period of midday maximum solar production to take advantage of carbon-free solar energy in the region that would otherwise be curtailed. The risk and opportunities associated with the identified opportunity continue to be monitored by the business areas and reported to EPC and ERM.

As an example for how these processes were applied to physical risks is heightened wildfire risk due to drought. The risk was assessed through the ERM process and identified as a level 04 risk. The business area presented an opportunity to implement fire mitigation plans to the EPC to address the risk. The effectiveness of our fire mitigation efforts was evident during the Tinder Fire during the summer of 2018. During this event, APS crews collaborated with state and local officials to de-energize power lines and ensure the safety of homes and residents in the affected area. As a result of the defensible space created in our utility corridor, the fire was prevented from reaching many of our poles and damaging our lines. This greatly improved our ability to quickly restore service after the fire was contained. Due to our successes in mitigating fires such as the Tinder Fire, energy companies in other states have sought our expertise in fire mitigation and service restoration during events such as the wildfires that devastated Northern California in 2017 and 2018. The risk and opportunities associated with the risk continue to be monitored by the business areas and reported to EPC and ERM.

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Policy and legal: Mandates on and regulation of existing products and services

Type of financial impact

<Not Applicable>

Company- specific description

A potential transition risk that may have financial impact on our operating costs are climate change litigation and legislative and regulatory efforts to limit greenhouse gas (GHG) emissions. Although there are no current or planned congressional attempts to pass cap and trade legislation to regulate GHG emissions, in the event cap and trade legislation ultimately passes, the actual economic and operational impact of such legislation on APS depends on a variety of factors, none of which can be fully known at this time. Factors include allowable GHG emissions; cost to reduce emissions; how any allowable emissions will be allocated to sources; the associated cost; and whether offsets and other measures to moderate the costs of compliance will be available. However, for numerous years the APS Integrated Resource Plan has included a "cost of carbon," which is factored into resource allocation decisions to address this potential cost to operations. Carbon tax costs are challenging to forecast because, despite numerous efforts, the federal government has not reached policy consensus on the magnitude, timing, or need for a carbon tax. It is difficult to forecast what final form that regulation may take; nonetheless, APS has included in its analysis the potential for carbon pricing in its 2017 Integrated Resource Plan (IRP). The CO2 cost included in the IRP analysis was based on the California market Cap and Trade 2016 CO2 cost of \$12.80, escalated at 2.5% beginning in 2023. Prior to 2023, APS's analysis assumed the CO2 cost to be \$0. The carbon tax will continue to be integrated into future scenarios as we work with stakeholders on our new plan that is currently scheduled to be updated in the first half of 2020.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1195000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

\$1,195M nominal (\$528M net present value) One of the most likely, but unpredictable outcomes is a carbon tax. Carbon tax costs are challenging to forecast because, despite numerous efforts, the federal government has not reached policy consensus on the magnitude, timing, or need for a carbon tax. It is difficult to forecast what final form that regulation may take; nonetheless, APS has included in its analysis the potential for carbon pricing in its 2017 Integrated Resource Plan (IRP). The CO2 cost included in the IRP analysis was based on the California market Cap and Trade 2016 CO2 cost of \$12.80, escalated at 2.5% beginning in 2023. Prior to 2023, APS's analysis assumed the CO2 cost to be \$0. The \$1,195M was calculated based on these assumptions and projected carbon emissions from 2018 thru 2032. These costs would be recovered by customers via adjusters on their monthly bill.

Management method

APS maintains a specialized Environmental Policy Expert who works with the various APS business units to ascertain, review and track local, state and federal environmental regulations that have the potential to impact APS's current and future operational goals. APS engages with the regulatory community in order to understand and become aware of environmental regulations that may impact our current and future operational goals. The Policy Expert meets monthly with the environmental support team and leadership to make sure that any regulations that have changed or are potentially being proposed are assessed for potential risks or opportunities. For example, this year the Affordable Clean Energy (ACE) Rule was proposed to replace the Clean Power Plan with a new set of regulations. The Policy Expert reviewed the proposed ACE Rule with the team to assess the risk of potential financial and operating impacts. At the end of 2018, the ACE Rule had still not passed, but the team was prepared to address any potential impact to the business. There is a yearly management cost of \$500,000 associated with monitoring the regulatory landscape, including the cost of a full time Environmental Policy expert, subscriptions to the various tracking tools, memberships in various industry trade groups that help alert APS to proposed regulations and help us understand potential impacts on the industry and, finally employee time spent assessing and mapping the impacts of climate regulations.

Cost of management

500000

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Chronic: Changes in precipitation patterns and extreme variability in weather patterns

Type of financial impact

Increased operating costs (e.g., higher compliance costs, increased insurance premiums)

Company- specific description

One of the largest physical risks driven by change in physical climate parameters is water supply which may result increasing operating costs to address this risk. Water in the Southwest is a very limited resource. Since water is a scarce resource in the Southwest, any change in precipitation or extended droughts driven by climate change bring with it inherent risks for APS and could materially impact on our business and operations. However, since its inception over a century ago, APS has been diligent and forward-looking in its efforts to find and secure sufficient water for current and future power generation. APS has an entire unit dedicated to assessing and addressing our current and future water needs. One of the largest physical risks driven by change in physical climate parameters is water supply. This risk is considered in our Enterprise Risk Management (ERM) process based on assessments conducted by business areas manager and the ERM group. The risk is recorded and monitored to determine the magnitude of the risk and the associated mitigated measures. This risk is considered a (04) rating in terms of financial significance. Financial impact may result in increasing operating costs to address this risk. APS Water Resource Management (WRM) is responsible for securing primary, secondary, and contingent water supplies for nine power plants, through a combination of water rights (groundwater and surface water), water contracts, and agreements. WRM also constructs and maintains reliable pumping, delivery, and water storage infrastructure. The APS generation fleet consists of the Palo Verde Generating Station (nuclear), Cholla and Four Corners Power Plants (coal), and six natural gas-fired plants; Redhawk, West Phoenix, Ocotillo, Sundance, Yucca, and Saguaro Power Plants. These plants use three sources of water primarily for cooling water, but also for drinking water and high-purity process water; treated effluent (70%), surface water (14%), and groundwater (16%). WRM manages water conservation programs and strategies for all plants, designed to reduce water consumption and improve efficiency over time, and manage other programs such as the well and pumping equipment reliability program that ensures the water supplies can be reliably delivered to the plants, when needed.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

4000000

Potential financial impact figure – maximum (currency)

6000000

Explanation of financial impact figure

The financial implication related to drought is difficult to equate an exact financial figure. However, two potential drought-related projects could result in expenditures of \$4-6M. If drought results in loss of surface water due to a shortage declaration on the Colorado River, agricultural users near the Sundance Power Plant could revert to pumping groundwater. This new groundwater pumping could lower the water table to levels that require drilling a new, deeper well at a cost of \$2-3M. A similar drought-related issue could occur at the Yuma Power Plant where a shortage declaration on the Colorado River could result in loss of all but one well supporting the plant, therefore APS would likely be required to drill a well to avoid having a single point of failure, at a cost of \$2-3M.

Management method

Because water supplies are so integral to the operations at APS, we have an entire Water Resource Management (WRM) department comprised of six employees, with a budget of approximately \$1.5M a year. This management team assesses and manages current as well as future risk associated with drought and extreme weather. APS has identified both primary water supplies and contingencies for each power plant in order to ensure reliable long-term operation, even in times of possible shortage, such as extended drought. In 2018, Arizona debated its participation in the Drought Contingency Plan (DCP), the DCP is a blueprint for shortage sharing built around water levels in Lake Mead, the giant reservoir on the Arizona-Nevada border that has sunk to near-record low levels after two decades of drought. Without the new plan in place, existing rules would leave Arizona looking at deep water cutbacks in the coming years. The WRM team participated in the stakeholder process and provided executives with updates on this issue and APS's risk exposure. This plan, if passed in 2019, will result in reduced risk of critical shortages at Lake Mead and in the Lower Colorado River Basin States, including Arizona. It was important for APS to be a stakeholder in the discussions because water for the Yucca Power Plant and Sundance Power Plant could be reduced if there is a shortage on the Colorado River. The WRM team has a plan to address the risk should the DCP be approved in 2019.

Cost of management

1500000

Comment

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Chronic: Changes in precipitation patterns and extreme variability in weather patterns

Type of financial impact

Increased operating costs (e.g., higher compliance costs, increased insurance premiums)

Company- specific description

A climate related physical risk due to changes in precipitation patterns and extreme variability in weather patterns with a potential financial impact to operating costs is heightened wildfire risk due to drought. The risk was assessed through the ERM process and identified as a level 04 risk. The business area presented an opportunity to implement fire mitigation plans to the EPC to address the risk. Catastrophic fire events were identified as an enterprise top risk in 2017-2019. Catastrophic fire events were identified as an enterprise top risk in 2017-2019. In Arizona, about half of primary residential and commercial structures are located near the wildland-urban interface (WUI). Due to extended drought over the past decade, forests and vegetation have been stressed from the

lack of regular and sufficient moisture, compounded by shorter, drier winters and longer, warmer summers. These changes in weather patterns pose a fire risk to the communities we serve. To effectively respond to this risk, we collaborate with key stakeholders to reduce wildland fire risk and create defensible space throughout Arizona. With over 35,000 miles of transmission and distribution wires throughout the state, the potential threat to our system from wildfires is very real. APS is focused on wildfires at all times, planning year-round and continually strengthening the system so that customers can feel confident in our ability to serve them power. Through proactive fire-mitigation measures, APS works to reduce the likelihood of fire in and around electrical equipment. Mitigation initiatives include the deployment of infrastructure systems technology as well as mobile technology to track and report fires. These technological innovations allow us to be more proactive and nimble in our efforts to provide for first responders and the safety of our customers.

Time horizon

Short-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

No, we do not have this figure

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

The financial impact to our organization is manageable. APS purchases insurance policies to mitigate the foreseeable financial impact of wildfires.

Management method

The cost of management is a yearly cost of approximately \$16.7M to support the forestry business unit, who is dedicated to management of rights-of-way and helping to harden assets against the threat of forest fires related to changes in physical climate parameters including forest fires. The management costs are an approximate yearly cost to maintain the department and all associated projects. We use a three-pronged approach to mitigate fire risk. First, we assess site-specific fire risk and develop a model to prioritize resources. Second, we educate and inform the communities we serve about fire mitigation. Third, we implement a proactive program to create defensible space around poles (DSAP) to address vegetation at the base of utility poles. The goal of the DSAP program is to remove combustible material inside a minimum 10-foot radius around equipment poles on a three-year cycle. APS rights-of-way, which are cleared of vegetation, are used by firefighters to suppress wildfires across Arizona. Since 2000, APS rights-of-way have been used to suppress 37 large fires of 100 acres or more.

Cost of management

16700000

Comment

The effectiveness of our fire mitigation efforts was evident during the Tinder Fire during the summer of 2018. During this event, APS crews collaborated with state and local officials to de-energize power lines and ensure the safety of homes and residents in the affected area. As a result of the defensible space created in our utility corridor, the fire was prevented from reaching many of our poles and damaging our lines. This greatly improved our ability to quickly restore service after the fire was contained. Due to our successes in mitigating fires such as the Tinder Fire, energy companies in other states have sought our expertise in fire mitigation and service restoration during events such as the wildfires that devastated Northern California in 2017 and 2018.

C2.4**(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?**

Yes

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

Use of supportive policy incentives

Type of financial impact

Reduced exposure to GHG emissions and therefore less sensitivity to changes in cost of carbon

Company-specific description

The Arizona Corporation Commission (ACC) has an electric Energy Efficiency Standard (EES). Under the EES, Arizona's public utilities under the ACC's jurisdiction are required to achieve cumulative annual energy savings of at least 22% of retail energy sales - measured in kWh - by 2020. APS offers a comprehensive portfolio of Demand-Side Management (DSM) programs to achieve the required EES. These programs are designed to reach all segments of APS customers including residential single family homes, multifamily properties, new construction and limited income households; existing commercial buildings, new commercial construction, and schools. The APS DSM portfolio also includes a focus on demand response, load shifting, energy storage and load management programs designed to help flatten system load shapes and shift energy use into the middle of the day during peak solar production when APS's generation mix has the lowest carbon intensity. These programs are also designed to help APS provide beneficial use for solar over-generation in the region – allowing solar energy to be beneficially utilized to serve customer loads rather than being curtailed. Since 2005, the current portfolio of APS's demand side management programs has provided over 5500 GWh of reported energy savings which has resulted in over 45.4 billion pounds of direct avoided carbon emissions.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1070000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

From 2005-2018, APS has reported spending of over \$629.5M on Demand Side Management (DSM) customer programs. Based on portfolio cost effectiveness results reported to the Arizona Corporation Commission, the APS DSM Portfolio has produced more than \$1.07 billion in net benefits (total benefits minus costs) for APS customers from 2005-2018. The APS DSM Portfolio is measured for cost effectiveness using the Societal Benefits Test. These net benefits are the result of avoided generation capacity, fuel savings, and operations and maintenance savings due to APS DSM programs. These net benefits do not include any monetary value for the carbon emission savings resulting from programs – these savings are quantified but not monetized.

