Welcome to your CDP Water Security Questionnaire 2020

W0. Introduction

W0.1

(W0.1) Give a general description of and introduction to your organization.

Pinnacle West Capital Corporation, an energy holding Company based in Phoenix, has consolidated assets of about $19 billion, about 6,300 megawatts of generating capacity and 6,200 employees in Arizona and New Mexico. Through its principal subsidiary, Arizona Public Service, the Company provides retail electricity service to nearly 1.3 million Arizona homes and businesses.

This report contains forward-looking statements based on current expectations, including statements regarding our earnings guidance and financial outlook and goals. These forward-looking statements are often identified by words such as “estimate,” “predict,” “may,” “believe,” “plan,” “expect,” “require,” “intend,” “assume,” “project,” "anticipate," "goal," "seek," "strategy," "likely," "should," "will," "could," 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 Pinnacle West or APS. These factors include, but are not limited to: the potential effects of the continued COVID-19 pandemic, including, but not limited to demand for energy, economic growth, our employees and contractors, supply chain, expenses, capital markets, capital projects, operations and maintenance activities, uncollectable accounts, liquidity, cash flows, or other unpredictable events; our ability to manage capital expenditures and operations and maintenance costs while maintaining high reliability and customer service levels; variations in demand for electricity, including those due to weather seasonality, the general economy or social conditions, customer and sales growth (or decline), the effects of energy conservation measures and distributed generation and technological advancements; power plant and transmission system performance and outages; competition in retail and wholesale power markets; regulatory and judicial decisions, developments and proceedings; new legislation, ballot initiatives and regulation, including those relating to environmental requirements, regulatory policy, nuclear plant operations and potential deregulation of retail electric markets; fuel and water supply availability; our ability to achieve timely and adequate rate recovery of our costs, including returns on and of debt and equity capital investments; our ability to meet renewable energy and energy efficiency mandates and recover related costs; risks inherent in the operation of nuclear facilities, including spent fuel disposal uncertainty; current and

future economic conditions in Arizona, including in real estate markets; the direct or indirect effect on our facilities or business from cybersecurity threats or intrusions, data security breaches, terrorist attack, physical attack, severe storms, droughts, or other catastrophic events, such as fires, explosions, pandemic health events, or similar occurrences; the development of new technologies which may affect electric sales or delivery; the cost of debt and equity capital and the ability to access capital markets when required; environmental, economic and other concerns surrounding coal-fired generation, including regulation of greenhouse gas emissions; volatile fuel and purchased power costs; the investment performance of the assets of our nuclear decommissioning trust, pension, and other post-retirement benefit plans and the resulting impact on future funding requirements; the liquidity of wholesale power markets and the use of derivative contracts in our business; potential shortfalls in insurance coverage; new accounting requirements or new interpretations of existing requirements; generation, transmission and distribution facility and system conditions and operating costs; the ability to meet the anticipated future need for additional generation and associated transmission facilities in our region; the willingness or ability of our counter parties, power plant participants and power plant land owners to meet contractual or other obligations or continue or discontinue power plant operations consistent with our corporate interests; and restrictions on dividends or other provisions in our credit agreements and ACC orders. These and other factors are discussed in Risk Factors described in Part I, Item 1A of the Pinnacle West/APS Annual Report on Form 10-K for the fiscal year ended December 31, 2019, in Part II, Item 1A in of the Pinnacle West/APS Quarterly Report on Form 10-Q for the quarter ended March 31, 2020, and in Part II, Item 1A in the Pinnacle West/APS Quarterly Report on Form 10-Q for the quarter ended June 30, 2020 which you should review carefully before placing any reliance on our financial statements, disclosures or earnings outlook. Neither Pinnacle West nor APS assumes any obligation to update these statements, even if our internal estimates change, except as required by law.

W-EU0.1a

(W-EU0.1a) Which activities in the electric utilities sector does your organization engage in?

Electricity generation
Transmission
Distribution

W-EU0.1b

(W-EU0.1b) For your electricity generation activities, provide details of your nameplate capacity and the generation for each technology.

	Nameplate capacity (MW)	% of total nameplate capacity	Gross electricity generation (GWh)
Coal – hard	2,307	22	11,422.41
Lignite	0	0	0
Oil	0	0	0
Gas	3,654	35	9,081.69
Biomass	0	0	0
Waste (non-biomass)	0	0	0
Nuclear	4,200	41	31,919.37
Fossil-fuel plants fitted with carbon capture and storage	0	0	0
Geothermal	0	0	0
Hydropower	0	0	0
Wind	0	0	0
Solar	242	2	564.46
Marine	0	0	0
Other renewable	0	0	0
Other non-renewable	0	0	0
Total	10,403	100	52,987.93

W0.2

(W0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date
Reporting year	January 1, 2019	December 31, 2019

W0.3

(W0.3) Select the countries/areas for which you will be supplying data.

United States of America

W0.4

(W0.4) Select the currency used for all financial information disclosed throughout your response.

USD

W0.5

(W0.5) Select the option that best describes the reporting boundary for companies, entities, or groups for which water impacts on your business are being reported.

Companies, entities or groups over which operational control is exercised

W0.6

(W0.6) Within this boundary, are there any geographies, facilities, water aspects, or other exclusions from your disclosure?

Yes

W0.6a

(W0.6a) Please report the exclusions.

Exclusion	Please explain
Commercial office buildings and facilities not associated with power generation	The facilities are excluded because the amount of water used in office buildings is immaterial in comparison to the amount of water used in power generation and the water is provided from sources that are not at risk of shortages. However, APS does monitor and track water usage in these facilities.

W1. Current state

W1.1

(W1.1) Rate the importance (current and future) of water quality and water quantity to the success of your business.

	Direct use importance rating	Indirect use importance rating	Please explain
Sufficient amounts of good quality freshwater available for use	Vital	Neutral	Good quality freshwater is important to the current and continued success of APS. Freshwater is the primary water supply at seven of the nine APS-owned power plants representing 5,115 MWe of generating capacity. Freshwater is primarily used in direct plant operations to generate electricity and is therefore considered "vital" to our business. Without freshwater, generating the power required to satisfy consumer energy demands would not be possible. Such direct uses are cooling water, boiler make-up, and steam production. APS also relies on freshwater to supply indirect uses. Our value chain utilizes freshwater for domestic use and potable water at plants, manufacturing processes, and other indirect operational uses. The importance of water for indirect use is considered "neutral" because our value chain has access to freshwater where applicable and top spend suppliers have low risk of water impacts. Future water dependency in our value chain is not anticipated to change based on our continuous engagement with our water suppliers. APS recognizes the importance of freshwater to the future of our business and has implemented plans to reduce freshwater consumption by 25 percent by the year 2035. This will be accomplished by retiring water intensive units, increasing renewable energy, implementing energy efficiency programs, and through other water conservation measures.
Sufficient amounts of recycled, brackish and/or	Vital	Neutral	Recycled water is primarily used as cooling water in our direct operations to generate electricity at the Palo Verde Generating Station and Redhawk Power Plant. Therefore, recycled water is the main water supply at two out of nine APS power plants representing 5288 MWe of generating capacity. Recycled water is considered “vital” to current and future

produced water available for use			direct operations at the Palo Verde Generating Station and the Redhawk Power Plant because other sources of water are not available in sufficient quantity to support generation at these plants. The generating stations are located in desert watersheds where freshwater resources are limited. Recycled water offers a renewable and reliable water source critical to power generation that is not substantially impacted by the current drought conditions experienced in the area. The importance of recycled water for direct operations will likely increase in the future due to increasing demand and competition for scarce water resources in the arid Southwest. Recycled water is also used in our value chain (indirect uses) to produce the commodities and chemicals needed to support power generation. Future water dependency in our value chain is not anticipated to change based on continuous engagement with suppliers. Delivery of recycled water to our plants is currently contracted in sufficient quantity to meet demands through 2050. The importance of recycled water for indirect uses is currently considered "neutral" because our value chain has access to sufficient amounts of recycled, ocean, brackish and/or fresh water where applicable.

W1.2

(W1.2) Across all your operations, what proportion of the following water aspects are regularly measured and monitored?

	% of sites/facilities/operations	Please explain
Water withdrawals – total volumes	100%	APS measures and monitors 100 percent of our water withdrawals. The Cholla, Four Corners, Ocotillo, Palo Verde, Red Hawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants' water use is measured by direct metering by plant personnel. The data is submitted to Water Resource Management where monthly reports are compiled and evaluated. In some cases, this is performed daily or as needed to support operational and/or regulatory requirements. This information is provided to management in monthly progress reports and metric target reports. Other water needs, such as in office buildings, service centers, etc., are met by a municipal provider. Because water use is vital for power production, it is important to track

		actual water usage as a baseline for water goal setting and water conservation purposes.
Water withdrawals – volumes by source	100%	APS measures and monitors 100 percent of water withdrawals and identifies the water withdrawals by source. The Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants use a combination of recycled water, groundwater and surface water, all of which are measured by direct metering by plant personnel. The data is submitted to Water Resource Management where monthly reports are compiled and evaluated. In some cases, measurement is performed daily or as needed to support operational and/or regulatory requirements. This information is provided to management in monthly progress and metric target reports. This information is also reported on an annual basis to the Arizona Department of Water Resources and monthly to the New Mexico Office of the State Engineer for compliance purposes. It is important to understand the source of the water withdrawal to identify potential watershed impacts and as a baseline for goal setting.
Water withdrawals quality	100%	APS measures and monitors water quality at the Cholla, Four Corners, Ocotillo, Palo Verde, Red Hawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants to ensure that water chemistry will have no adverse impact on generation or on water delivery or treatment infrastructure. Tests are performed daily, or as needed, to support operational and/or regulatory requirements. This information is measured by direct analysis in on-site labs or is sent to contract labs. The data is then recorded in databases and reported to the Arizona Department of Environmental Quality on frequencies dictated by plant-specific permits.
Water discharges – total volumes	100%	APS measures and monitors 100 percent of water discharge volumes at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants. A portion of the blowdown water is treated then recycled and reused at the plants. The remainder is discharged to a sanitary sewer, discharged to a river or is discharged into evaporation ponds. Measurement is performed daily to support operational and/or regulatory

		requirements. This information is collected through continuous direct metering utilizing a totalizer and is provided to Water Resource Management where reports are compiled and evaluated in monthly progress and metric target reports. This information is also reported on an annual basis to the Arizona Department of Water Resources and monthly to the New Mexico Office of the State Engineer for compliance purposes. Accurate measurement of discharge data is required to calculate water consumption.
Water discharges – volumes by destination	100%	APS measures and monitors 100 percent of water discharge volumes by destination at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants. A portion of the blowdown water is treated then recycled and reused at the plants. The remainder is discharged to a sanitary sewer, discharged to a river or is discharged into evaporation ponds. This information is collected through direct metering and reports are compiled and evaluated in monthly progress and metric target reports. We report this information on an annual basis to the Arizona Department of Water Resources or monthly to the New Mexico Office of the State Engineer for compliance purposes. Tracking the volume discharged by destination provides data regarding potential impacts on the Phoenix active management area (AMA) and the San Juan watersheds. Discharge quantity to the San Juan River is important because it provides critical flows to support endangered fish.
Water discharges – volumes by treatment method	100%	APS measures and monitors 100 percent of our water discharge volumes at our power plants by treatment method. A portion of our blowdown water is treated then recycled and reused at the plants. The remainder is discharged to a sanitary sewer, discharged to a river or is discharged into evaporation ponds. Measurement is performed daily or as needed. This information is collected through direct metering and is provided to Water Resource Management where reports are compiled and evaluated in monthly progress and metric target reports. We report this information on an annual basis to the Arizona Department of Water Resources or monthly to the New Mexico Office of the State Engineer for compliance purposes. APS treatment methods are identified in procedures at each power plant to optimize and encourage recycling when possible. Discharge volume, water quality, discharge locations

		and impacts to the watershed are accurately recorded and reported, as required in site-specific permits.
Water discharge quality – by standard effluent parameters	100%	APS measures and monitors 100 percent of our water discharge quality data at all plants that discharge, either to waters of the U.S. or to municipal publicly owned treatment works to ensure effluent quality standards are met. A portion of our blowdown water is treated then recycled and reused at the plants, is discharged to a sanitary sewer, discharged to a river or is discharged into evaporation ponds. In some cases, measurement is done daily. This information is collected through direct metering and is provided to Water Resource Management where reports are compiled and evaluated in monthly progress and metric target reports. This information is also reported on an annual basis to the Arizona Department of Environmental Quality or monthly to the Navajo EPA for compliance purposes. This information is measured and monitored to ensure compliance with applicable discharge permits and to ensure that environmental commitments are met.
Water discharge quality – temperature	100%	APS monitors water temperature at 100 percent of all plants that have a surface water discharge and temperature limits on the discharge. Water temperature data is collected at APS's Four Corners Power Plant to comply with environmental and National Pollutant Discharge Elimination System (NPDES) regulatory commitments. This information is reported to the Navajo EPA. APS measures the temperature continuously through local dataloggers in Morgan Lake and again at the point of discharge per NPDES permit requirements. Measurement prior to discharge is necessary to ensure compliance with the NPDES permit limit for discharge of 32.22 degrees C. If the water exceeds the threshold, then water is not discharged.
Water consumption – total volume	100%	APS measures and monitors 100 percent of our water consumption by total volume at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants. This information is collected through continuous direct metering utilizing a totalizer and is provided to Water Resource Management where reports are compiled and evaluated in monthly progress and metric target reports. This information is also reported on an annual basis to the Arizona Department of Water Resources or monthly to the New Mexico

		Office of the State Engineer for compliance purposes. Other water uses, such as in office buildings, service centers, etc., are served by a municipal provider. The APS Facilities department monitors water consumption in office buildings and service centers.
Water recycled/reused	100%	APS measures 100% of water that is recycled/reused. Water use is measured at West Phoenix and Redhawk power plants which utilize a zero liquid discharge (ZLD) system. Redhawk recycles 100% of water used and West Phoenix recycles 95-100% of water used. Palo Verde is a ZLD facility, recycling 95% of water used by increasing COC in cooling towers up to 25 times; Cholla is a ZLD facility that uses a cooling lake and cooling towers; 95% of water is recycled and 5% is sent to ash ponds. Four Corners is a closed-cycle cooling facility that recycles 99% of the water withdrawn from the San Juan River. Approximately 20% of the withdrawn water is returned to the San Juan River to avoid build-up of salts in the cooling lake. Information is collected through direct metering and is provided to Water Resource Management where monthly progress and metric target reports are prepared. This information is reported on an annual basis to the ADWR or monthly to the New Mexico Office of the State Engineer.
The provision of fully-functioning, safely managed WASH services to all workers	100%	APS provides fully functioning WASH services available to all workers and directly measures and monitors 100 percent of water withdrawals at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants. APS drinking water systems are permitted, operated by licensed operators, and receive annual inspections from regulators. Annual reports are sent to the Arizona Department of Environmental Quality that document compliance with Safe Drinking Water Act provisions.

