جهـــاز التخطيـــط والإحصـــاء
Planning and Statistics Authority
State of Qatar • دولـــة قطـــر

WATER STATISTICS

In the state of Qatar

2021

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In the State of Qatar, 2021

November 2022

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Preface

Allah the Exalted said in Holy Quran: "We made from water every living thing" *. Hence, water is life!

The protection of our national natural freshwater resources is part of our National Development Strategy.

Qatar relies on seawater desalination as the main source for drinking water and on groundwater abstraction for agricultural purposes. The re-use of treated wastewater has become an important alternative source of water for agricultural and green spaces irrigation.

Water policies of Qatar have achieved several successes, including safe drinking water for all population, minimum water loss, high-level treatment of urban wastewater and re-use of large proportions of treated wastewater. Statistics show that water use efficiency has increased in most economic sectors.

However, our fresh groundwater reserves are still being overexploited, which leads to lower groundwater levels and increased salinity. This, in turn, makes it difficult to use the groundwater for irrigation and drinking water purposes in the future.

According to available statistics, there is still the potential to increase the re-use of treated wastewater, so that household and economic activities will become more efficient in water consumption and reduction of water loss.

All these measures will together contribute to water and food security and to sustainable development as per Qatar National Vision 2030.

This Water Statistics Report gives a comprehensive overview on water sources and uses. Publishing these statistics is an important step to support knowledge-based decision-making in the water sector.

Dr. Saleh M. Al-Nabit

President of the Planning and Statistics Authority

Acknowledgement

The Planning and Statistics Authority extends its sincere thanks and appreciation to the ministries and government institutions and agencies for their cooperation in providing the necessary data, which had a significant effect in preparing the report and measuring the progress of water indicators in the State of Qatar. The Planning and Statistics Authority also extends its thanks to everyone who has contributed to the preparation of the Water Statistics Report in all its stages

Contents

Preface
Acknowledgement
Table of Contents

1- General information

2- Water Indicators in the 2030 SDGs

3- Water resources

3-1 Rationale

3-2 Key Messages

3-3 Statistics and Indicators

3-3-1 Rainfall

3-3-2 Groundwater Balance

4- Water production, Abstraction and Use

4-1 Rationale

4-2 Key Messages

4-3 Statistics and Indicators

4-3-1 Water production and re-use

4-3-2 Water use by economic activity

4-3-3 Water loss

4-3-4 Water use in agricultural activity

4-3-5 Water use in industrial and construction activity

4-3-6 Water use in commercial activity

4-3-7 Water use in government activity

4-3-8 Water use in domestic activity

4-3-9 Demand for water

4-3-10 Water use balance

5- Urban Wastewater Production, Collection, Treatment and Discharge

5-1 Rationale

5-2 Key Messages

5-3 Statistics and Indicators

5-3-1 Urban wastewater collection and treatment infrastructure

5-3-2 Treatment efficiency of urban wastewater treatment plants

5-3-3 Sewage sludge generation

5-3-4 Urban generated, collected and treated wastewater

5-3-5 Discharge and re-use of Treated Sewage Effluent (TSE)

6- Annexes

- Definitions
- List of Acronyms
- References and Data Sources
- Tables

GENERAL INFORMATION

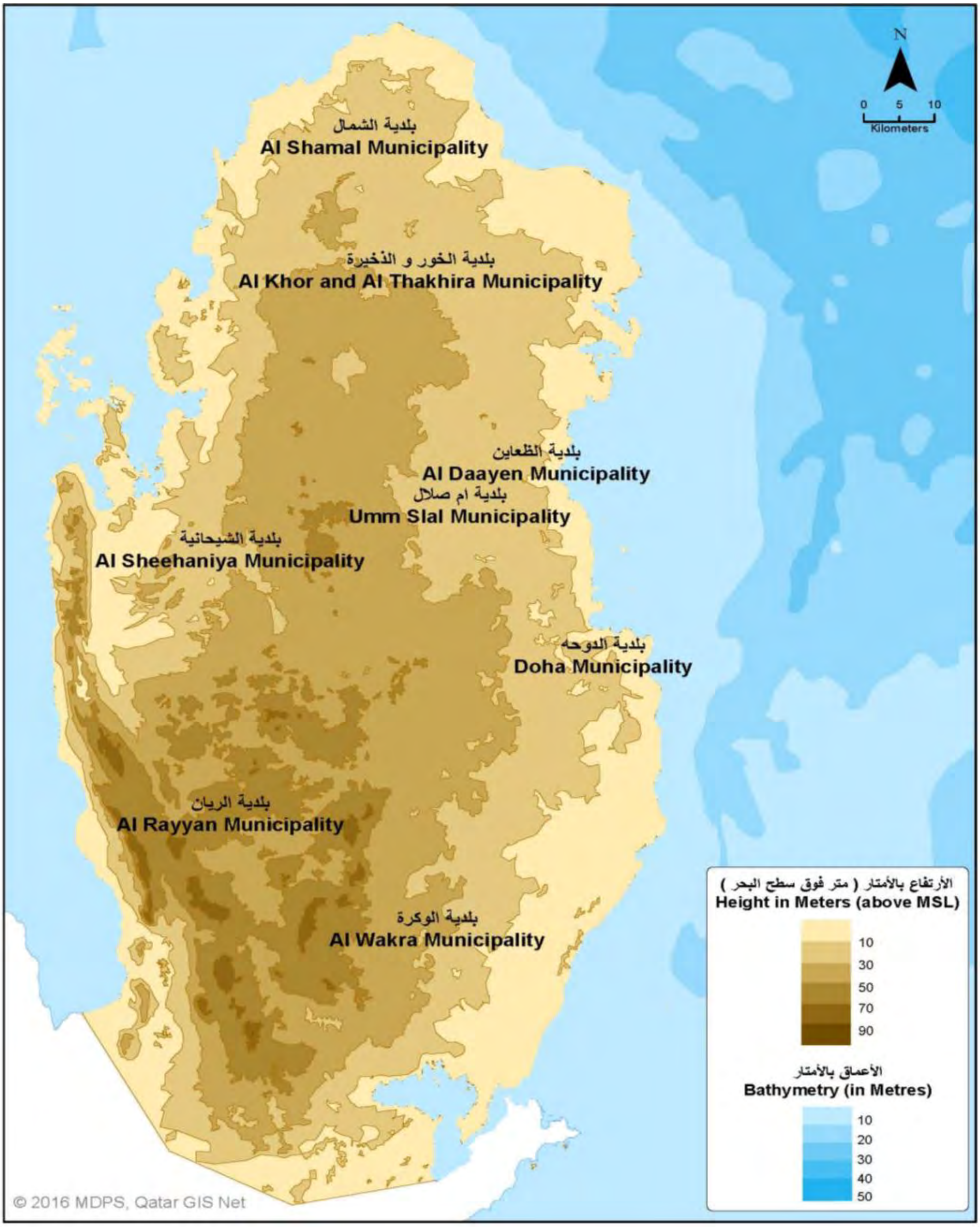
1. General Information

Qatar is situated midway along the western coast of the Arabian Gulf between latitudes 24.27˚-26.10˚ North and longitudes 50.45˚–51.40˚ East. Its surface area is 11,636.8 km2, which includes several small islands in the Arabian Gulf such as Halul, Shira'who, Ashat and Al-Bishiria.

The peninsula is approximately 185 km in length and 85 km in width. The waters of the Arabian Gulf surround the majority of the country, while the only land border of about 60 km separates the country from the Kingdom of Saudi Arabia. The United Arab Emirates lie to the east and Bahrain to the northwest of the country.

Qatar, in general, consists of flat rocky surfaces. It does, however, include some hills which reach an altitude of 100 m above sea level. Most of the country's land is sandy desert covered with scrub plants and loose gravel. Moving sand dunes, with an average height of about 40 meters, are found in the southern part of the country and in the northeastern coast near Ras Laffan. The northern part of Qatar is relatively low and rises gradually to the west and southwest (See Map1-1).

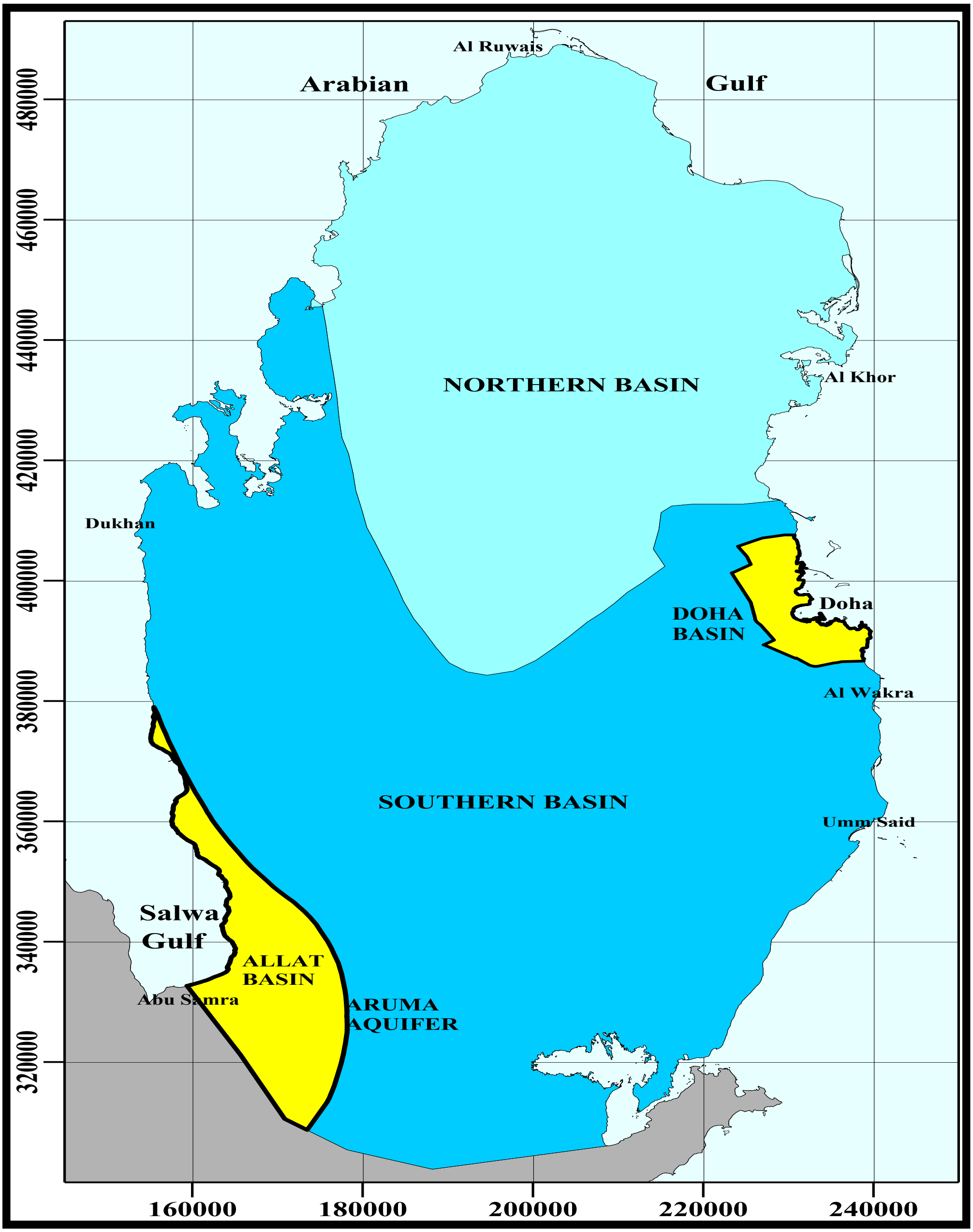
Map 1-1: Relief Map of Qatar



Source: Planning and Statistics Authority

Qatar's main groundwater basins include the Northern Basin, Southern Basin, Doha basin and the Allat Basin (See Map 2-1).

Map 2-1: Groundwater Basins in the State of Qatar



Source: Ministry of Environment and Climate Change

WATER INDICATORS
IN 2030 SDGS

2. Water Indicators in the 2030 SDGs

Table 2-1: Water indicators in sustainable developments (2016-2021)

Goal	Target	Indicator	Indicator Name	2016	2017	2018	2019	2020	2021
3	3.9	3.9.2	Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)	0	0	0	0	0	0
3	3.9.2	3.9	Unsafe water	0	0	0	0	0	0
			Unsafe sanitation	0	0	0	0	0	0
			Lack of hygiene materials	0	0	0	0	0	0
6	6.1	6.1.1	Proportion of population using safely managed drinking water services	100%	100%	100%	100%	100%	100%
6	6.2	6.2.1	Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water	100%	100%	100%	100%	100%	100%
6	6.3	6.3.1	Proportion of wastewater safely treated	99.1%	98.9%	99.4%	99.6%	99.7%	99.7%
6	6.3	6.3.2	Proportion of bodies of water with good ambient water quality	…	…	…	…	…	…
6	6.4	6.4.1	Change in water-use efficiency over time	Water Efficiency in the Agricultural, Industrial and Commercial Sector (QR/L)					
			Value added of agricultural activities (at constant prices 2018) (QR)/ amount of water used in the agricultural sector (liters)	0.004	0.004	0.005	0.005	0.005	0.006

Goal	Target	Indicator	Indicator Name	2016	2017	2018	2019	2020	2021
			Value added of industrial activities (at constant prices 2018) (QR)/ amount of water used in the industrial sector (liters)	16.8	33.9	15.6	11.6	13.2	12.8
			Value added of commercial activities (at constant prices 2018) (QR)/ amount of water used in the commercial sector (liters)	0.9	3.2	7.2	2.3	2.0	2.3
6	6.4	6.4.2	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	229%	247%	247%	280%	396%	236%
6	6.5	6.5.1	Degree of integrated water resources management implementation (0-100%)	80%	82%	82%	81%	90.5	9.7
6	6.b	6.b.1	Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	100%	100%	100%	100%	100%	100%

...: Unavailable from source

Source: Qatar Sustainable Development Goals Report 2016-2021

WATER RESOURCES

3.Water Resources

3.1 Rationale

Qatar’s only natural freshwater resources are rainfall and groundwater. The conservation of the quality and quantity of the country’s groundwater resources is one of the targets of Qatar’s National Development Strategy.

Table 3-1 shows the natural long-term water balance (1998–2021) of Qatar’s groundwater basins. The groundwater safe yield amounted to 54.2 million m^3 per year. However, the current groundwater abstraction reached 250 million m^3 per year, leading to depletion of aquifers, low groundwater levels and increased salinity.

