Pinnacle West Capital Corporation - Water Security 2019

W0. Introduction

W0.1

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

Pinnacle West Capital Corporation is an energy holding company based in Phoenix, AZ that conducts business primarily through our wholly owned subsidiary, Arizona Public Service Company ("APS"). APS is an investor-owned, vertically-integrated power company that generates and delivers reliable electric power and related services to approximately 1.2 million customers located in Arizona. To meet the energy demand of our customers, APS owns and operates a fleet of generation resources, including nuclear, coal, natural gas, and renewable (solar and wind) generation. Additionally, APS owns and operates a transmission and distribution system that is necessary to deliver power to our customers.

Water is vital for APS to meet its core business objectives. As a result, APS has a Water Resource Management department whose sole purpose is to ensure a sufficient quality and quantity of water is available to meet the current and future needs of our generating stations. The vision of the Water Resource Management department is to secure and maintain a sustainable and cost-effective supply of water to enable reliable energy production for APS customers. The Department's mission is to develop and implement a strategic water resource management program that will provide APS timely and reliable information to manage APS's water resources portfolio in support of the safe and efficient generation of electricity for the long term. This is accomplished through the acquisition of water supplies, alternative supplies, and conservation by the efficient use of water, development of water metrics and water conserving initiatives, participation in state and regional water management organizations, engagement in developing water legislation, research and technology, groundwater models, a well and pumping equipment reliability program, water supply contingency initiatives and development and use of well field management plans.

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 power source.

	Nameplate capacity (MW)	% of total nameplate capacity	Gross generation (MWh)
Coal – hard	2747	25	11123582
Lignite	0	0	0
Oil	0	0	0
Gas	3276	30	8142180
Biomass	0	0	0
Waste (non-biomass)	0	0	0
Nuclear	4200	38	31097257
Geothermal	0	0	0
Hydroelectric	0	0	0
Wind	289	2	745000
Solar	203	5	610000
Other renewable	0	0	0
Other non-renewable	0	0	0
Total	10715	100	51718019

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 2018	December 31 2018

W0.3

(W0.3) Select the countries/regions 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 4,582 MW 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 strives to reduce freshwater consumption by 10% by the year 2023. 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 produced water available for use	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. Recycled water is considered “vital” to current and future direct operations at the Palo Verde Generating Station and to 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 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

	% 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 plant water use is measured by direct metering from plant personnel and is submitted to Water Resource Management and 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 from water stressed areas	Not relevant	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. All of our plants have access to freshwater 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 Generation Station and Red Hawk Power Plant use treated effluent which is considered a drought resistant supply, because water conservation during a drought is to reduce outdoor water use, not indoor water use. Indoor water use is what supplies effluent to water treatment facilities. Our contracted supply is of adequate quantity and quality for the generation needs of these plants through 2050. Over 70 % of all APS power plant water consumption is treated effluent. The remaining 30% is groundwater or surface water that is protected by water rights, contracts, and agreements.
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 and 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 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.
Entrained water associated with your metals & mining sector activities - total volumes [only metals and mining sectors]	<Not Applicable>	<Not Applicable>
Produced water associated with your oil & gas sector activities - total volumes [only oil and gas sector]	<Not Applicable>	<Not Applicable>
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 then is 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 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 is reported on an annual basis to the Arizona Department of Water Resources and monthly to the New Mexico 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 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 State Engineer for compliance purposes. Tracking the volume discharged by destination provides data regarding potential impacts on the Phoenix AMA and the San Juan watersheds. Discharge quantity to the San Juan River is important because it provides critical flows to support endangered fishes.

	% of sites/facilities/operations	Please explain
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 State Engineer for compliance purposes. APS treatment methods are identified in procedures at each power plant in order 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 US 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 is reported on an annual basis to the Arizona Department of Environmental Quality 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% 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.
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 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 is reported on an annual basis to the Arizona Department of Water Resources or monthly to the New Mexico State Engineer for compliance purposes. Other water uses, such as in office buildings, service centers, etc. are served by a municipal provider. 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 and monitored at APS's West Phoenix and Redhawk power plants which utilize a zero liquid discharge (ZLD) system. The ZLD system is a very important tool. 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 uses a cooling lake, returns 20% of water used to the source, and recycles the remaining 80%. CoC is monitored on a daily basis. 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 is reported on an annual basis to the ADWR or monthly to the New Mexico State Engineers.
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	135547	About the same	The total withdrawals at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants for 2018 (135,547 megaliters/year) were about the same as in 2017 (137,917 megaliters/year). Even though generation for 2018 was slightly more than in 2017, water use was down particularly with the Palo Verde Generating Station and Red Hawk Power Plant. Year-to-year changes less than 5% were considered "about the same." Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower". Future withdrawals in the next five years are projected to stay about the same based on generation.
Total discharges	4366	About the same	The total discharge at the Four Corners, Ocotillo, and West Phoenix and Yucca Power Plants were about the same in 2018 (4,366 megaliters/year) as in 2017 (4,719 megaliters/year). The discharges were very consistent from last year for the plants that have a discharge componentdischarge component due to consistent generation from each of those plants compared to last year. The majority of reductions came from the Four Corners Power Plant and West Phoenix Power Plant. Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% 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	131181	About the same	The total consumption at the Cholla, Four Corners, Ocotillo, Palo Verde, Redhawk, Saguaro, Sundance, West Phoenix and Yucca Power Plants for 2018 (131,181 megaliters/year) were about the same as in 2017 (133,198 megaliters/year) due to generation being about the same. Our reported volumes of water of are calculated by the following formula: 131,181 (total consumption) = 135,547 (total withdrawals) - 4,366 (total discharges). Even though generation for 2018 was slightly more than in 2017, water use was down particularly with the Palo Verde Generating Station and Redhawk Power Plant. Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower". Future consumption in the next five years is projected to stay about the same based on generation.