W1.2b

(W1.2b) What are the total volumes of water withdrawn, discharged, and consumed across all your operations, and how do these volumes compare to the previous reporting year?

	Volume (megaliters/year)	Comparison with previous reporting year	Please explain
Total withdrawals	135,935	About the same	The total withdrawals at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants for 2019 (135,935 megaliters/year) were about the same as in 2018 (135,546 megaliters/year). Even though generation for 2019 was slightly more than in 2018, water use was down particularly with the Saguaro Power Plant, Sundance Power Plant, Ocotillo Power Plant and Cholla Power Plant. Year-to-year changes less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Future withdrawals in the next five years are projected to stay about the same based on generation projections.
Total discharges	5,916	Much higher	The total discharge at the Four Corners, Ocotillo, West Phoenix and Yucca Power Plants were much higher in 2019 (5,916 megaliters/year) than in 2018 (4,366 megaliters/year). The discharges were much higher than last year for the plants that have a discharge component primarily due to higher generation at Four Corners compared to last year. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Future discharges in the next five years are projected to stay about the same based on generation projections.
Total consumption	130,019	About the same	The total consumption at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants for 2019 (130,019 megaliters/year) were about the same as in 2018 (131,180 megaliters/year) due to generation being about the same. Our

			reported volumes of water are calculated by the following formula: 130,019 (total consumption) = 135,935 (total withdrawals) – 5,916 (total discharges). Even though generation for 2019 was slightly more than in 2018, water use was down particularly at the Saguaro Power Plant, Sundance Power Plant, Ocotillo Power Plant and Cholla Power Plant. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Future consumption in the next five years is projected to stay about the same based on generation.

W1.2d

(W1.2d) Indicate whether water is withdrawn from areas with water stress and provide the proportion.

	Withdrawals are from areas with water stress	Identification tool	Please explain
Row 1	No	Other, please specify Internal methods	All nine APS power plants are not located in currently water stressed areas and are not expected to be located in areas that meet the definition of water stressed in the future. APS evaluates water conditions at the watershed level at all nine power plants, using weather data and water inflow models to reservoirs that are provided by the United States Bureau of Reclamation (USBR), National Oceanic and Atmospheric Association (NOAA), the Colorado Basin River Forecast Center and the Arizona Department of Water Resources to determine water stress levels. In addition, APS meets with municipalities and other water users to confirm that water supplies are sufficient to meet their consumptive needs. All of our plants have access to freshwater to meet the demands of generation. APS holds more than sufficient rights at each individual plant and has infrastructure to deliver water to each of the plants. For example, the Palo Verde Generating Station and Redhawk Power Plant use treated effluent, which is considered a drought resistant supply because water conservation during a drought is primarily to reduce outdoor water use, not indoor water use. Indoor water use is what supplies effluent to water treatment facilities that provide water to Palo Verde and Redhawk. Our contracted supply of treated effluent is of adequate quantity and quality for the generation needs of these plants through 2050. Over 70 percent of all APS power plant water consumption

			was treated effluent in 2019. The remaining 30 percent is groundwater or surface water that is protected by water rights, contracts and agreements.

W1.2h

(W1.2h) Provide total water withdrawal data by source.

	Relevance	Volume (megaliters/year)	Comparison with previous reporting year	Please explain
Fresh surface water, including rainwater, water from wetlands, rivers, and lakes	Relevant	25,996	Higher	The total fresh surface water for 2019 (25,996 megaliters/year) was higher than 2018 (22,931 megaliters/year) due to generation being higher at plants that rely on surface water. Fresh surface water is relevant to our company because 15 percent of our total water usage comes from fresh surface water and, in the future, we do not anticipate our usage of fresh surface water to change. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."
Brackish surface water/Seawater	Not relevant			None of APS's operations withdrew water from brackish surface water/seawater sources. The total withdrawal made from this source is thus not applicable. We do not anticipate brackish surface/seawater will be relevant in the future as our operations withdraw on other water sources, such as groundwater and third party sources.
Groundwater – renewable	Not relevant			There are no renewable groundwater sources available for use at APS power plants, therefore no withdrawals were made. This was the case for the previous year as well, thus it is not applicable. We do not anticipate

				groundwater - renewable resources will be relevant in the future as our operations withdraw on other water sources, such as fresh surface water and third party sources.
Groundwater – non-renewable	Relevant	18,338	Lower	Overall, in 2019, 18,338 megaliters were consumed compared to 20,464 megaliters in 2018. Less power was generated at Cholla resulting in lower water consumption, and Ocotillo was converted from steam units to hybrid cooled combustion turbines, resulting in less water consumption. Groundwater – non-renewable is relevant to our company because 14 percent of our total water usage in 2019 came from groundwater – non-renewable resources and, in the future, we do not anticipate our usage of groundwater – non-renewable to change. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."
Produced/Entrained water	Not relevant			None of APS's operations withdrew water from produced/entrained water sources. This is the case for the previous year as well; thus, it is not applicable. We do not anticipate produced/entrained water will be relevant in the future as our operations withdraw on other water sources, such as fresh surface water and third-party sources.
Third party sources	Relevant	91,601	About the same	For purposes of this report, reclaimed water use is reported under third party sources. In 2019 (91,601 megaliters/year), reclaimed water use was about the same as in 2018 (92,152 megaliters) because generation totals were about the same for plants that utilize reclaimed water. Third party sources are relevant to our company because 71 percent of our total water usage in 2019 came from third party sources, and in the future, we do not anticipate our usage of third party sources to change.

				Third party source water is provided under contract that ensures adequate cooling water is available to meet generation needs through 2050. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."

W1.2i

(W1.2i) Provide total water discharge data by destination.

	Relevance	Volume (megaliters/year)	Comparison with previous reporting year	Please explain
Fresh surface water	Relevant	5,517	Much higher	Much more water was returned back to the environment in 2019 (5,517 megaliters/year) compared to 2018 (4,019 megaliters/year), primarily at the Four Corners Power Plant. The amount returned was much higher because generation at Four Corners was higher than the previous year, resulting in more water consumption and more water returned to the San Juan River. Return of water to the San Juan River from the Four Corners Power Plant is important because it supports critical flows needed to support endangered fish in the river. Future generation projections indicate that future water use will be about the same. Year-to-year changes of less than 5 percent were considered "about the same". Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower". Year-to-year changes over 15 percent were considered "much higher"/"much lower".

Brackish surface water/seawater	Not relevant			There were no discharges to brackish surface water/seawater. We do not anticipate discharging to brackish surface water/seawater within the next 5 years as there are no plans to source water volume from brackish surface water/seawater sources.
Groundwater	Not relevant			There were no discharges to groundwater. We do not anticipate discharging to groundwater sources within the next five years.
Third-party destinations	Relevant	399	Higher	More water was discharged to the city sewer at West Phoenix Power Plant in 2019 (399 megaliters) than in 2018 (347 megaliters/year) due to an extended outage for repairs of the zero liquid discharge system in 2019. Water discharges through the city sewer supply are relevant to the company because two of our nine APS facilities discharge water into the city sewer system, and at West Phoenix Power Plant, this water can be recycled when the ZLD equipment is operating properly. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."

W-EU1.3

(W-EU1.3) Do you calculate water intensity for your electricity generation activities?

Yes

W-EU1.3a

(W-EU1.3a) Provide the following intensity information associated with your electricity generation activities.

Water intensity value (m3)	Numerator: water aspect	Denominator	Comparison with previous reporting year	Please explain

2.46	Total water consumption	MWh	Lower	The water intensity value is the average of the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants in 2019. Generation from 2018 (50,363,286 MWh) to 2019 (52,423,472 MWh) was 4 percent higher overall; however, it was less at Cholla (3.71 cubic meters/MWh), more at Redhawk (1.11 cubic meters/MWh) and more at Ocotillo (0.62 cubic meters/MWh), resulting in reduced overall water intensity from 2018 (2.60 cubic meters/MWh) to 2019 (2.46 cubic meters/MWh) because of shift in generation load from high water intensity plants to lower water intensity plants. Water intensity is used internally to track progress toward achievement of APS goals to reduce water intensity of power served to APS customers by 17 percent by 2025. In the next five years, we plan to achieve this goal by retiring older more water-intensive units and replacing them with more water efficient units, relying more on renewable energy that does not use water and implementing water conservation plans at all power plants. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."

W1.4

(W1.4) Do you engage with your value chain on water-related issues?

Yes, our suppliers

W1.4a

(W1.4a) What proportion of suppliers do you request to report on their water use, risks and/or management information and what proportion of your procurement spend does this represent?

Row 1

% of suppliers by number

1-25

% of total procurement spend

26-50

Rationale for this coverage

Annually, APS engages our top suppliers in a sustainability survey. We engage the top suppliers based on the overall spend to APS, representing 29 percent of total spend, and because they supply primarily commodity chemicals to our power plants that generate the majority of our energy, including Palo Verde, Four Corners, Redhawk, West Phoenix and Cholla Power Plants. Top suppliers are identified based on the overall spend, representing 29 percent of total spend. Key suppliers are identified through a rigorous segmentation process that includes assessing spend, risk analysis, category strategy alignment and criticality to APS operations. APS utilizes this information to identify opportunities in their sourcing process to communicate to the suppliers the importance of sustainable internal practices to receive APS contracts. For example, a project critical to the expansion of APS operations incorporated supplier environmental sustainability maturity questions.

Impact of the engagement and 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. In 2018, we invited 90 suppliers to respond whereas in 2019, we decreased the number of suppliers to 31 so we can focus on following up with our suppliers and increase engagement. Our response rate in 2018 was 17 percent vs 2019 which was 68 percent. Survey results revealed that almost 60 percent of our key suppliers have implemented controls, improvement plans and measurement processes to address key environmental priorities such as water conservation and usage. In addition, nearly 70 percent of our key supplier's report on key issues and progress towards goals regarding environmental issues.

Comment

W1.4b

(W1.4b) Provide details of any other water-related supplier engagement activity.

Type of engagement

Innovation & collaboration

Details of engagement

Encourage/incentivize innovation to reduce water impacts in products and services
Encourage/incentivize suppliers to work collaboratively with other users in their river basins
Educate suppliers about water stewardship and collaboration

% of suppliers by number

1-25

% of total procurement spend

26-50

Rationale for the coverage of your engagement

Annually, APS engages with our top suppliers in a sustainability survey, with questions on how the suppliers are managing environmental impacts in their operations, including water conservation and efficiency, greenhouse gas emissions, energy and water usage, waste and materials management. We engage the top suppliers based on the overall spend to APS, representing 29 percent of total spend, and because they supply primarily commodity chemicals to our power plants that generate the majority of our energy, including Palo Verde, Four Corners, Redhawk, West Phoenix and Cholla Power Plants. APS utilizes this information to identify opportunities in their sourcing process to communicate to the suppliers the importance of sustainability, and to the extent that they demonstrate sustainable business practices, they will be more competitive for future contracts with APS.

Impact of the engagement and measures of success

APS's supplier relationship management program is utilized to effectively manage supplier engagements. Successful supplier discussions have led to a number of improvement opportunities incorporating sustainable best practices into construction projects. Survey results revealed almost 60% of our key suppliers have implemented controls, improvement plans and measurement processes to address key environmental priorities such as greenhouse gas emission reduction. In addition, our engagement strategy is successful as nearly 70% of our key suppliers report on key issues and progress towards goals regarding environmental issues and have implemented controls, improvement plans and processes to

address water related issues. APS works with suppliers to make sure they understand the value we place upon water stewardship and collaboration with other users in their river basins and advise them that engagement in this area will improve our opinion of their sustainable business practices

Comment

W2. Business impacts

W2.1

(W2.1) Has your organization experienced any detrimental water-related impacts?

No

W2.2

(W2.2) In the reporting year, was your organization subject to any fines, enforcement orders, and/or other penalties for water-related regulatory violations?

No

W3. Procedures

W-EU3.1

(W-EU3.1) How does your organization identify and classify potential water pollutants associated with your business activities in the electric utilities sector that could have a detrimental impact on water ecosystems or human health?