There are several ongoing projects to artificially increase the water recharge into aquifers (e.g. via recharge wells) and the artificial injection of TSE and distilled water. The irrigation return flow plays a significant role the overall water balance

Table 3-1: Natural water balance of Qatar’s aquifers (Annual average 1998-2021)

No.	Water Balance	Million M^3/Year	Data Source
1	Recharge of aquifers from rainfall	**72.2**	Qatar General Electricity and Water Corporation (Long-term annual average 1998-2021)
2	Total renewable water resources*	**72.2**	
3	Groundwater outflow into sea and deep saline aquifers	**18.0**	Qatar General Electricity and Water Corporation (Long-term annual average 1998-2021)
4	Average annual water balance (groundwater safe yield) **	**54.2**	Subtraction result (2-3)

* FAO Aquastat, OECD, UNSD and Eurostat

** Without the returns from irrigation

Source: Qatar General Electricity and Water Corporation (Kahramaa)

3.2 Key Messages

a) During the period 2016-2021, the total rainfall (monitored at Doha International Airport) was lower than the long-term average rainfall (1962-2021). The total rainfall in 2021 in Doha International Airport made up 19% of the long-term average.

b) Water abstraction from fresh groundwater is mainly for agricultural purposes (about 230 million m^3 per year in recent years, i.e. 92% of total abstracted groundwater).

c) The annual water deficit (mainly caused by groundwater abstraction) varied between 57 million m^3/year and 184 million m^3/year during the period 2016-2021.

d) Artificial recharge of groundwater aquifers by TSE injection, recharge wells and recharge from irrigation are the main source for the national groundwater reserve (22% of the annual additions to groundwater reserves from irrigation water, 65% from artificial recharge and 13% from rainfall).

3.3 Statistics and Indicators

3.3.1 Rainfall

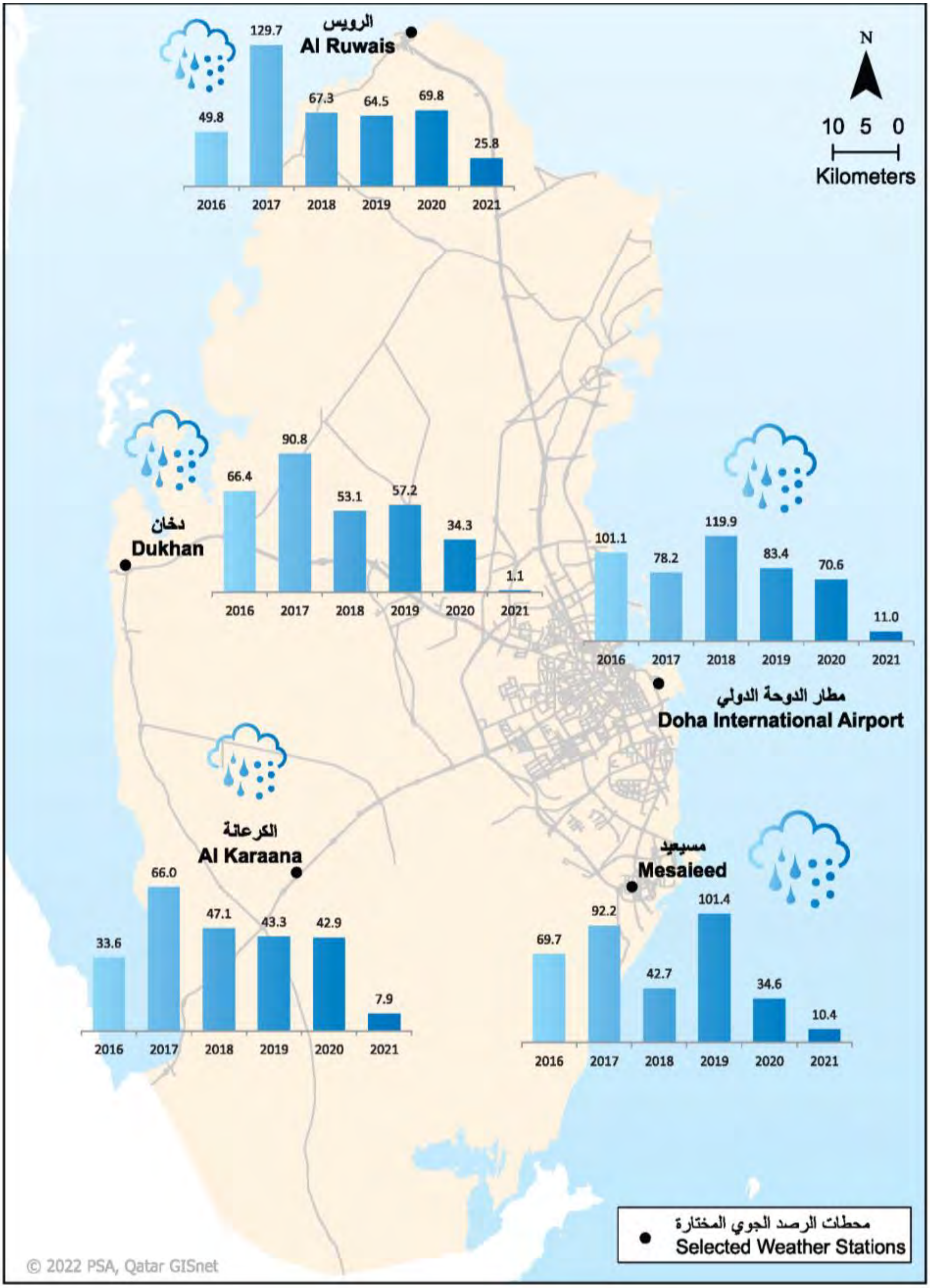
Compared to the long-term average rainfall (1962-2021), the year 2021 is considered relatively dry with a total rainfall of 11.0 mm at Doha International Airport Station, i.e. 19% of the long-term average rainfall. In 2021, the highest annual rainfall was recorded at Al-Ruwais Station vis-à-vis the other monitoring stations, whereas the lowest rainfall (1.1 mm) was recorded in Dukhan Station (See Table 3-2).

Table 3-2: Rainfall average (mm) at selected monitoring stations in Qatar 2016-2021

Station (mm)	2016	2017	2018	2019	2020	2021
Mesaieed	69.7	92.2	42.7	101.4	34.6	10.4
Al-Ruwais	49.8	129.7	67.3	64.5	69.8	25.8
Dukhan	66.4	90.8	53.1	57.2	34.3	1.1
Doha Intl. Airport	101.1	78.4	119.9	83.4	70.6	11.0
Al-Karaana	33.6	66.2	47.1	43.3	42.9	7.9

Source: Civil Aviation General Authority – QMD

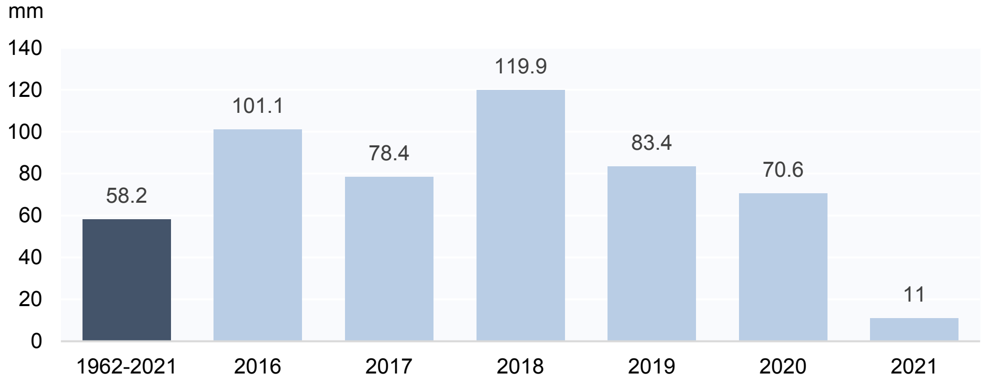
Map 2-2: Rainfall rate by years and selected stations (mm) 2016-2021



Source: Planning and Statistics Authority

Figure 3-1 below shows that the annual rainfall for all years during the period (2016-2021) was higher than the long-term annual average rainfall (1962-2021), except for the year 2021, where the annual rainfall rate reached 19% compared to the long-term annual rate (1962-2021).

Figure 3-1: Annual rainfall rate at Doha International Airport Station 2016-2021, compared

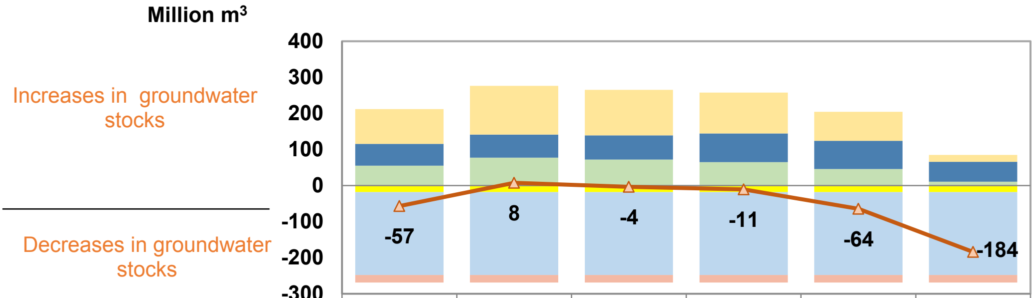


Source: Qatar Civil Aviation Authority, QMD

3.3.2 Groundwater Balance

below displays the groundwater balance during the period (2016-2021). The total groundwater reserve (total recharge from rainfall, artificial recharge and irrigation returns) decreased from 212 million m^3 in 2116 to 85 million m^3 in 2021. However, the decline in the aquifer (which includes municipal, industrial and agricultural withdrawals and flow to the sea) was relatively constant at about 269 million m^3 per year for the same period. This, in turn, led to an annual groundwater deficit ranging between 57 million m^3 and 184 million m^3 for the period (2016-2021).

Figure 3-2: The Increase and decrease in ground water reserve as a percentage of the total Water balance 2016-2021

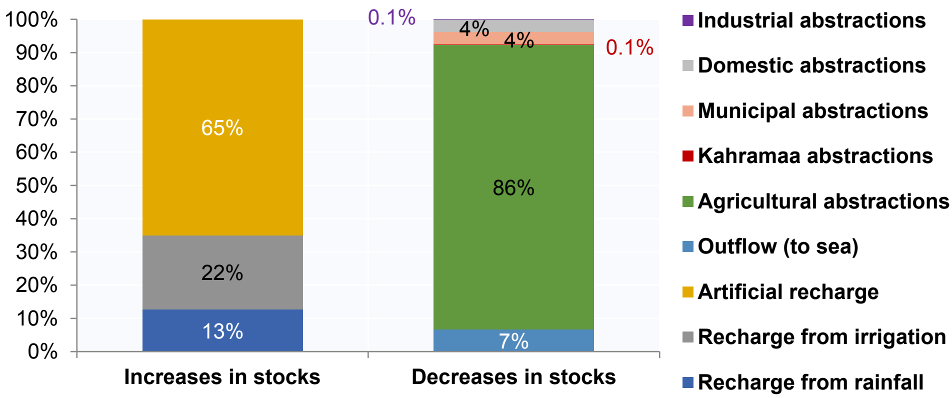


	2,016	2,017	2,018	2,019	2,020	2,021
Municipal and industrial abstractions	-21	-21	-21	-21	-21	-21
Agricultural abstractions	-230	-230	-230	-230	-230	-230
Outflow (to sea)	-18	-18	-18	-18	-18	-18
Recharge wells and irrigation recharge	96	135	126	113	80	19
TSE injection	60	64	67	80	78	55
Recharge from rainfall	55	77	72	65	46	11
Water balance	-57	8	-4	-11	-64	-184

Source: Ashghal, Kahramaa and computations by PSA

The artificial and irrigation recharge wells represent the largest source of additions to groundwater reserve. The decrease in groundwater reserve is attributed to water withdrawal for agricultural purposes. Figure 3-3 below shows the increase and decrease in water reserve in 2021.

Figure 3-3: Increase and decrease in groundwater reserve as a percentage of total water 2021



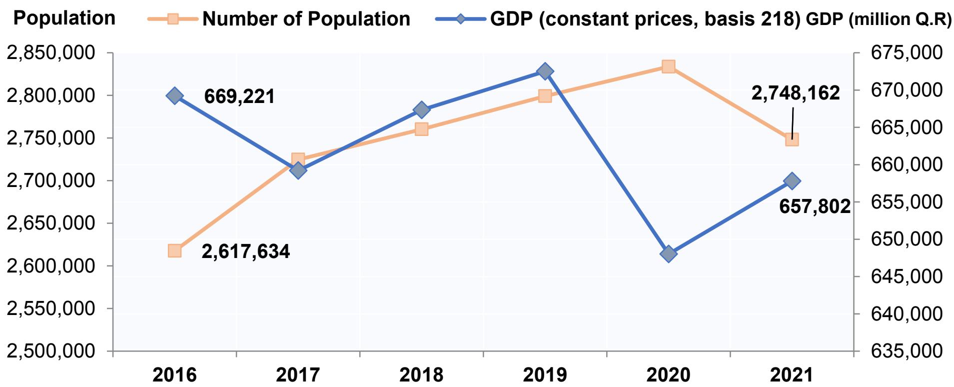
WATER PRODUCTION
ABSTRACTION AND USE

4. Water Production, Abstraction and Use

4.1 Rationale

Qatar's economy is rapidly growing with an ongoing population growth. Figure 4-1 below shows that during the period 2016-2021, the population rose from 2.6 million to 2.7 million people (4% growth rate). The annual GDP, however, decreased from QR 669 billion to QR 658 billion (-1% growth rate) for the same period. The measures taken to meet the water needs of Qatar's growing economy include the production of more water, increased water reuses and increased water use efficiency.

Figure 4-1: Population and GDP Growth (at constant price for 2018) 2016-2021



Source: Planning and Statistics Authority

The water available for use originates from the following sources:

1. Abstraction of fresh and saline groundwater.
2. Seawater desalination.
3. Re-use of Treated Sewage Effluent.

The potential future water sources include water generated by the GTL process, which is currently recycled in industries, where excess water is discharged without use. Data about the quantity of freshwater produced by the GTL process are currently not available.