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	22931	About the same	The total fresh surface water for 2018 (22,931 megaliters/year) was about the same as in 2017 (22,366 megaliters/year) due to generation being about the same for plants that rely on surface water. Fresh surface water is relevant to our company because 17% 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".
Brackish surface water/Seawater	Not relevant	<Not Applicable>	<Not Applicable>	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	<Not Applicable>	<Not Applicable>	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	20464	Higher	About the same amount of power was generated in 2018 (20,464 megaliters/year) compared to 2017 (20,386 megaliters/year) overall, however increased generation at more groundwater intensive plants caused higher groundwater use as compared to 2017. Groundwater – non-renewable is relevant to our company because 15% of our total water usage comes 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower"
Produced/Entrained water	Not relevant	<Not Applicable>	<Not Applicable>	None of APS's operations withdrew water from produced/process 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	92152	About the same	For purposes of this report, reclaimed water use is reported under third party sources. In 2018 (92,152 megaliters/year), reclaimed water use was about the same as than in 2017 (95,165 megaliters)., because generation totals were about the same for plants that utilize reclaimed water. Third party sources are relevant to our company because 68% of our total water usage comes from third party sources and, in the future, we do not anticipate our usage of third party sources to change." Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% 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	4019	About the same	Approximately the same amount of water was returned back to the environment in 2018 (4,019 megaliters/year) compared to 2017 (4,259 megaliters/year), primarily at the Four Corners Power Plant. The amount returned was about the same because generation was about the same as the previous year. 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 fishes in the river. Future generation projections indicate that future water use will be about the same. Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".
Brackish surface water/seawater	Not relevant	<Not Applicable>	<Not Applicable>	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 also source water volume from brackish surface water/seawater sources.
Groundwater	Not relevant	<Not Applicable>	<Not Applicable>	There were no discharges to groundwater We do not anticipate discharging to groundwater sources within the next 5 years.
Third-party destinations	Relevant	347	Lower	Less water was discharged to the city sewer at West Phoenix in 2018 (347 megaliters) than in 2017 (460 megaliters/year) due to equipment failure and an extended outage of the Zero Liquid Discharge system in 2017. Water discharges through the city sewer supply are relevant to the company because 2 of our 9 APS facilities discharge water into the city sewer system." Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

W1.2j

(W1.2j) What proportion of your total water use do you recycle or reuse?

	% recycled and reused	Comparison with previous reporting year	Please explain
Row 1	76-99%	About the same	The Zero Liquid Discharge blowdown recovery system at our Redhawk and West Phoenix power plants is a very important and effective water management tool for the plant, enabling them to keep water use low and cycles of concentration (CoC) as high as possible. CoC is a measure of the degree to which cooling water is recycled, and is a significant factor in ensuring efficient water use. Recycling water reduces the plants dependence on fresh water, minimizing the withdrawals from the aquifer and saving water for other uses. The volume of water recycled or reused has remained about the same because our generation of MWh remained steady compared to the previous reporting year and therefore our percent of recycled and reused water also remained steady. We do not anticipate implementing additional water recovery systems at any of our facilities in the next five years, so we do not anticipate our percentage of recycled water will change in the next 5 years. Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered"higher"/"lower". Year-to year changes over 15% 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: unit of production	Comparison with previous reporting year	Please explain
686	Total water consumption	MWh	About the same	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 2018. The value has remained about the same because our generation of MWh remained steady compared to the previous reporting year and therefore our water intensity also remained steady. Generation from 2017 (50,559,886 MWh) to 2018 (50,363,286 MWh) was about the same which reflects water intensity was about the same from 2017 (693 Gallons/MWh) to 2018 (686 gallons/MWh). Water intensity is used internally to track progress toward achievement of APS goals to reduce water intensity by 20% by 2025. In the next 5 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% 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

76-100

Rationale for this coverage

Annually, APS engages our top 100 suppliers out of a total of 3,316 suppliers (which makes up a total of 3% of suppliers being engaged) in a sustainability survey, with questions related to managing environmental impacts in their operations, including greenhouse gas emissions, energy and water usage. These top suppliers are identified based on the overall spend to APS, representing 85% of total spend (inclusive of the key suppliers). 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 sustainability. For example, a project critical to the expansion of APS operations incorporated supplier environmental sustainability maturity questions. Suppliers are incentivized to report by acknowledgement through the Supplier Excellence Awards.

Impact of the engagement and measures of success

Measures of success - APS defines success in two ways: a year over year increase in supplier response rate to the survey, and a year over year improvement in performance across the key performance indicators. (How this information is used) - Information gathered during annual Electric Utility Industry Sustainable Supply Chain Alliance (EUISSCA) survey is shared with Supply Chain Leadership to develop awareness of our supplier's performance. The survey requests input relating to water conservation, water efficiency, and water safety, in addition to specific water-related issues such as current policies, measures of success from water actions, as well as identification of water improvement opportunities. In the future, information will be used to drive Supplier Relationship Management quarterly discussions.

Comment

W1.4b

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

Type of engagement
Innovation & collaboration

Details of engagement
<Not Applicable>

% of suppliers by number
<Not Applicable>

% of total procurement spend
<Not Applicable>

Rationale for the coverage of your engagement
Annually, APS engages with our top 100 suppliers out of a total of 3,316 suppliers (which makes up a total of 3% of suppliers being engaged) in a 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 85% 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.

Impact of the engagement and measures of success
<Not Applicable>

Comment
<Not Applicable>

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 an 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 USBR 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% 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 100 suppliers out of a total of 3,316 suppliers (which makes up a total of 3% of suppliers being engaged) in a sustainability survey (aka EUISSCA survey). Through our EUISSA survey, 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	<Not Applicable>	<Not Applicable>	Four Corners has a discharge permit with limits on discharges that prevent environmental arm and compliance is documented. Spill Prevention Control and Countermeasures plans are implemented at all APS power plants, primarily to prevent oil spills, ash spills and minimize possible environmental impacts. These SPCC plans are recorded with 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 Four Corners or Cholla Power Plants is found to be leaking possible coal combustion residuals, additional monitoring is implemented and interceptor trenched are constructed with extraction wells to intercept and remove contaminants from groundwater.