Strategy to realize opportunity

During the time period from 2005 through 2018 APS has spent a total of about \$629.5M in customer focused Demand Side Management (DSM) programs. This investment has resulted in creation of over \$1.07B of net economic benefits (present value of societal benefits created by avoiding energy generation less the present value of societal costs from installing energy efficient measures) for APS customers. Each year APS files an annual DSM Implementation Plan with the Arizona Corporation Commission (ACC) which includes detailed information about DSM program goals, estimated participation, energy savings, emissions

reductions and proposed budgets. This annual plan is reviewed by ACC Staff, commented on by stakeholders and intervenors, and must receive a majority of Commissioner votes at an open meeting to proceed. In December of 2018 APS filed our DSM plan with the ACC, which outlines the proposed portfolio of technologies, anticipated energy savings and air emissions savings, expected costs, cost/benefit analysis and program delivery strategies to reach our target of 411,000 MWhs in 2019 . A total of \$34M is budgeted in 2019; including \$17M in battery storage, \$7M in EV charging infrastructure program, and more than \$10M in smart thermostats, water heater controls, and other load management.

Cost to realize opportunity

629500000

Comment

Identifier

Opp2

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

Use of lower-emission sources of energy

Type of financial impact

Reduced exposure to future fossil fuel price increases

Company-specific description

The Arizona Corporate Commission (ACC) has adopted a Renewable Energy Standard (RES), in which electric utilities under its jurisdiction must supply an increasing percentage of their retail electric energy sales from eligible renewable resources, including solar, wind, biomass, biogas and geothermal technologies. For calendar year 2018, the ACC mandated through its RES rule that 8.0% of APS's 2018 retail kilowatt-hour (kWh) sales must come from renewable resources, with 30%of the total requirement to be fulfilled with energy produced from Distributed Energy (DE) sources. In 2018, the Company's total RES resources were 2,992,274 MWh, which is 10.7% of APS's total 2018 retail sales. APS requested and received a waiver from the residential DG requirement as APS did not meet the residential DE requirement. However, APS did meet the non-DE RES compliance requirement in 2018. Renewable energy resources installed in APS's service territory produced 3,975,899 MWh in 2018, which includes energy from rooftop solar installations for which an incentive was not provided. This is equivalent to nearly 14.3% of APS's 2018 retail sales. The renewable energy standard increases annually until reaching 15%in 2025. This regulatory driver is having a large impact on APS's generation mix.

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

4796000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

\$4,796M nominal (\$3,027M net present value) Potential financial impact reflects assumptions and models included in APS's 2017 Integrated Resource Plan for 2018-2032. The above financial impacts include the ongoing capital and operation and maintenance costs for owned renewables, Purchased Power Agreement payments, integration costs, and future liabilities on incentivized rooftop solar. The financial impacts of increasing renewables as part of our resource mix reduce our exposure to future fossil fuel price increases as we don't need to purchase additional fossil fuels.

Strategy to realize opportunity

In June of 2018, APS submitted a Renewable Energy Standard (RES) Implementation Plan to the Arizona Corporation Commission (ACC) requesting funding approval for existing program commitments and deployment of previously authorized programs. The Company expects to achieve compliance with the 2019 RES requirements, except for the residential distributed generation (DG) target, provided all of the resources are authorized. APS expects the total base budget for production based incentives and other DG legacy costs, purchase power agreement projects in 2019 to be \$89.9M, and the total request for the 2019-2023 Plan to be \$431.4M, not including any funding offsets. One example within the plan are Renewable Generation (RG) resources, which are larger-scale renewable energy resources that serve the energy demand of all APS customers. APS's targeted RG resources for 2019 is 2,478GWh. Another program included in the plan is the continuation of the APS Solar Communities Program. APS owns all the generation under the program and all the renewable energy credits and program attributes require APS to invest between \$10 and \$15 million annually over three years (2018, 2019, 2020). APS is seeking \$3.4 million in 2019 for the Program. The Program is available to low-and moderate-income customers in single-family and multifamily housing, as well as non-profit commercial customers that serve limited income populations, Title I Schools, and rural government customers.

Cost to realize opportunity

431400000

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Customer

Opportunity type

Resilience

Primary climate-related opportunity driver

Resource substitutes/diversification

Type of financial impact

Increased reliability of supply chain and ability to operate under various conditions

Company-specific description

APS is deploying a wide array of new Distributed Energy Resource (DER) technologies to provide clean, reliable, affordable energy to its customers. These include battery storage, thermal storage, load management, electric vehicles, and other beneficial electrification technologies that have the potential to increase the value of intermittent generation resources as well as increase grid reliability and stability. Besides simply storing and dispatching power, they have the ability to provide other ancillary services such as voltage regulation, frequency response, and support for intermittent renewable resources. DERs can also potentially help defer investments in more traditional transmission and distribution infrastructure, allowing system reliability to be maintained at lower overall cost. With respect to renewable resources, energy storage makes these intermittent resources more useful for the utility system by better aligning the availability of power with the system's peak energy demand. APS has a number of current and future planned initiatives that utilize distributed energy resource technologies. Given the array of potential applications for energy storage, APS conducts surveillance and evaluation of storage technologies on an ongoing basis. APS recently completed two battery systems, at 2 MW each, in order to advance its knowledge of energy storage performance in a variety of distribution support use cases. The Solar Innovation Study and the APS Storage and Reserve Rewards programs are investigating residential-scale chemical and thermal storage system capabilities. APS also announced plans to procure power during peak demand periods from a first-of-its-kind, utility-scale solar and storage power plant. The plant is comprised of a 65 MW solar field coupled to a 50 MW battery storage system.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

112382

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

It is still too early to know the full financial impact these systems may provide. Most of the proposed projects are research and development projects to determine their ability to provide voltage regulations, power factor improvements, load balancing, and peak shaving. However, in 2018 the Energy Storage and Load Management Program for residential customers began implementation. Based on portfolio cost effectiveness results reported to the Arizona Corporation Commission, the program has produced \$112,382 in net benefits (total benefits minus costs) for APS customers in 2018. The APS DSM Portfolio is measured for cost effectiveness using the Societal Benefits Test. These net benefits are the result of avoided generation capacity, fuel savings, and operations and maintenance savings due to APS DSM programs. These net benefits do not include any monetary value for the carbon emission savings resulting from programs – these savings are quantified but not monetized.

Strategy to realize opportunity

In December of 2018 APS filed our Demand Side Management Plan with the Arizona Corporate Commission, which outlines the proposed portfolio of technologies, anticipated energy savings and peak demand reductions, air emissions savings (estimated 411,000 annual MWH annual savings), expected costs, benefit/cost analysis, and program delivery strategies based on extensive research in technologies and products available. A total of \$34M is budgeted in 2019 to realize this opportunity including \$17M in battery storage, \$7M in EV charging infrastructure program, and more than \$10M in smart thermostats, water heater controls, and other load management. In addition, APS has made strategic investments in metering, communications, cybersecurity, and a distributed energy resource management system operating platform that provides remote telemetry and control of these distributed energy resources. APS has also developed retail rate designs that encourage customers to shift their energy use off-peak, and educating customers about the benefit of these rates, and how DER technologies can help them shift their energy use to save money on time-of-use and demand based rate plans. The design of these plans and the technologies that APS is deploying are helping to reduce peak demand and improve system resiliency while also shifting energy use into the period of midday maximum solar production to take advantage of carbon-free solar energy in the region that would otherwise be curtailed.

Cost to realize opportunity

34000000

Comment

Identifier

Opp4

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resilience

Primary climate-related opportunity driver

Resource substitutes/diversification

Type of financial impact

Increased reliability of supply chain and ability to operate under various conditions

Company-specific description

Microgrids are small-scale power generating facilities installed at customer locations that can provide backup power to the customer in the event of a grid outage and deliver peaking services and frequency response to the APS grid that benefits additional customers. APS and the microgrid hosting customers can share in the costs of developing the microgrids, which results in cost-effective economic deployment of new grid reliability resources. Its fast-acting capabilities also enhance grid resilience and flexibility by providing important peaking resources and ancillary services such as frequency response, which can lessen the number and impact of power outages. Through an innovative relationship with the U.S. Department of the Navy, APS operates a low-emission, 25 MW microgrid at the Marine Corps Air Station (MCAS) Yuma. The system provides 125% of the backup power needed by the base in the event of a grid disruption, enhancing reliability and security at the base and allows the base to add more capabilities in the future. APS also operates an APS-owned microgrid at the Aligned Data Centers Phoenix campus, which is 13 MW, was deployed in 2016. Like the MCAS Yuma microgrid, the APS-owned, cost-shared microgrid at Aligned provides peak generation and frequency response to the APS grid, in addition to backup power for the data center in case of an outage. In 2018, there were 41 frequency response events that each microgrid responded to automatically. Microgrids offer great potential for developing grid innovation. For example, APS has two patents pending for the microgrid design and for the controller to perform autonomous frequency response.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

75000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

\$75M nominal (\$42M net present value) potential financial impact reflects assumptions and models included in APS's 2017 IRP for 2018-2032. The above financial impacts include the capital and operations and management costs associated the ownership and operation of the microgrid. The financial impact increases reliability as it diversifies our supply chain and ability to operate under various conditions as microgrids can provide backup power to the customer in the event of a grid outage and deliver peaking services and frequency response to the APS grid that benefits additional customers.

Strategy to realize opportunity

In 2018, APS started the process of potentially developing two additional microgrids that could start design in 2019. Between 2015-2016, APS invested approximately \$25M in microgrids. In addition there is annual O&M fees for the preventative maintenance of the microgrids. APS developed lease agreements with the Marine Corps Air Station (MCAS) and Aligned Data Centers to site the systems on the customer premises. At MCAS, the lease agreement gives APS access for the development, operation and maintenance of the microgrid power generation facility, located adjacent to the existing APS substation. During normal grid operating conditions, the microgrid will provide peak power to APS customers in the area if and when they need it. In the event of a grid outage, this facility will provide power to MCAS Yuma through a direct connection to the base's infrastructure, creating a backup generation facility. For Aligned, APS entered into a Microgrid Services Agreement which provides a lease of the areas occupied by the microgrid systems, including roof mounted generators. The microgrid is tied into a substation located adjacent to Aligned's facility. During normal grid operating conditions, the microgrid will provide peak power and frequency response capability to APS customers in the area if and when they need it. In the event of a grid outage, this facility will provide power to Aligned through a direct connection to the data center power distribution infrastructure.

Cost to realize opportunity

25000000

Comment

C2.5

(C2.5) Describe where and how the identified risks and opportunities have impacted your business.

	Impact	Description
Products and services	Impacted	Advancing technologies, growing renewable energy resources and increasing customer sentiment for cleaner energy are accelerating change in the electric utility industry, including here in Arizona. We are evaluating and developing innovative technologies such as batter storage and entering into microgrid partnerships with large commercial customers to serve the unique needs while also increasing grid reliability for all APS customer. By being able to connect and disconnect from the larger grid, microgrids provide backup power to the host customer and greater reliability to all APS customers. We are also continuing research programs that evaluate how solar, storage and other technologies interact with each other and the grid. Microgrids impact our direct operations as they provide us an opportunity for greater electrical grid resilience by diversifying our resources. The likelihood is certain and the time horizon is short as we have already installed two systems. The magnitude is of a medium high opportunity for the service we provide of providing reliable, affordable, and clean electricity to our customers. APS and the microgrid hosting customers can share in the costs of developing the microgrids, which results in cost-effective economic deployment of new grid reliability resources. Its fast-acting capabilities also enhance grid resilience and flexibility by providing important peaking resources and ancillary services such as frequency response, which can lessen the number and impact of power outages. Through an innovative relationship with the U.S. Department of the Navy, APS operates a low-emission, 25 MW microgrid at the Marine Corps Air Station (MCAS) Yuma. The system provides 125%of the backup power needed by the base in the event of a grid disruption, enhancing reliability and security at the base and allows the base to add more capabilities in the future. APS also operates an APS-owned microgrid at the Aligned Data Centers Phoenix campus, which is 13 MW, was deployed in 2016. Like the MCAS Yuma microgrid, the APS-owned, cost-shared microgrid at Aligned provides peak generation and frequency response to the APS grid, in addition to backup power for the data center in case of an outage. In 2018, there were 41 frequency response events that each microgrid responded to automatically.