4.2 Key Messages

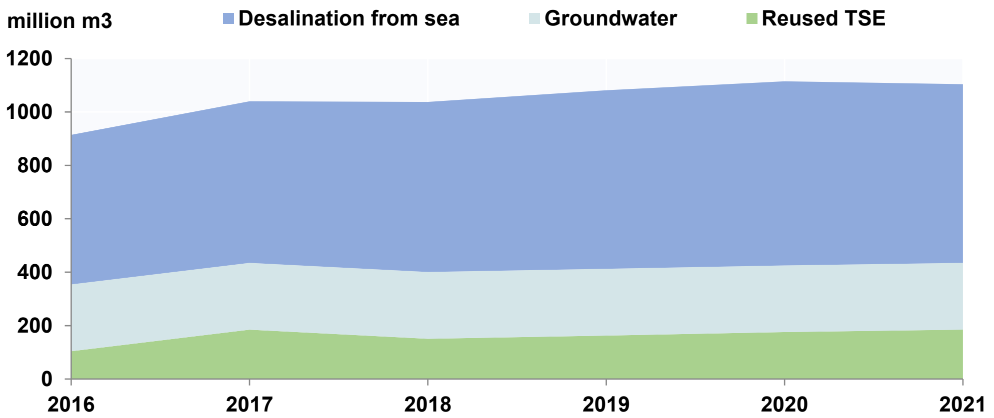
a) Total water production (desalination + fresh groundwater abstraction + re-use of TSE) rose from 914 million m^3 in 2016 to 1,104 million m^3 in 2021.
b) Water demand is accompanied with economic and population growth.
c) Since 2011, abstraction from groundwater aquifers has remained at the same annual level and has not shown a remarkable growth.
d) Real water loss of desalinated water was increased from 4% in 2016 to 6% in 2021.
e) In 2017 and 2018, productivity of water used in all economic activities has increased, while it decreased slightly during the period 2019-2021.

4.3 Statistics and Indicators

4.3.1 Water Production and Re-Use

Figure 4-2 below shows that in 2016, Qatar's only sources of water were groundwater abstraction (27%) and desalinated seawater (61%). In 2016, treated wastewater for agriculture and green spaces irrigation purposes reached 11%, and increased to 17% in 2021. It is noteworthy that in 2021 the main source of total water production was sea water desalination (61%), followed by groundwater abstraction (23%), and then reused TSE (16%).

Figure 4-2: Total water production and re-use by source of water (million m3) 2016-2021

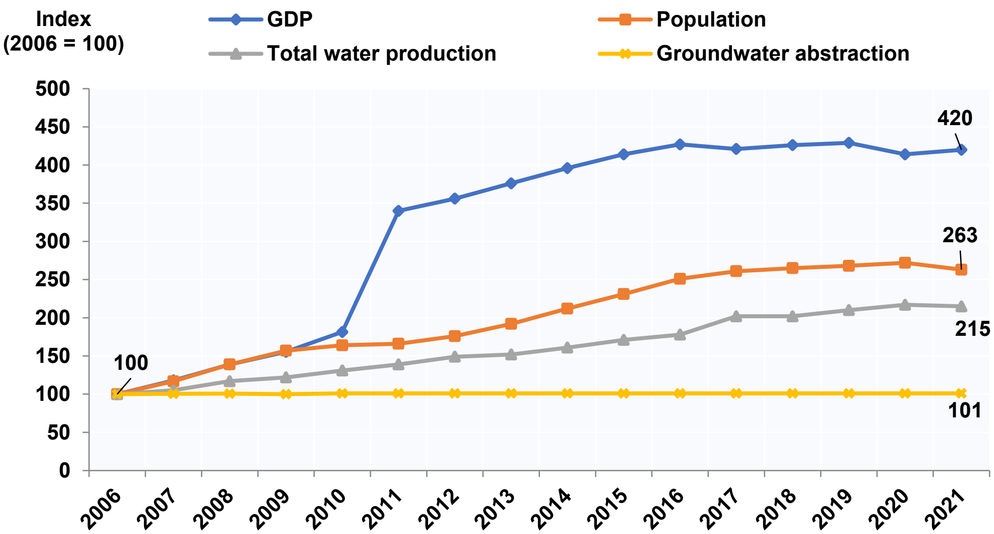


Source: Ashghal and Kahramaa

* Data for previous years have been changed from the source

Figure 4-3 below shows that the total water production is closely related to the economic and population growth. There is a clear divergence between GDP growth rate and total water production rate (abstracted groundwater + desalinated seawater + reused TSE).

Figure 4-3: Growth rates of GDP, population, total water production and groundwater abstraction (index base year 2006=100) 2006-2021

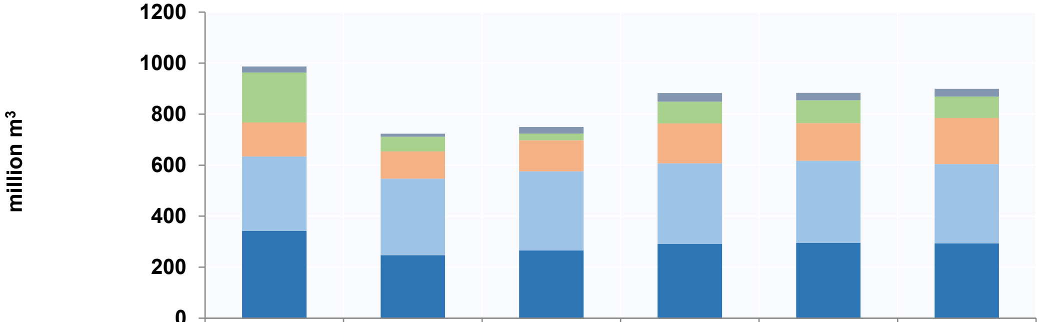


Source: PSA, Ashghal and Kahramaa; computations by PSA

4.3.2 Water Use by Economic Sector

Statistics indicate that used water quantity (net of loss/ after deducting the amount of water loss) decreased from 987 million m^3 to 898 million m^3 per year during the period 2016–2021. Figure 4-4 below shows that most of the water uses were allocated for agricultural and domestic purposes. However, the highest growth rates during the same period was in the industrial sector (18%), followed by the government sector (8%), whereas the growth of water use in the agricultural sector amounted to 1.4% (see Figure 4-5).

Figure 4-4: Water use by economic activity (million m^3) (excluding loss) 2016-2021

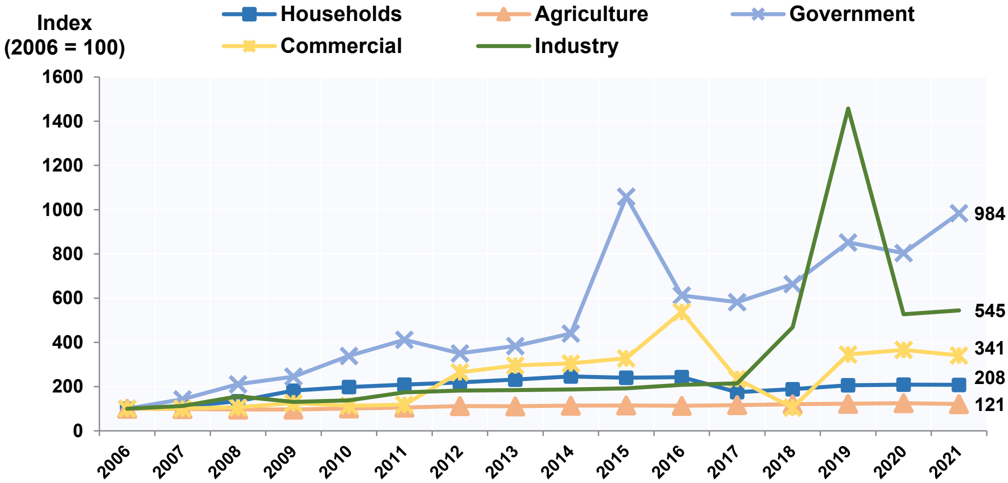


	2016	2017	2018	2019	2020	2021
Industry	24.1	11.8	25.8	34.0	29.00	30
Commercial	195.53	57.7	25.8	85.0	90.00	84
Government	133.34	107.0	122.0	156.7	147.60	181
Agriculture	291.70	299.6	310.0	316.1	322.00	311
Households	342.3	247.1	265.9	291.0	295.00	293

*Industry includes water supplied by Kahramaa and by artificial wells.

Source: Ashghal, Kahramaa and computations by PSA.

Figure 4-5: Growth rates of water use by economic activity 2006-2021* (Index base year 2006=100)



*There are some differences in domestic used water from previous years due to the different method of computation from the source.

Source: Ashghal, Kahramaa and computations by PSA

As for water use in different sectors (domestic, industrial, commercial and government sectors) except for the agricultural sector, an increase was noted in the per capita share of total amount of water produced, reaching 249 m^3 per year in 2021.

Table 4-1: Per capita water consumption for different usages (m3/year/per capita) 2016-2021

Year	Per capita total water production	Per capita total water transported to the network (including water loss)	Per capita consumption of water transported to the network (excluding real water loss)
2016	216	208	199
2017	224	217	208
2018	231	223	214
2019	242	234	224
2020	246	240	226
2021	249	245	230

Source: Kahramaa

4.3.3 Water Loss

Water loss occurs during the transport of drinking water, in wastewater sewers, in septic tanks or during evacuation and transport of septic tank's wastewater. As for the desalinated water, Kahramaa has statistics for the so-called “apparent loss and real loss” (according to the classification of the International Water Association (IWA)). Apparent loss and real loss are defined by IWA as follows:

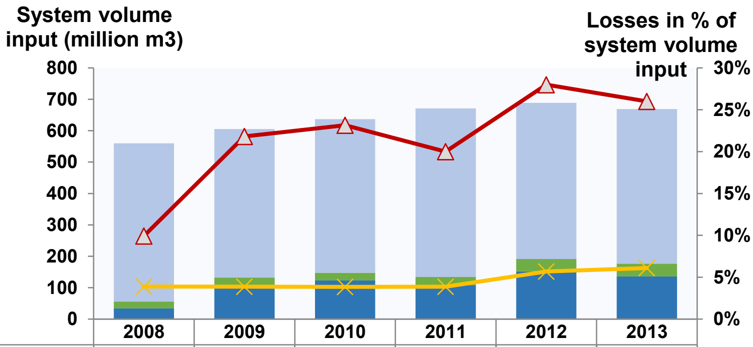
Apparent loss consists of unauthorized consumption (theft or illegal use), and all types of inaccuracies associated with production metering and customer metering. Under-registration of production meters or over-registration of customer meters leads to under-estimation of real losses. Over-registration of production meters and under-registration of customer meters lead to over-estimation of real loss.

Real loss is the physical water loss from the pressurized system, up to the point of customer metering. The volume lost through all types of leaks, bursts and overflows depends on frequencies, flow rates, and average durations of individual leaks.

Total loss is the sum of both apparent and real losses.

With respect to analysis and indicators, it is extremely important to be explicitly clear which loss (total, real, apparent) is in discussion. The following Figure 4-6 presents the development of real loss and total loss from 2016 to 2021. Total loss increased from 10% to 26%, and real loss from 4% to 6%. The figure also shows that the total volume of net user supplies increased from 560 million m^3 in 2016 to 669 million m^3 in 2021. Total loss increased from 10% to 26%, and real loss from 4% to 6%. The figure also shows that the total volume of net user supplies increased from 560 million m^3 in 2016 to 669 million m^3 in 2021.

Figure 4-6: Loss in distribution of drinking water 2016-2021



	2008	2009	2010	2011	2012	2013
Net supply to users (million m3)	504.4	473.0	489.5	536.8	497.62	492.39
Real losses (million m3)	21.8	23.5	24.5	25.94	39.21	40.8
Apparent losses (million m3)	33.8	108.6	123.0	108.3	152.2	135.81
Total losses (% of system volume input)	10%	22%	23%	20%	28%	26%
Real losses (% of system volume input)	4%	4%	4%	4%	6%	6%

Source: Kahramaa

There are currently no statistics on water loss in wastewater sewers in Qatar; however, only estimates exist. In terms of water quantity, the issue of groundwater leakage into the sewer seems to be of a larger concern than the actual water loss. Leakage into the sewer may be responsible for the relatively high salinity of TSE of around 1,000 mg/l measured at Doha wastewater treatment plants (see Ashghal & Schlumberger study, 2013).

4.3.4. Water Use in Agricultural Activity

For the sake of simplicity (and in line with available data), the economic activity "agriculture, forestry and fishery" has been included under "agricultural activity".

Groundwater and treated wastewater are the main sources of water for agricultural activity. The statistics in Table 4-2 indicate that the amount of treated wastewater used for agricultural purpose increased from 61.7 million m^3 in 2016 to 77.2 million m^3 in 2021. The percentage of treated wastewater used in agricultural activity was 24.8% of total water used in agricultural activity. According to Ashghal and Schlumberger study in 2013, water salinity at Doha wastewater treatment plants attained 1,000 mg/l, which is a major concern for water re-use in agriculture. The table also shows that from 2016 to 2021, the agricultural GDP increased from QR 1,043 million to QR 1,785 million.

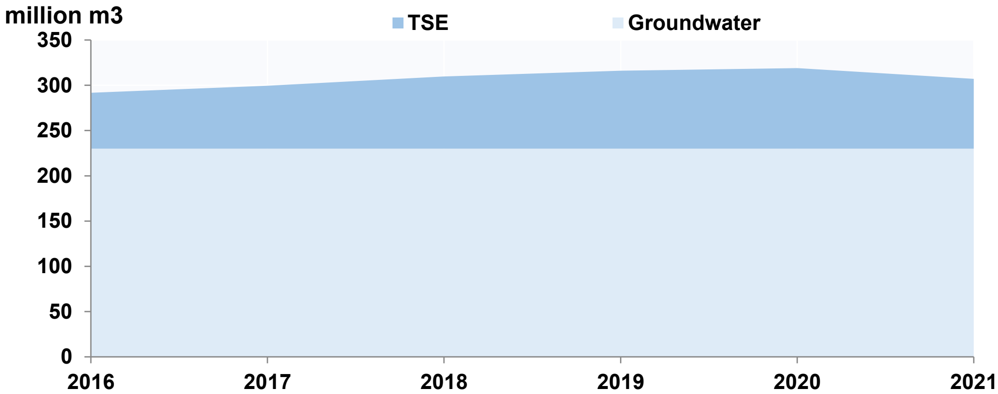
Table 4-2: Water used in agricultural activity by water source and agricultural GDP (at constant prices of 2018) 2016-2021

Year	Abstracted groundwater (Million m³)	Productive farms (million m³)	TSE (Million m³)	Total (Million m³)	GDP (Million QR at constant prices of 2018)
2016	230	0.12	61.70	291.82	1043
2017	230	0.13	69.51	299.64	1258
2018	230	0.3	79.67	309.97	1456
2019	230	0.2	86.1	316.4	1499
2020	230	3	88.96	321.96	1519
2021	230	4	77.16	311.16	1785

Source: PSA, Kahramaa and Ashghal

The Figure 4-7 below shows that the annual total water used in agricultural activity rose from 291.8 million m³ in 2016 to 311.2 million m³ in 2021. However, groundwater abstraction for agricultural purposes remained at the same level since 2016 (230 million m³/year).