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
Six-monthly or more frequently

How far into the future are risks considered?
>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 the operating licenses. The Four Corners Power Plant EIS 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 USBR, Sandia National Lab, LANL, and NREL to evaluate the potential impacts of climate change on power plant water availability in the Western US 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 NGOs to ensure that power plants are operated in 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. In addition, as part of 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 3-5 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
Six-monthly or more frequently

How far into the future are risks considered?
>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 Area executive is responsible for identifying significant risks and planned mitigations in his/her 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 Area risks which have the potential to impact achieving Company objectives. Risks (including water risk) are reported to shareholders, the public, and other stakeholders through company SEC filing.

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 that 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 that 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 has 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 at our power pPlants. 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 modeled 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 are able to provide the needed raw materials when needed, and that they cannot be constrained from delivering on time due to water-related issues. In 2018, APS asked its 100 top tier suppliers to report their water management through the Electric Utility Industry Sustainable Supply Chain Alliance (EUISSCA) Sustainability Survey. These suppliers represent about 31% 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 State Engineers Office 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, Redh Hawk, 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, 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 which 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. APS provides over $500,000 a year for 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.

	Relevance & inclusion	Please explain
Access to fully-functioning, safely managed WASH services for all employees	Relevant, always included	APS workers have full access to fully functioning WASH services at all APS facilities. APS drinking water treatment systems are permitted and monitored for compliance by ADEQ 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 protection that APS workers have full 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 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 of the SSA members are present to discuss how to prepare if a shortage is imminent. Other stakeholders also attend these meetings, including the USBR, NGOs, and local business owners that benefit from the discussions. Ultimately, all of the 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. 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 which are 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, therefore, must be discussed with co-owner/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 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.

	Relevance & inclusion	Please explain
NGOs	Relevant, always included	As environmental stewards, APS collaborates with NGOs 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 concerning water risks associated with potential adverse environmental impacts at the Four Corners and Cholla Power Plant. Some NGO's include the Sierra Club, National Parks and Conservation Association, Environmental Defense Fund, and the Nature Conservancy. Interaction with NGO's 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 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, such as effects of groundwater pumping on the environment.
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, Governors 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 State Engineers 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 interest 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 Governors Water Augmentation Council, the Groundwater Users Advisory Council, the Kyl Center for Water Policy, and the San Juan River Recovery Implementation Program (SJRRIP). 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 2018, APS asked its 100 top tier 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 (includes 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.
Water utilities at a local level	Relevant, always included	Water Utilities are included in our water risk assessment because potential 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 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), and ultimately is delivered to Palo Verde and Redhawk. APS also meets with representatives of Tolleson and Goodyear, 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 2018, less than 3% 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 Sustainability 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 USBR 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 by 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 project critical to the expansion of APS operations requested sustainable solutions as part of the final supplier selection for an architect and contractor.

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%) 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 2018. 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 impact on your business, and what is the potential business impact associated with those facilities?

Country/Region
United States of America

River basin
Other, please specify (Phoenix Active Management Area (AMA))

Number of facilities exposed to water risk
4

% company-wide facilities this represents
26-50

Production value for the metals & mining activities associated with these facilities
<Not Applicable>

% company's annual electricity generation that could be affected by these facilities
76-99

% company's global oil & gas production volume that could be affected by these facilities
<Not Applicable>

% company's total global revenue that could be affected
76-99

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

Country/Region
United States of America

River basin
Other, please specify (Pinal Active Management Area (AMA))

Number of facilities exposed to water risk
1

% company-wide facilities this represents
Less than 1%

Production value for the metals & mining activities associated with these facilities
<Not Applicable>

% company's annual electricity generation that could be affected by these facilities
Less than 1%

% company's global oil & gas production volume that could be affected by these facilities

<Not Applicable>

% company's total global revenue that could be affected
Less than 1%

Comment
Sundance Power Plant

Country/Region
United States of America

River basin
Other, please specify (Tucson Active Management Area (AMA))

Number of facilities exposed to water risk
1

% company-wide facilities this represents
Less than 1%

Production value for the metals & mining activities associated with these facilities
<Not Applicable>

% company's annual electricity generation that could be affected by these facilities
Less than 1%

% company's global oil & gas production volume that could be affected by these facilities
<Not Applicable>

% company's total global revenue that could be affected
Less than 1%

Comment
Saguaro Power Plant

Country/Region
United States of America

River basin
Other, please specify (Joseph City Irrig. Non-Expansion Area)

Number of facilities exposed to water risk
1

% company-wide facilities this represents
1-25

Production value for the metals & mining activities associated with these facilities
<Not Applicable>

% company's annual electricity generation that could be affected by these facilities
1-25

% company's global oil & gas production volume that could be affected by these facilities
<Not Applicable>

% company's total global revenue that could be affected
1-25

Comment
Cholla Power Plant

Country/Region
United States of America

River basin
Other, please specify (San Juan River Basin)

Number of facilities exposed to water risk

1

% company-wide facilities this represents
1-25

Production value for the metals & mining activities associated with these facilities
<Not Applicable>

% company's annual electricity generation that could be affected by these facilities
1-25

% company's global oil & gas production volume that could be affected by these facilities
<Not Applicable>

% company's total global revenue that could be affected
1-25

Comment
Four Corners Power Plant

Country/Region
United States of America

River basin
Other, please specify (Colorado River Basin)

Number of facilities exposed to water risk
1

% company-wide facilities this represents
1-25

Production value for the metals & mining activities associated with these facilities
<Not Applicable>

% company's annual electricity generation that could be affected by these facilities
Less than 1%

% company's global oil & gas production volume that could be affected by these facilities
<Not Applicable>

% 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/Region
United States of America

River basin
Other, please specify (AMA, Colorado River and San Juan Basin)

Type of risk
Physical

Primary risk driver
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. 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 2018.