	Impact	Description
Supply chain and/or value chain	Impacted	APS is deploying a wide array of new Distributed Energy Resource (DER) technologies to provide clean, reliable, affordable energy to its customers. These include battery storage, thermal storage, load management, electric vehicles, and other beneficial electrification technologies that have the potential to increase the value of intermittent generation resources as well as increase grid reliability and stability, therefore creating increased reliability of our supply chain and ability to operate under various conditions. The magnitude of the impact for the customer value chain and our supply chain is medium-high and is in the short term time horizon as APS currently has a number of current and future planned initiatives to utilize DER technologies. Besides simply storing and dispatching power, these technologies have the ability to provide other ancillary services such as voltage regulation, frequency response, and support for intermittent renewable resources. DERs can also potentially help defer investments in more traditional transmission and distribution infrastructure, allowing system reliability to be maintained at lower overall cost. With respect to renewable resources, energy storage makes these intermittent resources more useful for the utility system by better aligning the availability of power with the system's peak energy demand. Given the array of potential applications for energy storage, APS evaluates storage technologies on an ongoing basis. APS recently completed two battery systems, at 2 MW each, in order to advance its knowledge of energy storage performance in a variety of distribution support use cases. The Solar Innovation Study and the APS Storage and Reserve Rewards programs are investigating residential-scale chemical and thermal storage system capabilities. APS also announced plans to procure power during peak demand periods from a first-of-its-kind, utility-scale solar and storage power plant. The plant is comprised of a 65 MW solar field coupled to a 50 MW battery storage system.
Adaptation and mitigation activities	Impacted	One opportunity to expand upon renewable energy to mitigate and adapt to climate change is to provide our customers the opportunity to participate in renewable energy program. The use of lower-emission sources of energy, such as renewables, has a high impact on direct operations as increasing renewables as part of our resource mix reduces our exposure to future fossil fuel price increases as we will not need to purchase additional fossil fuels. APS customers across the state are now benefiting from APS Solar Communities, a new program making renewable energy more accessible to those who otherwise may not have the financial means to go solar. Designed specifically for limited- and moderate-income customers, we are investing \$10M million to \$15M million annually for three years (2018-2020) in the program. APS Solar Communities residential participants agree to have a rooftop solar system installed at no cost. Customers then begin receiving a monthly \$30 bill credit from APS while helping to contribute to our 50%-percent clean energy mix. The program also plans to include Title I schools, non-profits aiding limited-income groups, multifamily housing and government entities serving rural communities located in our service territory. The APS Solar Communities program launched in April 2018 and received over 1,600 residential applications for participation in the program with 189 solar installations approved in 2018. APS received 38 complete and submitted applications for non-residential participation and approved 9 organizational sites including Title I Schools, non-profits and rural government customers. In 2018, the program installed 1.2 MW AC capacity, with a production of 93 MWh for 2018. The first system went online at the end of July (2018).
Investment in R&D	Impacted	APS is deploying a wide array of new Distributed Energy Resource (DER) technologies to provide clean, reliable, affordable energy to its customers. These opportunities in R&D for new DER technologies are of a medium-high impact to our operations, by providing resource substitutions/diversification that provides increased reliability of our supply chain and the ability to operate under various conditions. The likelihood of implementation of the DERs is very likely in the short-term time horizon. These DERs include battery storage, thermal storage, load management, electric vehicles, and other beneficial electrification technologies that have the potential to increase the value of intermittent generation resources as well as increase grid reliability and stability. Besides simply storing and dispatching power, they have the ability to provide other ancillary services such as voltage regulation, frequency response, and support for intermittent renewable resources. DERs can also potentially help defer investments in more traditional transmission and distribution infrastructure, allowing system reliability to be maintained at lower overall cost. With respect to renewable resources, energy storage makes these intermittent resources more useful for the utility system by better aligning the availability of power with the system's peak energy demand. APS has a number of current and future planned initiatives that utilize distributed energy resource technologies. Given the array of potential applications for energy storage, APS conducts surveillance and evaluation of storage technologies on an ongoing basis. APS recently completed two battery systems, at 2 MW each, in order to advance its knowledge of energy storage performance in a variety of distribution support use cases. The Solar Innovation Study and the APS Storage and Reserve Rewards programs are investigating residential-scale chemical and thermal storage system capabilities. APS also announced plans to procure power during peak demand periods from a first-of-its-kind, utility-scale solar and storage power plant. The plant is comprised of a 65 MW solar field coupled to a 50 MW battery storage system.
Operations	Impacted	Microgrids impact our direct operations as they provide us an opportunity for greater electrical grid resilience by diversifying our resources. The likelihood is certain and the time horizon is short as we have already installed two systems. The magnitude is of a medium high opportunity for the service we provide of providing reliable, affordable, and clean electricity to our customers. APS and the microgrid hosting customers can share in the costs of developing the microgrids, which results in cost-effective economic deployment of new grid reliability resources. Its fast-acting capabilities also enhance grid resilience and flexibility by providing important peaking resources and ancillary services such as frequency response, which can lessen the number and impact of power outages. APS developed lease agreements with the Marine Corps Air Station (MCAS) and Aligned Data Centers in order to site the systems on the customer premises. At MCAS, the lease agreement gives APS access for the development, operation and maintenance of the microgrid power generation facility, located adjacent to the existing APS substation and the base's existing substation. During normal grid operating conditions, the microgrid will provide peak power to APS customers in the Yuma area if and when they need it most. In the event of a grid outage, this facility will provide power to MCAS Yuma through a direct connection to the base's infrastructure, creating a backup generation facility. The 25 MW capacity is projected to meet all future energy requirements at the base. For Aligned, APS entered into a Microgrid Services Agreement which provides a lease of the areas occupied by the microgrid systems, including roof mounted generators. The microgrid is tied into a newly built substation located adjacent to Aligned's facility. During normal grid operating conditions, the microgrid will provide peak power and frequency response capability to APS customers in the north Phoenix area if and when they need it most. In the event of a grid outage, this facility will provide power to Aligned through a direct connection to the data center power distribution infrastructure, creating a backup generation facility. APS will add additional capacity as the data center load grows.
Other, please specify	Please select	

C2.6

(C2.6) Describe where and how the identified risks and opportunities have been factored into your financial planning process.

	Relevance	Description
Revenues	Impacted	As a regulated utility, the Company typically recovers through rates charged to retail customers any and all prudent costs of providing electric service. The cost basis upon which revenues are earned includes such factors as: -The costs of providing energy efficiency programs to meet the requirements of the Energy Efficiency Standard; for example from 2005-2018, APS has reported spending of over \$629.5M on Demand Side Management (DSM) customer programs. This opportunity is a high financial impact to the company and has been virtually certain since 2005. It also has an impact on lowering our potential financial impact from the transition risk of congressional attempts to potentially pass cap and trade legislation to regulate greenhouse gas (GHG) emissions as well reducing our risk exposure to future fossil fuel price increases. -The costs of providing customer-oriented renewable energy programs, including long-term production-based incentives for customer-sited renewable generation facilities, to meet the Renewable Energy Standard; for example APS expects the total base budget for production based incentives and other distributed generation legacy costs, Purchase Power Agreement projects in 2019 to be \$89.9M , and the total request for the 2019-2023 Plan to be \$431.4M, not including any funding offsets. This opportunity is a high financial impact to the company and has been virtually certain since 2005. It also has an impact on lowering our potential financial impact from the transition risk of congressional attempts to potentially pass cap and trade legislation to regulate greenhouse gas (GHG) emissions as well reducing our risk exposure to future fossil fuel price increases. Additionally, revenue plans must consider reductions in fuel expenses and other operating costs where renewable generation facilities substitute for conventional generation facilities. Revenue projections include the expected impacts of both currently operating facilities (owned or under contract) and planned facilities.
Operating costs	Impacted for some suppliers, facilities, or product lines	The Company's financial projections include the impacts of known and/or assumed costs related to the operating and maintenance costs of the chronic physical risk of water supply and wildfire. Such costs include: -The operating costs to mitigate fire risk, which is a short-term time horizon risk with high financial risk that may impact operational costs; One of the operating costs to mitigate fire risk is yearly budget of \$16.7M to manage the forestry business unit, who is dedicated to management of rights-of-way and helping to harden assets against the threat of forest fires related to changes in physical climate parameters, including forest fires. -The operating costs to mitigate water risk, which is a medium-term time horizon risk with medium-high financial risk that may impact operational costs; Because water supplies are so integral to the operations at APS, APS has an entire Water Resource Management unit comprised of six full-time employees, with a budget of approximately \$1.5M a year, the team assesses and manages current as well as future risk associated with drought and extreme weather.
Capital expenditures / capital allocation	Impacted	The Company's long-term investment strategy is influenced by both the risks and opportunities presented by managing for climate change means that the total level of capital expenditures and the amount of that capital allocated to renewable and/or environmental equipment/facilities is explicitly considered in all of the Company's financial plans. This is a high financial impact in the medium term time frame. For example, the Company continuously evaluates through its capital allocation process the value of constructing and owning grid-scale solar generating plants, micro-grids, customer-sited solar arrays, and energy storage as suitable substitutes for conventional natural gas-fuelled generating facilities. The CAP-Ex plan ending in 2021 has \$37M allocated for solar generation and \$563M for generation that may include energy storage, renewable projects and other clean energy projects.
Acquisitions and divestments	Not impacted	The Company does not actively participate in acquiring or divesting businesses or lines of business. It is unlikely that climate change related risks and opportunities will be sufficient to alter the Company's business strategy in this area
Access to capital	Not impacted	As a regulated electric utility with a solid A- credit rating, the Company's ability to access capital markets for both debt and equity remains high. Any risks associated with climate change appear to be manageable at present and are not expected to materially disrupt the Company's means of financing its long-term investment strategy.
Assets	Impacted	In its financial projections, the Company includes the effects of changes in the total plant and equipment in service. To the extent that future capital expenditures are allocated to renewable generation and/or environmental equipment, then the Company's projected asset values will reflect those additions. This is a high financial impact in the medium term time frame. The CAP-Ex plan ending in 2021 has \$37M allocated for solar generation and \$563M for generation that may include energy storage, renewable projects and other clean energy projects. Likewise, to the extent that investments in renewable generation and/or environmental equipment displace investments in conventional fossil-fuelled generation, then those reductions in plant in service are also reflected in the Company's projected asset values.
Liabilities	Impacted	In its financial projections, the Company includes the financial commitments under long-term purchased power agreements (PPA) and long-term agreements for customer-sited renewable generation production based incentives. This is a high financial impact in the medium term time frame. APS expects the total base budget for Project Based Initiatives and other Distributed Generation legacy costs, PPA projects in 2019 to be \$89.9M. These liability calculations include amounts related to debt imputations performed by credit rating agencies in their routine methodologies for assessing Company credit-worthiness.
Other	Please select	

C3. Business Strategy

C3.1

(C3.1) Are climate-related issues integrated into your business strategy?

Yes

C3.1a

(C3.1a) Does your organization use climate-related scenario analysis to inform your business strategy?

No, but we anticipate doing so in the next two years

C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b

(C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b) Indicate whether your organization has developed a low-carbon transition plan to support the long-term business strategy.

Yes

C3.1c

(C3.1c) Explain how climate-related issues are integrated into your business objectives and strategy.

Climate change is integrated into our business strategy through our Integrated Resource Plans (IRP). The plan serves as an official forecast of how APS will meet customers' energy needs through the Company's 15-year resource planning period and fulfil regulatory targets. APS's executive team recognizes the importance of having a carbon strategy because it is a key factor in mitigating financial, physical, and operational risks. Climate change issues, particularly carbon costs and water resources, are critical parameters in long-range resource planning process. Following a look at the broad trends affecting the energy industry, the resource planning process evaluates what quantity of resources APS needs and the timing of these needs, existing and future resources, and major risks in the APS service territory. Analytical models are implemented to produce a series of resource portfolios for further evaluation. APS set a long-term carbon emission goals based on carbon intensity, as measured by the pounds of carbon emission per megawatt-hour of energy. By 2032, APS expects their carbon-emission rate to decrease to less than 600 lb/MWh.

In the formulation of the IRP, uncertainties regarding environmental regulation and the evolving nature of the electric industry significantly influenced the plan. As a result, understanding current and potential future environmental regulations is an important part of the planning process. Environmental regulations are promulgated on the federal, state, and county levels. In response to the uncertainty around environmental regulations, APS focuses on the following: utilizing a combination of market-based solutions, updating conventional generation resources, expansion of renewable generation, adding transmission resources, evaluating our remaining coal fleet, and investing in advanced grid technologies. Transitioning to a decarbonized generation resource mix is a long and expensive undertaking. However, APS has been moving toward a lower carbon position for many years. For example, to further our commitment to providing clean energy, we announced this year that we are adding nearly 1 gigawatt of clean energy projects by the summer of 2025. These projects include 850 megawatts (MW) of battery storage and at least 100 MW of new solar generation. These projects amount to one of the largest battery storage initiatives in the United States and continue APS's leadership in solar energy and battery energy storage to serve customers. Arizona has unique and growing power needs that energy storage can help to meet. APS customers need almost double the electricity at peak times in the summer than in other, milder-weather seasons. During the summer, customers are coming home and relying on air conditioning almost nonstop to combat hot temperatures that last late into the evening. The simple challenge has been that solar panels go off the clock when the sun sets, just as APS customers are starting to use the most electricity. Batteries can now help solve that challenge. The batteries allow us to take solar energy that's produced in the middle of the day and deploy it in those evening hours when our customers need it the most. These projects are key to unlocking the potential of fully utilizing additional solar energy for our customers and Arizona.

To measure our overall carbon reduction—not just decreasing emissions from generation but also in our own operations—we use a carbon-avoidance metric. This reflects actions taken throughout the Company, including retiring coal units, installing renewable generation and energy efficiency, increasing our building and operating efficiencies, and pursuing fleet electrification. In 2018, we avoided 4.5 million metric tons of carbon. Since 2015, APS has avoided 18.1 million metric tons of carbon dioxide emissions that would have been emitted – equivalent of removing almost 4 million automobiles from the road. We have a target of avoiding total of 24.5 million metric tons of carbon by 2020. The primary reasons for surpassing our carbon avoidance goal were an increase in renewable energy and ongoing energy efficiency measures.