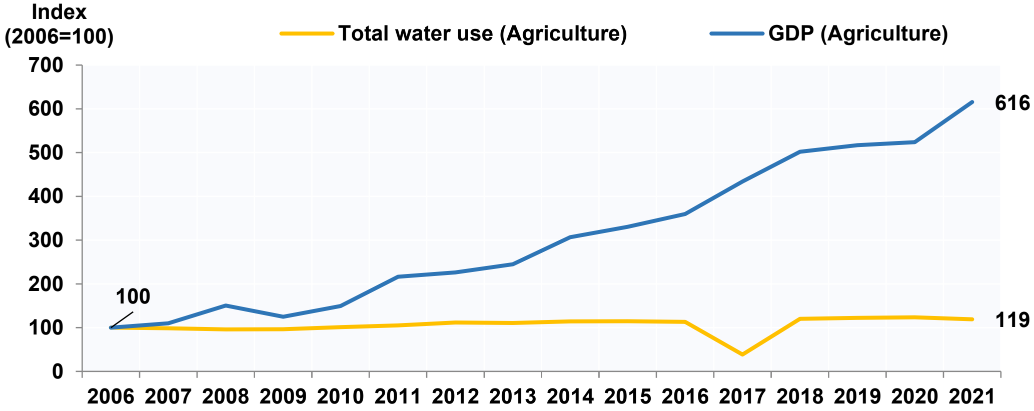
Figure 4-7: Water use in agricultural activity by water source (million m3) 2016-2021



Source: Kahramaa and Ashghal

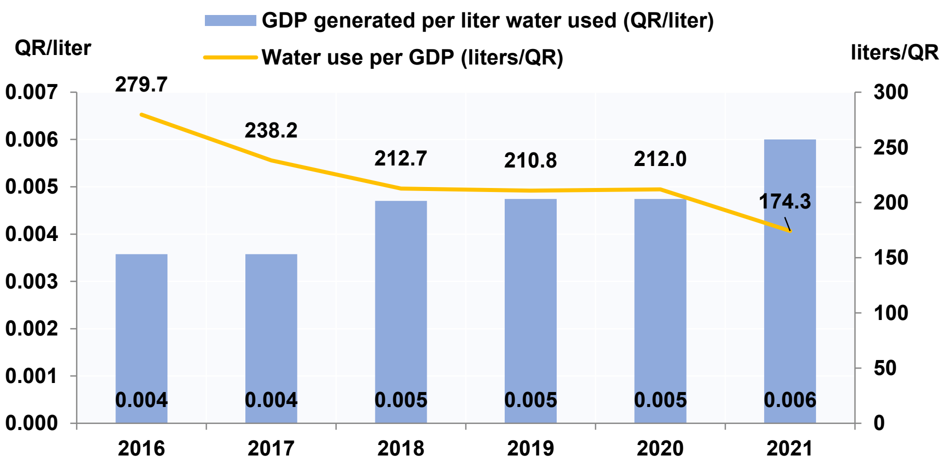
Figure (4-8) shows the **efficiency of water used in agricultural activity***:* the 2016 statistics indicate that 280 liters of water were needed to produce QR 1 of agricultural GDP, while in 2021, this amount decreased to 174 liters. As for productivity of water used in agricultural activity*:* in 2021, water productivity increased from its level in 2016, as one liter of water contributed to QR 0.006 of agricultural GDP, while it was QR 0.004 in 2016 (See Figure 4-9).

Figure 4-8: Growth rate of water used in agricultural activity and agricultural GDP (at constant prices of 2018) 2006-2021 (index base year 2006=100)



Sources: PSA, Ashghal and Kahramaa and computations by PSA

Figure 4-9: Water use efficiency (liter/QR of GDP) and water use productivity (GDP per each liter of water used) in agricultural activity 2016-2021 (at constant prices of 2018)



Sources: PSA, Ashghal and Kahramaa and Computations by PSA

4.3.5 Water Use in the Industrial Activity

For the sake of simplification (and in line with the actual data available), the following economic activities are aggregated under the "industrial activity" category:

- Mining and quarrying (including oil & gas)
- Manufacturing
- Supply of electricity, gas, steam and air conditioning.
- Water supply, sewage activities and waste management and treatment.
- Building and construction

Industries in Qatar rely on three main sources of freshwater, namely:

1. Water supplied by Kahramaa
2. Water from groundwater wells for industrial purposes
3. Seawater desalinated in industrial plants. For this type (desalination), data is unavailable. thus, analysis can only be done for that part of water which originates from groundwater (self-abstraction by industries) and water statistics supplied by Kahramaa.

Statistics in Table 4-3 below indicate an increase in the annual water used in the industrial activity from 24.1 million m^3 in 2016 to 30.2 million m^3 in 2021. The GDP of the industrial activity also rose from QR 404.9 million in 2016 to QR 387.2 million in 2021.

Table 4-3: Water used in industrial activity by water source and industrial GDP (at constant prices of 2018) 2016-2021

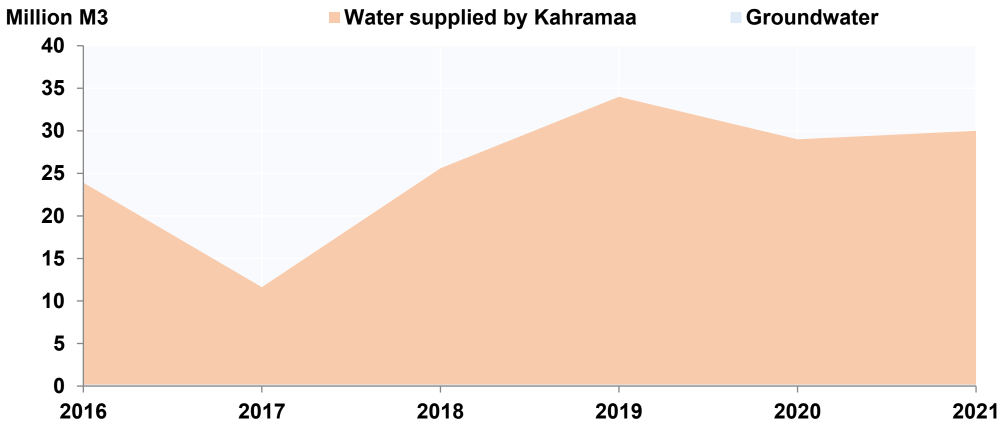
Year	Water supplied by Kahramaa (million m^3)	Industrial groundwater wells (Million m^3)	Total water use (Million m^3) *	GDP (Million QR at constant prices of 2018) **
2016	23.9	0.18	24.08	404.877
2017	11.62	0.18	11.8	399.921
2018	25.6	0.18	25.78	402.950
2019	34	0.18	34.18	397.269
2020	29	0.18	29.18	386.000
2021	30	0.18	30.18	387.217

*Excluding desalinated industrial water.

**Including mining and quarrying (including oil and gas), manufacturing, electricity and water and building and construction.

Sources: PSA and Kahramaa

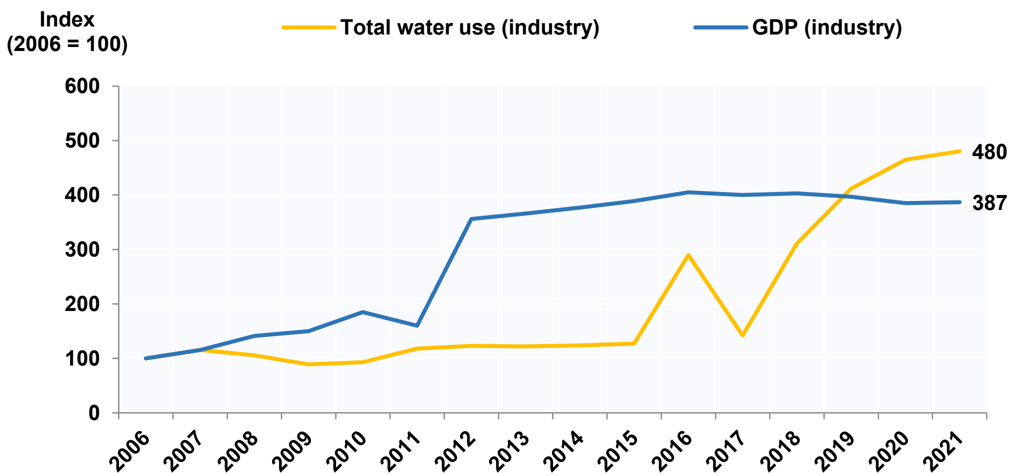
Figure 4-10: Water used in industrial activity by water source (million m^3) 2016-2021



Source: Kahramaa

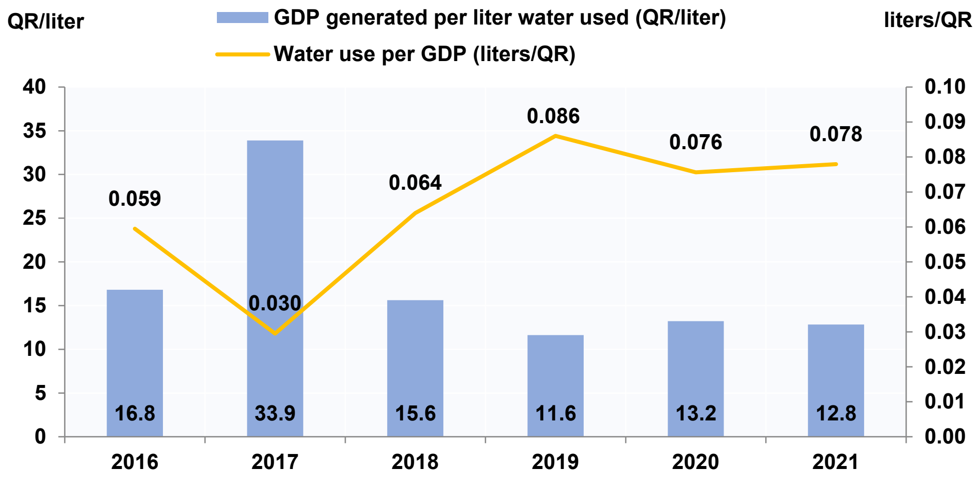
Figure 4-11 below shows that GDP growth rate in the industrial activity is related to the amount of water used, even with improved water use efficiency and productivity. In 2016, about 0.06 liter of water was needed to produce QR 1 of industrial GDP, whereas 0.08 liter of water was needed to produce QR 1 of the same GDP in 2021. In other words, this means that the productivity of one liter of water was worth QR 16.8 of industrial GDP, whereas, in 2021, the water productivity value decreased to QR 12.8 of industrial GDP per liter.

Figure 4-11: Growth rate of water use in industrial activity and GDP at constant prices of 2018 (index base year 2006=100) 2006-2021



Source: Kahramaa and Computations by PSA.

Figure 4-12: Water use efficiency (GDP liter/QR) and water use productivity (GDP per liter of water used) in industrial activity (at constant prices of 2018) 2016-2021



Source: Kahramaa and Computations by PSA.

4.3.6 Water Use in Commercial Activity

For the sake of simplification (and in line with the actual data available), the following economic activities are aggregated under the "commercial activity" category:

- Wholesale and retail trade; Repair of motor vehicles and motorcycles.
- Transport and storage.
- Accommodation and food service activities.
- Information and communication.
- Financial and insurance activities.
- Real estate activities.
- Activities of households that employ personnel, and household activities in the production of unmarked goods and services for their own use.

The water supplied by Qatar General Electricity and Water Corporation "Kahramaa" is the only known source of water in commercial activity. Statistics in Figure 4-13 indicate an increase in total amount of water used in commercial activity in 2018 and 2021 from 25 million m^3 to 84 million m^3.

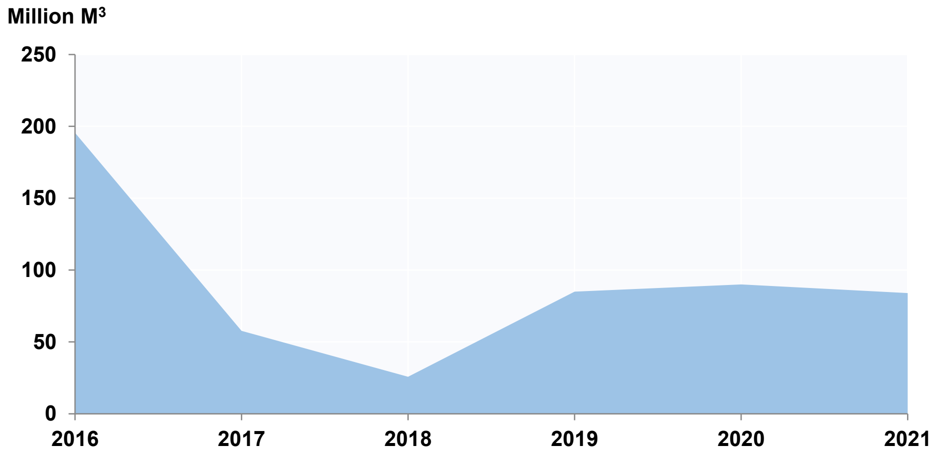
Table 4-4: Water used in commercial activity and commercial GDP (at constant prices of 2018) 2016-2021

Year	Total water use (i.e., water supplied by Kahramaa) million m^3	GDP (Million QR at constant prices of 2018)
2016	195.53	179,624
2017	57.68	182,748
2018	25.8	186,751
2019	85	190,149
2020	90	181,347
2021	84	190,575

* Trade, restaurants and hotels, transport and storage, information and communications, finance and insurance, real estate services, household business and services.