Five APS power plants are zero liquid discharge plants, including Palo Verde, Redhawk, Cholla, Saguaro, and Sundance, therefore no pollutants are discharged that may be detrimental to water systems or human health. Four APS plants have permitted discharges and are discussed as follows. The

West Phoenix Power Plant has a permitted discharge to the City of Phoenix sanitary sewer and discharges are regulated under their industrial pre-treatment program. Samples of the discharge are taken by APS and reported to demonstrate compliance with permit limits. Additional compliance samples are taken by the City of Phoenix to confirm compliance. The Ocotillo Power Plant has a permitted discharge to the City of Tempe sanitary sewer and discharges are regulated under their industrial pre-treatment program. Samples of the discharge are taken by APS and reported to demonstrate compliance with permit limits. Additional compliance samples are taken by the City of Tempe to confirm compliance. The Four Corners Power Plant has a National Pollutant Discharge Elimination System (NPDES) permit that places limits on discharges from Morgan Lake to Chaco Wash. Annual inspections are conducted by the Navajo EPA and compliance samples are collected. APS also collects compliance samples and reports results to confirm compliance. The Yucca Power Plant has a discharge to the United States Bureau of Reclamation Mode Canal that has water quality limits. Samples are collected and reported by APS to confirm compliance. The four plants that have permitted discharges would measure success by demonstrating 100 percent compliance with all permitted discharges. For example, at Four Corners, the discharge to Chaco Wash has a temperature limit for discharge, therefore, success would be to demonstrate that no discharge occurred that would exceed the required temperature limit. If a higher than allowed temperature effluent was discharged, it could impact endangered fish in the San Juan River, particularly sensitive larvae or juvenile life stages. Water related impacts also vary across our value chain. Annually, APS engages our top suppliers in a sustainability survey through which we request information related to wastewater minimization, ecosystems impact, and hazardous waste storage and transportation practices.

W-EU3.1a

(W-EU3.1a) Describe how your organization minimizes the adverse impacts of potential water pollutants associated with your activities in the electric utilities sector on water ecosystems or human health.

Potential water pollutant	Description of water pollutant and potential impacts	Management procedures	Please explain
Coal combustion residuals	Coal combustion residuals have potential to contaminate groundwater and surface water, possibly impacting aquatic and terrestrial habitats. The Four Corners Power Plant has a National Pollutant Discharge Elimination System (NPDES) permit to discharge to Chaco Wash and ultimately to the San Juan River in New Mexico.	Compliance with effluent quality standards Measures to prevent spillage, leaching, and leakages	Four Corners has a discharge permit with limits on discharges that prevent environmental harm, and compliance is documented. Spill prevention control and countermeasures (SPCC) plans are implemented at all APS power plants, primarily to prevent oil or ash spills and minimize possible environmental impacts. These SPCC plans are recorded with

	Both permitted and unpermitted discharges of coal combustion residuals could adversely impact two endangered fish species in the San Juan River. The Cholla Power Plant does not have a discharge permit. However, unpermitted or uncontrolled discharges could result in damage to critical habitat of a threatened fish.	Emergency preparedness Other, please specify Interceptor trenches to remove pollutants from environment	local emergency management agencies and are exercised on regular frequencies to confirm effectiveness. Emergency preparedness is another activity undertaken by APS plants. This includes coordination with local environmental, police and regulatory agencies on issues such as spill response or any public safety issue. An example is that APS has many regulated dams that provide containment for evaporation ponds, water storage reservoirs and ash ponds. These regulated dams are regularly inspected to confirm compliance with safety standards. In the event that a pond at the Four Corners or Cholla Power Plants is found to be leaking possible coal combustion residuals, additional monitoring is implemented. If necessary, corrective action is implemented to stop any CCR releases and restore the aquifer water quality.

W3.3

(W3.3) Does your organization undertake a water-related risk assessment?

Yes, water-related risks are assessed

W3.3a

(W3.3a) Select the options that best describe your procedures for identifying and assessing water-related risks.

Direct operations

Coverage

Full

Risk assessment procedure

Water risks are assessed as part of an enterprise risk management framework

Frequency of assessment

More than once a year

How far into the future are risks considered?

More than 6 years

Type of tools and methods used

Enterprise Risk Management
International methodologies
Databases
Other

Tools and methods used

Environmental Impact Assessment
Internal company methods
External consultants
Other, please specify
Water Resource Management Business Plan and ISO 14001 Compliance at all Power Plants

Comment

EIS actions are conducted at some plants to renew various leases, permits and licenses necessary to operate our facilities. The Four Corners Power Plant National Environmental Policy Act (NEPA) process resulted in a biological opinion and reasonable and prudent measures (RPMs) to be identified, implemented and reported annually. APS has committed over $500,000 annually to implement RPMs at Four Corners, including hiring a biologist, constructing non-native fish controls, eliminating barriers to fish migration and performing studies on possible impacts of mercury and selenium deposition. APS worked with the United States Bureau of Reclamation, Sandia National Lab, Los Alamos National Laboratory, and National Renewable Energy Laboratory to evaluate the potential impacts of climate change on power plant water availability in the western U.S. and received a final report in December 2017. ISO 14001 EMS was implemented at all APS power plants. Contamination of aquatic and terrestrial habitats could occur and cause environmental damage unless proper measures are taken to ensure that plants are

operated in an environmentally sound manner. APS works with local regulatory agencies, communities and Non-Governmental Organizations to ensure that power plants are operated in a sustainable and environmentally sound manner, with appropriate protective permits in place and monitoring to ensure compliance.

Supply chain

Coverage

Full

Risk assessment procedure

Water risks are assessed as part of an enterprise risk management framework

Frequency of assessment

Annually

How far into the future are risks considered?

3 to 6 years

Type of tools and methods used

Tools on the market
Enterprise Risk Management
International methodologies
Other

Tools and methods used

Environmental Impact Assessment
Life Cycle Assessment
Internal company methods
External consultants
Other, please specify
Risk Viability, Procurement IQ, Power Advocate, EUISSCA resources

Comment

Suppliers are vetted and segmented in proper categories, and supplier risk analysis consists of evaluation by financial, terms and conditions, regional/natural disaster, environmental, health, safety, corporate responsibility, business resilience, quality and service capacity considerations. In addition, as part of the sourcing process, risk analysis is done for each considered supplier so that APS can understand the risk that it is assuming and potential impacts. Our master service agreements can also be three to five years based on the scope of work and can include environmental assessment questions (including water risk). Depending on the project, environmental requirements are also included as criteria.

Other stages of the value chain

Coverage

Full

Risk assessment procedure

Water risks are assessed as part of an enterprise risk management framework

Frequency of assessment

More than once a year

How far into the future are risks considered?

More than 6 years

Type of tools and methods used

Enterprise Risk Management
Databases
Other

Tools and methods used

Other, please specify
Internal Expertise

Comment

Each business unit executive is responsible for identifying significant risks and planned mitigations in the unit's business plan. Each executive is also responsible for supporting the Company's enterprise risk management process by assigning a risk coordinator to surface and report business unit risks that have the potential to impact achieving Company objectives. Risks (including water risk) are reported to shareholders, the public and other stakeholders through company SEC filings.

W3.3b

(W3.3b) Which of the following contextual issues are considered in your organization's water-related risk assessments?

	Relevance & inclusion	Please explain
Water availability at a basin/catchment level	Relevant, always included	APS has numerous agreements and contracts with local communities regarding current and future water supplies. We engage with the local communities and use enterprise risk management as a tool to develop these agreements and contracts through local monitoring of groundwater levels, groundwater models, working with the Bureau of Reclamation on river conditions and attending meetings that provide insight to local water availability challenges. Examples of such agreements are the San Juan River shortage sharing agreement for the Four Corners Power Plant, which ensures that all water users would share proportionally in drought-related cuts to water supply. Another example is the Joseph City severance and transfer agreement, which provides a contingent supply of surface water to the Cholla Power Plant in the event that sufficient groundwater was not available. APS recognizes our continued success depends on a sufficient water supply for use in energy production and is therefore invested in working with these entities to continue efficient water use and to develop plans for shortage mitigation that will ensure the availability of a reliable local water source for all. Water availability at a basin/catchment level is relevant and is always included in our water-related risk assessments because we rely on water from local water basins for some of our plants, such as Four Corners and Cholla, in order to generate electricity for our customers. Models are used to assess surface water conditions, using weather data, and projecting future runoff and storage of water in reservoirs. Groundwater models are used to track the possible impacts of pumping on groundwater levels and pumping is adjusted to ensure aquifers are sustainable.
Water quality at a basin/catchment level	Relevant, always included	Water quality issues are addressed at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants through effluent monitoring, groundwater monitoring,

		using tools such as groundwater models, ensuring that water treatment systems are well designed and operated, and working with the Arizona Department of Environmental Quality and stakeholders and attending public meetings that provide insight to local water quality challenges. APS actively manages plant activities such as effluent monitoring, reporting and spill response and ensures that operators are properly trained and certified to ensure permit compliance. Water quality at a basin/catchment level is relevant and is always included in our water-related risk assessments because we rely on water from local water basins for some of our plants, such as Four Corners and Cholla, in order to generate electricity for our customers. Good water quality is essential for equipment reliability and longevity.
Stakeholder conflicts concerning water resources at a basin/catchment level	Relevant, always included	APS participates in a number of groups that are working to resolve water resource conflicts and issues that may impact our power plants. We attend stakeholder meetings to gain insight on local water availability and to build relationships between APS and local water stakeholder groups. Examples include the Governor's Water Augmentation Council, the Groundwater Users Advisory Council, the Kyl Center for Water Policy, Arizona's Drought Contingency Planning and the San Juan River Basin Recovery Implementation Program. While planning for future water supply acquisition, APS looks at potential stakeholder conflicts and examines different scenarios to determine if those conflicts can be resolved while ensuring that sufficient water is available to meet each stakeholder's needs. APS evaluates alternative water supplies to alleviate future stakeholder conflicts, such as harnessing poor-quality groundwater that is currently underutilized in Arizona and is being considered for development by multiple entities. Scenarios have been modelled to determine whether to independently pursue such water supplies or to work with one or more parties to jointly develop the resource. Computer simulation tools are used to test scenarios of blending variable water types to determine feasibility of using alternative supplies such as poor-quality groundwater. Resolving water resource conflicts with stakeholders is. relevant and is always included in our water-related risk assessments because we rely on water from local water basins for some of our plants, such as Four Corners and Cholla, in order to generate electricity for our customers.
Implications of water on your key commodities/raw materials	Relevant, always included	APS relies on suppliers to provide critical commodities and chemicals used to treat water for use in power plants. It is essential that these suppliers be able to provide the raw materials when needed, and that they

		cannot be constrained from delivering on time due to water-related issues. In 2019, APS asked its top tier suppliers to report their water management through the Electric Utility Industry Sustainable Supply Chain Alliance (EUISSCA) sustainability survey. These suppliers represent about 29 percent of total expenditures. APS suppliers invited to respond were selected based on prioritizing top tier suppliers, the most critical and strategic suppliers and those with whom APS spends significant dollars. Responding suppliers may state whether their company operates in a region that is currently or projected to be a water-scarce region and if their company's production/service/generation process rely on water availability. Water shortages are not anticipated to have an impact on key commodities/raw materials needed to support electric generation. Water availability to our suppliers is relevant and is always included in our water-related risk assessments because we rely on our suppliers to provide commodities and chemicals used to treat water for use in power plants in order to generate electricity for our customers.
Water-related regulatory frameworks	Relevant, always included	One important aspect of risk assessment at APS is complying with local, state and federal regulatory requirements. APS works with the Arizona Department of Water Resources on state regulations of groundwater and surface water as well as Arizona's Drought Contingency Planning, the Arizona Department of Environmental Quality on water quality regulations and the New Mexico Office of the State Engineer on water supplies in New Mexico. Regulatory issues such as developing legislation, rules or guidance documents are tracked and reported quarterly or more frequently if needed. Plans are in place to proactively participate in the regulatory process, to provide comments, and address each developing issue to ensure there is no adverse impact to the water supplies needed to support generation at our Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants. APS participated in the Lower Colorado River Basin Drought Contingency Plan workgroup meetings, providing comments on developing legislation and analysing the potential impacts to APS power plants, service areas and customers. This plan was ultimately passed in 2019 and will result in reduced risk of critical shortages at Lake Mead and in the Lower Colorado River Basin states of Arizona, California and Nevada and in Mexico. Water availability through our regulatory framework is relevant and is always included in our water-related risk assessments because regulators can have an impact on our ability to generate electricity for our customers.
Status of ecosystems and habitats	Relevant, always included	APS applies internal company methods that encourage participation in local or regional partnerships to improve business relations with other stakeholders. APS participates on the Biology Committee and

		Coordinating Committee of the San Juan River Basin Recovery Implementation Program to assist in recovery efforts associated with the endangered Colorado Pikeminnow and Razorback Sucker, which may impact our Four Corners Power Plant. Pursuant to the Four Corners Power Plant Section 7 ESA consultation, APS provides over $500,000 a year for Reasonable and Prudent Measures that include endangerd fish stocking programs, non-native fish removal, protecting and augmenting fish habitat, monitoring endangered fish populations, prohibiting expansion of non-native fish species (fish traps), constructing an in-stream fish passage and evaluating temperature modification studies. APS also participates in the Coconino Plateau Water Advisory Committee, modelling Coconino Aquifer withdrawals, and protecting the critical habitat of the Little Colorado Spinedace. APS works with water users and environmental stakeholders to evaluate potential impacts/mitigation of groundwater pumping from our Cholla Power Plant on spring flows that provide critical habitat for threatened fish populations. Ecosystems and habitats are relevant and are always included in our water-related risk assessments because we rely on water from local water basins for some of our plants, such as Four Corners and Cholla, in order to generate electricity for our customers. We must ensure that our water use does not have an adverse impact on these ecosystems and habitats in order to continue to use that water in power plant operations.
Access to fully-functioning, safely managed WASH services for all employees	Relevant, always included	APS workers have access to fully functioning WASH services at all APS facilities. APS drinking water treatment systems are permitted and monitored for compliance by Arizona Department of Environmental Quality, and APS operators are trained and licensed by the state to ensure proper operation and protection of public health. Periodic monitoring is performed by collecting water quality samples to demonstrate the water is safe to drink and to confirm the effectiveness of water treatment systems in reducing water-related risks. Results of this monitoring are sent to regulatory agencies. This contextual issue is relevant and always included in our water-related risk assessments because it is important for health reasons that APS workers have access to fully functioning WASH services at all APS facilities.
Other contextual issues, please specify	Not relevant, explanation provided	There are no other water issues for risk assessments.