Timeframe
Current up to 1 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)
<Not Applicable>

Potential financial impact figure - minimum (currency)
3000000

Potential financial impact figure - maximum (currency)
6000000

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 2018. 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)

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
635000

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/Region
United States of America

River basin
Other, please specify (AMA, Colorado River and San Juan Basin)

Type of risk
Regulatory

Primary risk driver
Other, please specify (Exceedance of Permit Requirements)

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. 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 tracked, therefore referring to these documents can be used by 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 the West Phoenix Power Plants have annual groundwater allotments that cannot be exceeded. APS is required to monitor and report each plants annual groundwater use . 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 1 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)
<Not Applicable>

Potential financial impact figure - minimum (currency)
1000

Potential financial impact figure - maximum (currency)
10000

Explanation of financial impact
Fines range from $1000 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 $1000 – 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 (Process, 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 Resources adequate time to compile and report the required information on time. Examples of reporting deadlines we track in Enviance include ADWR annual reports for all our water rights within the AMAs, New Mexico State Engineer's report for Four Corners Power Plant water use and BOR reporting for Yucca Power Plant.

Cost of response
200000

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/Region
United States of America

River basin
Other, please specify (AMA, Colorado River and San Juan Basin)

Type of risk
Regulatory

Primary risk driver
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. 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 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 70% 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)
<Not Applicable>

Potential financial impact figure - minimum (currency)
500000

Potential financial impact figure - maximum (currency)
1000000

Explanation of financial impact
APS has purchased water contingency contracts to deal with shortages that cost $500,000 – 1,000,000/year.

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
2000000

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 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 100 suppliers in a 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 85% 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 and 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%. 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% of current consumption. 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 and energy efficiency programs will reduce customer demand for energy. Continued development of renewable energy such as PV 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 of 20% by 2025.

Estimated timeframe for realization

>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)

<Not Applicable>

Potential financial impact figure – minimum (currency)

3000000

Potential financial impact figure – maximum (currency)

5000000

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 and pipeline replacement projects can easily exceed $1 million. 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
>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)
12500000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

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 bi-annual audits of water sales in the area. Recent audits have revealed that the inflation rate has been less than 2%, however, local water costs are inflating at 4-8%. Having a contract with a maximum escalation rate of 3%/year between 2025 and 2050 in a water market that exceeds a 3%/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%/year, but the water market is escalating at 6%/year, the savings would be $600,000/year. ($500,000/year * 25 years = $12,500,000)

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 1000 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, with reductions from 1000 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 20% by 2025. This reduction in water consumption will reduce the need for water pumping and treatment infrastructure.

Estimated timeframe for realization

>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)
4000000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact
Reduced water pumping, delivery and treatment costs between 2018 and 2025 at $500,000/year. Reduced water pumping, delivery and treatment costs between 2018 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 – 100,000. 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, well infrastructure inspection (including pumps and motors, meters and lubrication systems). Expected improvements in reliability of 2%/year are being tracked. Prior to 2015 APS experienced 5 well failures in one year. With the implementation of the Well and Pumping Equipment Reliability Program, the 2018 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 of our 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)
150000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact
This program is expected to reduce unplanned well failures to one per year. In 2018, 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 $50-100,000, however, an unplanned failure can cost twice that amount. ($50,000/year * 3 years = $150,000)

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 at all times, and 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 (3) 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)
100000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact
Improved efficiency at the three identified plants could reduce water consumption by 5%/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, total water accounting data and comparisons with the previous reporting year.

Facility reference number
Facility 1

Facility name (optional)
Palo Verde Generating Station

Country/Region
United States of America

River basin
Other, please specify (Phoenix Active Management Areas)

Latitude
33.395277

Longitude
-112.858333

Primary power generation source for your electricity generation at this facility
Nuclear

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
90319

Comparison of withdrawals with previous reporting year
About the same

Total water discharges at this facility (megaliters/year)
0

Comparison of discharges with previous reporting year
About the same

Total water consumption at this facility (megaliters/year)
90319

Comparison of 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 2018 resulting in about the same amount of reclaimed water used. 2017 consumption was 93,184 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 US in 2018. Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 2

Facility name (optional)
Red Hawk Power Plant

Country/Region
United States of America

River basin
Other, please specify (Phoenix Active Management Area)

Latitude
33.336229

Longitude
-112.840533

Primary power generation source for your electricity generation at this facility
Gas

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
4786

Comparison of withdrawals with previous reporting year
Lower

Total water discharges at this facility (megaliters/year)
0

Comparison of discharges with previous reporting year
About the same

Total water consumption at this facility (megaliters/year)
4786

Comparison of consumption with previous reporting year
Lower

Please explain
Less power was generated at the Redhawk Power Plant in 2018 resulting in less reclaimed water and groundwater use. 2017 consumption was 5,092 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to- year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 3

Facility name (optional)
West Phoenix Power Plant

Country/Region
United States of America

River basin
Other, please specify (Phoenix Active Management Area)

Latitude
33.440277

Longitude
-112.162777

Primary power generation source for your electricity generation at this facility
Gas

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
3968

Comparison of withdrawals with previous reporting year
About the same

Total water discharges at this facility (megaliters/year)
209

Comparison of discharges with previous reporting year
Lower

Total water consumption at this facility (megaliters/year)
3759

Comparison of consumption with previous reporting year
About the same

Please explain
Water use was about the same in 2018 due to about the same amount of generation at the West Phoenix Power Plant. 2017 consumption was 3,680 megaliters compared to 3,759 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 a decrease of water discharged in 2018 due to consistent operation of the ZLD system. Year-to-year changes of less than 5% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 4

Facility name (optional)
Ocotillo Power Plant

Country/Region
United States of America

River basin
Other, please specify (Phoenix Active Management Area)

Latitude
33.428888

Longitude
-111.910277

Primary power generation source for your electricity generation at this facility
Gas

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
847

Comparison of withdrawals with previous reporting year
Higher

Total water discharges at this facility (megaliters/year)
138

Comparison of discharges with previous reporting year
Higher

Total water consumption at this facility (megaliters/year)
709

Comparison of consumption with previous reporting year
Higher

Please explain
Water use was higher in 2018 due to increased generation at the Ocotillo Power Plant, associated with reduction in natural gas prices and increased use of the steam units. 2017 consumption was 627 megaliters compared to 709 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 5