Sources: PSA and Kahramaa

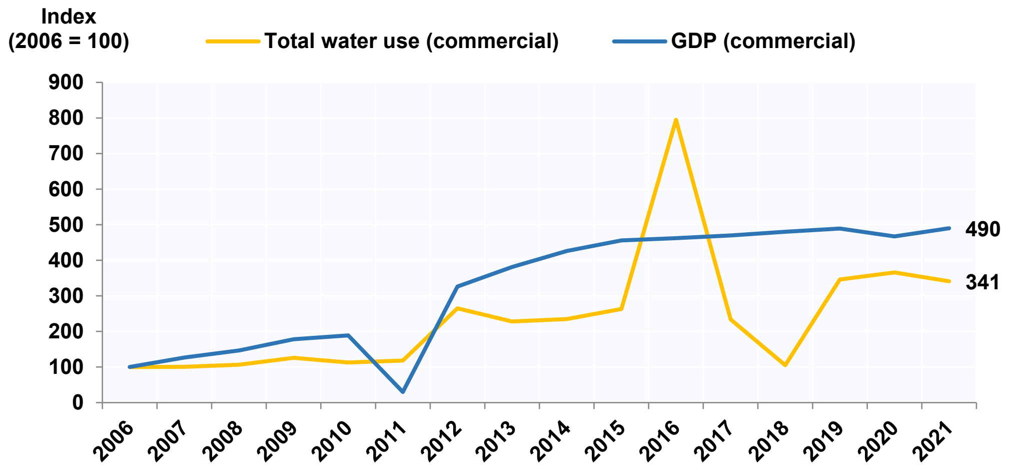
Figure 4-13: Water used in commercial activity (million m^3) 2016-2021



Source: Kahramaa

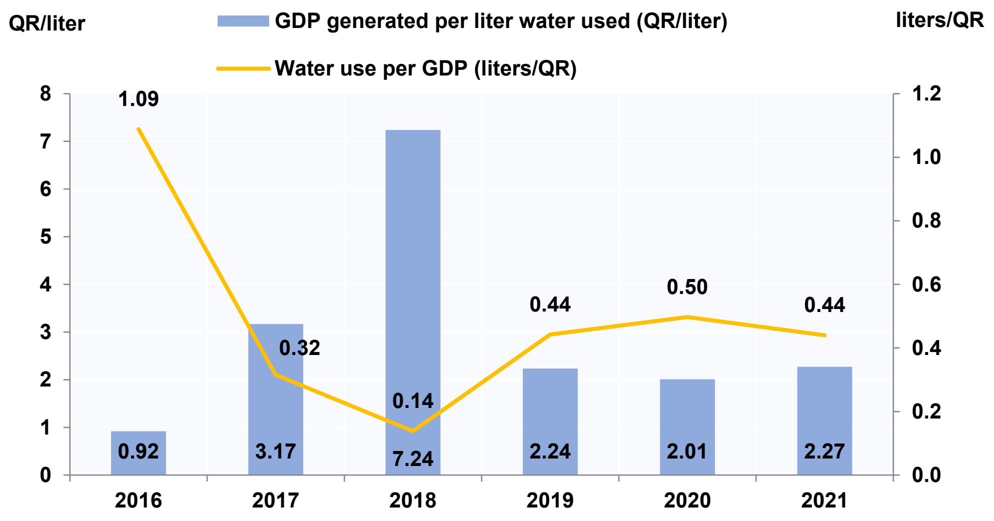
Figure 4-14 below shows that the GDP growth rate in the commercial activity is related to the water use quantity since 2016. Figure 4-15 below shows that about 1.1 liters of water were needed to produce QR 1 of commercial GDP in 2016, whereas only 0.43 liter of water was needed to achieve the same GDP in 2021. In other words, one liter of water used for commercial activities produced QR 0.92 of GDP in 2016, while one liter of water produced QR 2.27 of GDP in 2021.

Figure 4-14: Growth rate of water used in commercial activity and commercial GDP (index base year 2006=100) 2016-2021



Source: PSA and Kahramaa. Computaions by PSA.

Figure 4-15: Water use efficiency (GDP liter/ QR) and water use productivity (GDP per liter of water used) in commercial activity (at constant prices of 2018) 2016-2021



Source: PSA and Kahramaa.

4.3.7 Water Use in Government Activity

For the sake of simplification (and in line with the actual data available), the following economic activities are aggregated under "government activity" category:

- Public administration and defence; and social security.
- Education.
- Activities in the field of human health and social work.
- Arts, entertainment and leisure.

Water supplied by Kahramaa and TSE used for irrigation of green spaces are the main water source for government activity. The statistics in Table 4-5 and Figure 4-16 below show that the water used in government activity increased from 133 million m^3 in 2016 to around 181 million m^3 in 2021. The percentage of 60% of water used in government activity originated from re-used TSE in 2021 (used for the irrigation of green spaces).

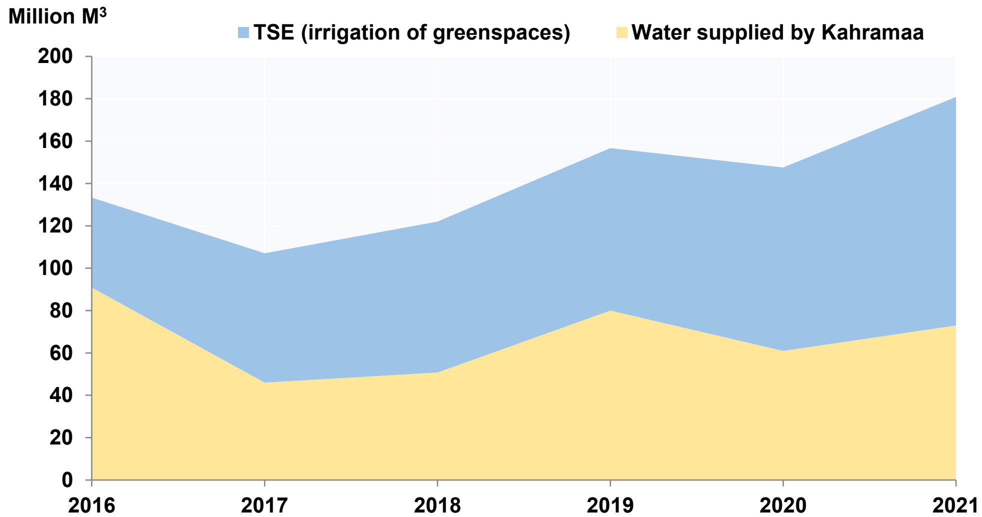
As the government activity is mainly a consumer of goods and services, a comparison-based analysis of GDP with water use in government activity (as analyzed in agricultural, industrial and service activities) would not be useful, even if there are certain government services which are included in the GDP computation

Table 4-5: Water used in government activity by water source (million m^3/year) 2016-2021

Year	Water supplied by Kahramaa	TSE (for irrigation of green spaces)	Total water used
2016	90.86	42.48	133.34
2017	46.00	61.03	107.03
2018	50.80	71.21	122.01
2019	80.00	76.65	156.65
2020	61.00	86.57	147.60
2021	73.00	107.86	180.86

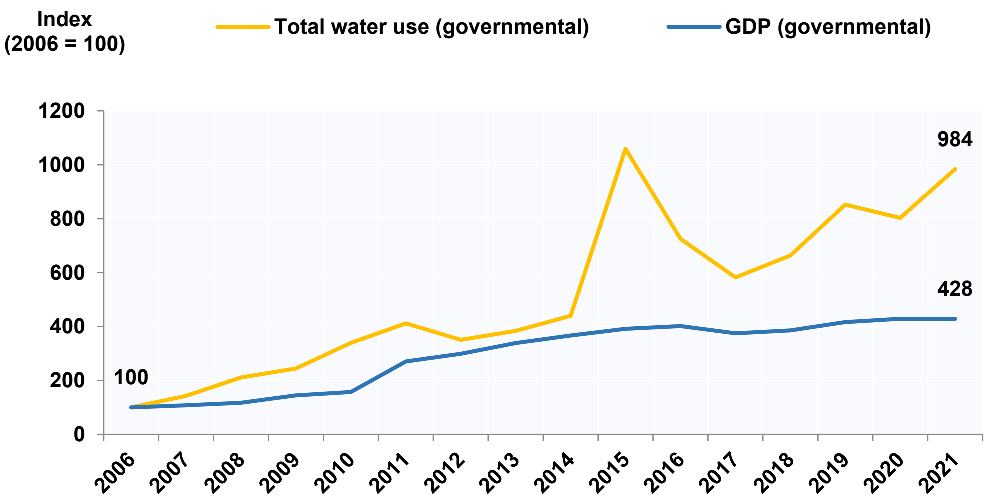
Source: Ashghal and Kahramaa

Figure 4-16: Water used in government activity by water source (Million m^3) 2016-2021



Source: Ashghal and Kahramaa.

Figure 4-17: Growth rate of water used in government activity and GDP (index base year 2006) 2006-2021



Source: PSA and Kahramaa.

4.3.8 Water Use in Domestic Activity

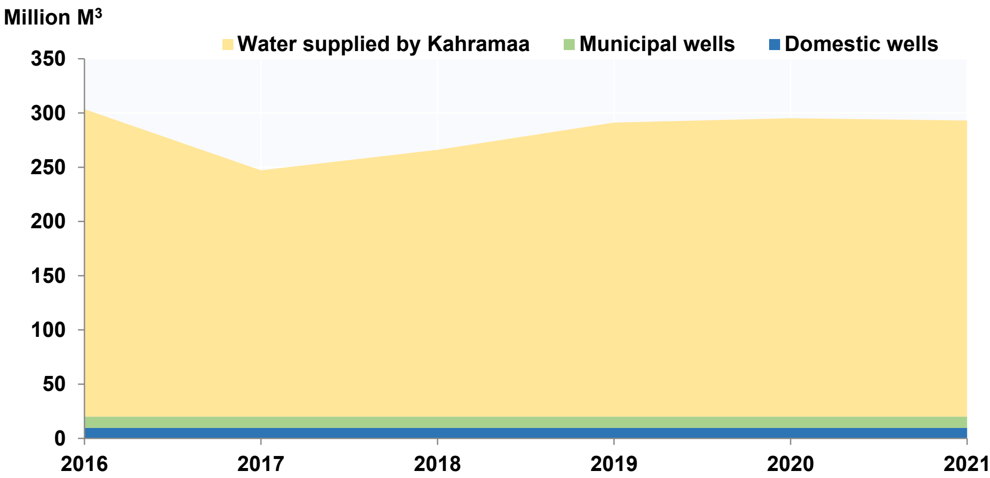
The water used by households depends mainly on Kahramaa water supply. However, there are also domestic wells and municipal wells, which mainly provide water for domestic use. Data of water supplied by Kahramaa in Table 4-6 and Figure 4-18 show that water used by household decreased during the period 2016-2021. In 2016, the households used about 304 million m^3, whereas they used about 293 million m^3 in 2021.

Table 4-6: Water used in domestic activity by water source (million m3/year) 2016-2021

Year	Water supplied by Kahramaa	Domestic wells	Municipal wells	Total water use
2016	283.43	9.7	10.4	303.5
2017	227.06	9.7	10.4	247.2
2018	245.9	9.7	10.4	266.0
2019	271	9.7	10.4	291.1
2020	275	9.7	10.4	295.1
2021	273	9.7	10.4	293.1

Data source: Kahramaa

Figure 4-18: Water used in domestic activity by water source (million m^3) 2016-2021



Data sources: Kahramaa

4.3.9 Demand for Water

The table below shows that the demand for water decreased in 2021 from 2020 by 2%. However, the prevailing trend for water demand shows an annual increase in general since 2016 by an annual average of 5%. With regard to the number of subscribers, it increased from 297.2 thousand in 2016 to 406.7 thousand subscribers in 2021.

Table 4-7: Demand for water by type, number and growth rate of subscribers (2016-2021)

Year	Average demand for distribution	Average demand in industrial activity	Average demand in residential activity	No. of subscribers	Annual growth rate of subscribers
2016	314	20	294	297,261	7.10%
2017	343	22	321	317,215	6.70%
2018	359	23	336	329,832	4.00%
2019	379	23	356	363,338	10.20%
2020	393	23	370	382,932	5.40%
2021	386	24	362	406,745	6.20%

Data sources: Kahramaa

4.3.10 Water Use Balance

In 2021, the water quantity available for use amounted to 1,173.49 million m^3, including desalinated water (prior to computation of loss), abstracted groundwater and treated and untreated urban wastewater.

The amount of water used by final consumers (including agricultural, industrial, commercial, government and domestic activities) consists of the water available for use less water losses and wastewater discharged without re-use. The process of injecting TSE into aquifers is a way to compensate over-exploitation, but not a final use. Thus, it is shown separately in the aggregate water balance (Table 4-8).

Table 4-8: Aggregate Water Use Balance (million m^3), 2021

Description	Million m^3/year
Water potentially available for use (a)	1173.49
Water loss (b)	176.61
Amount of discharged wastewater without reuse (c)	114.42
Amount of water injected into aquifers	69.21
Amount of water used by final consumers (=a – b – c)	882.46

The following Table 4-8 displays the details of water use balance.

Table 4-8: Details of water use balance (water balance/ million m3), 2021

Description	Water potentially available for use	Water use and losses	Remarks
Desalinated water	669		Water supplied by Kahramaa
Fresh groundwater abstraction	250.28		Including data on agricultural, municipal, domestic and industrial wells.
TSE	253.21		Wastewater discharged by urban wastewater treatment plants
Wastewater discharged without treatment	1		Discharge of untreated wastewater into lagoons
Total water potentially available for use	1173.49		Water available before loss
Untreated wastewater		1	
Apparent amount of distilled water loss		135.81	Total losses
Real amount of distilled water loss		40.80	
TSE discharged into lagoons		13.40	
TSE discharged into sea		0.11	
TSE injected into deep aquifers		54.70	
Water used in agricultural activity		311.156	Groundwater and TSE
Water used in industrial and commercial activities		114.18	Water supplied by Kahramaa, and water supplied by industrial wells, including big industrial complexes and hotels.
Water used in domestic activity		293.1	Water supplied by Kahramaa, domestic wells and municipal wells.
Water used in government activity		180.86	Water supplied by Kahramaa and TSE for irrigation of green spaces
Uses or losses of desalinated water not indicated		28.39	Such differences between water input to the system and uses or losses from the source are not indicated
Total water uses and losses		1173.056	

URBAN WASTEWATER PRODUCTION, COLLECTION TREATMENT AND DISCHARGE

5. Urban Wastewater Production, Collection, Treatment and Discharge

5.1 Rationale

In the State of Qatar, the collection and treatment of urban wastewater is an important measure to re-use this water for irrigation, cooling and groundwater recharge and to protect the environment from adverse impacts of water-borne pollution. Furthermore, this infrastructure is essential to provide appropriate sanitation services for all individuals across the State.