W3.3c

(W3.3c) Which of the following stakeholders are considered in your organization's water-related risk assessments?

	Relevance & inclusion	Please explain
Customers	Relevant, always included	APS customers are considered in water risk assessments because potential disruptions to our water supply would limit our ability to generate the electricity needed to meet customer demands. A disruption in our water supply could result in a disruption of our services. A disruption in service could compromise our customers' safety, especially in the hot summer months. Therefore, water risk assessments are performed to minimize risk to APS's ability to generate power in the interest of our customers. APS discusses water risk with suppliers such as those that produce effluent that is purchased for use at power plants. Water suppliers are also APS customers; therefore, it is mutually beneficial to jointly assess potential impact of water risks. An example of water risk management where we consider and interface with APS customers is at our Four Corners Power Plant. The possibility of a water shortage on the San Juan River, the sole water provider for the plant, is never considered more than three years away due to the small watershed associated with Navajo Reservoir. The San Juan shortage sharing agreement (SSA) is intended to make a shortage less of a burden on one member of the group, as shortages are equally shared. Further, the quarterly Navajo Reservoir meetings provide an opportunity to remain aware of current watershed conditions and outlook, plus all SSA members are present to discuss how to prepare if a shortage is imminent. Other stakeholders also attend these meetings, including the United States Bureau of Reclamation, Non-Governmental Organizations and local business owners that benefit from the discussions. Ultimately, all stakeholders that we interface with are our customers, and we all share the benefit of sustainable power generation for the region due to this agreement.
Employees	Relevant, always included	Employees are included in water risk assessments because potential disruptions to our water supply would limit our ability to generate electricity for our customers. A disruption in the services we provide to our customers would negatively impact our business, reputation and overall profits, which could result in employee layoffs or furloughs. To keep employees informed of potential water risks, they are included in the water risk assessments. Risk assessments inform APS employees on how to better manage power generation enabling us to provide reliable

		service to our customers and to meet the plants' domestic water needs. At APS, employees are continually educated concerning water risks to the company. This is done by providing presentations to executive management, directors and employees that are interested in how APS manages water. Water Resource Management (WRM) presented APS water management issues at a brown bag lunch meeting during Sustainability Week and to plant managers and key staff at the Cholla, Four Corners, Ocotillo and Yucca Power Plants. Presentations included updates on Arizona's drought contingency planning efforts and WRM's well drilling, water infrastructure and risk mitigation projects. WRM works directly with plant operators and chemical control specialists at the plants that operate water treatment and disposal systems. WRM staff meets monthly with plant managers, directors, general managers and vice presidents to discuss the status of water conservation initiatives and suggest actions that the plants can take to minimize water use. WRM conducts water use surveys at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants to develop specific recommendations to reduce water consumption. WRM makes an effort to familiarize all new employees with water management issues within APS and ensure they are cross-trained to the extent practicable as they learn new job duties.
Investors	Relevant, always included	Investors are included in our water risk assessment because potential disruptions to our water supply would potentially limit our ability to generate electricity for our customers, which may lead to a loss of business, reputation and overall profits, all important aspects to current and future investors. APS discusses water risks with partners at all participant-owned plants – Palo Verde, Cholla, Yucca and Four Corners. Decisions that reduce risk often involve cost and must be discussed with co-owners/investors. APS also reports to investors through SEC filings (10-K and 10-Q), the Pinnacle West Corporate Responsibility Report and CDP water questionnaire. APS risk assessments identify and eliminate risks that may interfere with plant operations and help APS to become a better steward of water resources.
Local communities	Relevant, always included	Active involvement by APS in local communities on water issues improves their awareness that water is essential to continued power generation and that water-related risk assessments are beneficial to everyone. APS participates with local communities throughout Arizona and in New Mexico to seek local solutions to water resource issues. APS participates in community advisory panel meetings that occur near the Palo Verde Generating Station to ensure that the local community is aware of activities at Palo Verde and to answer any questions that may develop. APS works on the San Juan Recovery Implementation Program in New Mexico, participating in quarterly Navajo Reservoir meetings and Biology Committee meetings to discuss local watershed

		issues and make the public aware of activities at the Four Corners Power Plant Local communities are always included in our water-related risk assessments because engagement with the local communities improves their awareness that water is essential to continued power generation and helps APS to seek local solutions to water resource issues, such as shortage sharing and groundwater declines.
NGOs	Relevant, always included	As an environmental steward, APS collaborates with NGO s throughout Arizona and New Mexico to seek local solutions to water resource issues. Staff attends regular meetings to talk with NGOs about local water issues and to look for opportunities to support efforts aimed at reducing water risks. For example, APS engages with NGOs such as The Nature Conservancy concerning water risks associated with potential adverse environmental impacts at the Four Corners Power Plant. Interaction with The Nature Conservancy has proven beneficial, particularly at Four Corners, where the process of working together on endangered fish issues has made it clear that our interests are aligned. APS worked with The Nature Conservancy in 2019 by traveling to Washington, D.C, both supporting continued funding of the San Juan River Recovery Implementation Program. NGOs are always included in our water-related risk assessments because engagement with NGOs improves their awareness that water is essential to continued power generation and helps APS to seek local solutions to water resource issues.
Other water users at a basin/catchment level	Relevant, always included	APS engages with local water users in planning meetings such as the Groundwater Users Advisory Council, Governor's Water Augmentation Council and the Kyl Center for Water Policy. APS also interacts with local users on the San Juan River to maintain a shortage sharing agreement to be implemented following severe drought conditions. Quarterly Navajo Reservoir meetings are also a good opportunity to interact with local business interests, such as fishing guides and motel/cabin owners that are impacted by water conditions on the San Juan River. The groups mentioned above are included in our water risk assessment because potential disruptions to our water supply would potentially limit our ability to generate electricity for our customers, which may lead to a loss of business, reputation and overall profits.
Regulators	Relevant, always included	APS engages with the Arizona Department of Water Resources concerning risk to water supplies in state-wide planning meetings, such as the Groundwater Users Advisory Council. APS also engages with the New Mexico Office of the State Engineer concerning water supply conditions on the San Juan River, Navajo Reservoir and shortage sharing. As potential shortages on the Colorado River remain possible in the next few years, APS has engaged with local regulators and other stakeholders to develop and support the Lower Colorado River Drought Contingency Plan, designed to keep more water in Lake Mead and reduce the possibility of future shortages.

		Regulators are included in our water risk assessment because complying with regulatory limits is essential to continued generation of power in support of our customers.
River basin management authorities	Relevant, always included	APS participates with river basin management authorities throughout Arizona and New Mexico to seek local solutions to water resource issues. For example, APS works with the U.S. Bureau of Reclamation concerning management of the water supply for the Four Corners Power Plant in the Navajo Reservoir. APS participates in on-going environmental flows workshops designed to balance the needs between commercial, agricultural and environmental interests in the San Juan River Basin in New Mexico. River basin management authorities are always included in our water-related risk assessments because engagement with them improves their awareness that water is essential to continued power generation and helps APS to seek local solutions to water resource issues, such as shortage sharing criteria.
Statutory special interest groups at a local level	Relevant, always included	APS works with statutory special interest groups as they are identified and, based on evaluation, may directly engage with the groups when appropriate. APS meets regularly with a variety of groups such as the Governor's Water Augmentation Council, the Groundwater Users Advisory Council, the Kyl Center for Water Policy and the San Juan River Recovery Implementation Program (SJRIP). Statutory special interests groups are always included in our water-related risk assessments because engagement with them improves their awareness that water is essential to continued power generation and helps APS to seek local solutions to water resource issues, such as shortage sharing and groundwater declines.
Suppliers	Relevant, always included	Suppliers are included in our water risk assessment because potential disruptions to our water supply would potentially limit our ability to generate electricity for our customers, which may lead to changing supply needs from our venders. A disruption in service may also impact their ability to treat and/or supply the water APS needs for plant operations. We have worked with our suppliers to better understand our value-chain footprint. In 2019, APS asked its top suppliers to report on their water management through the Electric Utility Industry Sustainable Supply Chain Alliance sustainability survey. Suppliers are selected based upon their ability to meet the needs of APS power plants while ensuring their products are not at risk of delivery due to water-related issues. Responding suppliers may state whether their company operates in a region that is currently or projected to be a water-scarce region and if their company's production/service/generation process rely on water availability. We engage our suppliers through a variety of channels and communications. At a corporate level, this includes the Corporate Responsibility section of our corporate website, our annual Corporate Responsibility Report and through multi-

		stakeholder roundtables. We also hold annual Supplier of the Year awards and hold an annual Key Supplier Forum. In addition, APS performs assessments of supplier risk (including water treatment chemicals). Risk is evaluated by financial, terms and conditions, regional/natural disaster, environmental, health, safety, corporate responsibility, business resilience, quality, and service and capacity considerations.
Water utilities at a local level	Relevant, always included	Water utilities are included in our water risk assessment because disruptions to our water supply would potentially limit our ability to generate electricity, which may lead to a loss of water service to water utility customers. The same water risks can also apply to the water utilities and including them in our risk assessment will help both APS and the water utility to plan for the future. Communication with local water utilities is essential to ensure that a sustainable water supply is available for use at the Palo Verde Generating Station and the Redhawk Power Plant. APS meets regularly with representatives of the five municipalities that supply water to the 91st Avenue Wastewater Treatment Plant (Phoenix, Scottsdale, Glendale, Mesa and Tempe, Arizona), which ultimately is delivered to Palo Verde and Redhawk. APS also meets with representatives of Tolleson, as needed, to ensure that their discharges to the Palo Verde pipeline remain reliable and meet water quality goals.
Other stakeholder, please specify	Relevant, always included	APS meets with other electric utilities in Arizona to pool data that demonstrates to the public the efficient use of water by the electric power industry in Arizona. Statewide efficiency of power plants, by type, is developed, water consumption is tracked over time, water intensity (efficiency) is trended, and this data is shared with state agencies, municipalities and non-governmental organizations (NGOs) in a variety of local and statewide public meetings. In 2019, less than 3 percent of Arizona's statewide water budget was consumed by the electric industry. The stakeholders mentioned above are included in our water risk assessment because potential disruptions to our water supply would potentially limit our ability to generate electricity for our customers, which may lead to a loss of business, reputation and overall profits.

W3.3d

(W3.3d) Describe your organization's process for identifying, assessing, and responding to water-related risks within your direct operations and other stages of your value chain.

The Chief Financial Officer is responsible for enterprise risk management (ERM) and chairs the Executive Risk Committee (ERC). The ERC is responsible for ensuring the Board receives timely information concerning Company material risks and risk management processes. The ERC provides the Board with a list of the Company's top risks on an annual basis. Risks encompass a broad range of topics such as water resource availability and

cost and exposures in the supply chain. Each executive is responsible for identifying significant risks and planned mitigation in their business plan. Each executive is also responsible for supporting the ERM process by assigning a risk coordinator to report risks which have the potential to impact achieving Company objectives. Risks (including water risk) are reported to shareholders and other stakeholders through Pinnacle West's Form 10-K and Corporate Responsibility Report, and to regulators via annual reporting. In addition, a corporate water quantity policy was established with risk criteria, including shortages due to drought, infrastructure issues, regulatory/legal limits and costs of water. Risk is assessed quarterly and reported to executives on the strategic options roadmap. APS also files an Integrated Resource Plans every 2-3 years with the Arizona Corporation Commission that address water risks for the next 15 years. Environmental Impact Assessments are performed annually by the United States Bureau of Reclamation and external consultants at Navajo Reservoir and in the San Juan River. These assessments identify potential for drought-related shortages and involve models developed by the Colorado Basin River Forecast Center. In addition, the ISO 14001 compliance program is used at all power plants to ensure that a sound environmental management system is in place to address water-related risks. Suppliers are vetted and segmented in proper categories and supplier risk analysis includes evaluation on regional/natural disaster, business resilience, and service capacity. In addition, as part of the sourcing process, risk analysis is conducted for each considered supplier so that APS can understand the risk it is assuming and potential impacts. Supplier risk assessments are conducted annually and assessed one to three years in the future. Suppliers are aware that they may not be awarded contracts based upon their responsiveness to APS water concerns. In addition, we are implementing sustainability questions into our bidding instructions. For example, a major project critical to the expansion of APS operations requested sustainable solutions as part of the final supplier selection for an architect and contractor. The overall risk assessment process is used to establish an environmental roadmap to assist development of internal water targets and metrics and establish long-term water conservation goals.

W4. Risks and opportunities

W4.1

(W4.1) Have you identified any inherent water-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes, only within our direct operations

W4.1a

(W4.1a) How does your organization define substantive financial or strategic impact on your business?

APS defines substantive change to our direct operations and supply chain related to water risk in three ways. First, a physical disruption of a water supply that limited generation at any APS power plant would constitute a substantive and disruptive change. We define substantive change as any loss of generation capacity, (i.e. less than 100 percent) due to insufficient water supply. If a vital piece of infrastructure is damaged or becomes inoperable, output could be impacted or generation could be curtailed entirely. In addition, this can incur additional costs and impact supply chain demand. Second, APS and/or supplier noncompliance with a permit or regulatory requirement could impact production and/or result in notices of violations and penalties. Finally, APS and supplier allocation cuts related to water shortages would impact production. An example of a metric designed to reduce the probability of infrastructure failure is the Well and Pumping Equipment Reliability Program. Well infrastructure failure could have a financial impact and/or a production impact as wells are needed at eight of our nine plants to provide essential water to support generation. To prevent this impact, the Well and Pumping Equipment Reliability Program increased frequency of preventive maintenance activities, replaced existing wells with new wells, and increased the frequency of major well rehabilitations. The result was that well failures have decreased from 5/year in 2015 to a single failure in 2019. Also, if there was a water shortage that impacted a supplier provided product or service, depending on the criticality there could be substantive impacts to APS's operations. Water quality and quantity is vital to our direct operations and is considered neutral to our indirect operations.