The most important component of our IRP is providing the most reasonable combination of overall economic performance, and flexibility in the generation fleet to support grid reliability, integrating renewable energy and managing uncertainties. The IRP process enables APS to develop long-term plans and evaluate which resource options may be appropriate given today's forecasts of future energy needs, resource costs and associated uncertainties. Important for APS is the growth of solar generation, requiring a responsive, supportive electric grid and additional flexible resources to balance the system in order to continue meeting customers' energy needs reliably. Natural gas will play an increasingly important role in transforming the resource portfolio into one that is more flexible and responsive. Our regulated electric business does not face direct competition from other utility companies. However, it is imperative to ensure that customers in our service territory are provided with safe, reliable and affordable electricity into the foreseeable future. To ensure we continue to provide the same quality of service, a diverse fuel mix is critical to effectively manage overall price volatility for our customers, and to insulate against risks in commodity supply chains such as price spikes or infrastructure issues.

A substantial business decisions made during the reporting year that address climate change included the adoption of low-carbon principles to guide our path towards a low-carbon economy. The following principles help to guide APS as we transition to a low-carbon economy:

- Maintain appropriate governance to drive management practices and decisions to achieve cleaner air and a low-carbon economy
- Continue to explore solutions to decarbonize our generation assets and provide the grid infrastructure that allows the adoption of low and zero carbon emission resources
- Maintain a high level of transparency with respect to carbon metrics and emissions reporting
- Participate in legislative and regulatory actions that address cleaner air and a low-carbon economy while ensuring reliable and affordable energy to our customers
- Participate with non-governmental organizations, industry trade groups, think-tanks and other organizations to achieve attainable and meaningful carbon reductions and advancement of a low-carbon economy
- Engage in and share research that may further reduce carbon emissions associated with supplying electrical energy.

C-AC3.1e/C-CE3.1e/C-CH3.1e/C-CO3.1e/C-EU3.1e/C-FB3.1e/C-MM3.1e/C-OG3.1e/C-PF3.1e/C-ST3.1e/C-TO3.1e/C-TS3.1e

(C-AC3.1e/C-CE3.1e/C-CH3.1e/C-CO3.1e/C-EU3.1e/C-FB3.1e/C-MM3.1e/C-OG3.1e/C-PF3.1e/C-ST3.1e/C-TO3.1e/C-TS3.1e)
Disclose details of your organization's low-carbon transition plan.

The vision of APS is to create a sustainable energy future for Arizona. A sustainable energy future requires balancing the generation and delivery of reliable and affordable energy in unison with environmental stewardship, which for us translates to clean energy. To further our commitment to providing clean energy, we are adding nearly 1 gigawatt of clean energy projects by the summer of 2025. These projects include 850 megawatts (MW) of new solar storage with batteries and at least 100 MW of new solar generation.

By the end of 2018, more than 50% of our diverse energy mix was carbon free. We achieved this mix with a combination of traditional and renewable energy resources and energy efficiency actions, and we continue to make our energy mix cleaner by closing more coal units, modernizing natural gas plants, deploying renewable energy, installing battery storage and improving energy efficiency.

Advancing technologies, growing renewable energy resources and increasing customer sentiment for cleaner energy are accelerating change in the electric utility industry. The APS Integrated Resource Plan (IRP) details our blueprint to provide customers with clean, reliable and affordable energy, fulfill regulatory targets and manage environmental impacts. These trends are shaping the current planning objectives: Developing cleaner energy resources, increasing investment in the energy grid, participating in energy markets to lower customer bills, increasing system flexibility to maintain reliable service that our customers require.

We are engaging our stakeholders to review and discuss current and future resource plans. Through the IRP process, we expect to file a preliminary update to our plan later this year (2019) and an update to the entire plan in the first half of 2020.

C3.1g

(C3.1g) Why does your organization not use climate-related scenario analysis to inform your business strategy?

Our vision at APS is to create a sustainable energy future for Arizona. APS's executive team recognizes that we must strike a balance between delivering reliable, affordable energy and being responsible stewards of the environment. As a Company, we are working with our stakeholders to determine what our future resource mix; this is captured by our Integrated Resource Plan (IRP). Our stakeholders are providing us with the necessary inputs as we update our IRP; part of these considerations includes the potential use of a climate-related scenario analysis.

Although a formal climate-related scenario analysis has not been used to inform our business strategy in the past, we have successfully implemented strategies for reducing the carbon intensity of our electricity generation through our Integrated Resource Plan (IRP). Advancing technologies, growing renewable energy resources and increasing customer sentiment for cleaner energy are accelerating change in the electric utility industry. The IRP details our blueprint to provide customers with clean, reliable and affordable energy fulfil regulatory targets and manage environmental impacts. These trends are shaping the current planning objectives:

Developing cleaner energy resources

Increasing investment in the energy grid

Participating in energy markets to lower customer bills

Increasing system flexibility to maintain reliable service that our customers require

We are engaging our stakeholders to review and discuss current and future resource plans. Through the IRP process, we expect to file a preliminary update to our plan towards the end of 2019 and an update to the entire plan in the first half of 2020.

The Company is currently assessing the use of a climate-scenario analysis. In 2018 we made the investment to participate in the Electric Power Research Institute's Understanding Climate Scenarios and Goal Setting Activities project. This is giving us the opportunity to develop a technical foundation to develop an informed dialogue and decisions as we move forward with determining a plan for developing a climate-related scenario. In addition, it gives us the opportunity to learn from our peers that have used a climate-related scenario analysis. This is becoming an increasing request from stakeholders and investors that we have heard and making sure we choose that is technically grounded and appropriate for the complexity of the utility sector.

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Both absolute and intensity targets

C4.1a

(C4.1a) Provide details of your absolute emissions target(s) and progress made against those targets.

Target reference number

Abs 1

Scope

Scope 1 +2 (market-based)

% emissions in Scope

99.5

Targeted % reduction from base year

32

Base year

2005

Start year

2005

Base year emissions covered by target (metric tons CO2e)

16557441

Target year

2020

Is this a science-based target?

No, and we do not anticipate setting one in the next 2 years

% of target achieved

88

Target status

Underway

Please explain

APS recognizes that electric utilities face a unique challenge when it comes to reducing their GHG emissions. Transitioning to a decarbonized generation resource mix is a long and expensive undertaking. However, APS has been moving toward a lower carbon position for many years. To further our commitment to providing clean energy, we are adding nearly 1 gigawatt of clean energy projects by the summer of 2025. These projects include 850 megawatts (MW) of new solar storage with batteries and at least 100 MW of new solar generation. In line with projected population growth in Arizona, we anticipate customer growth of approximately 45 percent by 2032, representing up to an additional 549,000 customers. We expect renewable energy and energy efficiency to meet more than 50 percent of that growth, along with a planned reduction of coal generation from 21 percent in 2017 to 11 percent of the APS generation mix by 2032. Our medium-term goal to reduce our total carbon emissions by 32% in 2020 from our baseline year of 2005. By the end of 2018 we have reduced our total carbon emissions by 28%, that means we have achieved 88% of our goal. APS has been exploring and working with the SBT framework to set a target and has not aligned at this time with a scenario that best meets our growing load and still remaining clean, reliable, and affordable. We are in the process of engaging our stakeholders to review and discuss current and future resource plans. Through the Integrated Resource Planning process, we expect to file a preliminary update to our plan later in 2019 and an update to the entire plan in the first half of 2020. At that time, we will then once again evaluate the best scenario for a science-based target and if that aligns with our direction.

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Scope

Scope 1

% emissions in Scope

99.5

Targeted % reduction from base year

48

Metric

Metric tons CO₂e per megawatt hour (MWh)*

Base year

2005

Start year

2005

Normalized base year emissions covered by target (metric tons CO₂e)

16557440

Target year

2032

Is this a science-based target?

No, and we do not anticipate setting one in the next 2 years

% of target achieved

67

Target status

Underway

Please explain

APS recognizes that electric utilities face a unique challenge when it comes to reducing their GHG emissions. For more than a century the majority of electrical energy has been generated with carbon-based fuels. Transitioning to a decarbonized generation resource mix is a long and expensive undertaking. However, APS has been moving toward a lower carbon position for many years. For example, from 2006 through 2016 we added over one gigawatt of solar nameplate capacity to our system, becoming the only electric utility outside of California to achieve this milestone. And by the end of 2017 our system had over 1,600 megawatts of renewables of which approximately 1,300 megawatts came from solar resources. In line with projected population growth in Arizona, we anticipate customer growth of approximately 45 percent by 2032, representing up to an additional 549,000 customers. We expect renewable energy and energy efficiency to meet more than 50 percent of that growth, along with a planned reduction of coal generation from 21 percent in 2017 to 11 percent of the APS generation mix by 2032. This will help us achieve our long-term goal to reduce our carbon-emission rate to less than 600 pounds per megawatt-hour (lb/MWh) by 2032. APS has been exploring and working with the SBT framework to set a target and has not aligned at this time with a scenario that best meets our growing load and still remaining clean, reliable, and affordable. We are in the process of engaging our stakeholders to review and discuss current and future resource plans. Through the Integrated Resource Planning process, we expect to file a preliminary update to our plan later in 2019 and an update to the entire plan in the first half of 2020. At that time, we will then once again evaluate the best scenario for a science-based target and if that aligns with our direction.

% change anticipated in absolute Scope 1+2 emissions

19

% change anticipated in absolute Scope 3 emissions

0

C4.2

(C4.2) Provide details of other key climate-related targets not already reported in question C4.1/a/b.

Target

Renewable electricity production

KPI – Metric numerator

percent renewable generation (MWh)

KPI – Metric denominator (intensity targets only)

per total generation (MWh)

Base year

2007

Start year

2007

Target year

2025

KPI in baseline year

1.1

KPI in target year

15

% achieved in reporting year

86

Target Status

Underway

Please explain

The Arizona Corporate Commission (ACC) has adopted a Renewable Energy Standard (RES), in which electric utilities under its jurisdiction must supply an increasing percentage of their retail electric energy sales from eligible renewable resources, including solar, wind, biomass, biogas and geothermal technologies. For calendar year 2018, the ACC mandated through its RES rule that 8.0 percent of APS' 2018 retail kilowatt-hour (kWh) sales must come from renewable resources, with 30 percent of the total requirement to be fulfilled with energy produced from Distributed Energy (DE) sources. The renewable energy standard increases annually until reaching 15 percent in 2025. This regulatory driver is having a large impact on APS' generation mix. In 2018, the Company's total RES resources were 2,992,274 MWh, which is 10.7 percent of APS's total 2018 retail sales. The RES Rules further mandate that 30 percent of an affected utility's total requirement be fulfilled with energy produced from Distributed Energy (DE) sources, one-half of which may come from residential applications and the remaining one half from non-residential, non-utility applications. APS requested and received a waiver from the residential distributed generation requirement as APS did not meet the residential DE requirement. However, APS did meet the non-DE RES compliance requirement in 2018. In 2018, the total renewable energy on the APS system increased to 1,543 MW.

Part of emissions target

The APS 2017 Integrated Resource Plan (IRP) details our comprehensive plan to reliably and affordably meet customers' projected energy needs, fulfill regulatory targets and management environmental impacts over the next 15 years. We work to achieve a cleaner energy mix through efforts that include closing older coal units, increasing environmental controls at existing units, modernizing natural gas plants, using more renewable energy and increasing energy efficiency. In addition, the Palo Verde Generating Station, the nation's largest carbon-free energy resource, provides more than 70 percent of Arizona's carbon-free energy. The IRP outlines planned reduction of coal generation from 21 percent in 2017 to 11 percent of the APS generation mix by 2032 while increasing renewable generation by approximately 50 percent. This will help us achieve our long-term goal to reduce our carbon-emission rate to less than 600 pounds per megawatt-hour (lb/MWh) or .32 metric tons CO2/MWh by 2032.

Is this target part of an overarching initiative?

Other, please specify (2017 APS Integrated Resource Plan)

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	6	2648
To be implemented*	1	54297
Implementation commenced*	1	56796
Implemented*	3	12503
Not to be implemented	0	0

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

12459

Scope

Scope 1

Voluntary/Mandatory

Mandatory

Annual monetary savings (unit currency – as specified in C0.4)

113000

Investment required (unit currency – as specified in C0.4)

2779668

Payback period

No payback

Estimated lifetime of the initiative

6-10 years

Comment

The Demand Response, Energy Storage and Load Management (or 'DRESLM') initiative was approved by the Arizona Corporation Commission on August 23, 2017, in Decision No. 76314. The initiative includes emerging technologies for managing system load shapes and helping customers shift energy use to lower cost off-peak hours including battery storage, connected water heaters, and demand response with smart thermostats. It is being marketed to APS customers as the 'Rewards' initiative which includes Storage Rewards (battery storage), Reserve Rewards (connected water heaters), and Cool Rewards (smart thermostats). In 2018, the storage rewards and cool rewards programs were implemented. Four Cool Rewards demand response events were called during this reporting period and resulted in an average of 0.82 kW load reduction/thermostat per event. For the Storage Rewards program element, 3 feeder scale batteries were installed and operating by the end of 2018. The feeder scale batteries are sized at 350 kw, 475 kw and 475 kw, providing a total energy storage capacity of 1.7 MWs including capacity reserve and line losses. A total of 12,459 metric tons of CO2 were avoided in 2018 due to these two new programs.