Since rainfall rates in Qatar are one of the world's lowest and with Qatar moving towards integrated water resource management, treated wastewater is a "significant alternative to desalinated seawater" and abstraction of Qatar's limited fresh groundwater resources. The use of TSE is an important measure to achieve more sustainable water use.

5.2 Key Messages

a) The design capacity of urban wastewater treatment plants increased from 827 m^3/day in 2016 to 1,022 m^3/day in 2021.

b) In terms of type of treatment, all wastewater treatment plants in Qatar are equipped with at least a secondary treatment.

c) Urban wastewater treatment plants remove more than 99% of organic pollution.

d) In 2021, 99% of urban wastewater generated was treated at treatment plants.

e) In 2021, 30% of TSE was used for agriculture irrigation and 42% for green space irrigation.

5.3 Statistics and Indicators

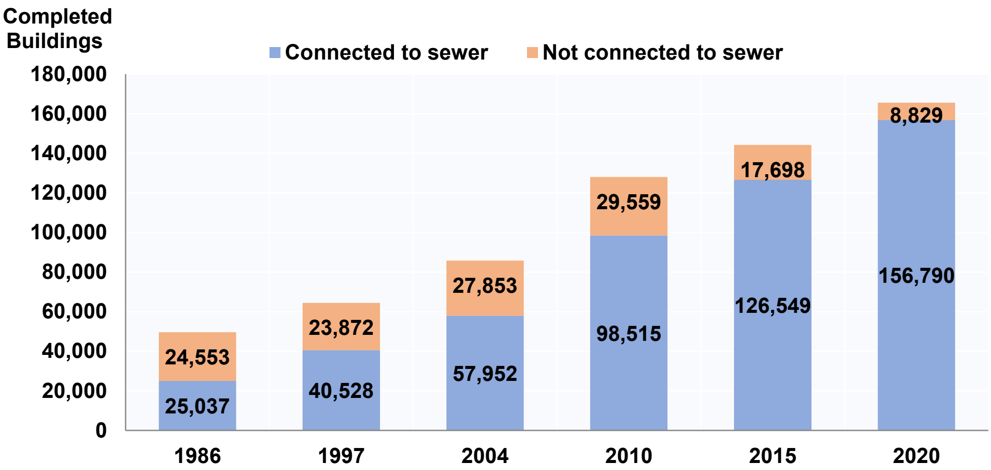
5.3.1 Urban Wastewater Collection and Treatment Infrastructure

According to statistics from the Population, Housing and Establishment Census (1986–2020), the number of completed buildings connected to public sewage increased from 127 thousand (87.7% of total completed buildings) in 2015 to 157 thousand (94.7% of total completed buildings) in 2020 (see Figure 5-1)

As for buildings not connected to public sewage yet, they are served by tankers that transport wastewater to treatment plants and sewage lagoons.

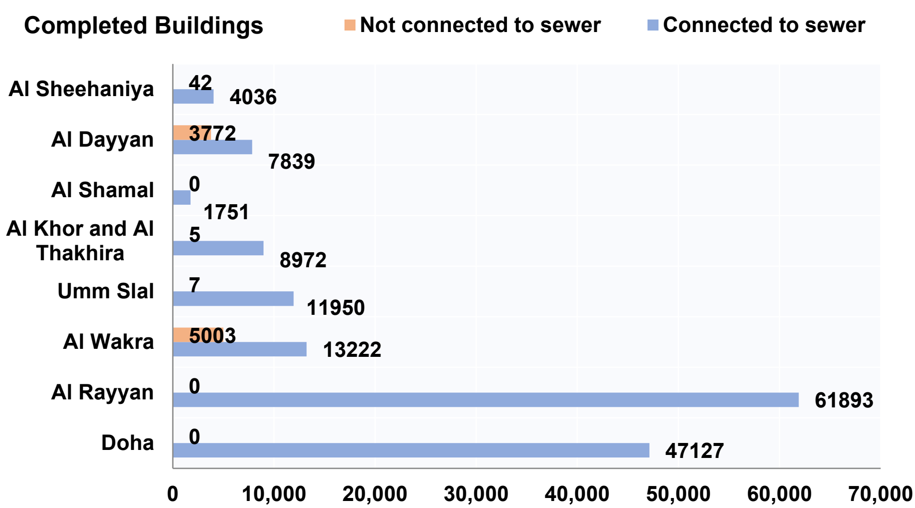
Figure 5-2 shows that the highest percentage of buildings connected to public sewage according to Census 2020 was in the municipalities of Al Rayyan, Doha, Al Shamal and al Khor (100%), whereas the lowest percentage was in Al Dhaayen Municipality (67.5%).

Figure 5-1: Number of completed buildings connected to public sewage, Census 1986-2020



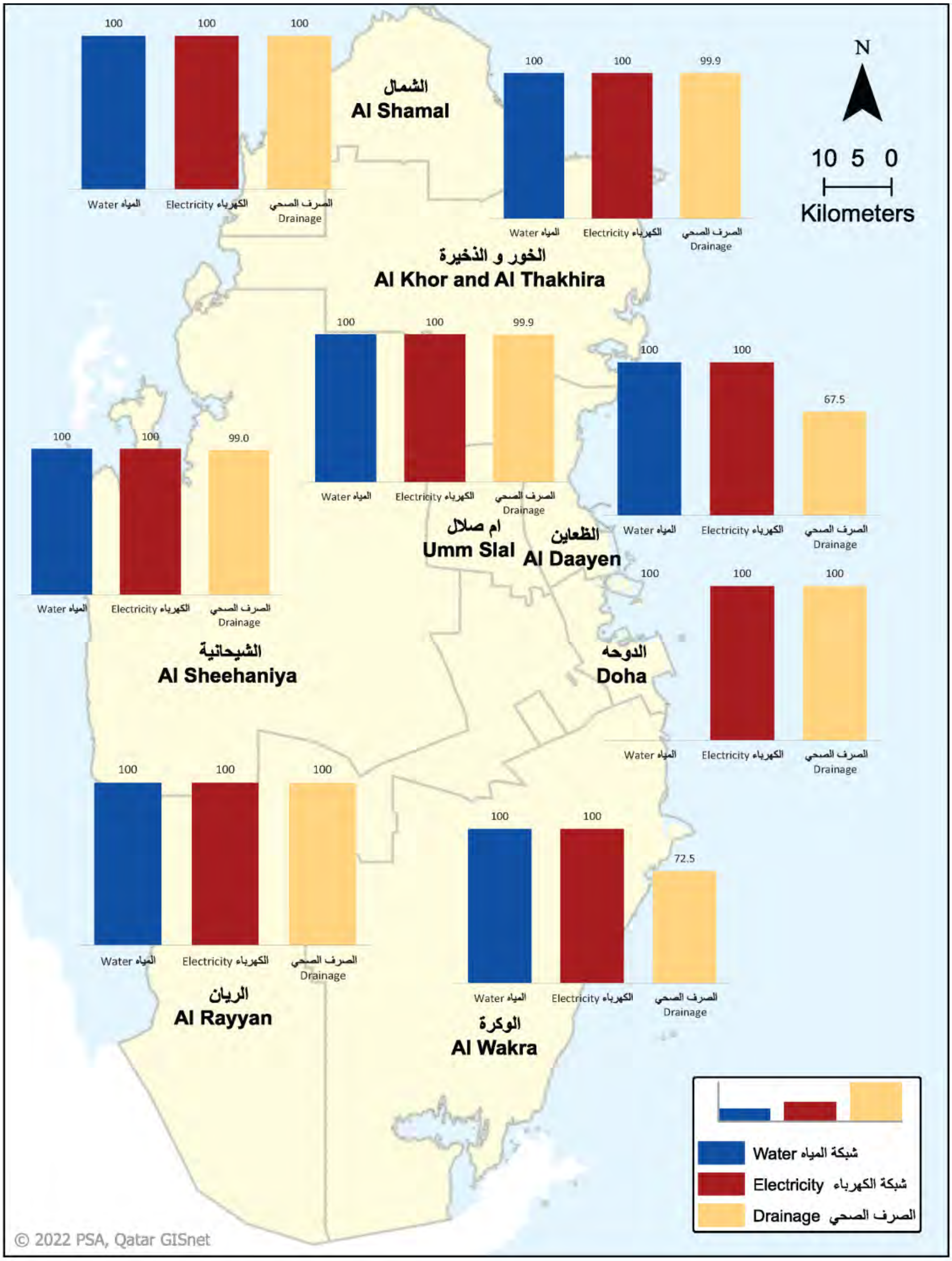
Source: PSA

Figure 5-2: Number of completed buildings by connection to public sewage and municipality, Census 2020



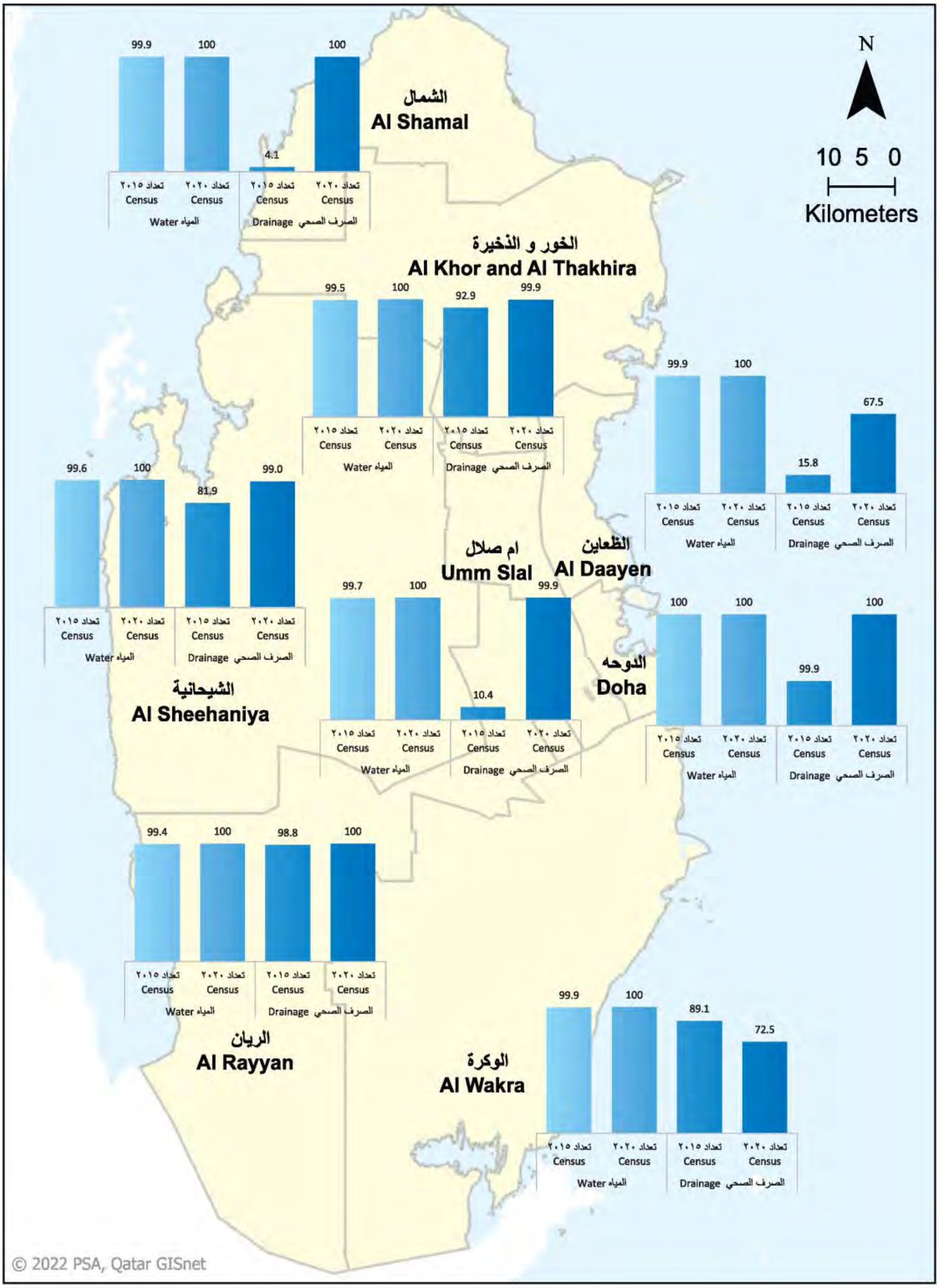
Source: PSA

Map 5-1: Percentage of completed buildings connected to public utilities by municipality Census 2020



Source: PSA

Map 5-2: Percentage of completed buildings connected to water and sewage network by municipality, 2015 and 2020 censuses



Source: PSA

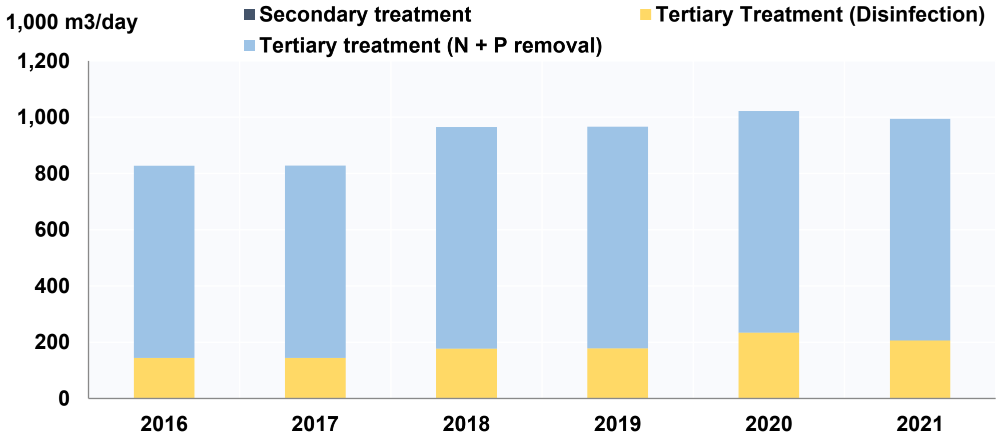
Table 5-1: Wastewater at Sewage Plants 2016-2021

Description	2016	2017	2018	2019	2020	2021
Number of sewage plants	23	24	24	26	26	27
Total design capacity of wastewater treatment plants (1000 m³/day)	827	828	965	966	1,022	994
Amount of collected wastewater (1000 m³ /year)	209,518	231,473	257,829	278,216	291.5	255,049
Amount of treated wastewater (1000 m³ /year)	204,392	228,668	256,467	276,114	285.8	253.2
Percentage of treated wastewater to total wastewater	97.6%	98.8%	99.5%	99.2%	99.7	99.7
Treated wastewater used for agriculture irrigation (1000 m³ /year)	61,699	69,508	79,669	86,056	88,957	77,156
Amount of treated wastewater used for green space irrigation (1000 m³/year)	42,480	61,029	71,208	76,648	86,568	107,862
Amount of treated water used for injecting groundwater (1000 m3/year)	60,364	63,859	66,892	79,706	78,034	54,697
Amount of treated water discharged into lagoons (1000 m³/year)	39,168	33,817	38,161	33,001	32,313	13,401
Amount of treated water discharged into the sea (1000 m³/year)	681	455	546	713	55	107
Dry sludge from wastewater (ton/year)	41,551	41,554	37,688	39,096	40,960	41,349
Sludge from wastewater (1000 m³/year)	197	224	202	191	203	210
Amount of wastewater not collected at sewage plant and is discharged into lagoons without treatment (million m³/ year)	1.9	2.4	1.62	0.995	0.825	0.678
Total surface groundwater discharged into the sea (million m³/year)	89.7	95.4	100.9	90.9	98.5	81.1

Data source: Ashghal

By 2021, the number of wastewater treatment plants reached 27. The statistics in Table 5-2 and Figure 5-3 indicate an increase in the design capacity of urban wastewater treatment from 827 m³/day in 2016 to 994 m³/day in 2021 (an annual growth rate of 4%). All urban wastewater treatment plants are equipped with at least secondary treatment methods, ensuring, to a large extent, the elimination of organic pollution.