W4.1b

(W4.1b) What is the total number of facilities exposed to water risks with the potential to have a substantive financial or strategic impact on your business, and what proportion of your company-wide facilities does this represent?

	Total number of facilities exposed to water risk	% company-wide facilities this represents	Comment
Row 1	9	100	Includes Palo Verde Generating Station, Redhawk Power Plant, West Phoenix Power Plant, Ocotillo Power Plant, Sundance Power Plant, Saguaro Power Plant, Cholla Power Plant, Four Corners Power Plant, and Yucca Power Plant

W4.1c

(W4.1c) By river basin, what is the number and proportion of facilities exposed to water risks that could have a substantive financial or strategic impact on your business, and what is the potential business impact associated with those facilities?

Country/Area & River basin

United States of America

Other, please specify

Phoenix Active Management Area (AMA)

Number of facilities exposed to water risk

4

% company-wide facilities this represents

26-50

% company's annual electricity generation that could be affected by these facilities

76-99

% company's total global revenue that could be affected

71-80

Comment

Includes Palo Verde Generating Station, Redhawk Power Plant, West Phoenix Power Plant and Ocotillo Power Plant

Country/Area & River basin

United States of America

Other, please specify

Pinal Active Management Area (AMA)

Number of facilities exposed to water risk

1

% company-wide facilities this represents

1-25

% company's annual electricity generation that could be affected by these facilities

Less than 1%

% company's total global revenue that could be affected

Less than 1%

Comment

Sundance Power Plant

Country/Area & River basin

United States of America

Other, please specify

Tucson Active Management Area

Number of facilities exposed to water risk

1

% company-wide facilities this represents

1-25

% company's annual electricity generation that could be affected by these facilities

Less than 1%

% company's total global revenue that could be affected

Less than 1%

Comment

Saguaro Power Plant

Country/Area & River basin

United States of America

Other, please specify

Joseph City Irrigation Non-expansion Area (INA)

Number of facilities exposed to water risk

1

% company-wide facilities this represents

1-25

% company's annual electricity generation that could be affected by these facilities

1-25

% company's total global revenue that could be affected

1-10

Comment

Cholla Power Plant

Country/Area & River basin

United States of America

Other, please specify

San Juan River Basin

Number of facilities exposed to water risk

1

% company-wide facilities this represents

1-25

% company's annual electricity generation that could be affected by these facilities

1-25

% company's total global revenue that could be affected

11-20

Comment

Four Corners Power Plant

Country/Area & River basin

United States of America

Other, please specify

Colorado River Basin

Number of facilities exposed to water risk

1

% company-wide facilities this represents

1-25

% company's annual electricity generation that could be affected by these facilities

Less than 1%

% company's total global revenue that could be affected

Less than 1%

Comment

Yucca Power Plant

W4.2

(W4.2) Provide details of identified risks in your direct operations with the potential to have a substantive financial or strategic impact on your business, and your response to those risks.

Country/Area & River basin

United States of America

Other, please specify

AMAs, Colorado River, and San Juan River Basin

Type of risk & Primary risk driver

Physical

Other, please specify

Physical Disruption of Water Supply

Primary potential impact

Reduction or disruption in production capacity

Company-specific description

Well failure is a risk that could disrupt plant production and generate a substantive change in our business operations. APS owns and operates 44 production wells that provide cooling water and supplemental water to support generation at eight of nine power plants in the United States. Well failure is a risk that could disrupt plant production and generate a substantive change in our business operations. To mitigate this risk, we established a Well and Pumping Equipment Reliability Program in 2015. The Well and Pumping Equipment Reliability Program increased

frequency of preventive maintenance activities, replaced existing wells with new wells and increased the frequency of major well rehabilitation. The program includes monitoring and testing of groundwater wells, pump testing and well infrastructure inspection (including pumps and motors, meters and lubrication systems). In the past, APS essentially had a "run-to-failure" program, which caused more equipment damage and longer down time. Under the new program, APS takes a proactive approach, which provides shorter down time and less expensive equipment replacement. The result is well failures have decreased from 5/year in 2015 to a single failure in 2019. Well 9A at the West Phoenix Power Plant failed in 2019; however, other wells were available to supply needed cooling water, and there was no disruption of production capacity. The well was repaired and returned to service to restore excess pumping capacity.

Timeframe

Current up to one year

Magnitude of potential impact

Low

Likelihood

Unlikely

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure - minimum (currency)

3,000,000

Potential financial impact figure - maximum (currency)

6,000,000

Explanation of financial impact

The Well and Pumping Equipment Reliability Program includes capital well replacements ($3-6 million/year, which is historically what it cost to drill/replace 1 to 2 wells per year). The enhanced rehabilitation program has reduced unplanned well failures from 5/year in 2015 to one per year in 2019. Wells that fail typically double the cost of repair over a well that was repaired prior to failure.

Primary response to risk

Other, please specify

Well and Pumping Equipment Reliability Program

Description of response

Potential well failures have been identified in previous years. In response, APS devised and implemented the Well and Pumping Equipment Reliability Program to identify and mitigate well failure risks. The program consists of well closure/replacement capital projects (typically for wells greater than 50 years old), enhanced well efficiency testing (increased frequency from once per year to once per month), rehabilitation of existing wells and the addition of new equipment to increase well efficiency and reliability, such as variable frequency drives and automated oilers.

Cost of response

635,000

Explanation of cost of response

The Well and Pumping Equipment Reliability Program includes annual O&M expenditures for rehabilitation ($635,000 based on operational experience). Of the $635,000, $300,000 is pump and motor repairs and $335,000 is instrumentation modification repairs. Pump and Motor Repairs ($300,000) + Instrumentation Modification Repairs ($335,000) = $635,000.

Country/Area & River basin

United States of America

Other, please specify

AMAs, Colorado River and Jan Juan River Basin

Type of risk & Primary risk driver

Regulatory

Lack of transparency of water rights

Primary potential impact

Reduction or disruption in production capacity

Company-specific description

If a permit requirement is exceeded, a notice of violation could be issued that may include monetary fines and changes in our business practices that could generate a substantive change in our business. In an extreme case, there is a risk of injunction to cease generation and correct the cause of the violation. To avoid this risk, APS implemented an initiative to focus on building a comprehensive, controlled and structured body of the company's policies, processes and procedures. This action is used to ensure APS has documented its regulatory requirements in a manner that allows for regulatory compliance. There are multiple requirements that need to be tracked; therefore, referring to these documents helps new and existing employees to ensure that permit requirements are tracked properly and not exceeded. For example, the Ocotillo, Palo Verde, Red Hawk, Saguaro, Sundance and West Phoenix Power Plants have annual groundwater allotments (water rights) that cannot be exceeded. APS is required to monitor and report each plant's annual groundwater use. As an example, at the Ocotillo Power Plant, APS holds a Type 2 Power Grandfathered Water Right Number 58-114047.0002 in the Phoenix Active Management Area with a withdrawal limit of 2173 acre-feet per year. In 2019, APS reported withdrawals from that well of 312.49 acre-feet, demonstrating compliance. Similar water rights are held at other plants. If overdrawn, APS would be subject to penalties as identified above. A company formatted policies, processes and procedures document was written to detail how to properly calculate and report groundwater usage to the state as required by statute.

Timeframe

Current up to one year

Magnitude of potential impact

Low

Likelihood

Unlikely

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure - minimum (currency)

1,000

Potential financial impact figure - maximum (currency)

10,000

Explanation of financial impact

Fines range from $1,000 to $10,000 depending on the nature of permit exceedance. APS understands that penalties vary depending on the nature of the violation. We have a great relationship with our regulators and engaged with them for years to know that these fines can vary. Penalties for water quality exceedances are rare because APS manages discharges with a clear understanding of permit limits, and a more likely penalty would be a permit violation, such as failure to submit a report on time. A single violation could result in a fine of $1,000 - 10,000, depending upon the severity and duration of the violation. If a violation occurred for 10 days in a row, the range of fines could increase to $10,000 - 100,000. In extreme cases, an injunction by the regulator could result in an order to cease generation and correct the problem.

Primary response to risk

Other, please specify

Processes, procedures, and policies

Description of response

APS understands permit limits and conditions and tracks regulatory commitments in the Enviance database. This ensures that such commitments are understood and completed, as required. The Enviance database is an especially useful tool for tracking reporting deadlines. All reporting requirements have been entered into the Enviance system, which reminds APS when a deadline is approaching. This allows Water Resource Management adequate time to compile and report the required information on time. Examples of reporting deadlines we track in Enviance include Arizona Department of Water Resources annual reports for all our water rights within the active management areas , New Mexico Office of the State Engineer’s report for Four Corners Power Plant water use and United States Bureau of Reclamation reporting for Yucca Power Plant.

Cost of response

200,000

Explanation of cost of response

Database acquisition and support cost is $100,000-200,000/year. Commitment-tracking databases are part of the routine cost of doing business, no added expense involved.

Country/Area & River basin

United States of America

Other, please specify

AMA, Colorado River and San Juan Basin

Type of risk & Primary risk driver

Regulatory

Statutory water withdrawal limits/changes to water allocation

Primary potential impact

Reduction or disruption in production capacity

Company-specific description

Another significant risk is the potential declaration of water shortages in the Southwest. Risk is mitigated by participating in the San Juan shortage sharing agreement for the Four Corners Power Plant. APS also developed a severance and transfer agreement with the Joseph City Irrigation Company and the Cholla Power Plant to develop a surface water supply contingency to the groundwater supply. In both the Four Corners and Cholla cases where a water shortage existed, there might not be sufficient water to operate the plants at full capacity, limiting production of electricity needed to serve APS customers. APS mitigates the risk of water shortages by investigating storing water and acquiring groundwater rights for use in shortage circumstances. APS has investigated the possibility of acquiring land for storing water in underground storage facilities for use when other supplies are threatened by drought. APS engages with the Electric Power Research Institute under their P-185 water management program. It includes research into advanced cooling technologies, water treatment technologies and specific power generation effluent treatment technologies. APS works with state and local government agencies as well as water providers in Arizona and other states to manage these risks. Due to possibility of drought, surface water supplies are the most at risk water supply, which we manage very closely. APS has agreements to mitigate drought conditions at plants that rely on surface water and has acquired permits that exceed the

water needed to support maximum generation. Reclaimed water is the most drought proof supply we have, which provides 71 percent of all of our supply

Timeframe

4-6 years

Magnitude of potential impact

Low

Likelihood

Unlikely

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure - minimum (currency)

500,000

Potential financial impact figure - maximum (currency)

1,000,000

Explanation of financial impact

APS has purchased water contingency contracts to deal with shortages that cost $500,000 - 1,000,000/year. Annual payments to Joseph City Irrigation Company (JCIC) at the Cholla Power Plant are made by providing power at no cost to three wells that are used by the irrigation company and performing needed maintenance on the wells at no cost. The actual amount will vary from year to year, depending on how many hours the wells were operated and when scheduled maintenance is due. Examples of wells recently repaired under the JCIC contract are Well P-34 for a cost of $31,000.00 and JCIC East Well for a cost of $23,000.00. These relatively shallow wells are typically less costly to repair than deeper wells (APS has wells up to 2000 feet deep). Costs can be much higher depending on the amount of rework that is required, i.e., pump replacement, motor replacement, shaft repair, casing cleaning, electrical repair, or total well replacement that can exceed $1,000,000.00.

Primary response to risk

Develop drought emergency plans

Description of response

Shortage sharing agreements (Four Corners), participation in regional strategic planning activities (Drought Contingency Plan), provision of primary and secondary water supplies at power plants, and creation of severance and transfer agreements (Cholla) reduces the probability of an adverse result from drought conditions.

Cost of response

2,000,000

Explanation of cost of response

Contracts for shortage sharing, contingent water supplies, agreements to provide wells, pipeline maintenance agreements range from $1,000,000 - 2,000,000 a year.

W4.2c

(W4.2c) Why does your organization not consider itself exposed to water risks in its value chain (beyond direct operations) with the potential to have a substantive financial or strategic impact?

	Primary reason	Please explain
Row 1	Risks exist, but no substantive impact anticipated	Per our Electric Utility Industry Sustainable Supply Chain Alliance (EUISSCA) survey, suppliers have indicated risks but none that are anticipated to have a substantive impact on their operations. On a quarterly basis, we engage with our key suppliers to discuss current performance, including risks identified and mitigation plans. Our key suppliers have instituted sustainability programs, including quality of water, water risk and water consumption. Annually, APS engages with our top suppliers in this sustainability survey, with questions on how the suppliers are managing environmental impacts in their operations, including greenhouse gas emissions, energy and water usage, waste and materials management. These top suppliers are identified based on the overall spend to APS, representing 29 percent of total spend, and is inclusive of the key suppliers. Key suppliers are identified through a rigorous segmentation process that includes assessing spend, risk analysis, strategy alignment and criticality to APS operations. APS utilizes this information to identify opportunities in their sourcing process to communicate to the suppliers the importance of environmental awareness and sustainability. Further, in major projects, we

		collaborate with suppliers to discuss capacity and quality expectations as well as planning for future demand. We did not find substantive water risks through analysis via the EUISSCA survey.

W4.3

(W4.3) Have you identified any water-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes, we have identified opportunities, and some/all are being realized

W4.3a

(W4.3a) Provide details of opportunities currently being realized that could have a substantive financial or strategic impact on your business.