Initiative type

Low-carbon energy installation

Description of initiative

Solar PV

Estimated annual CO2e savings (metric tonnes CO2e)

44

Scope

Scope 1

Voluntary/Mandatory

Mandatory

Annual monetary savings (unit currency – as specified in C0.4)

0

Investment required (unit currency – as specified in C0.4)

45000000

Payback period

1-3 years

Estimated lifetime of the initiative

16-20 years

Comment

APS customers across the state are now benefiting from APS Solar Communities, a new program making renewable energy more accessible to those who otherwise may not have the financial means to go solar. Designed specifically for limited- and moderate-income customers, we are investing \$10 million to \$15 million annually for three years (2018-2020) in the program. APS Solar Communities residential participants agree to have a rooftop solar system installed at no cost. Customers then begin receiving a monthly \$30 bill credit from APS while helping to contribute to our 50-percent clean energy mix. The program also plans to include Title I schools, non-profits aiding limited-income groups, multifamily housing and government entities serving rural communities located in our service territory. The APS Solar Communities program launched in April 2018 and received over 1,600 residential applications for participation in the program with 189 solar installations approved in 2018. APS received 38 complete and submitted applications for non-residential participation and approved 9 organizational sites including Title I Schools, non-profits and rural government customers. In 2018, the program installed 1.2 MW AC capacity, with a production of 93 MWh for 2018. The first system went online at the end of July (2018).

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Compliance with regulatory requirements/standards	APS uses and integrated planning process to link our business strategy with resource planning. Benchmarking and continuous improvement are valued by the executive team and employees ensuring that the process keep APS focused on key objectives and will ultimately help them deliver reliable and affordable power to Arizona. The Arizona Corporation Commission (ACC) also has an electric Energy Efficiency Standards (EES). Under the EES, Arizona's public utilities under the ACC's jurisdiction are required to achieve cumulative annual energy savings of at least 22 percent of retail sales in 2019 - measured in kWh - by 2020. The Arizona Corporate Commission (ACC) has adopted a Renewable Energy Standard (RES), in which electric utilities under its jurisdiction must supply an increasing percentage of their retail electric energy sales from eligible renewable resources, including solar, wind, biomass, biogas and geothermal technologies. The renewable energy standard increases annually until reaching 15 percent in 2025. This regulatory driver is having a large impact on APS' generation mix.
Dedicated budget for energy efficiency	APS spending for implementation of DSM programs was \$32.9M. The breakdown of DSM expenses was \$1.9 M for Demand Response (DR), \$15.4M for residential energy efficiency (EE) programs, \$10.6M for non-residential EE programs, \$3.2M for other EE initiatives, and \$1.8M for measurement evaluation research, and performance incentive.
Dedicated budget for low-carbon product R&D	APS participates in R & D programs through the Electric Power Research Institute (EPRI) dedicated to sustainability, electric transportation, energy storage and distributed generation research. In 2018, APS budgeted a total of close to \$4 Million and over \$250,000 of self-directed funds towards EPRI membership and research activities.
Internal price on carbon	APS maintains a projection on carbon pricing. The internal cost and projection is used to evaluate business decisions.
Dedicated budget for other emissions reduction activities	The APS transportation fleet continues its conversion to more fuel-efficient vehicles and electrification by continually researching the market and updating the electrification strategy for our fleet. APS is a key committee member in the development of the Edison Electric Institute (EEI) Electrification Initiative. Involvement in this program allows APS to exchange valuable ideas, understand emerging technologies and identify potential opportunities within our fleet. In 2018, APS spent almost \$5 million to add electric ATVs, 23 Passenger Tram, Indoor Air Picker, Electric Forklift, Electric Articulating Boom Man lifts, and addition ePTO/Cab Comfort/ Jem units for our fleet. Instead of using the transmission to drive the hydraulic pump to power the aerial unit, an ePTO/cab comfort / Jem uses an electric motor to drive the hydraulic pump. This reduces engine idle time which also saves fuel and leads to reduced emissions.
Partnering with governments on technology development	Through an innovative relationship with the U.S. Department of the Navy, we operate a low-emission, 25-MW microgrid at the Marine Corps Air Station (MCAS) Yuma. The system provides 125% of the backup power needed by the base in the event of a grid disruption, enhancing reliability and security at the base and allows the base to add more capabilities in the future.
Internal incentives/recognition programs	APS participates in a Travel Reduction Program with Maricopa County to incentive employees to use alternate forms of transportation. The incentives range from raffle prizes, bus and rail passes, car pool parking passes, and the support of van pools. The budget for the program in 2018 was almost \$230,000.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.

Level of aggregation

Group of products

Description of product/Group of products

APS offers customers a comprehensive portfolio of energy efficiency options.

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Arizona Energy Efficiency Standard)

% revenue from low carbon product(s) in the reporting year

0

Comment

In the 2018 DSM Plan, APS forecasted estimated savings of 470,230 MWhs for the year, slightly below the compliance target of 508,893 MWhs calculated by the 'smoothed compliance' approach approved in Decision No. 75679. In 2018, the Company achieved 77.0% of the annual smoothed DSM goal. With the inclusion of its 2018 savings, APS has achieved cumulative MWh savings of 4,173,079, which is 16.0% of its 2017 adjusted retail sales putting it only slightly behind the cumulative EES goal of 4,670,587 or 17.0% by 2018. The programs helped to avoid 2,854 million pounds of CO2 in 2018 and a total of 45,451 million pounds of CO2 since January 2005.

Level of aggregation

Product

Description of product/Group of products

APS Green Choice program allows customers to purchase up to 100% of their power from renewable energy from Arizona and New Mexico.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Green-e Energy certification)

% revenue from low carbon product(s) in the reporting year

0

Comment

In 2018, 1,264 customers subscribed to the Green Choice rates for 30,162 MWh of sales and gross revenue of \$309,082.

C-EU4.6

(C-EU4.6) Describe your organization's efforts to reduce methane emissions from your activities.

APS recognizes methane emissions are a significant greenhouse gas emission due both to its high global warming potential and the quantity of methane released. The methane emissions from APS's electricity generating activities is predominantly from of natural gas releases, which is typically comprised of about 95% methane. APS does not own or operate any methane exploration, production or distribution facilities, so any methane releases associated with the supply of natural gas to APS is considered indirect emissions.

The natural gas consumed by the Company is used as a fuel for a fleet of 30 natural gas-fired combustion turbines and 2 gas-fired boilers. Each combustion turbine or boiler can combust upwards of 9 million cubic feet of natural gas per year. Due to large amount of natural gas used by the facilities, APS has a great interest to properly manage and prevent inadvertent releases of methane to assure plant safety, environmental protection and fiscal responsibility. The natural gas supplied to the combustion turbines operates under high pressure, typically in the range of 350 to 650 pounds per square inch. Because of the elevated delivery pressure and highly flammable nature of natural gas, safety is of utmost importance. To assure continual safety of personnel and equipment plant operators monitor and inspect daily the natural gas supply lines and gas conditioning equipment. Plant operators record any identified methane leaks and issue work orders for plant maintenance to repair identified methane leaks as quickly as possible.

To ensure there are not any methane leaks that may go undetected by plant personnel, APS uses a third-party methane detection company to verify there are no leaks from any of the natural gas lines, valves and gas conditioning system. Our eight fossil plants all have their own frequency of third party monitoring depending on various requirements: Four Corners Power Plant gets an annual inspection; Cholla Power Plant, Ocotillo Power Plant, Saguaro Power Plant, West Phoenix Power Plant and Yucca Power Plant get semi-annual inspections; Redhawk Power Plant and Sundance Power Plant get quarterly inspections.

The surveys are conducted by a third party and any leaks found are tagged and a report is generated. An engineer at the plant receives these reports and creates a service request in our internal reporting system. The plant personnel then have the responsibility to repair the leaks. The surveys start at the APS gas yards at each plant and cover the underground portion up to the unit (accessible above ground piping). The contractor uses methane specific intrinsically safe detection equipment. Starting this year, West Phoenix Power Plant is having a new consultant do their leak survey who is also qualified to do repairs on the system, making it a more streamlined approach to leaks and repairs. The daily monitoring by plant personnel and the third-party methane detection inspections provide a process for the Company to ensure any methane leaks are promptly identified and repaired.

Because methane leaks at the sites are rare, a specific methane reduction target has not been established. However, the methane identification and reduction actions taken by the plant ensures methane emissions are minimized to maintain the plant is a safe condition, protect the environment from greenhouse gas emissions, and maintain fiscal responsibility by ensuring natural resources are not wasted.

APS is currently becoming engaged with various organizations to understand the larger issue of methane emissions associated with natural gas exploration, production and distribution. There is a potential that these methane emissions could be a significant contribution to total greenhouse gas emissions and if APS is looking to set methane reduction targets with our natural gas suppliers the Company must first understand the potential contribution and impact associated with these emissions.

C5. Emissions methodology

C5.1

(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).

Scope 1

Base year start

January 1 2005

Base year end

December 31 2005

Base year emissions (metric tons CO2e)

16661531

Comment

2005 is used as the Scope 1 baseline year to align our carbon emission reductions with the targets set at COP 21.

Scope 2 (location-based)

Base year start

January 1 2009

Base year end

December 31 2009

Base year emissions (metric tons CO2e)

17209

Comment

2009 is used at the baseline year for Scope 2 carbon emissions because this is the first year we established emission reduction goals for Scope 2 emissions.

Scope 2 (market-based)

Base year start

January 1 2009

Base year end

December 31 2009

Base year emissions (metric tons CO2e)

18883

Comment

2009 is used at the baseline year for Scope 2 carbon emissions because this is the first year we established emission reduction goals for Scope 2 emissions.

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions.

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
US EPA Mandatory Greenhouse Gas Reporting Rule

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?

Reporting year

Gross global Scope 1 emissions (metric tons CO2e)

12008503

Start date

January 1 2018

End date

December 31 2018

Comment

In 2018, the total APS carbon dioxide emissions were 13,137,903 tons. This represents an increase of 11.1% over total carbon dioxide emissions in 2017. The 2018 increase is attributable to greater utilization of coal-fired generation, especially the Four Corners units. The increased utilization of the coal-fired units was due primarily to two reasons. First, in 2018 the Four Corners units returned to service after major unit outages in which the units were retrofitted with selective catalytic reduction (SCR) technology—a technology that dramatically reduces nitrogen oxide emissions. As a result, the operation of these units increased in 2018. The other contributing factor was an increase in natural gas prices. The average natural gas price in 2018 was 16% higher than the previous three-year average. However, when viewed with a longer-perspective lens, the trend is still towards reduced carbon emissions. Compared to just three years ago, the total company carbon dioxide emissions have decreased by 12.2%, and the percentage of total carbon dioxide emissions from coal-fired units has decreased almost 10%. While we expect year-over-year carbon emissions to vacillate, the long-term trend for carbon dioxide emissions continues to be on a downward trajectory. In addition to carbon reductions, we are on the pathway to reduce nitrogen oxide (NOx) and sulfur dioxide (SO2) intensity by 93% and 89%, respectively. Since 2005, we have had an intensity reduction of 77% for NOx and 86% for SO2. This resulted from our commitments to reduce emissions and institute operational efficiency enhancements. APS reduces its environmental impact by closing older, less-efficient coal units and upgrading environmental controls on newer units. SCR technology currently is employed at six of our power plants. As noted above, installation of two new SCRs at the Four Corners Power Plant in 2018 resulted in an 88% NOx reduction at that facility.

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?

Reporting year

Scope 2, location-based

13940

Scope 2, market-based (if applicable)

13865

Start date

January 1 2018

End date

December 31 2018

Comment

Our commitment to reduce our environmental footprint through sustainable practices is evident throughout APS facilities. Our corporate headquarters in Phoenix has earned five ENERGY STAR labels for energy efficiency from the EPA. Over the past 11 years, we have improved energy efficiency at this facility by approximately 30%. Overall, APS facilities have received 10 ENERGY STAR labels. In 2018, our energy use decreased 6% compared to 2017 through efficiencies we implemented, resulting in a reduction of 1,156 metric tons of carbon dioxide emissions.

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

C6.5

(C6.5) Account for your organization's Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, not yet calculated

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

In 2008, APS helped to found (and today remains an active member of) the Electric Utility Industry Sustainable Supply Chain Alliance (EUISSCA or the Alliance). The Alliance is a group of North American electric utility companies whose mission is to share and advance best sustainability practices within our own companies and within our supply chains and supplier networks. The Alliance accomplishes this by providing a forum for utilities to share best practices and learn from each other, and by issuing an annual supplier performance survey to gauge performance on key sustainability performance indicators. The survey system was recently updated to improve the user experience, enabling more supplier responses in the future and providing immediate feedback for benchmarking purposes. The survey results this year indicated that over 60% of our key suppliers have practices in place to reduce their greenhouse gas and carbon emissions. Suppliers' practices include vehicle monitoring systems such as telematics (maximizing fuel efficiencies through driver behavior and vehicle maintenance programs), as well as practices within the office such as efficient energy usage programs. Approximately 70% of survey respondents have improvement plans in place and are actively pursuing environmental goals through implemented controls, improvement plans, and established measurement processes. At APS, we are using the survey to communicate with key suppliers about our environmental performance expectations and goals. Last year, the Alliance opened its membership to Supplier Affiliates that have an interest in advancing sustainability within the electric utility supply chain. The Alliance's Supplier Affiliate Program is creating closer collaboration between electric utility industry leaders who are addressing the challenges of creating a cleaner, more reliable and more affordable supply chain – and their suppliers.