Figure 5-3: Hydraulic design capacity of wastewater treatment plants by type of treatment 2016-2021



Source: Ashghal

Table 5-2: Hydraulic design capacity of operating wastewater treatment plants by type of treatment, (1,000 m3/day) 2016-2021

Year	Secondary treatment	Tertiary treatment (disinfection)	Tertiary treatment (N+P removal)	Total treatment capacity
2016	2.1	141.8	683.5	827.4
2017	2.1	142.3	683.5	827.9
2018	1.95	175	788	964.6
2019	1.95	176	788	965.9
2020	1.95	232	788	1,022.1
2021	1.95	204	788	994.1

Source: Ashghal

The statistics in Table 5-3 refer to all urban wastewater treatment plants in Qatar by type of treatment, design capacity and amount of wastewater received.

Table 5-3: Urban wastewater treatment plants by type of treatment, design capacity and amount of wastewater received, 2021

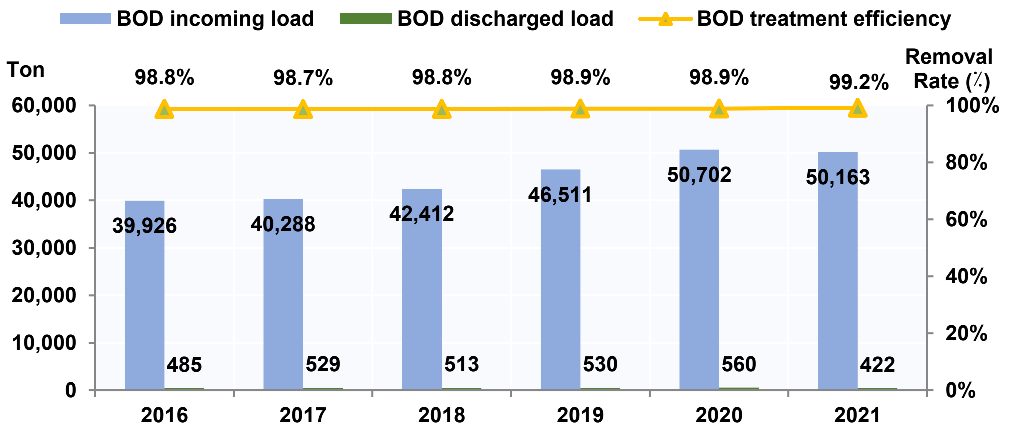
Treatment Plant	Type of Treatment	Hydraulic Design Capacity		Amount of Wastewater Received (1,000 m³/year)
		(1,000 m³/day)	(1,000 m³/year)	
Al-Jamiliyah PTP	Secondary (sterilization)	0.54	71941.5	90
Al-Khuraib PTP		0.06	7993.5	29
Slaughterhouse PTP		0.18	107912.3	36
Ras bu Fontas PTP		0.54	71941.5	112
Al-Dhakhira PTP	Tertiary (disinfection)	0	426320	0
New Al-Dhakhira PTP		56.2	0	5,879
Al-Khor PTP		9.72	1294947	1,552
Al Shamal PTP (3)		0.6	79935	226
Barwa Al Baraha PTP		12	1598700	3,532
Barwa City STW		15	1998375	2,921
Barwa Msaimeer PTP		1.5	199837.5	335
Barwa Siliyah PTP		1.5	199837.5	270
Barwa Village PTP		1	133225	199
Duhail PTP		0	107912.3	0
Industrial Area STW		90	7993500	23278
Al Ghazal		0.44	58619	144
Al Shihaniyah		1.345	179187.6	648
Al Karaanah		10	1332250	2,945
Jeryan (2)		0.25	33306.25	85
North Camp Mobile Station (2)		1	133225	266
Barzan (1)		3.3	439642.5	214
North Camp		0.245	32640125	98
Doha North STW	Tertiary (N and P removal)	244		47035
Doha West STW (1)		280		88925
Doha South STW		204		68,778
Lusail		60		11177
Total (1)		993.42		258774

(1) Total does not include Slaughterhouse
Source: Ashghal

5.3.2 Treatment Efficiency of Urban Wastewater Treatment Plants

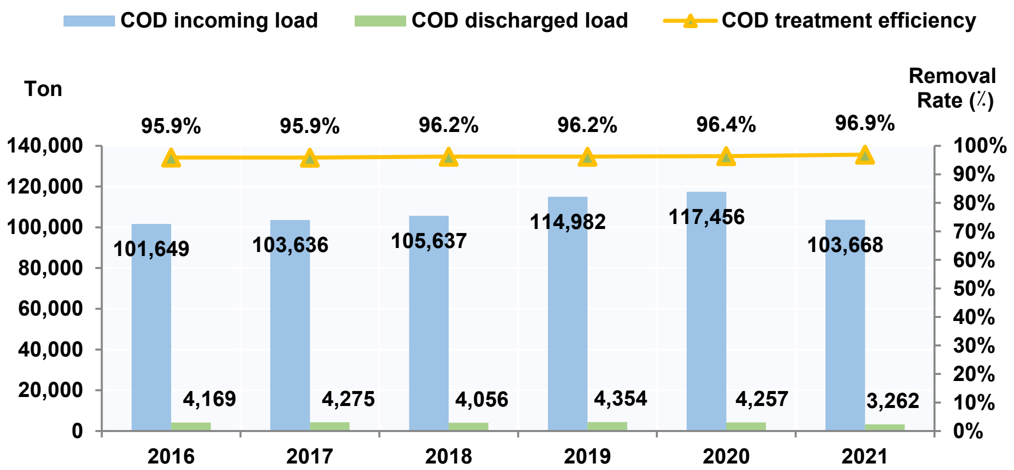
Figure 5-4 and Figure 5-5 show that Organic pollution in terms of BOD5 has been removed by 99% in most of the years during the period 2016-2021. In terms of COD, the removal rates reached 96% in most of the years during the same period.

Figure 5-4: Treatment of BOD5, 2016-2021



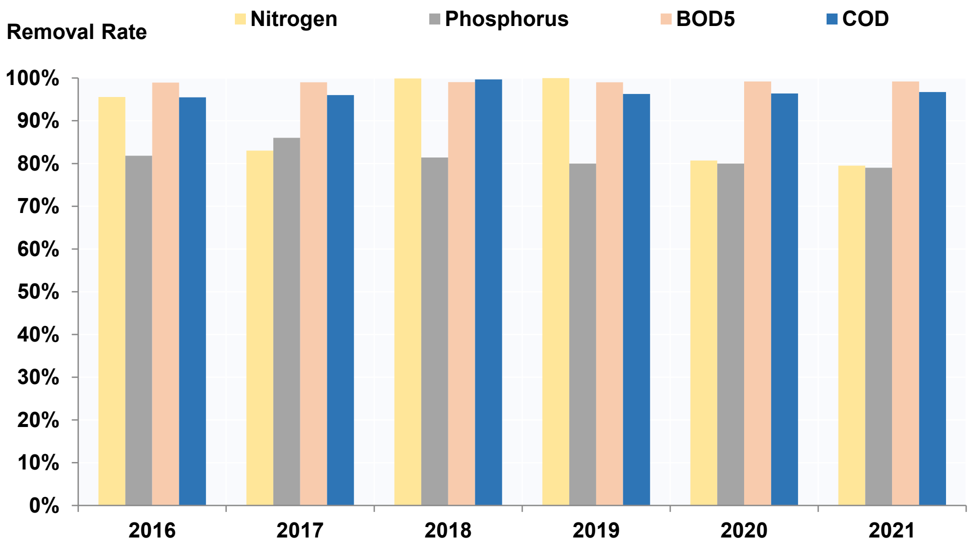
Data source: Ashghal and computations by PSA

Figure 5-5: Treatment of COD, 2016-2021



Data source: Ashghal and computations by PSA

Figure 5-6: Rates of BOD5, COD, total nitrogen and phosphorus removal at UWWTP Doha West 2016-2021

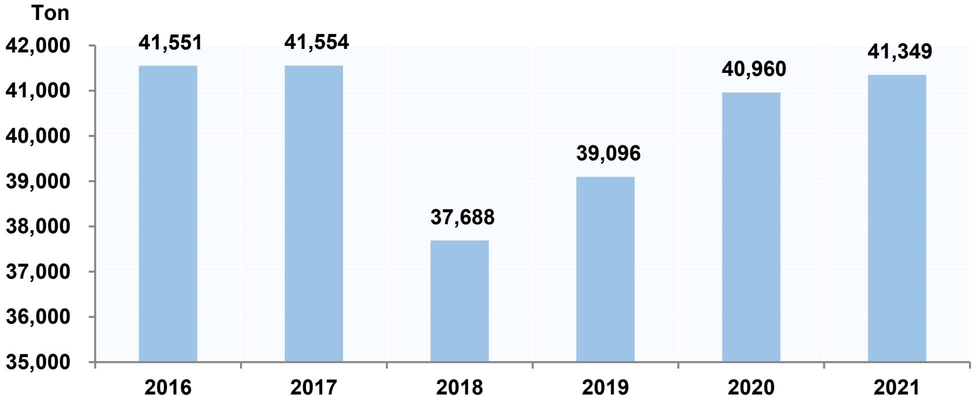


Data source: Ashghal and computations by PSA

5.3.3 Sewage Sludge Generation

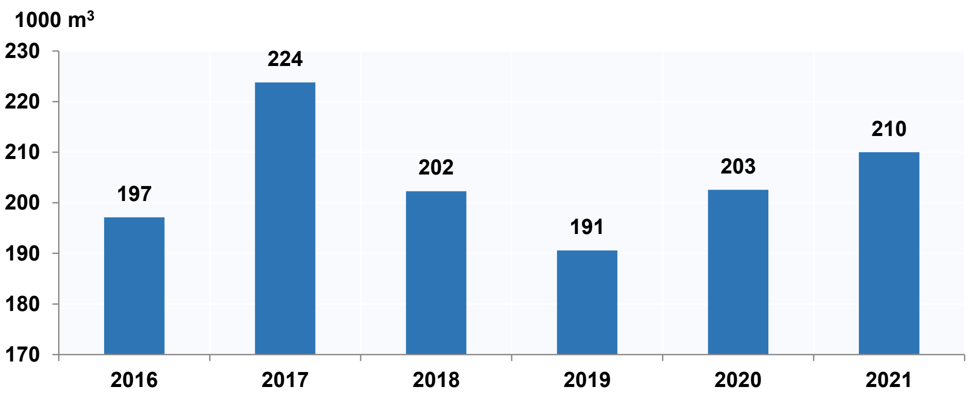
With the increase of treatment design capacity of the UWWTPs, the generation of sewage sludge also increased. In 2016, 197,000 m^3 of sewage sludge were generated, amounting to 42 thousand tons of dry solids (water content was about 83%). Whereas in 2021, urban wastewater treatment plants in Qatar produced 210,000 m^3 of sewage sludge, which included 41,000 tons. Its water content was approximately 84%, including 41,000 tons of dry solids (see Figures 5-7 and 5-8).

Figure 5-7: Generation of sewage sludge at urban wastewater treatment plants by mass (tons of dry solids) 2016-2021



Data source: Ashghal

Figure 5-8: Generation of sewage sludge at urban wastewater treatment plants by volume (1,000 m^3) 2016-2021



Data source: Ashghal

5.3.4 Urban Generated, Collected and Treated Wastewater

In Qatar, the urban wastewater is collected by sewage network and by tankers. All of the wastewater connected to sewage network and most of the wastewater generated by households and collected by tankers are both treated at UWWTPs. However, some of the wastewater collected by tankers is discharged into lagoons (lakes) without treatment, which are mainly collected from non-household sources.