Facility name (optional)
Sundance Power Plant

Country/Region
United States of America

River basin
Other, please specify (Pinal Active Management Area)

Latitude
32.927941

Longitude
-111.588993

Primary power generation source for your electricity generation at this facility
Gas

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
313

Comparison of withdrawals with previous reporting year
Higher

Total water discharges at this facility (megaliters/year)
0

Comparison of discharges with previous reporting year
About the same

Total water consumption at this facility (megaliters/year)
313

Comparison of consumption with previous reporting year
Higher

Please explain
5% less power was generated at the Sundance Power Plant in 2018, however this resulted in slightly more water used. 2017 consumption was 297 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 6

Facility name (optional)
Saguaro Power Plant

Country/Region
United States of America

River basin
Other, please specify (Tucson Active Management Area)

Latitude
32.553903

Longitude
-111.299829

Primary power generation source for your electricity generation at this facility
Gas

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
22

Comparison of withdrawals with previous reporting year
Much higher

Total water discharges at this facility (megaliters/year)
0

Comparison of discharges with previous reporting year
About the same

Total water consumption at this facility (megaliters/year)
22

Comparison of consumption with previous reporting year
Much higher

Please explain
Power production at the Saguaro Power Plant was much higher in 2018 resulting in increased water use. Even though water use is classified as much higher, there was only a difference of 3 megaliters from 2017 to 2018. Decommissioning of old steam Units at Saguaro was completed in 2017 and improvements to well infrastructure will ensure a reliable water supply remains available to support current and future generation. 2017 consumption was 19 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number

Facility 7

Facility name (optional)
Cholla Power Plant

Country/Region
United States of America

River basin
Other, please specify (Joseph City Irrigation Non-expansion Area)

Latitude
34.940654

Longitude
-110.299623

Primary power generation source for your electricity generation at this facility
Coal - hard

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
12240

Comparison of withdrawals with previous reporting year
About the same

Total water discharges at this facility (megaliters/year)
0

Comparison of discharges with previous reporting year
About the same

Total water consumption at this facility (megaliters/year)
12240

Comparison of consumption with previous reporting year
About the same

Please explain
Power production at Cholla was about the same in 2018 resulting in about the same water consumption. Power production and water use difference from 2017 to 2018 was only 1%. 2017 consumption was 12,104 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 8

Facility name (optional)
Four Corners Power Plant

Country/Region
United States of America

River basin
Other, please specify (San Juan)

Latitude
36.685009

Longitude
-108.479176

Primary power generation source for your electricity generation at this facility
Coal - hard

Oil & gas sector business division

<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
22224

Comparison of withdrawals with previous reporting year
About the same

Total water discharges at this facility (megaliters/year)
4019

Comparison of discharges with previous reporting year
Lower

Total water consumption at this facility (megaliters/year)
18205

Comparison of consumption with previous reporting year
About the same

Please explain
Water use at the Four Corners Power Plant was about the same in 2018 however generation was much higher than in 2017. 2017 consumption was 17,584 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year- to-year changes over 15% were considered "much higher"/'much lower".

Facility reference number
Facility 9

Facility name (optional)
Yucca Power Plant

Country/Region
United States of America

River basin
Other, please specify (Colorado River)

Latitude
32.719722

Longitude
-114.713333

Primary power generation source for your electricity generation at this facility
Gas

Oil & gas sector business division
<Not Applicable>

Total water withdrawals at this facility (megaliters/year)
828

Comparison of withdrawals with previous reporting year
Much higher

Total water discharges at this facility (megaliters/year)
0

Comparison of discharges with previous reporting year
About the same

Total water consumption at this facility (megaliters/year)
828

Comparison of consumption with previous reporting year
Much higher

Please explain
Power generation was much higher at Yucca due to increased operation of the water-intensive steam unit resulting in much higher

water use. 2017 consumption was 612 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% were considered "about the same". Year-to-year changes between 5% and 15% were considered "higher"/"lower". Year-to-year changes over 15% were considered "much higher"/'much lower".

W5.1a

(W5.1a) For each facility referenced in W5.1, provide withdrawal data by water source.

Facility reference number
Facility 1

Facility name
Palo Verde Generating Station

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
90

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
2313

Produced/Entrained water
0

Third party sources
87917

Comment
Third party sources for purposes of this report is reclaimed water.

Facility reference number
Facility 2

Facility name
Red Hawk Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
0

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
551

Produced/Entrained water
0

Third party sources
4235

Comment
Third party sources for purposes of this report is reclaimed water.

Facility reference number
Facility 3

Facility name
West Phoenix Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
0

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
3968

Produced/Entrained water
0

Third party sources
0

Comment
Groundwater is the main source of cooling water.

Facility reference number
Facility 4

Facility name
Ocotillo Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
0

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
847

Produced/Entrained water
0

Third party sources
0

Comment
Groundwater is the main source for cooling water.

Facility reference number
Facility 5

Facility name
Sundance Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
313

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
0

Produced/Entrained water

0

Third party sources
0

Comment
Surface water is the main source for cooling water. APS entered into an exchange agreement with the Gila River Indian Community (GRIC) for this water supply. The way the exchange works is APS will receive GRIC CAP Indian Priority water directly at its turnout at the Sundance Facility and will exchange Long Term Storage Credits that will be recovered at one or more of the recovery wells pursuant to a Recovery Well Permit which will then be used by the GRIC.

Facility reference number
Facility 6

Facility name
Saguaro Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
0

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
22

Produced/Entrained water
0

Third party sources
0

Comment
Groundwater is the main source for cooling water.

Facility reference number
Facility 7

Facility name
Cholla Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
248

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
11992

Produced/Entrained water
0

Third party sources
0

Comment
Groundwater is the main source for cooling water.

Facility reference number
Facility 8

Facility name

Four Corners Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
22224

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
0

Produced/Entrained water
0

Third party sources
0

Comment
Surface water from the San Juan River is the main source for cooling water.