Capital goods

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

We do not separate capital goods from overall purchased goods therefore capital goods are incorporated in our overall purchased goods and services.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

2709173

Emissions calculation methodology

Purchased Power is electrical energy purchased by APS from merchant power plants or from transmission systems as source of energy for APS's electric utility customers. (ii) Data is provided by Fuel Analysis and Forecasting team. (iii) APS calculated this emission category based on CO₂e emissions factor from our own fleet (0.473 metric tons/MWh). The total Purchased Power for 2018 was 7,520,518 MWh, of which 1,795,903 MWh were renewables. So the emission factor was applied to the total Purchased Power minus the renewables, for a total of 5,724,615 MWh. $(7,520,518 \text{ MWh} - 1,795,903 \text{ MWh}) \times 0.473 \text{ metric tons CO}_2\text{e/MWh} = 2,709,173 \text{ metric tons CO}_2\text{e}$

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

CO₂e emissions are associated with purchase power agreements from conventional sources such as gas units, marketing and trading purchases (resales) and renewable purchased power. APS joined the Energy Imbalance Market (EIM) in October of 2016. The EIM enables utilities across the western region to buy and sell energy more efficiently. The difference between participating in the EIM over traditional energy markets is that the EIM automatically finds the most efficient energy resources available if APS decides to buy or sell power in five minute increments. EIM's real-time market capabilities help APS respond quickly to variable renewable energy production (like solar) and better incorporate renewable resources by automatically adjusting to intermittency.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

3375723

Emissions calculation methodology

The CO₂e emissions are calculated by APS using the EPA Emission Factors for Greenhouse Inventories (March 2018) and the 5th Assessment of Global Warming Potentials. Specifically, the Product Transport Emission Factors for Medium and Heavy Duty trucks. (CO₂ 0.202 ton/mile (GWP:1); CH₄ .0020 ton/mile (GWP:28); N₂O 0.0015 ton/mile (GWP:265)) In 2018, our logistics firm reported a total of 5,676,732 miles for their delivery trucks. The total miles were multiplied by the EPA Emission Factors for Greenhouse Inventories (March 2018) and the 5th Assessment of Global Warming Potentials. Specifically, the Product Transport Emission Factors for Medium and Heavy Duty trucks. $[(5,676,732 \times 0.202) \times 1] + [(5,676,732 \times 0.0015) \times 265] + [(5,676,732 \times 0.002) \times 28] = 3,721,098 \text{ tons of CO}_2\text{e}$. Converted to metric tons by multiplying by 0.90718474. $3,721,098 \times 0.90718474 = 3,375,723 \text{ metric tons CO}_2\text{e}$.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

APS receives total miles from our logistics firm that handles the majority of our shipping needs. The CO₂e emissions are calculated by APS using the EPA Emission Factors for Greenhouse Inventories (March 2018) and the 5th Assessment of Global Warming Potentials. Specifically, the Product Transport Emission Factors for Medium and Heavy Duty trucks.

Waste generated in operations

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

401279

Emissions calculation methodology

The EPA identifies a range of carbon reduction emission factors for the reuse of fly ash. The values range from .71 to .8 tons of carbon reduction per ton of fly ash reuse. APS currently uses a more conservative factor of 0.6 tons of carbon reduction per ton of fly ash, which is a factor developed internally based on engineering evaluation. A total of 668,799 tons of fly ash was sold. (668,799 x 0.6 = 401,279 metric tons CO₂e)

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

APS is reusing fly ash to help reduce its environmental footprint while adding to its bottom line. APS sells much of its fly ash for use in concrete production. This allows concrete manufacturers to reuse the coal ash as a base product in cement production, eliminating the need to produce this material themselves and significantly reducing their energy consumption to produce cement. This estimated carbon reduction is 401,279 metric tons of carbon dioxide.

Business travel

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

2671

Emissions calculation methodology

i) Business travel encompasses GHG emissions from airline travel, rental cars, and vehicle reimbursement for miles drives for business by APS employees. ii) The source of the airline data is from BCD Travel's Decision Source Database, the rental car data is from our rental car agencies, and the reimbursement miles from internal accounting. iii) Travel emission calculations are based on the Greenhouse Gas Protocol for Business Travel Emission Factors and the 5th Assessment of Global Warming Potentials. (Passenger Cars; (CO₂ 0.343 kg/mile (GWP:1); CH₄ 0.019 g/mile (GWP:28); NO₂ 0.011g/mile (GWP:265))

Percentage of emissions calculated using data obtained from suppliers or value chain partners

75

Explanation

This business travel data about APS employees as recorded by our business travel agency, rental miles are provided by the approved rental car agencies for employee travel, and reimbursement miles are provided by our internal accounting based on a type of cost code. All APS travel must be approved at the Vice President's for conference travel and at the leader level for local travel. Employees are asked to use teleconferencing as much as possible to reduce overall miles traveled by employees.

Employee commuting

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

2481

Emissions calculation methodology

This information was calculated based on the APS's employee responses to the 2018 Maricopa County Regional Travel Reduction Program survey. Emission calculations are based on the Greenhouse Gas Protocol using the distance based method and Business Travel Emission Factors for passenger cars, buses, commuter train, and vans.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

89

Explanation

We encourage employees to take part in the Trip Reduction Program. This program focuses on reducing the number of single-occupancy vehicles commuting to our work sites. Maricopa County is a customer of APS, but the survey is not performed as part of our value chain.

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS does not have any upstream leased assets.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

1026534

Emissions calculation methodology

i) Transmission losses are an estimate of CO2e emissions resulting from electrical energy consumed in delivering energy between power plant and a substation. ii) Source of the data is from the losses and company use in the Pinnacle West 2017 Statistical Report and APS system CO2e emission. The estimated energy loss is multiplied by the APS System CO2e emission rate of 0.473 mtons/MWh.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

99

Explanation

APS delivers electrical energy from the power plant to customer's location through a transmission and distribution system. There is an inherent loss in MWh during transmission.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS generates and distributes electricity. There is no processing of our products to calculate processing of sold products.

Use of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS generates and distributes electricity. Emissions are calculated in our Scope 1 response.

End of life treatment of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS generates and distributes electricity. Emissions are calculated in our Scope 1 response.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS does not have downstream leased assets.

Franchises

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS does not have any franchises.

Investments

Evaluation status

Relevant, not yet calculated

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS does not have a method presently of evaluating emissions by any of our investments.

Other (upstream)

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS does not have any additional upstream sources in 2018.

Other (downstream)

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Explanation

APS generates and distributes electricity. Emissions are calculated in our Scope 1 response.

C6.7

(C6.7) Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

Yes

C6.7a

(C6.7a) Provide the emissions from biologically sequestered carbon relevant to your organization in metric tons CO2.

Row 1

Emissions from biologically sequestered carbon (metric tons CO2)

4453

Comment

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.003

Metric numerator (Gross global combined Scope 1 and 2 emissions)

12022368

Metric denominator

unit total revenue

Metric denominator: Unit total

3868000000

Scope 2 figure used

Market-based

% change from previous year

7

Direction of change

Increased

Reason for change

In 2018, gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO₂e the total APS carbon dioxide emissions per total revenue intensity increased by 7% since last year. The 2018 increase is attributable to greater utilization of coal-fired generation, especially the Four Corners units. The increased utilization of the coal-fired units was due primarily to two reasons. First, in 2018 the Four Corners units returned to service after major unit outages in which the units were retrofitted with selective catalytic reduction (SCR) technology—a technology that dramatically reduces nitrogen oxide emissions. As a result, the operation of these units increased in 2018. The other contributing factor was an increase in natural gas prices. The average natural gas price in 2018 was 16% higher than the previous three-year average. However, when viewed with a longer-perspective lens, the trend is still towards reduced carbon emissions. Compared to just three years ago, the total company carbon dioxide emissions have decreased by 12.2%, and the percentage of total carbon dioxide emissions from coal-fired units has decreased almost 10%. While we expect year-over-year carbon emissions to vacillate, the long-term trend for carbon dioxide emissions continues to be on a downward trajectory.

Intensity figure

0.368

Metric numerator (Gross global combined Scope 1 and 2 emissions)

12022368

Metric denominator

megawatt hour generated (MWh)

Metric denominator: Unit total

32646000

Scope 2 figure used

Market-based

% change from previous year

11

Direction of change

Increased

Reason for change

In 2018, gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO₂e the total APS carbon dioxide emissions per total MWh generated intensity increased by 11% since last year. The 2018 increase is attributable to greater utilization of coal-fired generation, especially the Four Corners units. The increased utilization of the coal-fired units was due primarily to two reasons. First, in 2018 the Four Corners units returned to service after major unit outages in which the units were retrofitted with selective catalytic reduction (SCR) technology—a technology that dramatically reduces nitrogen oxide emissions. As a result, the operation of these units increased in 2018. The other contributing factor was an increase in natural gas prices. The average natural gas price in 2018 was 16% higher than the previous three-year average. However, when viewed with a longer-perspective lens, the trend is still towards reduced carbon emissions. Compared to just three years ago, the total company carbon dioxide emissions have decreased by 12.2%, and the percentage of total carbon dioxide emissions from coal-fired units has decreased almost 10%. While we expect year-over-year carbon emissions to vacillate, the long-term trend for carbon dioxide emissions continues to be on a downward trajectory.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	11935000	IPCC Fifth Assessment Report (AR5 – 100 year)
SF6	9773	IPCC Fifth Assessment Report (AR5 – 100 year)
CH4	26796	IPCC Fifth Assessment Report (AR5 – 100 year)
N2O	36934	IPCC Fifth Assessment Report (AR5 – 100 year)

C-EU7.1b

(C-EU7.1b) Break down your total gross global Scope 1 emissions from electric utilities value chain activities by greenhouse gas type.

	Gross Scope 1 CO2 emissions (metric tons CO2)	Gross Scope 1 methane emissions (metric tons CH4)	Gross Scope 1 SF6 emissions (metric tons SF6)	Gross Scope 1 emissions (metric tons CO2e)	Comment
Fugitives	0	0	0.41	9773	Emissions from our owned generation.
Combustion (Electric utilities)	11918509	25566	0	11988295	Emissions from our owned generation.
Combustion (Gas utilities)	0	0	0	0	APS is not a gas utility.
Combustion (Other)	16491	1229	0	20208	Diesel and gasoline from our mobile fleet and generators.
Emissions not elsewhere classified	0	0	0	0	No additional emissions to report.

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
United States of America	12008503

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By business division

By facility

By activity

C7.3a

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
Generation. All emissions based on owned energy production.	11988295
Transmission and Distribution. All emissions based on fleet and mobile generators.	20207

C7.3b

(C7.3b) Break down your total gross global Scope 1 emissions by business facility.

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Four Corners Power Plant	4824789	40.929011	-121.544389
Navajo Generating Station	1523097	36.914722	-111.455833
Cholla Power Plant	2022711	34.94	-110.33
Ocotillo Power Plant	202945	33.4225	-111.9122
West Phoenix Power Plant	1391865	33.773441	-84.394931
Redhawk Power Plant	1596852	33.335833	-112.840528
Yucca Power Plant	116860	32.715235	-114.710441
Saguaro Power Plant	80652	32.552181	-111.298135
Douglas Power Plant	282	31.363622	-109.552532
Sundance Power Plant	229363	53.5075	-114.557222

C7.3c

(C7.3c) Break down your total gross global Scope 1 emissions by business activity.

Activity	Scope 1 emissions (metric tons CO2e)
Stationary Combustion	11988295
Mobile Combustion	20208
Fugitive Combustion	9773

C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4

(C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4) Break down your organization's total gross global Scope 1 emissions by sector production activity in metric tons CO2e.

	Gross Scope 1 emissions, metric tons CO2e	Net Scope 1 emissions , metric tons CO2e	Comment
Cement production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Chemicals production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Coal production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Electric utility generation activities	12008503	<Not Applicable>	Inclusive of Scope 1 emissions of owned generation, our largest source of Scope 1 emissions.
Metals and mining production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (upstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (downstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Steel production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport OEM activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport services activities	<Not Applicable>	<Not Applicable>	<Not Applicable>

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
United States of America	13940	13865	19043613	10254253

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By facility

C7.6b

(C7.6b) Break down your total gross global Scope 2 emissions by business facility.