Type of opportunity

Efficiency

Primary water-related opportunity

Improved water efficiency in operations

Company-specific description & strategy to realize opportunity

Natural gas and solar generation are more water efficient than coal generation. Accordingly, APS's closure of coal units at Cholla and Four Corners (820 megawatts retired since 2013) has resulted in the reduction of water consumption by approximately 20 percent. APS plans to retire an additional 767 megawatts of coal by 2025, which is projected to further reduce water consumption at the Cholla Power Plant to less than 10 percent of current consumption. Additionally, APS has announced we are exiting from coal-fired generation at the Four Corners Power Plant in 2031, eliminating 1,540 megawatts of coal generation. Shift in load from coal to natural gas will result in significant water savings as the water intensity (gallons/megawatt hour) at gas plants is less than half of the coal plant water intensity. Energy efficiency programs will reduce customer demand for energy, and continued development of renewable energy such as solar and wind will reduce fleet-wide water intensity.

When combined with reduction in coal generation, plus the retirement of steam units at Ocotillo (replaced with more efficient combustion turbines), APS expects fleet-wide water intensity reductions for power provided to APS customers of 41 percent by 2035.

Estimated timeframe for realization

More than 6 years

Magnitude of potential financial impact

Low-medium

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

3,000,000

Potential financial impact figure – maximum (currency)

5,000,000

Explanation of financial impact

Reduced water consumption will reduce need for well and pumping equipment maintenance and capital replacements proportional to reductions in water consumption. Savings of $1,000,000 - 2,000,000/year would be reasonable. APS evaluates the need for new infrastructure and includes such projects in the long-range forecast. Then, based upon reduced need for water due to more efficient plants, or retirement of older plants, certain of the capital projects can be eliminated. As plant retirements are planned, certain capital improvement projects can be eliminated without risk, such as need for new wells and/or pipeline replacements, assuming existing infrastructure is maintained properly. A single new well could cost $2-3 million based upon complexity of the site (depth to water, geology) and pipeline replacement projects can easily exceed $1 million, based upon recent experience at the Ocotillo Power Plant. Reduction in water consumption would result in reduced maintenance resulting in O&M savings of $1,000,000 - 2,000,000/year, and eliminating the need for a new well could save $2,000,000 - 3,000,000, or a total of $3,000,000 - 5,000,000. (Lower Range Savings) - O&M ($1,000,000) + New Well ($2,000,000) = 3,000,000. (Higher Range Savings) - O&M ($2,000,000) + New Well ($3,000,000) = $5,000,000

Type of opportunity

Resilience

Primary water-related opportunity

Other, please specify

Resilience to costs and supply challenge

Company-specific description & strategy to realize opportunity

Investments to meet future generation needs: APS investment in water for the future includes purchase of effluent under contracts through 2050 for Palo Verde and Redhawk, to be extended if needed. It also includes purchase of long-term storage credits from the Gila River Indian Community to supply high priority water to the Sundance Power Plant. These long-duration contracts provide assured water at a known price and ensure reliable, continuous availability of water for power generation.

Estimated timeframe for realization

More than 6 years

Magnitude of potential financial impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

15,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact

Assured water supplies for a predictable price allows long-term budgeting with a high probability of confidence. The regional cost of water is currently increasing at twice the rate of inflation or more; therefore, from 2025-2050, it is likely that current contracts could save $500,000/year or more. This is based upon knowledge of the existing water market, supplemented by biennial audits of water sales in the area. Recent audits have revealed that the inflation rate has been less than 2 percent; however, local water costs are inflating at 4-8 percent. Having a contract with a maximum escalation rate of 3 percent/year between 2025 and 2050 in a water market that exceeds a 3 percent/year escalation rate will result in substantial savings. For example, if the cost of water in 2025 is $20,000,000/year, escalating at a maximum of 3 percent/year, but the water market is escalating at 6 percent/year, the savings would be $600,000/year. ($600,000/year * 25 years = $15,000,000)

Type of opportunity

Efficiency

Primary water-related opportunity

Improved water efficiency in operations

Company-specific description & strategy to realize opportunity

Alternative cooling technologies: Retirement of steam units at Ocotillo and replacement with more efficient combustion turbines, cooled by hybrid cooling will reduce water consumption significantly. Water intensity will improve from approximately 1,000 g/MWh to 140 g/MWh. Additional efficiencies will be achieved by retiring older water intensive steam units at Cholla by 2025 and replacing them with gas-fired units at other APS plants, with reductions from 1,000 g/MWh to an average of 300 g/MWh. APS water efficiency strategies include development of commercial scale solar and wind generation, energy efficiency improvements and distributed generation (rooftop solar) that will reduce overall water consumption for power delivered to APS customers. We project a reduction in water intensity of 41 percent by 2035. This reduction in water consumption will reduce the need for water pumping and treatment infrastructure.

Estimated timeframe for realization

More than 6 years

Magnitude of potential financial impact

Low-medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

4,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact

Reduced water pumping, delivery and treatment costs between 2019 and 2025 at $500,000/year. As the quantity of water needed to support generation decreases, the costs of delivering water (acquisition, electricity, maintenance, equipment replacement) is decreasing. In addition, APS has successfully upgraded the quality of wells and pumping equipment for several years to the point that the need for on-going major maintenance/replacement is decreasing. A single planned major maintenance of a well can cost $50,000 - 100,000, based upon recent well maintenance at the Cholla Power Plant. We currently have 44 wells and plan major maintenance at least every 5 years, but may extend the maintenance period to 6 years or more, depending on how many hours the wells are run.

Type of opportunity

Efficiency

Primary water-related opportunity

Improved water efficiency in operations

Company-specific description & strategy to realize opportunity

Infrastructure maintenance and repair: APS established a Well and Pumping Equipment Reliability Program in 2015 that encompasses critical components of the water supply, including groundwater wells, well testing and inspection, pump testing and well infrastructure inspection (including pumps and motors, meters and lubrication systems). Expected improvements in reliability of 2 percent/year are being tracked. In 2015

APS experienced 5 well failures in one year. With the implementation of the Well and Pumping Equipment Reliability Program, the 2019 failure rate was a single well and is expected to be no more than one/year after 2019. We also perform well testing on all mission critical wells every year to gain information on their efficiency and reliability. This will ensure reliable access to water for uninterrupted power generation to supply our customers.

Estimated timeframe for realization

1 to 3 years

Magnitude of potential financial impact

Low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

150,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact

This program is expected to reduce unplanned well failures to one per year. In 2019, we experienced one unplanned well failure. We expect to see a savings over 3 years of $150,000. A single planned well rehabilitation can cost $50,000 - 100,000; however, an unplanned failure can cost twice that amount. ($50,000/year * 3 years = $150,000). An example of a planned well repair in 2019 was Cholla Well P-5R. The pump was replaced, however, no rework was needed on the well column or tube/shaft, and the well casing did not require cleaning. The total cost was $39,000.00, $13,000.00 for labor and $26,000.00 for materials. If this well had failed prior to scheduled repair, the damage could easily have been more than to the pump alone. Cleaning the well casing would have cost $12,000.00, if needed. Well rehabilitation can vary considerably based on the size and depth of the well. APS has production wells that range from 300 feet below land surface to 2,000 feet below land surface, and the cost to repair deeper wells is higher.

Type of opportunity

Efficiency

Primary water-related opportunity

Improved water efficiency in operations

Company-specific description & strategy to realize opportunity

Management of pumping is important to ensure that the highest quality water possible is delivered to the plant and is used as efficiently as possible before water needs to be discharged for disposal. It also prevents or minimizes degradation of water quality in the well field area over time because poor quality water that surrounds the pumping area is not drawn toward the pumps as quickly when pumping is reduced. Use of higher quality water reduces treatment and equipment operation and maintenance costs. Currently there are three well field operation plans that have been developed. They include Cholla, West Phoenix and Redhawk. These plans identify a well ranking system to prioritize which wells should run first, to ensure the best quality is used. This results in reduced water consumption as higher quality water can be cycled up more times prior to disposal. These plans are based on reviews of information such as well flow rate (gallons per minute), water quality (total dissolved solids), location, historical pumpage, planned maintenance/evaluation schedules and number of years the well has been in service.

Estimated timeframe for realization

Current - up to 1 year

Magnitude of potential financial impact

Low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

100,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact

Improved efficiency at the three identified plants could reduce water consumption by 5 percent/year. The cost of water at these plants is limited to the cost of pumping and treatment. Savings are achieved in reduced power costs and reduced need for major maintenance as wells and pumping equipment are lasting longer, due to shorter run times.

W5. Facility-level water accounting

W5.1

(W5.1) For each facility referenced in W4.1c, provide coordinates, water accounting data, and a comparison with the previous reporting year.

Facility reference number

Facility 1

Facility name (optional)

Palo Verde Generating Station

Country/Area & River basin

United States of America

Other, please specify

Phoenix Active Management Area

Latitude

33.395277

Longitude

-112.858333

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Nuclear

Total water withdrawals at this facility (megaliters/year)

89,236

Comparison of total withdrawals with previous reporting year

About the same

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

89

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

2,254

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

86,893

Total water discharges at this facility (megaliters/year)

0

Comparison of total discharges with previous reporting year

About the same

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

89,236

Comparison of total consumption with previous reporting year

About the same

Please explain

Approximately the same amount of power was generated at the Palo Verde Generating Station in 2019 resulting in about the same amount of reclaimed water used. 2019 consumption was 89,236 megaliters compared to 90,319 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Palo Verde continued to be the single largest producer of electricity in the U.S. in 2019. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Palo Verde is a zero liquid discharge facility with no discharge to surface water,

groundwater, or third-party destinations. All water is evaporated or stored on site.

Facility reference number

Facility 2

Facility name (optional)

Redhawk Power Plant

Country/Area & River basin

United States of America

Other, please specify

Phoenix Active Management Area

Latitude

33.336229

Longitude

-112.840533

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Gas

Total water withdrawals at this facility (megaliters/year)

5,159

Comparison of total withdrawals with previous reporting year

Higher

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

0

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

451

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

4,708

Total water discharges at this facility (megaliters/year)

0

Comparison of total discharges with previous reporting year

About the same

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

5,159

Comparison of total consumption with previous reporting year

Higher

Please explain

More power was generated at the Redhawk Power Plant in 2019 resulting in more reclaimed water and groundwater use. 2019 consumption was 5,159 megaliters compared to 4,786 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Redhawk is a zero liquid discharge facility with no discharge to surface water, groundwater, or third-party destinations. All water is evaporated or stored on site.

Facility reference number

Facility 3

Facility name (optional)

West Phoenix Power Plant

Country/Area & River basin

United States of America

Other, please specify

Phoenix Active Management Area

Latitude

33.440277

Longitude

-112.162777

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Gas

Total water withdrawals at this facility (megaliters/year)

4,152

Comparison of total withdrawals with previous reporting year

About the same

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

0

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

4,152

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

306

Comparison of total discharges with previous reporting year

Much higher

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

306

Total water consumption at this facility (megaliters/year)

3,846

Comparison of total consumption with previous reporting year

About the same

Please explain

Water use was about the same in 2019 due to about the same amount of generation at the West Phoenix Power Plant. 2019 consumption was 3,846 megaliters compared to 3,758 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. There was an increase of water discharged in 2019 due to consistent operation of the ZLD system. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."

Facility reference number

Facility 4

Facility name (optional)

Ocotillo Power Plant

Country/Area & River basin

United States of America

Other, please specify

Phoenix Active Management Area

Latitude

33.428888

Longitude

-111.910277

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Gas

Total water withdrawals at this facility (megaliters/year)

385

Comparison of total withdrawals with previous reporting year

Much lower

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

0

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

385

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

93

Comparison of total discharges with previous reporting year

Much lower

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

93

Total water consumption at this facility (megaliters/year)

291

Comparison of total consumption with previous reporting year

Much lower

Please explain

Water use was much lower in 2019 due to replacement of steam turbines with more water efficient gas turbines (GT) with hybrid cooling towers. 2019 consumption was 291 megaliters compared to 709 megaliters in 2018. The new GTs are 85 percent more water efficient than the old steam units. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower."

Facility reference number

Facility 5

Facility name (optional)

Sundance Power Plant

Country/Area & River basin

United States of America

Other, please specify

Pinal Active Management Area

Latitude

32.927941

Longitude

-111.588993

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Gas

Total water withdrawals at this facility (megaliters/year)

239

Comparison of total withdrawals with previous reporting year

Much lower

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

239

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

0

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

0

Comparison of total discharges with previous reporting year

About the same

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

239

Comparison of total consumption with previous reporting year

Much lower

Please explain

Generation at Sundance was less in 2019 resulting in less water use. 2019 consumption was 239 megaliters compared to 313 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Sundance is a zero liquid discharge facility with no discharge to surface water, groundwater, or third-party destinations. All water is evaporated or stored on site.

Facility reference number

Facility 6

Facility name (optional)

Saguaro Power Plant

Country/Area & River basin

United States of America

Other, please specify

Tucson Active Management Area

Latitude

32.553903

Longitude

-111.299829

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Gas

Total water withdrawals at this facility (megaliters/year)

16

Comparison of total withdrawals with previous reporting year

Much lower

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

0

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

16

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

0

Comparison of total discharges with previous reporting year

About the same

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

16

Comparison of total consumption with previous reporting year

Much lower

Please explain

Power production at the Saguaro Power Plant was less in 2019 resulting in lower water use. 2019 consumption was 16 megaliters compared to 22 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Saguaro is a zero liquid discharge facility with no discharge to surface water, groundwater, or third-party destinations. All water is evaporated or stored on site.

Facility reference number

Facility 7

Facility name (optional)

Cholla Power Plant

Country/Area & River basin

United States of America

Other, please specify

Joseph City Irrigation Non-expansion Area

Latitude

34.940654

Longitude

-110.299623

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Coal - hard

Total water withdrawals at this facility (megaliters/year)

10,552

Comparison of total withdrawals with previous reporting year

Lower

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

237

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

10,315

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

0

Comparison of total discharges with previous reporting year

About the same

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

10,552

Comparison of total consumption with previous reporting year

Lower

Please explain

Power production at Cholla was less in 2019 resulting in less water consumption. 2019 consumption was 10,552 megaliters compared to 12,240 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Cholla is a zero liquid discharge facility with no discharge to surface water, groundwater, or third-party destinations. All water is evaporated or stored on site.