Facility reference number
Facility 9

Facility name
Yucca Power Plant

Fresh surface water, including rainwater, water from wetlands, rivers and lakes
56

Brackish surface water/seawater
0

Groundwater - renewable
0

Groundwater - non-renewable
772

Produced/Entrained water
0

Third party sources
0

Comment
Groundwater and Colorado River water (surface water) is the main source for cooling water.

W5.1b

(W5.1b) For each facility referenced in W5.1, provide discharge data by destination.

Facility reference number
Facility 1

Facility name
Palo Verde Generating Station

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater

0

Third party destinations
0

Comment
Zero liquid discharge facility

Facility reference number
Facility 2

Facility name
Red Hawk Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
0

Comment
Zero liquid discharge facility

Facility reference number
Facility 3

Facility name
West Phoenix Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
209

Comment
Discharge to the City of Phoenix sanitary sewer

Facility reference number
Facility 4

Facility name
Ocotillo Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
138

Comment

Discharged to the City of Tempe sanitary sewer

Facility reference number
Facility 5

Facility name
Sundance Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
0

Comment
Zero Liquid Discharge Facility

Facility reference number
Facility 6

Facility name
Saguaro Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
0

Comment
Zero Liquid Discharge Facility

Facility reference number
Facility 7

Facility name
Cholla Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
0

Comment
Zero Liquid Discharge Facility

Facility reference number
Facility 8

Facility name

Four Corners Power Plant

Fresh surface water
4019

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
0

Comment
In 2018, about the same amount of water was returned back into the environment than in 2017. Water is ultimately discharged back into the San Juan River.

Facility reference number
Facility 9

Facility name
Yucca Power Plant

Fresh surface water
0

Brackish surface water/Seawater
0

Groundwater
0

Third party destinations
0

Comment
No comment.

W5.1c

(W5.1c) For each facility referenced in W5.1, provide the proportion of your total water use that is recycled or reused, and give the comparison with the previous reporting year.

Facility reference number
Facility 1

Facility name
Palo Verde Generating Station

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
Palo Verde is a ZLD facility, recycling 95% of water used by increasing COC in cooling towers up to 25 times; the blowdown is discharged to evaporation ponds.

Facility reference number
Facility 2

Facility name
Red Hawk Power Plant

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
Red Hawk is also a zero liquid discharge (ZLD) site, meaning that all water is continually reclaimed and reused. No water is released to the environment and blowdown water is distilled to remove impurities and is continually reused in the system. Water loss at the plant is primarily through evaporation in the cooling towers.

Facility reference number
Facility 3

Facility name
West Phoenix Power Plant

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
West Phoenix is a zero liquid discharge (ZLD) site, meaning that all water is continually reclaimed and reused. No water is released to the environment and blowdown water is distilled to remove impurities and is continually reused in the system. Water loss at the plant is primarily through evaporation in the cooling towers.

Facility reference number
Facility 4

Facility name
Ocotillo Power Plant

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
Ocotillo recycles 90% of water used by increasing the cycles of concentration in cooling towers up to 8 times; the blowdown is discharged to the sewer.

Facility reference number
Facility 5

Facility name
Sundance Power Plant

% recycled or reused
None

Comparison with previous reporting year
<Not Applicable>

Please explain
None of the water at Sundance is recycled.

Facility reference number
Facility 6

Facility name
Saguaro Power Plant

% recycled or reused
None

Comparison with previous reporting year
<Not Applicable>

Please explain
None of the water at Saguaro is recycled.

Facility reference number
Facility 7

Facility name
Cholla Power Plant

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
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

---

Facility reference number
Facility 8

Facility name
Four Corners Power Plant

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
Four Corners uses a cooling lake, returns approximately 20% of water used to the source, and recycles the remaining 80%.

Facility reference number
Facility 9

Facility name
Yucca Power Plant

% recycled or reused
76-99%

Comparison with previous reporting year
<Not Applicable>

Please explain
Yucca recycles 85% of water used by increasing cycles of concentration in cooling towers up to 8 times.

W5.1d

(W5.1d) 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. The 3rd party verification report is attached at W-FI in Section 11.

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. The 3rd party verification report is attached at W-FI in Section 11.

Water withdrawals – quality

% verified
Not verified

What standard and methodology was used?
Water quality was 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. The 3rd party verification report is attached at W-FI in Section 11.

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. The 3rd party verification report is attached at W-FI in Section 11.

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. The 3rd party verification report is attached at W-FI in Section 11.

Water discharge quality – quality by standard effluent parameters

% verified
Not verified

What standard and methodology was used?
Water discharge quality by standard eluent parameters was not verified.

Water discharge quality – temperature

% verified
Not verified

What standard and methodology was used?
Water discharge quality - temperature was 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. The 3rd party verification report is attached at W-FI in Section 11.

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. The 3rd party verification report is attached at W-FI in Section 11.

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 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 Recognition of environmental linkages, for example, due to climate change	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 details the main components of the water resource management program which encompass 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 identifying 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 EUISSCA survey which include water-related issues, standards, policies, and processes. In addition, we plan to identify opportunities for suppliers to reduce their water impact and risk. Also, we plan to include water related questions in our sourcing questionnaire where responses are evaluated against an environmental sustainability weighting in the overall bid review. We are also updating 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 covers water issues.

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 the Chairmen of the Board and Chief Executive Officer of Arizona Public Service Company, has the highest level of direct responsibility for water within our organization. The Chief Executive Officer reviews material water issues twice per year via the SEC reporting process and Board of Director's Top Risk 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.

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 to provide assurance that the Company's risk management processes are well adapted to and consistent with the Company's business and strategy. 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. Management also assists the Human Resources Committee in recommending: salary levels; annual incentive plan structure and design, including earnings and business unit performance targets or goals. 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; the principal non-nuclear business functions of the Company and APS, including fossil energy generation, energy transmission and delivery, customer service, and receives reports on the Company's sustainability initiatives and strategy. Water issues received added attention in 2018 as Arizona debated participation in the Drought Contingency Plan, and APS executives had an opportunity to receive updates on this issue and provide feedback on our position. When passed, this Plan provided a strategic framework and cooperative atmosphere for the Lower Colorado River Basin States to more effectively manage the shared water supply.