Facility	Scope 2 location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
501 and 502 Office Complex	1847	1837
Buckeye Service Center	94	94
Casa Grande Business Office and Service Center Complex	207	206
Central Headquarters	2542	2529
Cottonwood Business Office and Service Center Complex	114	114
Deer Valley Complex	6423	6389
Douglas Business Office and Service Center Complex	47	46
Flagstaff Service Center	507	504
Globe Service Center	92	91
Goodyear Service Center	130	129
Holbrook Field Office	7	7
Ocotillo Service Center and Star Center Complex	189	188
Paradise Valley Service Center	327	326
Parker Service Center	66	65
Payson Service Center	119	118
Pole Training Yard	50	50
Prescott Business Office and Service Center	324	323
Snowflake Service Office	164	163
Surprise Service Center	263	262
Wickenburg Service Center	52	51
Williams Business Office and Service Center	39	39
Winslow Business Office	18	18
Yuma Business Office and Service Center	293	291
Southern Yard - Buckeye	24	24

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Increased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined) and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	25542	Decreased	0.24	APS consumes power from our own energy delivery grid, the mix of power delivered includes generated and purchased renewable energy. In 2018 the total RE (purchased and generated) was 2518 GWH of a total of 32646 GWH of energy sources to meet our delivery needs. Whereas in 2017 the total RE (generated and purchased) was 2464 GWH of the total 32759 GWH of energy sources to meet our delivery needs. This accounted for a .24% decrease in CO2e reductions as it the increase in renewable generation of 54GWh is approximately 25,542 mtons CO2e. $[25,542 \text{ mtons CO2e (change in Scope 1+2 emissions attributed to renewable energy consumption)} / 10,835,997 \text{ mtons CO2e (2017 Scope 1\&2 emissions)}] \times 100 = .24\%$
Other emissions reduction activities	4543098	Decreased	42	Due to other emission reduction activities implemented during the year, despite an increase in production, emissions have not grown as could be expected. APS uses a carbon avoidance metric to measure overall carbon reduction—not just decreasing emissions from generation but also in our own operations. This reflects actions taken throughout the company, including retiring coal units, installing renewable generation and energy efficiency, increasing our building and operating efficiencies and pursuing fleet electrification. In 2018, we avoided 4.5 million metric tons of carbon, making it a total of 18.1 million metric tons of CO2 since 2015. APS's total carbon avoidance in 2018 was 4,543,098 metric tons of CO2. This accounted for a 42% decrease in CO2e reductions. $[4,543,098 \text{ mtons CO2 (change in Scope 1+2 emissions attributed to other emissions reduction activities)} / 10,835,997 \text{ mtons CO2e (2017 Scope 1\&2 emissions)}] \times 100 = 42\%$
Divestment	0	No change	0	No divestment during 2018.
Acquisitions	0	No change	0	No acquisitions during 2018.
Mergers	0	No change	0	No mergers during 2018
Change in output	1185707	Increased	11	In 2018, total generation from coal, gas, and oil was 15,673 GWh, this is 616 GWh more than in 2017 (15057 GWh), this resulted in an increase of 1,185,706 mtons of CO2e for our owned generation fleet. (10,802,588 mtons CO2e in 2017 and 11,988,295 mtons CO2e in 2018). The increased utilization of the coal-fired units was due primarily to two reasons. First, in 2018 the Four Corners units returned to service after major unit outages in which the units were retrofitted with selective catalytic reduction (SCR) technology—a technology that dramatically reduces nitrogen oxide emissions. As a result, the operation of these units increased in 2018. The other contributing factor was an increase in natural gas prices. The average natural gas price in 2018 was 16% higher than the previous three-year average. This accounted for a 11% increase in CO2e reductions. $[1,185,707 \text{ mtons CO2e (change in Scope 1+2 emissions attributed to change in output)} / 10,835,997 \text{ mtons CO2e (2017 Scope 1\&2 emissions)}] \times 100 = 11\%$
Change in methodology	5587	Decreased	0.05	Emissions reduction activities included improved efforts in SF6 emissions by implementing process, procedure and tracking improvements to reduce emissions by 36%. APS total SF6 emissions in 2017 was 15,360 metric tons CO2e and 9773 mtons in 2018. The total difference was a reduction of 5,587 mtons CO2e. This accounted for a .05% decrease in CO2e reductions. $[5,587 \text{ mtons CO2e (change in Scope 1+2 emissions attributed to change in methodology)} / 10,835,997 \text{ mtons CO2e (2017 Scope 1\&2 emissions)}] \times 100 = .05\%$
Change in boundary	0	No change	0	No changes in boundaries during 2018
Change in physical operating conditions	0	No change	0	Projections for the southwest United States from climate change models include an increase in the number of extreme hot days in the summer, less precipitation in the form of snow and the earlier runoff of snowmelt, increased wildfire potential, and the potential for increased water shortages. The year 2018 ended up being the 7th warmest year recorded in the history of central Arizona (Phoenix), and the 8th warmest recorded for southwest Arizona (Yuma) - all of which are in our service territory. In fact, the year will likely go down as one of the top 5 warmest for the state as a whole after all data are compiled.
Unidentified	0	No change	0	No additional changes to report.
Other	0	No change	0	No additional changes to report.

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Market-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 70% but less than or equal to 75%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertakes this energy-related activity
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)	0	24725000	24725000
Consumption of purchased or acquired electricity	<Not Applicable>	1923000	5402000	7325000
Consumption of purchased or acquired heat	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	595000	<Not Applicable>	595000
Total energy consumption	<Not Applicable>	2518000	30723000	32646000

C8.2b

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	No
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	No

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Fuels (excluding feedstocks)

Bituminous Coal

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

7817000

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Comment

Fuels (excluding feedstocks)

Natural Gas

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

7854300

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Comment

Fuels (excluding feedstocks)

Fuel Oil Number 2

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

1700

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Comment

Fuels (excluding feedstocks)

Other, please specify (Nuclear (Uranium))

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

9052000

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Comment

C8.2d

(C8.2d) List the average emission factors of the fuels reported in C8.2c.

Bituminous Coal

Emission factor

205

Unit

lb CO2 per million Btu

Emission factor source

APS Emission Inventory Index

Comment

The APS Emission Inventory Index is an internal reporting tool we use to calculate emissions for our generation fleet that are reported to the Clean Air Markets Division (CAMD), EPA Part 98 reporting, and other state emission inventory reporting.

Fuel Oil Number 2

Emission factor

163

Unit

lb CO2 per million Btu

Emission factor source

APS Emission Inventory Index

Comment

The APS Emission Inventory Index is an internal reporting tool we use to calculate emissions for our generation fleet that are reported to the Clean Air Markets Division (CAMD), EPA Part 98 reporting, and other state emission inventory reporting.

Natural Gas

Emission factor

53.06

Unit

kg CO2 per million Btu

Emission factor source

APS Emission Inventory Index

Comment

The APS Emission Inventory Index is an internal reporting tool we use to calculate emissions for our generation fleet that are reported to the Clean Air Markets Division (CAMD), EPA Part 98 reporting, and other state emission inventory reporting.

Other

Emission factor

0

Unit

metric tons CO2e per MWh

Emission factor source

Nuclear does not have any CO2 emissions from generation.

Comment

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	42879466	42269066	610400	610400
Heat	0	0	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C-EU8.2e

(C-EU8.2e) For your electric utility activities, provide a breakdown of your total power plant capacity, generation, and related emissions during the reporting year by source.

Coal – hard

Nameplate capacity (MW)

1794

Gross electricity generation (GWh)

8556

Net electricity generation (GWh)

7817

Absolute scope 1 emissions (metric tons CO2e)

8370596

Scope 1 emissions intensity (metric tons CO2e per GWh)

1070.87

Comment

Lignite

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently use Lignite.

Oil

Nameplate capacity (MW)

98.5

Gross electricity generation (GWh)

2

Net electricity generation (GWh)

2

Absolute scope 1 emissions (metric tons CO2e)

3109

Scope 1 emissions intensity (metric tons CO2e per GWh)

1792.85

Comment

Gas

Nameplate capacity (MW)

3710.6

Gross electricity generation (GWh)

8383

Net electricity generation (GWh)

7854

Absolute scope 1 emissions (metric tons CO2e)

3615710

Scope 1 emissions intensity (metric tons CO2e per GWh)

460.38

Comment

Biomass

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate a Biomass facility.

Waste (non-biomass)

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate a Waste (non-biomass) facility.

Nuclear

Nameplate capacity (MW)

4235

Gross electricity generation (GWh)

9567

Net electricity generation (GWh)

9049

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Geothermal

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate a geothermal facility.

Hydroelectric

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate a hydroelectric facility.

Wind

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate a wind facility.

Solar

Nameplate capacity (MW)

203

Gross electricity generation (GWh)

610

Net electricity generation (GWh)

610

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Other renewable

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate any other renewable facilities.

Other non-renewable

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

APS does not currently operate any other renewable facilities.

Total

Nameplate capacity (MW)

10041

Gross electricity generation (GWh)

27117

Net electricity generation (GWh)

25331.86

Absolute scope 1 emissions (metric tons CO2e)

11989415

Scope 1 emissions intensity (metric tons CO2e per GWh)

473.29

Comment

C8.2f

(C8.2f) Provide details on the electricity, heat, steam and/or cooling amounts that were accounted for at a low-carbon emission factor in the market-based Scope 2 figure reported in C6.3.

Basis for applying a low-carbon emission factor

Other, please specify (As an electric utility we know our generation mix contains 35% low-carbon sources (this includes nuclear generation, solar generation, and purchased power agreements for renewables))

Low-carbon technology type

Solar PV
Concentrated solar power (CSP)
Wind
Nuclear
Biomass (including biogas)

Region of consumption of low-carbon electricity, heat, steam or cooling

North America

MWh consumed associated with low-carbon electricity, heat, steam or cooling

10254253

Emission factor (in units of metric tons CO2e per MWh)

0

Comment

C-EU8.4

(C-EU8.4) Does your electric utility organization have a transmission and distribution business?

Yes

C-EU8.4a

(C-EU8.4a) Disclose the following information about your transmission and distribution business.

Country/Region

United States of America

Voltage level

Distribution (low voltage)

Annual load (GWh)

32646

Scope 2 emissions (basis)

Market-based

Scope 2 emissions (metric tons CO2e)

15441558

Annual energy losses (% of annual load)

7

Length of network (km)

62492

Number of connections

1261999

Area covered (km2)

89733

Comment

APS owns transmission (above 69kV) and distribution lines, however the majority of the lines are distribution (over 75%) so both types of lines are included in this response. The number of connections shown is the number of electric customers served in 2018.

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

C-EU9.5a

(C-EU9.5a) Break down, by source, your total planned CAPEX in your current CAPEX plan for power generation.

Primary power generation source	CAPEX planned for power generation from this source	Percentage of total CAPEX planned for power generation	End year of CAPEX plan	Comment
Gas	16000000	1.06	2021	
Nuclear	404000000	27	2021	
Solar	37000000	2.46	2021	

C-EU9.5b

(C-EU9.5b) Break down your total planned CAPEX in your current CAPEX plan for products and services (e.g. smart grids, digitalization, etc.).

Products and services	Description of product/service	CAPEX planned for product/service	Percentage of total CAPEX planned products and services	End of year CAPEX plan
Other, please specify (Clean Energy Projects)	May include energy storage, renewable projects and other clean energy projects.	563000000	37	2021

C-CO9.6/C-EU9.6/C-OG9.6

(C-CO9.6/C-EU9.6/C-OG9.6) Disclose your investments in low-carbon research and development (R&D), equipment, products, and services.

Investment start date

September 1 2018

Investment end date

October 31 2018

Investment area

Equipment

Technology area

Energy storage

Investment maturity

Large scale commercial deployment

Investment figure

563000000

Low-carbon investment percentage

21-40%

Please explain

Projected future generation resources, which may include energy storage, renewable projects and other clean energy projects. The vision of APS is to create a sustainable energy future for Arizona. A sustainable energy future requires balancing the generation and delivery of reliable and affordable energy in unison with environmental stewardship, which for us translates to clean energy. To further our commitment to providing clean energy, we are adding nearly 1 gigawatt of clean energy projects by the summer of 2025. These projects include 850 megawatts (MW) of new solar storage with batteries and at least 100 MW of new solar generation.

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 and/or Scope 2 emissions and attach the relevant statements.

Scope

Scope 1

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Attach the statement

CDP Verification Statement APS CY2018 TR.pdf

Page/ section reference

Page 2 Verification Scope and Assertions

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

Scope

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Attach the statement

CDP Verification Statement APS CY2018 TR.pdf

Page/ section reference

Page 2 Verification Scope and Assertions

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

Scope

Scope 2 market-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Attach the statement

CDP Verification Statement APS CY2018 TR.pdf

Page/ section reference

Page 2 Verification Scope and Assertions

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.

Scope

Scope 3- at least one applicable category

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Attach the statement

CDP Verification Statement APS CY2018 TR.pdf

Page/section reference

Page 2 Verification Scope and Assertions

Relevant standard

ISO14064-3

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

No, we do not verify any other climate-related information reported in our CDP disclosure

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

Yes

C11.1a

(C11.1a) Select the carbon pricing regulation(s) which impacts your operations.

California CaT

C11.1b

(C11.1b) Complete the following table for each of the emissions trading systems in which you participate.

California CaT

% of Scope 1 emissions covered by the ETS

0.4

Period start date

January 1 2018

Period end date

December 31 2018

Allowances allocated

131048

Allowances purchased

140000

Verified emissions in metric tons CO₂e

58706

Details of ownership

Facilities we own and operate

Comment

C11.1d

(C11.1d) What is your strategy for complying with the systems in which you participate or anticipate participating?

Beginning in 2012, APS began purchasing carbon allowances in the secondary market to cover any compliance obligations related to net imports into the state of California. Our strategy to ensure compliance is that our Risk Management group maintains an internal Hedge Policy comparing obligations and allowances. Our trading allowances purchased and allocated are monitored weekly and reported to all key internal parties. In addition, our Settlements department fulfils our obligation by transferring allowances through Compliance Instrument Tracking System Service (CITSS) as required by the California Air Quality Board. CITSS is a management and tracking system for accounts and compliance instruments issued through participating Western Climate Initiative cap-and-trade programs. CITSS is administered by the Western Climate Initiative, Inc. (WCI, Inc.). CITSS tracks compliance instruments (emissions allowances and offsets) from the point of issuance by jurisdictional governments, to ownership, transfer by regulated greenhouse gas emitters and other voluntary or general market participants, and to final compliance retirement. This strategy has kept us in compliance and with our participation in the California Cap and Trade program. This year we were allocated 131, 048 allowance and purchased a total of 140,000 allowances, resulting in a total of 58,706 metric tons of verified CO₂e.