Facility reference number

Facility 8

Facility name (optional)

Four Corners Power Plant

Country/Area & River basin

United States of America

Other, please specify

San Juan River Basin

Latitude

36.685009

Longitude

-108.479176

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Coal - hard

Total water withdrawals at this facility (megaliters/year)

25,429

Comparison of total withdrawals with previous reporting year

Higher

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

25,429

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

0

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

5,517

Comparison of total discharges with previous reporting year

Much higher

Discharges to fresh surface water

5,517

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

19,912

Comparison of total consumption with previous reporting year

Higher

Please explain

Generation and water use were higher at the Four Corners Power Plant in 2019. 2019 consumption was 19,912 megaliters compared to 18,205 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year- to-year changes over 15 percent were considered "much higher"/"much lower."

Facility reference number

Facility 9

Facility name (optional)

Yucca Power Plant

Country/Area & River basin

United States of America

Other, please specify

Colorado River

Latitude

32.719722

Longitude

-114.713333

Located in area with water stress

No

Primary power generation source for your electricity generation at this facility

Gas

Total water withdrawals at this facility (megaliters/year)

766

Comparison of total withdrawals with previous reporting year

Lower

Withdrawals from fresh surface water, including rainwater, water from wetlands, rivers and lakes

0

Withdrawals from brackish surface water/seawater

0

Withdrawals from groundwater - renewable

0

Withdrawals from groundwater - non-renewable

766

Withdrawals from produced/entrained water

0

Withdrawals from third party sources

0

Total water discharges at this facility (megaliters/year)

0

Comparison of total discharges with previous reporting year

About the same

Discharges to fresh surface water

0

Discharges to brackish surface water/seawater

0

Discharges to groundwater

0

Discharges to third party destinations

0

Total water consumption at this facility (megaliters/year)

766

Comparison of total consumption with previous reporting year

Lower

Please explain

Power generation and water consumption at Yucca were lower in 2019. 2019 consumption was 766 megaliters compared to 828 megaliters in 2018. Water use and generation go hand in hand at our power plants. When generation increases, water use typically increases, and when generation goes down, water use typically goes down. Year-to-year changes of less than 5 percent were considered "about the same." Year-to-year changes between 5 percent and 15 percent were considered "higher"/"lower." Year-to-year changes over 15 percent were considered "much higher"/"much lower." Yucca is a zero liquid discharge facility with no discharge to surface water, groundwater, or third-party destinations. All water is evaporated or stored on site.

W5.1a

(W5.1a) For the facilities referenced in W5.1, what proportion of water accounting data has been externally verified?

Water withdrawals – total volumes

% verified

76-100

What standard and methodology was used?

APS's water withdrawal data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

Water withdrawals – volume by source

% verified

76-100

What standard and methodology was used?

APS's water withdrawal data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

Water withdrawals – quality

% verified

Not verified

Water discharges – total volumes

% verified

76-100

What standard and methodology was used?

APS's water discharge data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

Water discharges – volume by destination

% verified

76-100

What standard and methodology was used?

APS's water discharge data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

Water discharges – volume by treatment method

% verified

76-100

What standard and methodology was used?

APS's water discharge data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

Water discharge quality – quality by standard effluent parameters

% verified

Not verified

Water discharge quality – temperature

% verified

Not verified

Water consumption – total volume

% verified

76-100

What standard and methodology was used?

APS's water discharge data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

Water recycled/reused

% verified

76-100

What standard and methodology was used?

APS's water discharge data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000.

W6. Governance

W6.1

(W6.1) Does your organization have a water policy?

Yes, we have a documented water policy that is publicly available

W6.1a

(W6.1a) Select the options that best describe the scope and content of your water policy.

	Scope	Content	Please explain
Row 1	Company-wide	Description of business dependency on water	Our water policy guiding APS is the company's strategic water plan. The plan is company-wide to address water impacts from all operations. It is made available to all employees to demonstrate commitment to water stewardship, foster water issue awareness and maintain transparency. The plan

		Description of business impact on water Description of water-related performance standards for direct operations Description of water-related standards for procurement Reference to international standards and widely-recognized water initiatives Company water targets and goals Commitment to align with public policy initiatives, such as the SDGs Commitments beyond regulatory compliance Commitment to water-related innovation Commitment to stakeholder awareness and education Commitment to water stewardship and/or collective action Acknowledgement of the human right to water and sanitation	details the main components of the water resource management program, which encompasses the acquisition of water supplies, alternative supplies, conservation by the efficient use of water, research and technology, groundwater models, well and pumping reliability program, water supply contingency initiative and well field management plans. It also recognizes climate change impacts such as drought and identifies current initiatives and opportunities for expansion of water-related business. There is an environmental linkage between water and climate change. Climate change may have a negative impact on the quality and quantity of water resources utilized by our power plants. Additionally, it describes plans to go beyond providing water for treatment plants and looks at water conditions in APS service territories. In addition, we are committed to engage with stakeholders regarding state water policy issues and comply with all local, state and federal water laws and regulations, and participate in the development of new water laws and regulations. We perform analysis of our key supplier responses to the EUISSCA survey, which includes water-related issues, standards, policies and processes. In addition, we plan to identify opportunities for suppliers to reduce their water impact and risk. We have included water-related questions in our sourcing questionnaire where responses are evaluated against an environmental sustainability weighting in the overall bid review. We also updated our supplier code of conduct to include APS's water policy and ensure supplier compliance and adherence when doing business with APS. We also conform to the ISO 14001 standards, which cover water issues

		Recognition of environmental linkages, for example, due to climate change	

W6.2

(W6.2) Is there board level oversight of water-related issues within your organization?

Yes

W6.2a

(W6.2a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for water-related issues.

Position of individual	Please explain
Chief Executive Officer (CEO)	The Chairman of the Board, President and Chief Executive Officer of Pinnacle West and Arizona Public Service Company has the highest level of direct responsibility for water within our organization. The Chief Executive Officer reviews material water issues throughout the year via the SEC reporting process, Investor Relations Reports/Presentations and Corporate Responsibility Report. The CEO has the highest responsibility over water-related issues because he has oversight over ensuring that business operations remain consistent with APS's water-related environmental policies. The CEO considers water issues such as impacts of climate change, drought preparedness, future changes in water availability, increasing cost of water and planning for more water efficient generation in the future. In 2019, the CEO assessed opportunities and impacts related to a clean energy goal, including the impact of overall water impacts. In January 2020, the CEO made the announcement to exit coal generation at the Four Corners Power Plant in 2031, which will ultimately decrease our long-term overall water withdrawals and consumption.

W6.2b

(W6.2b) Provide further details on the board's oversight of water-related issues.

	Frequency that water-related issues are a scheduled agenda item	Governance mechanisms into which water-related issues are integrated	Please explain
Row 1	Scheduled - some meetings	Monitoring implementation and performance Overseeing acquisitions and divestiture Overseeing major capital expenditures Reviewing and guiding annual budgets Reviewing and guiding major plans of action Reviewing and guiding risk management policies Reviewing and guiding strategy Reviewing innovation/R&D priorities Setting performance objectives	The Board oversees the Company's business strategy (including water strategy). In addition, the Board's oversees the Company's risk management function. Each Board committee receives periodic presentations from management about its assigned risk areas. The Executive Risk Committee is responsible for ensuring the Board receives timely information concerning the Company's material risks and risk management processes. The Finance Committee reviews and discusses with management the Company's process for allocating and managing capital and reviews the Company's annual operations and maintenance budget. The Human Resource Committee annually reviews the goals and performance of the officers of the Pinnacle West and APS and approves corporate goals and objectives relevant to the compensation of the CEO. The Nuclear and Operating Committee receives regular reports from management and monitors the overall performance of Palo Verde and non-nuclear business functions of the Company and APS, including fossil energy generation, energy transmission and delivery, customer service and the Company's sustainability initiatives and strategy

W6.3

(W6.3) Provide the highest management-level position(s) or committee(s) with responsibility for water-related issues (do not include the names of individuals).

Name of the position(s) and/or committee(s)

Chief Executive Officer (CEO)

Responsibility

Both assessing and managing water-related risks and opportunities

Frequency of reporting to the board on water-related issues

Half-yearly

Please explain

The CEO reports directly to the Board of Directors and has the highest level of direct responsibility for water within our organization. The CEO reviews and approves material water issues four times per year via the SEC reporting process, the Investor Relations Report/Presentations, and Board of Director's Top Risk Report. The CEO is provided with reports from facility managers and executives concerning water targets/policies and updates the Board as required. Briefings in 2019 included status of the Lower Colorado River Basin Drought Contingency Plan that keeps water in Lake Mead to avoid future shortages on the Colorado River and protects Arizona citizens from water shortages.

W6.4

(W6.4) Do you provide incentives to C-suite employees or board members for the management of water-related issues?

	Provide incentives for management of water-related issues	Comment
Row 1	Yes	Monetary reward

W6.4a

(W6.4a) What incentives are provided to C-suite employees or board members for the management of water-related issues (do not include the names of individuals)?

	Role(s) entitled to incentive	Performance indicator	Please explain

Monetary reward	Chief Sustainability Officer (CSO) Other C-suite Officer VP of Fossil Generation	Reduction in consumption volumes	Our executive compensation programs focus on transparency with an emphasis on incentivizing performance. APS's compensation philosophy incorporates multiple business performance metrics to assess executive performance. The business unit metrics component of our annual incentive plan ensures that our compensation program appropriately focuses our employees on core measures of overall Company health and performance. Our use of business unit metrics in our executives' incentive plans promotes our performance and our continued success as a safe, sustainable and overall well-run vertically integrated and regulated electric utility. APS has chosen the performance indicator for these incentives to be a reduction in consumption volumes because this is in line with our goal for sustainable water security. In 2015, APS created a new Tier 1 water metric designed to reduce the quantity of non-renewable groundwater consumed. The goal was to reduce consumption of non-renewable water, the most at-risk supply, by 8 percent in 2016 as compared to a 2014 baseline year. The goal in 2019 was to reduce consumption of non-renewable water by 14 percent compared to the 2014 baseline year and the result was 22 percent below 2014. A Tier 1 metric is the highest-level metric at APS and reflects the highest level of commitment to hit the targets. Each plant manager is rated monthly on meeting these targets and must answer to their executives, up to the CEO, if targets are not met.
Non-monetary reward	Chief Sustainability Officer (CSO) Other C-suite Officer VP of Fossil Generation	Reduction in consumption volumes	Our executive compensation programs focus on transparency with an emphasis on incentivizing performance. APS's compensation philosophy incorporates multiple business performance metrics to assess executive performance. The business unit metrics component of our annual incentive plan ensures that our compensation program appropriately focuses our employees on core measures of overall Company health and performance. Our use of business unit metrics in our executives' incentive plans promotes our performance and our continued success as a safe, sustainable and overall well-run vertically integrated and regulated electric utility. In 2015, APS created a new Tier 1 water metric designed to reduce the quantity of non-renewable groundwater consumed. The goal was to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline

			year. The goal in 2019 was to reduce consumption of non-renewable water by 14 percent compared to the 2014 baseline year and the result was 22 percent below 2014. . Each plant manager is rated monthly on meeting these targets and must answer to their executives, up to the CEO, if targets are not met.

W6.5

(W6.5) Do you engage in activities that could either directly or indirectly influence public policy on water through any of the following?

Yes, direct engagement with policy makers

Yes, trade associations

Yes, funding research organizations

W6.5a

(W6.5a) What processes do you have in place to ensure that all of your direct and indirect activities seeking to influence policy are consistent with your water policy/water commitments?

During the first quarter of each calendar year, management reviews with the Corporate Governance Committee of the Board of Directors its anticipated governmental affairs strategies for the year, including the priorities for the Company's political activities. During the year, management periodically reports to the Corporate Governance Committee on the progress of the Company's strategy, including any significant activities not encompassed within the initial strategy discussion. Following each of its meetings, the Corporate Governance Committee provides a summary to the Board of the matters involving political activities. At least annually, the Corporate Governance Committee reviews our political participation policy and recommends to the Board any revisions it deems necessary. Some of the entities we engage with or participate in include the following: Arizona Department of Water Resources, Groundwater Users Advisory Council, statutory special interest groups, EPRI Water Research Center, the Governors Water Augmentation Council, Arizona Drought Contingency Planning and the Kyl Center for Water Policy. If an entity's stated water security position is not consistent with our policy, we discuss internally and engage our internal policy group. Following this, we develop an internal policy position and develop a plan to support, stay neutral, or oppose the entity's stance and communicate that position to the entity.

W6.6

(W6.6) Did your organization include information about its response to water-related risks in its most recent mainstream financial report?

Yes (you may attach the report - this is optional)

40864aa8-5380-45d2-b895-72981259d303.pdf

W7. Business strategy

W7.1

(W7.1) Are water-related issues integrated into any aspects of your long-term strategic business plan, and if so how?