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 Chairman of the Board, President and Chief Executive Officer of Pinnacle West and the Chairman of the Board and Chief Executive Officer of Arizona Public Service Company, has the highest level of direct responsibility for water within our organization. The Chief Executive Officer reviews material water issues twice per year via the SEC reporting process and Board of Director's Top Risk Report. Briefings included status of the Drought Contingency Plan that keeps water in Lake Mead to avoid future shortages on the Colorado River.

W-FB6.4/W-CH6.4/W-EU6.4/W-OG6.4/W-MM6.4

(W-FB6.4/W-CH6.4/W-EU6.4/W-OG6.4/W-MM6.4) Do you provide incentives to C-suite employees or board members for the management of water-related issues?
Yes

W-FB6.4a/W-CH6.4a/W-EU6.4a/W-OG6.4a/W-MM6.4a

(W-FB6.4a/W-CH6.4a/W-EU6.4a/W-OG6.4a/W-MM6.4a) 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)?

	Who is entitled to benefit from these incentives?	Indicator for incentivized performance	Please explain
Monetary reward	Chief Sustainability Officer (CSO) Other C-suite Officer (VP of Fossil Generation)	<Not Applicable>	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 executive incentive plans promotes our performance. Our use of business unit metrics in our executive incentive plans promotes 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 to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year. The goal in 2018 was to reduce consumption of non-renewable water by 12% compared to the 2014 baseline year. 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.
Recognition (non-monetary)	Chief Sustainability Officer (CSO) Other C-suite Officer (VP of Fossil Generation)	<Not Applicable>	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 executive's incentive plans promotes our performance. Our use of business unit metrics in our executive's incentive plans promotes 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 to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year.
Other non-monetary reward	Chief Sustainability Officer (CSO) Other C-suite Officer (VP of Fossil Generation)	<Not Applicable>	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 executive incentive plans promotes our performance. Our use of business unit metrics in our executive incentive plans promotes 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 to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year.

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)

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 while developing comprehensive strategies that promote water sustainability in APS customer service areas. APS develops a biannual 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 Plan 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 850 MW of battery systems and at least 100 MW of new solar generation by 2025, for a total of 950 MW of new clean energy technology. Through our use of renewable energy and energy efficiency programs (including water heater timers) we project significant avoided water usage. APS forecasts out 15 years because this the term out Resource Plan extends, 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 include Water Investment, Research and Technology, Water Metrics/Initiatives, Well and Pumping Equipment Reliability Program, Water Supply Contingency Initiative, Water Intensity, Wellfield Operations Management Plans, and Data Collection. APS forecasts out 15 years for consistency with ACC Resource Plan requirements and to react to market changes and generation needs. Market changes include price of water, customer growth, economic conditions, drought, and generation needs are influenced by residential and commercial developments that required 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 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 out 15 years due to market changes and generation needs and for consistency with ACC 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 approximately $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 health program in 2015, and expanded the program in 2017 to a well and pumping equipment reliability program. 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 2018. The result is that both capital and operating expenditures have levelled out to a steady, planned amount instead of fluctuating from year to year due to unexpected failures. Reductions in cost in future years due to less need for water will be offset by inflation.

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 what our future resource mix, this is captured by our IRP. Our stakeholders are providing us with the necessary inputs as we update our IRP, part of these considerations includes the potential use of a climate-related scenario analysis. Although a formal climate-related scenario analysis has not been used to inform our business strategy in the past, we have successfully implemented strategies for reducing the carbon intensity of our electricity generation through our Integrated Resource Plan (IRP). In addition, the Company is currently assessing the use of a climate-scenario analysis. In 2018, 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 acquisition of new water supplies or extension of existing agreements will escalate faster than the standard rate of inflation. A recent market analysis performed for the Company's Water Resource Management group indicated that the cost of many water supplies is increasing at a rate of 8% to 10% per year. Additionally, operation of the Water Reclamation Facility at Palo Verde and Redhawk Power Station adds more than $1 and $0.60 per MWh, respectively, to each plant's O&M 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.

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	In 2016, APS created a Tier 1 (our highest company metrics) water metric designed to reduce the quantity of non-renewable groundwater consumed. The goal to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year. The 2017 goal is a 10 percent reduction and the 2018 goal is a 12 percent reduction and 2019 will be 14%. APS established these targets because 16 percent of the fleet's water demand is supplied from groundwater. Initiatives are underway to conserve groundwater, including early retirement of additional coal units, implementation of well field operations plans, and further development of 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 16 percent of the fleet's water demand is supplied from groundwater.

Beginning in 2016 the target for this metric is an 2% reduction per year from the 2014 baseline groundwater consumption. For 2017 the goal was a 10 percent reduction from the 2014 baseline year. 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
2018

% achieved
100

Please explain
The 2018 target of 12% reduction compared to 2014 was achieved, with 13.4% reduction documented. The goal for 2019 is for a 14% 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 non-renewable water consumption by 50% by 2026.

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%, equating to 5 unplanned failures. Water Resource Management (WRM) established a goal to increase the reliability rate by 2%/year through 2019, resulting in a 98% reliability rate in 2019, equating to one unplanned failure per year. The rate in 2018 was 2%.

Quantitative metric
Other, please specify (Well and Pumping Equipment Reliability)

Baseline year
2015

Start year
2016

Target year
2019

% achieved
98

Please explain
The 2016 result was 98% reliability, exceeding the goal of 92% reliability. The 2017 result was 96% reliability, exceeding the goal of 94% reliability. The 2018 result was 98%, exceeding the goal of 96% reliability.

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. The goal to reduce consumption of non-renewable water by 8 percent in 2016 as compared to a 2014 baseline year. The 2017 goal is a 10 percent reduction and the 2018 goal is a 12 percent reduction. APS established these targets because 16 percent of the fleet's water demand is supplied from groundwater. Initiatives are underway to conserve groundwater, including early retirement of additional coal units, implementation of well field operations plans, and further development of implementation of Renewable Energy, Distributed Generation and Energy Efficiency programs. At Cholla, APS modelled water use, developed a well field operation plan and provided water conservation recommendations. APS also developed a plant operations plan that included evaluation of water quality at each well.