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

No

C11.3

(C11.3) Does your organization use an internal price on carbon?

Yes

C11.3a

(C11.3a) Provide details of how your organization uses an internal price on carbon.

Objective for implementing an internal carbon price

Navigate GHG regulations

Other, please specify (Integrated Resource Planning)

GHG Scope

Scope 1

Application

APS has included in its analysis the potential for carbon pricing in the 2017 Integrated Resource Plan (IRP). The CO2 cost included in the IRP analysis was based on the California market Cap and Trade 2016 CO2 cost of \$12.80, escalated at 2.5% beginning in 2023. Prior to 2023, APS's analysis assumed the CO2 cost to be \$0.

Actual price(s) used (Currency /metric ton)

12.8

Variance of price(s) used

The CO2 cost included in the IRP analysis was based on the California market Cap and Trade 2016 CO2 cost of \$12.80, escalated at 2.5% beginning in 2023.

Type of internal carbon price

Internal fee

Impact & implication

APS directly manages potential impacts from Carbon Cap and Trade programs. For example, APS has included in its analysis the potential for carbon pricing in the 2017 Integrated Resource Plan (IRP) based on the actual trading price of CO2 allowances in the California market. In the IRP, annual revenue requirements steadily rise over the course of the Planning Period, regardless of the Portfolio that was considered. Costs are driven by increasing fuel prices, inclusion of assumed carbon tax, increased operation and maintenance costs, and increased capital investment to meet load growth. The Flexible Resource Portfolio was chosen as it has a number of positive elements. It reduces carbon emissions through select coal reductions, continues to add more peak demand-reducing Demand Side Management, has a prudent level of energy storage, continues to add renewables and maintains operation of the Palo Verde Nuclear Generating Station. We are engaging our stakeholders to review and discuss current and future resource plans. Through the IRP process, we expect to file a preliminary update to our plan later in 2019 and an update to the entire plan in the first half of 2020.

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, our customers

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Information collection (understanding supplier behavior)

Details of engagement

Collect climate change and carbon information at least annually from suppliers

% of suppliers by number

2.77

% total procurement spend (direct and indirect)

85.34

% Scope 3 emissions as reported in C6.5

45

Rationale for the coverage of your engagement

Annually, APS engages our top tier suppliers in a sustainability survey, with questions on how they are managing environmental impacts in their operations, including greenhouse gas emissions, energy and water usage, waste, and materials management. In addition, proposal evaluations incorporate the importance of environmental stewardship and true supplier alignment to the APS Core Values which includes Environment. Within APS's supply chain, we prioritize our top tier suppliers, our most critical and strategic suppliers and those with whom we spend significant dollars. APS evaluates these suppliers using key performance indicators such as safety, quality, operations and risk impact, and supplier diversity. In 2018, we sent the survey to 2.77% of our suppliers, representing 85.34% of our total spend.

Impact of engagement, including measures of success

APS defines success in two ways: a year over year increase in supplier response to the survey, and a year over year improvement in performance across the key performance indicators. In addition, success stories are celebrated through our supplier of the year nomination process for an environmental sustainability award that is presented each year. For 2018 performance success stories included three suppliers being nominated specifically for the environmental sustainability award. This year the survey was changed so we were not able to look at performance across key indicators using the same metrics, but we were able to establish new baselines. The results found that over 60% of our key suppliers have practices in place to reduce their greenhouse gas emissions and approximately 70% have improvement plans in place and are actively working on environmental goals through implemented controls, improvement plans, and established measurement processes. In 2018, we had a 3% decrease in the number (50 in 2017 as compared to 37 in 2018) of suppliers that responded to the survey. We are planning to do more outreach to suppliers to encourage participation and show value in the survey, we have plans in place to increase responses in 2019 through communicating new expectations aligning suppliers with APS' supply chain sustainability priorities.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement

Education/information sharing

Details of engagement

Share information about your products and relevant certification schemes (i.e. Energy STAR)

% of customers by number

100

% Scope 3 emissions as reported in C6.5

0

Please explain the rationale for selecting this group of customers and scope of engagement

APS engages with 100% of our customers through messaging on our web site, monthly newsletters (printed and email), sponsorships and advertisement in order to give all our customers the opportunity to achieve energy savings and greenhouse gas (GHG) emissions reductions as all customers are eligible to participate in our programs. To help customers achieve energy savings and GHG reductions, we offer programs and incentives for energy efficiency, demand response, solar installation, and more. Technologies such as rooftop solar, LED lighting and smart thermostats have given customers more power to control their energy usage, reduce GHG emissions, and potentially reduce their costs.

Impact of engagement, including measures of success

There are various ways to measure success of messaging, but the most successful measurement for knowing we have reached our customers is when they participate in our programs. This means they have not only become aware of the program, but they have taken action to potentially reduce their energy use and GHG emissions. With over a million customers in a very transitory service area, the measure of success is participation in one or more of our programs and reaching our annual energy efficiency targets. Our messaging campaign resulted in our energy efficiency programs providing 392,022 megawatt hours (MWh) of energy savings for our customers in 2018, which was 23% below our compliance target of 508,893 MWh for 2018. Some specific actions from customers in 2018 included: - rebates for 368 ENERGY STAR variable-speed pool pumps - rebates for 6,965 smart thermostat devices purchased by customers - rebates for 4,729 AC unit installations - rebates for 1,930 ENERGY STAR® approved Energy Audits - paid \$5,313,086 in Large Existing Program incentives for commercial and industrial customers

C12.3

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

Trade associations

C12.3b

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

C12.3c

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

WEST Associates

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Recognizes the potential impact of climate change on electric utilities and works to integrate the unique western conditions into viable solutions.

How have you influenced, or are you attempting to influence their position?

We are a board member, provide technical support, and funding to the organization.

Trade association

Edison Electric Institute (EEI)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Global climate change presents one of the biggest current energy and environmental policy challenges. EEI member companies are committed to addressing the challenge of climate change and have undertaken a wide range of initiatives over the last 30 years to reduce, avoid or sequester GHG emissions. Policies to address climate change should seek to ensure energy reliability, minimize impacts on consumers and avoid harm to U.S. industry and the economy.

How have you influenced, or are you attempting to influence their position?

Our Chairman and CEO serves on the board of the Edison Electric Institute.

Trade association

Nuclear Energy Institute

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Nuclear Energy Institute reports that we need deep decarbonization to hit our climate goals. Nuclear power can get us there. As our largest source of clean energy, nuclear power is critical to reduce carbon emissions. Wind, solar and geothermal are on the rise, but the smartest policies will ensure these technologies complement, not replace, nuclear's clean energy production. Protecting and growing our use of nuclear technologies are important ways to make a dent in greenhouse gases and help us make meaningful progress to address climate change. No other source, renewable or otherwise, contributes as much to meeting U.S. energy demand without emissions as nuclear. Every year, nuclear-generated electricity saves our atmosphere from more than 555 million metric tons of carbon dioxide emissions that would otherwise come from fossil fuels. That's the same as taking 117 million passenger vehicles off the road. Clean energy sources—nuclear, hydropower, geothermal, wind and solar—work together to reduce greenhouse gases in our atmosphere. According to the Energy Information Administration, nuclear energy is the largest clean energy source in the United States, producing more carbon-free electricity than all other sources combined. 2017 figures show that nuclear energy generates more than 56 percent of America's emission-free electricity. That is nearly three times the amount generated by hydropower, more than 3.5 times the amount generated by wind, and more than 18.5 times the amount generated by solar.

How have you influenced, or are you attempting to influence their position?

Our Chairman and CEO serves as the chairman of the Nuclear Energy Institute.

Trade association

Nature Conservancy

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Climate change is one of the world's most urgent challenges and an immediate risk to our communities, economies, and to our conservation mission. The Nature Conservancy is promoting practical, innovative solutions to create a prosperous, low-carbon future that is cleaner, healthier, and more secure for everyone.

How have you influenced, or are you attempting to influence their position?

Our Chairman and CEO serves on the board of the Nature Conservancy in Arizona.

Trade association

Center for Climate and Energy Solutions (C2ES)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

C2ES, the Center for Climate and Energy Solutions, is an independent, nonpartisan, non-profit organization working to forge practical solutions to climate change. C2ES has a mission to advance strong policy and action to reduce greenhouse gas emissions, promote clean energy, and strengthen resilience to climate impacts. A key objective is a national market-based program to reduce emissions cost-effectively. They believe a sound climate strategy is essential to ensure a strong, sustainable economy.

C2ES is the successor to the Pew Center on Global Climate Change, and is widely recognized as an influential and pragmatic voice on climate issues. APS was a contributor to the recent C2ES publication. Pathways to 2050: Alternative Scenarios for Decarbonizing the US Economy.

How have you influenced, or are you attempting to influence their position?

Members of the C2ES's Business Environmental Leadership Council (BELC)

Trade association

Arizona Forward

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Arizona Forward brings business and civic leaders together to promote cooperative efforts to improve the environmental sustainability and economic vitality of Arizona and local regions. The organization is working to understand the perceptions of Arizona residents about climate change to fill the gaps on educating people about the topic. The intent is to publish state-wide editorial opinion pieces and/or stories about climate change to advocate for ways to mitigate the impacts.

How have you influenced, or are you attempting to influence their position?

An APS executive is a Board Member.

C12.3f

(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

In 2018, APS adopted low carbon-economy principles as part of our overall climate strategy, these principles in combination with our Political Participation Policy work together to ensure that all of our direct and indirect activities are consistent with our overall climate change strategy. APS believes we have a responsibility to power a low-carbon economy with clean energy that can be used to support the transition of other sectors like transportation through increased electrification. A future powered by a low-carbon economy will achieve a healthier environment, greater social responsibility and allow APS and our customers to leverage future opportunities. To create a sustainable energy future for Arizona and a successful transition to a low-carbon economy, APS operates according to the following principles:

- Maintain appropriate governance to drive management practices and decisions to achieve cleaner air and a low-carbon economy.
- Continue to explore solutions to decarbonize our generation assets and provide the grid infrastructure that allows the adoption of low and zero carbon emission resources.
- Maintain a high level of transparency with respect to carbon metrics and emissions reporting.
- Participate in legislative and regulatory actions that address cleaner air and a low-carbon economy while ensuring reliable and affordable energy to our customers.
- Participate with non-governmental organizations, industry trade groups, think-tanks and other organizations to achieve attainable and meaningful carbon reductions and advancement of a low-carbon economy.
- Engage in and share research that may further reduce carbon emissions associated with supplying electrical energy.

APS has a Political Participation Policy, which outlines our role in the political process as an advocate for a responsible and sustainable energy future for Arizona. The policy is posted on our web site, www.pinnaclewest.com. The purpose of the Policy is to promote compliance with all applicable federal, state and local laws, rules, and regulations surrounding political contributions by APS in a manner consistent with our values. The Policy also describes our decision-making and oversight processes for political spending and for reporting of political contributions, in which processes both management and our Board of Directors play important roles. As one of the largest and longest-serving local businesses in Arizona, APS takes its commitment to corporate citizenship seriously. Being a good corporate citizen may include being informed about issues, encouraging our employees to volunteer and participate in their communities, speaking publicly about the issues of the day, sponsoring a political action committee and, where permitted by law, considering the contribution of corporate funds to political candidates, political parties, political action committees, and organizations that engage in political activities. These activities may also include independent expenditures, or the sponsoring of a political action committee that engages in independent expenditures, in relation to elections of candidates to office, get-out-the-vote efforts, and ballot initiatives and referenda. In general, a political expenditure is independent when it is not made in cooperation, consultation, or at the request or suggestion of a candidate, a candidate's agent or authorized political committee, or a political party.

Our low carbon-economy principles in combination with our Political Participation Policy work together to ensure that all of our direct and indirect activities are consistent with our overall climate change strategy.

C12.4

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Publication

In voluntary sustainability report

Status

Complete

Attach the document

1903062_Sustainability_Highlights_Brochure_Web-ONLINE_FL.pdf

Page/Section reference

P. 3 - Healthy Environment and What's Next

Content elements

Emissions figures

Emission targets

Comment

Full Report is now online only at: <http://www.pinnaclewest.com/corporate-responsibility/default.aspx> See the section on Clean Energy: <http://www.pinnaclewest.com/corporate-responsibility/environment/clean-energy/default.aspx> - Low Carbon Principles - Coal Reduction - Carbon and Air Emissions

Publication

In mainstream reports

Status

Complete

Attach the document

Annual-Report_2018_Web.pdf

Page/Section reference

p. 6 : 50% of our energy mix is carbon free and 1400MW of solar capacity, ranking APS #5 nationally p. 41: Company response to Climate Change Initiatives p. 52: Climate change risk

Content elements

Risks & opportunities

Emissions figures

Other, please specify (Company response to Climate Change Initiatives)

Comment

Full Report is now online only at

Publication

In mainstream reports

Status

Complete

Attach the document

2019-Proxy-Statement-Web-Ready.pdf

Page/Section reference

p. 14 - Carbon Management p. 31 - Responsibilities of The Nuclear and Operating Committee

Content elements

Governance

Emissions figures

Emission targets

Comment

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C14.1

(C14.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	President, Arizona Public Service Company, and Executive Vice President, Public Policy, Pinnacle West Capital Corporation (President equivalent)	President

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	Public or Non-Public Submission	I am submitting to
I am submitting my response	Public	Investors

Please confirm below

I have read and accept the applicable Terms