	Are water-related issues integrated?	Long-term time horizon (years)	Please explain
Long-term business objectives	Yes, water-related issues are integrated	11-15	One of our core objectives is to secure and maintain a reliable and cost-effective supply of water to APS power plants. APS develops a triennial resource plan and submits this plan to the Public Utility Commission (the Arizona Corporation Commission) for review and approval. Water strategies and plans associated with APS power plants and strategies to increase renewable energy and energy efficiency are identified for the next 15 years. Water strategies and plans include Palo Verde Generating Station and Redhawk Power Plant using treated effluent for cooling water, continuing to establish goals to reduce the use of non-renewable water resources for power generation, implementing hybrid cooling technology at the Ocotillo Power Plant and reducing fleet-level water intensity due to the closure of coal plants. In addition, APS will add significantly during the resource planning period to solar, wind and battery storage infrastructure, indicative of our commitment to new clean energy technology. Through our expanded renewable energy and energy efficiency programs, we will rely upon significant new generation capacity that does not require water, allowing retirement

			of older water-intensive plants. APS forecasts for 15 years because this is the term of the resource plan as required by the Arizona Corporation Commission, and due to market changes and generation needs. This timeframe allows APS to make the appropriate decisions based on reasonable forecasts.
Strategy for achieving long-term objectives	Yes, water-related issues are integrated	11-15	Our water strategy encompasses developing and implementing a strategic water resource management program, including initiatives that meet the needs of current APS customers and the evolving needs of the utility of the future. These strategies focus on water investment, research and technology, water metrics/initiatives, the Well and Pumping Equipment Reliability Program, the Water Supply Contingency Initiative, water intensity, wellfield operations management plans and data collection. APS forecasts for 15 years for consistency with regulatory resource plan requirements and to react to market changes and generation needs. Market changes include price of water, customer growth, economic conditions, and drought, and generation needs are influenced by residential and commercial developments that require power from APS plants.
Financial planning	Yes, water-related issues are integrated	11-15	The largest single water related expenditure for APS is the contract for treated effluent for use at Palo Verde and Redhawk. This contract extends through 2050, and APS has first right of refusal to renegotiate and extend the contract, if needed. This contract has fixed costs through 2025 and limits on annual cost increases for the remaining 25 years. Water supplies are guaranteed through 2050 at a known price. Capital costs for water improvements are identified in the long-range forecast. Well capital replacements are identified for 10 years in order to prepare financing for anticipated changes. APS forecasts for 15 years due to market changes and generation needs and for consistency with regulatory resource plan requirements. Market changes include the price of water, customer growth, economic conditions, drought and generation needs. This timeframe allows APS to make the appropriate decisions based on reasonable forecasts.

W7.2

(W7.2) What is the trend in your organization's water-related capital expenditure (CAPEX) and operating expenditure (OPEX) for the reporting year, and the anticipated trend for the next reporting year?

Row 1

Water-related CAPEX (+/- % change)

0

Anticipated forward trend for CAPEX (+/- % change)

0

Water-related OPEX (+/- % change)

0

Anticipated forward trend for OPEX (+/- % change)

0

Please explain

Capital expenditures for new wells and well abandonments are expected to be $4,000,000/year in future years. Operating expenses for well maintenance are expected to be $545,000/year in future years. APS developed a well and pumping equipment reliability program in 2017. Since implementation, the number of unplanned well and/or pumping equipment failures have been reduced from five/year in 2015 to a single failure in 2019. The result is that both capital and operating expenditures have levelled out to a steady amount instead of fluctuating from year to year. Reductions in cost in future years due to less need for water will be offset by inflation. In 2019, APS implemented a well risk survey to identify wells that were no longer needed and prioritize abandonment based upon identified risk. Eleven of the highest priority wells were abandoned at the Cholla Power Plant in 2019, and 41 high priority wells were identified for abandonment in future years.

W7.3

(W7.3) Does your organization use climate-related scenario analysis to inform its business strategy?

	Use of climate-related scenario analysis	Comment
Row 1	No, but we anticipate doing so within the next two years	As a Company, we are working with our stakeholders to determine 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 IRP. In addition, the Company is currently assessing the use of a climate-scenario analysis. In 2019, we participated 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.

W7.4

(W7.4) Does your company use an internal price on water?

Row 1

Does your company use an internal price on water?

Yes

Please explain

As water supplies remain constant and demand continues to rise, the cost of new water supplies or extension of existing agreements will escalate faster than the rate of inflation. A recent market analysis indicated that the cost of many water supplies is increasing at a rate of 8 to 10 percent per year. Additionally, operation of the water reclamation facility at Palo Verde and Redhawk Power Plant adds more than $1 and $0.60 per MWh, respectively, to each plant's operation and maintenance cost. These costs are expected to increase to over $2.50 per MWh by 2050, due to increasing costs of effluent, chemicals and labor. Increased O&M costs and the resultant impact to electricity costs may challenge operational cost-effectiveness of these plants. To offset these cost increases, APS is planning to increase reliance on technologies that do not use water, such as wind and solar, and will expand energy efficiency programs that reduce the need for new, potentially water intensive generation.

W8. Targets

W8.1

(W8.1) Describe your approach to setting and monitoring water-related targets and/or goals.

	Levels for targets and/or goals	Monitoring at corporate level	Approach to setting and monitoring targets and/or goals
Row 1	Company-wide targets and goals Business level specific targets and/or goals Site/facility specific targets and/or goals	Targets are monitored at the corporate level Goals are monitored at the corporate level	The Company's approach to setting water-related targets and goals is based on awareness of Arizona Department of Water Resources goals to reduce reliance upon groundwater, a non-renewable water supply that is at risk of depletion. In 2015, APS created a Tier 1 (our highest-level company metric) water metric designed to reduce the quantity of non-renewable groundwater consumed. The goal was to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year. The 2017 goal was a 10 percent reduction, the 2018 goal was a 12 percent reduction, and 2019 was 14 percent. APS established these targets because approximately 15 percent of the fleet's water demand was supplied from groundwater, and this non-renewable supply was at risk of depletion. Initiatives are underway to conserve groundwater, including early retirement of additional coal units, implementation of well field operations plans and further development and implementation of renewable energy, distributed generation and energy efficiency programs. These initiatives were presented to APS upper management, which includes managers, directors and vice presidents. Their feedback is essential to the development and implementation of these initiatives.

W8.1a

(W8.1a) Provide details of your water targets that are monitored at the corporate level, and the progress made.

Target reference number

Target 1

Category of target

Other, please specify

Absolute reduction of water withdrawals

Level

Company-wide

Primary motivation

Water stewardship

Description of target

APS created a Tier 1 (the highest-level company metric) water metric designed to reduce the quantity of non-renewable groundwater consumed. APS set this metric because approximately 15 percent of the fleet's water demand is supplied from groundwater. Beginning in 2016, the target for this metric was a 2 percent reduction per year from the 2014 baseline groundwater consumption. For 2017 the goal was a 10 percent reduction from the 2014 baseline year, 2018 was 12 percent, and 2019 was 14 percent. APS uses three types of water: groundwater, surface water and treated effluent. Both surface water and treated effluent are renewable; however, groundwater is not considered renewable because it can be withdrawn from the ground much faster than it is replenished. Therefore, we chose conservation of the non-renewable supply as our highest level water metric.

Quantitative metric

Other, please specify

% reduction of water sourced from GW

Baseline year

2014

Start year

2016

Target year

2019

% of target achieved

100

Please explain

The 2019 target of 14 percent reduction compared to 2014 was achieved, with 23 percent reduction documented. The goal for 2020 is a 16 percent reduction, as we continue to challenge ourselves to use water more efficiently. This achievement places the company on solid ground to achieve a longer-term goal of reducing fleet non-renewable water consumption by 75 percent by 2035.

Target reference number

Target 2

Category of target

Other, please specify

Increase Pumping Equipment Reliability

Level

Company-wide

Primary motivation

Risk mitigation

Description of target

APS owns and operates 44 production wells that provide cooling water and supplemental water to support generation at eight of nine power plants. Unplanned well and pumping equipment failures can occur as a result of pumping equipment failure, electrical/mechanical issues, well casing problems or human performance errors. These failures disrupt scheduled maintenance plans, result in unplanned/unbudgeted costs and could result in loss of water necessary to support generation. The reliability rate in 2015 was 90 percent, equating to five unplanned failures. Water Resource Management established a goal to increase the reliability rate by 2 percent/year through 2019, resulting in a 98 percent reliability rate in 2019, equating to one unplanned failure.

Quantitative metric

Other, please specify

Well and Pumping Equipment Reliability

Baseline year

2015

Start year

2016

Target year

2019

% of target achieved

100

Please explain

The 2016 result was 98 percent reliability, exceeding the goal of 92 percent reliability. The 2017 result was 96 percent reliability, exceeding the goal of 94 percent reliability. The 2018 result was 98 percent, exceeding the goal of 96 percent reliability. The 2019 result was 98 percent reliable, on target.

Target reference number

Target 3

Category of target

Other, please specify

Summertime Equivalent Availability Factor

Level

Site/facility

Primary motivation

Risk mitigation

Description of target

APS fossil plants have a summertime equivalent availability factor (EAF) target designed to ensure that maximum generation needs can be met during the summer when the greatest power demand exists. In 2018, to support this goal, Water Resource Management set a 2019 Tier 2 goal to provide water to the fossil plants sufficient to support the EAF target 100 percent of the time. That means that well pumping capacity at every plant must always be sufficient to meet peak generation demand on the hottest summer day.

Quantitative metric

Other, please specify

Summertime EAF

Baseline year

2018

Start year

2019

Target year

2020

% of target achieved

100

Please explain

The 2019 result was 100 percent EAF reliability, on-target. A similar goal of 100 percent was established for 2020.

W8.1b

(W8.1b) Provide details of your water goal(s) that are monitored at the corporate level and the progress made.

Goal

Reduce environmental impact of product in use phase

Level

Company-wide

Motivation

Water stewardship

Description of goal

In 2015, APS created a new Tier 1 water metric designed to reduce the quantity of non-renewable groundwater consumed. It is important to reduce reliance on non-renewable groundwater because it is the most at-risk supply in Arizona, is an insurance policy if surface water is not available due to drought, and conservation of groundwater aligns APS with state-wide strategies to reduce groundwater consumption dictated by the Arizona Department of Water Resources. The initial goal of the Tier 1 metric was to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year. The 2017 goal was a 10 percent reduction, the 2018 goal was a 12 percent reduction, and the 2019 goal was 14 percent. APS established these targets because approximately 15 percent of the fleet's water demand was supplied from non-renewable groundwater. Initiatives are underway to conserve groundwater, including early retirement of additional coal units, implementation of well field operations plans and further development and implementation of renewable energy, distributed generation and energy efficiency programs.

Baseline year

2014

Start year

2016

End year

2020

Progress

In 2019, the target was 14 percent below 2014 groundwater usage and the result was 23 percent below 2014. The goal for 2020 is 16 percent below 2014 consumption. In 2019, APS groundwater consumption was approximately 14 percent of total fleet water consumption, and the long-

term goal is to reduce that to 5 percent by 2035. At the same time, APS plans to increase reliance on renewable treated effluent from the 2019 level of 71 percent of total fleet water consumption to a 2035 target of 95 percent of total fleet water consumption. This goal is important to the Company because it will help APS reduce the amount of non-renewable water used and help APS move towards achieving sustainable water security.

Goal

Reduce environmental impact of product in use phase

Level

Company-wide

Motivation

Other, please specify

Reduce Water Intensity Use in Operations

Description of goal

This goal to reduce water intensity is important to APS because it will help reduce our overall water consumption and move us to a more sustainable, water-secure position going forward. It will also help us phase out less efficient operating units, achieving production goals with the least amount of water possible. This will be accomplished by retiring older water intensive units and replacing them with more efficient units, increasing use of solar and wind generation, increasing energy efficiency programs and implementing water conservation plans at all power plants.

Baseline year

2019

Start year

2020

End year

2035

Progress

The indicators used to assess progress are based on the increased number of megawatts resulting from increasing use of solar and wind generation and the number of older water intensive units that have been retired and replaced with more efficient units. In 2018, two old steam units at the Ocotillo Power Plant were replaced with five quick-start gas turbines that are 85 percent more efficient than the steam units. We consider a threshold of success to reduce fleet-wide water intensity of power served to APS customers by 41 percent by 2035. The first evidence of reduction from the 2019 baseline year will be available at the end of 2020.

W9. Verification

W9.1

(W9.1) Do you verify any other water information reported in your CDP disclosure (not already covered by W5.1a)?

Yes

CDP Verification Statement APS CY2019 v1 TR.pdf

W9.1a

(W9.1a) Which data points within your CDP disclosure have been verified, and which standards were used?

Disclosure module	Data verified	Verification standard	Please explain
W1 Current state	The following water use and discharge data has been verified for CY2019: Palo Verde, Four Corners, Redhawk, Cholla, Ocotillo, Saguaro, Sundance, Wes Phoenix, and Yucca.	ISAE 3000	APS's water withdrawal and discharge data was verified in accordance with the guidelines set forth in the International Standard on Assurance Engagements (ISAE) 3000. Verification of APS's water data for CY2019 was constructed to provide a reasonable level of assurance.

W10. Sign off

W-FI

(W-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.

W10.1

(W10.1) Provide details for the person that has signed off (approved) your CDP water response.

	Job title	Corresponding job category
Row 1	Chairman of the Board, President and Chief Executive Officer, Pinnacle West Capital Corporation Chairman of the Board and Chief Executive Officer, Arizona Public Service Company	Chief Executive Officer (CEO)

W10.2

(W10.2) Please indicate whether your organization agrees for CDP to transfer your publicly disclosed data on your impact and risk response strategies to the CEO Water Mandate's Water Action Hub [applies only to W2.1a (response to impacts), W4.2 and W4.2a (response to risks)].

Yes

SW. Supply chain module

SW0.1

(SW0.1) What is your organization's annual revenue for the reporting period?

	Annual revenue
Row 1	

SW0.2

(SW0.2) Do you have an ISIN for your organization that you are willing to share with CDP?

SW1.1

(SW1.1) Could any of your facilities reported in W5.1 have an impact on a requesting CDP supply chain member?

SW1.2

(SW1.2) Are you able to provide geolocation data for your facilities?

	Are you able to provide geolocation data for your facilities?	Comment
Row 1		

SW2.1

(SW2.1) Please propose any mutually beneficial water-related projects you could collaborate on with specific CDP supply chain members.

SW2.2

(SW2.2) Have any water projects been implemented due to CDP supply chain member engagement?

SW3.1

(SW3.1) Provide any available water intensity values for your organization's products or services.

Submit your response

In which language are you submitting your response?

Please confirm how your response should be handled by CDP

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

Please confirm below