Baseline year
2014

Start year
2015

End year
2018

Progress
Plant well field staff have incorporated recommendations into Daily Operations Reports and are using the highest quality water available. Plant water use in 2017 was essentially equal to 2018. The Cholla model has enabled monitoring of the impacts of reduced groundwater pumping associated with reduced generation, showing that groundwater levels are rising across the wellfield and that water quality improvements have been measured, due to decreased pumping from lower levels in the aquifer.

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
APS plans to reduce fleet wide water intensity by 20 percent by 2025. This will be accomplished by retiring older water intensive units and replacing them with more efficient units, increasing use of solar photo-voltaic and wind generation, increasing energy efficiency programs, and implementing water conservation plans at all power plants. This goal is important to the company because it will help APS reduce the amount of water used and help APS move towards achieving water security.

Baseline year
2014

Start year
2015

End year
2025

Progress
Reductions in fleet water intensity from 2012 through 2018 were 17.2%, on-target for the goal of 20% reduction by 2025. The indicators used to assess progress are based on the increased number of megawatts resulting from increasing use of solar photovoltaic and wind generation and the number of older water intensive units that have been retired and replaced with 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% more efficient than the steam units.

W9. Linkages and trade-offs

W9.1

(W9.1) Has your organization identified any linkages or tradeoffs between water and other environmental issues in its direct operations and/or other parts of its value chain?

Yes

W9.1a

(W9.1a) Describe the linkages or tradeoffs and the related management policy or action.

Linkage or tradeoff

Linkage

Type of linkage/tradeoff

Other, please specify (Coal Combustion Residual)

Description of linkage/tradeoff

The Coal Combustion Residual (CCR) rules require closure of unlined ponds three years after operations cease. APS estimates that its share of incremental costs to comply with the CCR rule for Four Corners is approximately $22 million and its share of incremental costs to comply with the CCR rule for Cholla is approximately $20 million. The Navajo Plant currently disposes of CCR in a dry landfill storage area. APS estimates that its share of incremental costs to comply with the CCR rule for the Navajo Plant is approximately $1 million. APS is working to minimize the quantity of water sent to the impoundments to meet the coal combustion residual rules, allowing closure within three years of ceasing operations. The linkage of complying with the CCR Rule will lead to reduced water consumption.

Policy or action

Groundwater models have been developed that distinguish between wells with variable water quality (TDS). Modeling demonstrated that by using the lower TDS well water for plant cooling water, the cooling towers are able to achieve higher cycles of concentration, reducing water consumption and reducing the quantity of wastewater sent to the fly ash pond. This will reduce the quantity of water that must be evaporated to allow pond closure. This helps APS meet its business strategy by achieving conservation by the efficient use of water while enhancing our ability to meet the CCR program requirements to close CCR Units within 3 years of ceasing plant operations. In addition, the models enable development and implementation of a strategic water resource management program that will provide APS timely and reliable information to manage APS's water resources portfolio in support of the safe and efficient generation of electricity for the long term.

Linkage or tradeoff

Linkage

Type of linkage/tradeoff

Other, please specify (PM-10)

Description of linkage/tradeoff

Palo Verde Generating Station and Redhawk Power Plant are located in Maricopa County, Arizona; a non-attainment area for PM-10. Therefore, cooling tower emissions are limited. At the same time, the Arizona Department of Water Resources cooling tower water efficiency requirements require cycling up cooling tower circulation water 15 times prior to blowdown, potentially increasing PM-10 emissions. APS operates the cooling towers in a manner that ensures compliance with the PM-10 non-attainment area limits while meeting the water conservation requirements that result in reduced water consumption.

Policy or action

APS exceeds the ADWR water conservation requirements of 15 cycles of concentration (currently 25 cycles achieved) and also meets the PM-10 requirements of the non-attainment area. Both air and water limits are met, consistent with our policy to comply with all regulatory requirements.

Linkage or tradeoff

Linkage

Type of linkage/tradeoff

Other, please specify (Water-Energy Nexus)

Description of linkage/tradeoff

APS has been keenly aware of what the nation has come to know as the 'water-energy nexus' for many years i.e., that it takes water to generate power and it takes power to treat and deliver water. This is a well understood concept in the Arizona desert. Whether for creating steam to drive the turbines in coal-, natural gas- or nuclear-powered generating units or for cooling the equipment in combustion turbine units, all electric steam-generating plants use water. Since water is such a precious commodity in the desert Southwest, it is imperative that APS uses it as efficiently as possible.

Policy or action

At the Ocotillo Power Plant, APS elected to replace two old steam units that are highly water intensive, with new combustion turbines that incorporate hybrid cooling, a technology that will result in an 85% decrease in water consumption. APS will continue to decrease water intensity as the renewable portfolio is expanded. To date, APS has a diverse portfolio of existing renewable resources totaling 2239 MW, including solar, wind, geothermal, biomass and biogas. APS's strategy to achieve its RES requirements includes executing purchased power contracts for new facilities, ongoing development of distributed energy resources and procurement of new facilities to be owned by APS. Finally, APS's energy efficiency programs reduce the energy needed by our customers, and reduce the need to supply water-intensive generation. Water intensity (gal/MWh) is used internally to track progress toward achievement of APS goals to reduce water intensity by 20% by 2025 from 2014 values. In the next 5 years, we plan to reach 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.

W10. Verification

W10.1

(W10.1) Do you verify any other water information reported in your CDP disclosure (not already covered by W5.1d)?

No, we do not currently verify any other water information reported in our CDP disclosure

W11. 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.

Water verification data provided on page 3 of the attached report.

W11.1

(W11.1) Provide details for the person that has signed off (approved) your CDP water response.

	Job title	Corresponding job category
Row 1	President of APS and Executive Vice President, Public Policy of Pinnacle West (President-equivalency)	President

W11.2

(W11.2) 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

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

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

Please confirm below

I have read and accept the applicable Terms