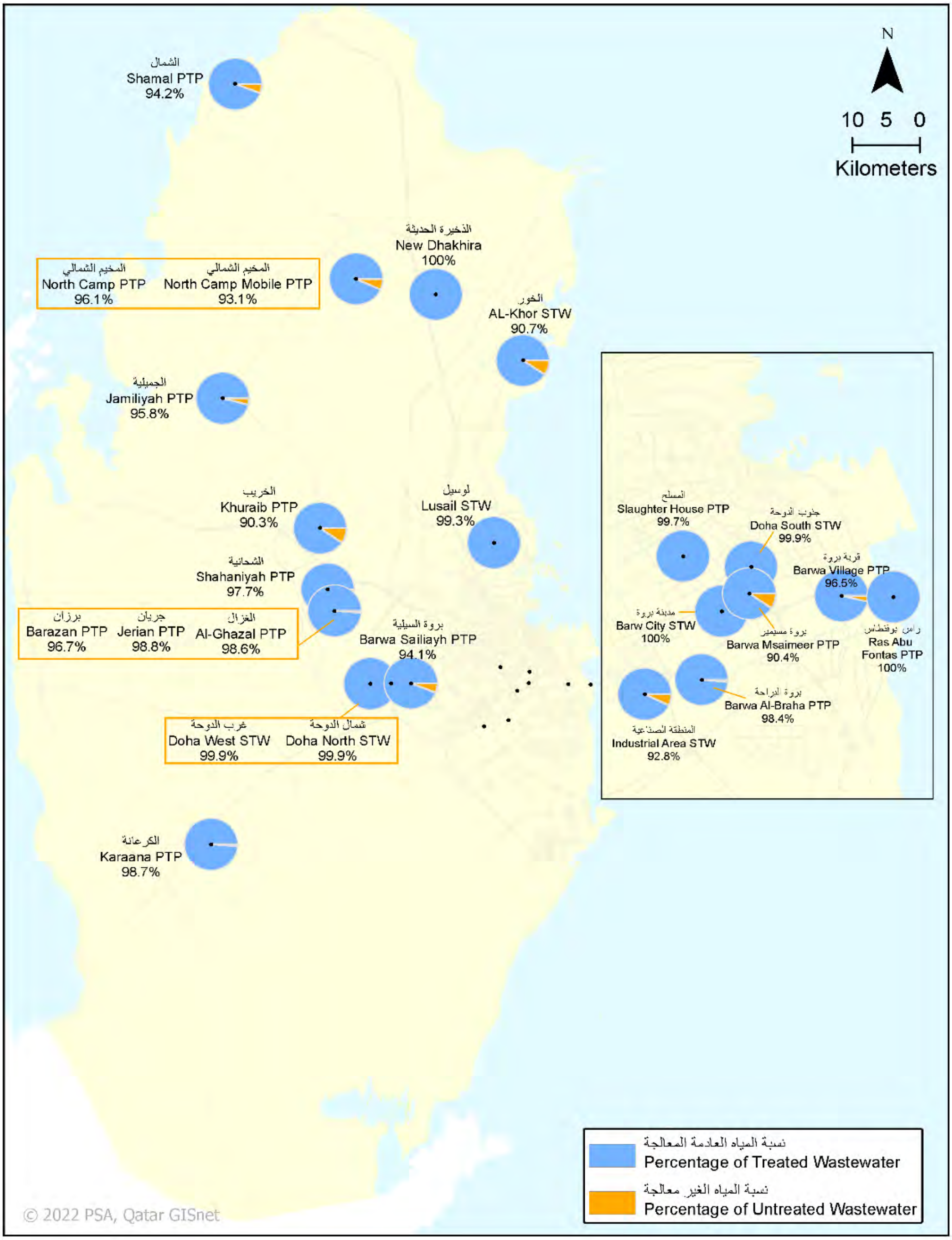
Table 5-4 shows that the collected wastewater increased from 209.5 million m^3 in 2016 to 255 million m^3 in 2021, where about 5.3% (0.7 million m^3) of total wastewater generated was discharged into lagoons without any treatment.

Table 5-4: Urban wastewater generated by method of handling and discharge without treatment (million m^3) 2016-2021

Urban Wastewater	2016	2017	2018	2019	2020	2021
Total collected wastewater	209.5	231.5	257.8	278.2	291.5	255.0
Total treated wastewater	204.4	228.7	256.5	276.1	285.8	253.2
Secondary treated wastewater	0.29	0.31	0.41	0.36	0.37	0.26
Tertiary treated wastewater	204.1	228.4	256.1	275.7	285.4	253.0
Wastewater without treatment	1.9	2.4	1.6	1.0	0.8	0.7

Data source: Ashghal

Map 5-3: Percentage of treated wastewater to total wastewater by UWWTPs, 2021

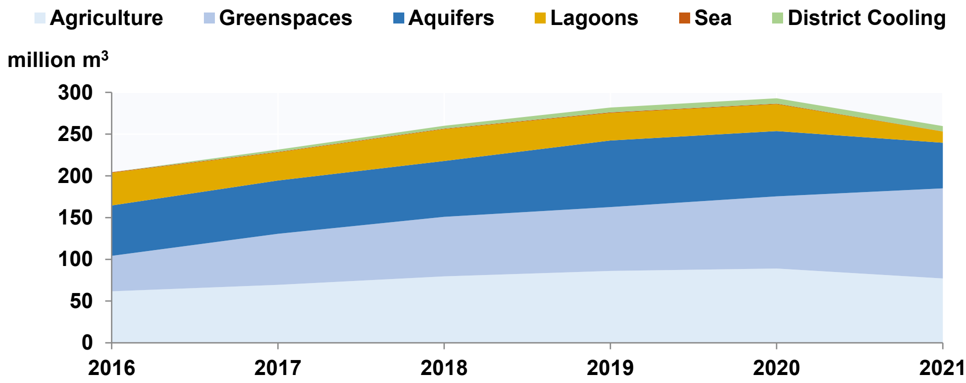


Source: PSA

5.3.5 Discharge and Re-Use of Treated Sewage Effluent (TSE)

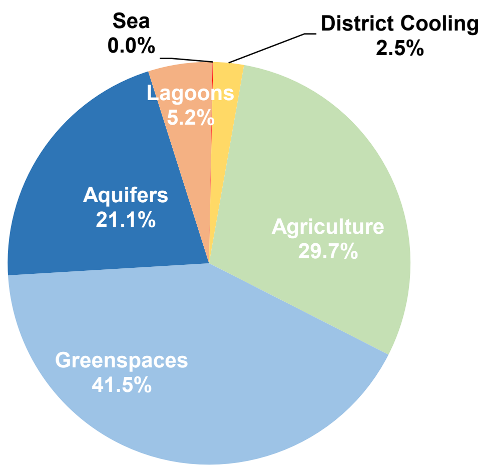
With the expansion of the wastewater treatment capacity since 2016, the production of wastewater increased from 204.5 million m^3 in 2016 to around 255 million m^3 in 2021. The government activity became the most important user of TSE (41.5% of TSE was used for green space irrigation), followed by the agricultural activity (29.7% in 2021). About 21.1% of TSE was used for deep injection into aquifers and about 5.2% was not used and discharged into lagoons. (See Figure 5-9 and Figure 5-10).

Figure 5-9: Use and discharge of treated sewage effluent (TSE) (million m3) 2016-2021



Source: Ashghal and PSA

Figure 5-10: Percentage distribution of use and discharge of TSE, 2021



Source: Ashghal and Computations by PSA

Annexes

Definitions

ISIC Classification Code/s	Economic Activity	ISIC Rev. 4
E 36	Water supply industry	This includes the collection, treatment and distribution of water for domestic and industrial needs. Collection of water from various sources, as well as distribution by various means is included.
E 37	Wastewater treatment (sewage)	Sewage includes: - Operation of sewage network facilities or sewage treatment facilities. - Collection and transportation of human or industrial wastewater from one or several users, as well as rainwater through sewage networks, collectors, tanks and other means (sewage vehicles, etc. - Release and cleaning of cesspools and contaminated reservoirs, drains and wells from sewage; maintenance of toilets with chemical sterilization. - Wastewater treatment (including human and industrial wastewater, swimming pool water, etc.) through physical, chemical or biological processes, such as dissolution, screening, filtration, settling, etc. - Maintenance and cleaning of collectors and sewerage networks, including cleaning of collectors.
A 01-03	Agriculture, forestry and fishing	The agriculture, forestry and fishing sector covers crop and animal production, fishing and related services; forestry and logging; and fishing and aquaculture. This section includes operations related to the exploitation of natural crop and animal resources. It also includes growing crops, raising and breeding of animals, harvesting of timber and other plants, and exploitation of animals or animal products from a farm or their natural habitats.
C 10-33	Manufacturing	Manufacturing includes the physical or chemical transformation of materials or components into new products. The materials or components transformed are raw materials from products of agriculture, forestry, fishing, mining or quarrying, as well as products of other manufacturing industries. In general, the processes of modification, renovation or basic transformation of some materials are considered to be manufacturing industries.
D 351	Electricity Industry	Electricity generation, transmission and distribution.

Term	Definition
Precipitation	The total volume of wet precipitation (rain, snow, hail, dew, etc.) that falls on the territory of a country over a year, in million cubic metres.
Actual evapotranspiration	The total actual volume of evaporation from the ground, wetlands, natural water bodies and vegetation transpiration. According to the definition of this concept in hydrology, evapotranspiration resulting from all human interventions is excluded, except for unirrigated agriculture and forestry. The actual evapotranspiration is calculated using different types of mathematical models, ranging from very simple logarithms (Budyko, Turn Pyke, etc.), to schemes that represent the hydrological cycle in detail.
Internal flow	The total volume of river runoff and groundwater generated exclusively from precipitation into a territory over a period of a year under natural conditions. The inflow is equal to precipitation less actual evapotranspiration and can be calculated or measured. If river runoff and groundwater generation are to be measured separately, transfers between surface water and groundwater should be filtered out to avoid double counting.
Inflow of surface water and groundwater from neighboring territories	Total volume of actual inflow of rivers and groundwater from neighboring territories. The border waters should be divided equally between the two riverine territories, unless there are other water-sharing agreements.
Renewable freshwater resources	= inflows of surface water + groundwater and inflows from neighboring territories.
Outflows of surface water and groundwater into neighboring countries	Actual outflows of rivers and groundwater to neighboring territories.
Water secured by treaties	The volume of surface water and groundwater secured by formal agreements that outflow from a given territory to neighboring territories annually.
Water not secured by treaties	The volume of surface water and groundwater not secured by formal agreements that outflow from a given territory into neighboring territories annually.
Outflow of surface water and groundwater into the seas	The actual outflow of rivers and groundwater into the seas.
Long term annual average	Arithmetic average over a period of at least 30 consecutive years. Please indicate the average over the available period and the length of the period in the footnotes.

Term	Definition
Fresh surface water	fresh water that flows or settles on the surface of a landmass; It forms natural waterways such as rivers, canals, fairway, lakes, etc., as well as artificial waterways such as irrigation canals, industrial or navigational channels, drainage networks and artificial reservoirs. For the purposes of this questionnaire, the water obtained from filtration is included under (fresh) surface water. Sea water and transitional waters such as semi-saline swamps, ponds and estuaries are not considered as fresh surface water. The water obtained from filtration is the result of using the geological formations located near the surface water masses in the filtration of drinking water. Wells are drilled in the sandy sediments adjacent to water masses, and water is abstracted from these wells. The water in the water masses is filtered by passing through the sediments, in order to remove pollutants.
Fresh surface water	Freshwater contained in underground formations that can usually be recovered from or through such formations, and all permanent or temporary sediments of water, artificially or naturally entrained into the subsoil, of sufficient quality for at least seasonal use. This category includes the water-bearing layer and the deep layer that is or is not under pressure contained in the porous or loose soil. For the purposes of this questionnaire, groundwater includes concentrated springs and springs distributed under surface water.
Abstracted fresh surface water	Water taken from any surface water source such as rivers, lakes, reservoirs or rainwater, whether permanent or temporary.
Abstracted fresh groundwater	Water taken from any underground water source, whether permanent or temporary.
Abstracted fresh water	Water taken from any water source (surface water sources such as rivers, lakes, reservoirs or rainwater, and groundwater sources), whether permanent or temporary. It includes abstraction by the water supply industry for distribution purposes, and direct abstraction by other activities for self-use. The volume of water abstracted is distributed according to the major categories of economic activity of the extractor (according to ISIC Rev.4) and the households.
Fresh water abstracted by the water supply industry (ISIC 36)	The amount of water abstracted from surface water sources (rivers, lakes, reservoirs, etc., including the amount of rainfall collected) and from groundwater sources by economic units whose main activities are the collection, treatment and distribution of water to households and other users (ISIC 36: Water Collection, Treatment and Supply). This calculation excludes the amount of water abstracted by the water supply industry for the operation of irrigation canals and should be reported as freshwater abstracted by agriculture, forestry and fishing activities.
Fresh water abstracted by households	The amount of water abstracted directly from surface water sources (rivers, lakes, reservoirs, etc., including the amount of rainfall collected), and from groundwater sources, by households for their own uses.
Fresh water abstracted by agriculture, forestry and fishing (ISIC 01-03)	The amount of water abstracted directly from surface water sources (rivers, lakes, reservoirs, etc., including the amount of rainfall collected) and from groundwater sources, by economic units under the category (ISIC 01-03) for their own uses. It includes water abstracted by the water supply industry (ISIC 36) for the operation of irrigation canals.

Term	Definition
Fresh water abstracted by manufacturing industry (ISIC 01-33)	The amount of water abstracted directly from surface water sources (rivers, lakes, reservoirs, etc., including rainfall collected) and from groundwater sources, by units under ISIC Category 01-33 for their own use.
Fresh water abstracted by electricity industry (ISIC 351)	The amount of water abstracted directly from surface water sources (rivers, lakes, reservoirs, etc., including the amount of rainfall collected) and from groundwater sources, by economic units under category (ISIC 351), for their own uses. Water used for hydroelectric purposes (such as water behind dams) is excluded from this calculation.
Fresh water abstracted by other economic activities	The amount of water abstracted directly from surface water sources (rivers, lakes, reservoirs, etc., including the amount of rainfall collected), and from groundwater sources, by economic units under all other ISIC categories not specified above, for their own uses.
Desalinated water	Total amount of water obtained from desalination of sea and brackish water.
Reused water	Used water obtained directly from another user, whether treated or not, for use in other purposes. It also includes treated wastewater obtained from treatment plants for use in other purposes. It does not include water that is discharged into waterways and used again downstream. It excludes water recycling at industrial sites.
Water imports	The total volume of fresh water imported from other countries as a commodity through pipelines or on ships or trucks. It does not include bottled water.
Water exports	The total volume of fresh water that is exported to other countries as a commodity through pipelines or on ships or trucks. It does not include bottled water.
Total fresh water available for use	= Net Fresh Water Abstracted + Desalinated Water + Reused Water + Water Imports - Water Exports
Loss during transport	Volume of fresh water lost during transport, between point of abstraction and point of use, and between points of use and points of reuse. It includes water lost by leakage and evaporation.
Total fresh water use	Water use is the total volume of water self-abstracted or obtained through water suppliers that has been used by end users, including households or economic activities, for processes related to production or consumption. The volume of used water is distributed according to the main categories of economic activity of end users (according to ISIC Rev.4) and households.
Fresh water used by households	The volume of water used in households, whether obtained from the water supply industry or abstracted directly by households for their own use, which is included in the normal household use (such as drinking and washing), and may include irrigation of a home garden, but should not include water used for commercial agriculture.

Term	Definition
Freshwater abstraction by agriculture, forestry and fishing (ISIC 01-03)	The volume of water used by economic activities under the categories of agriculture, forestry and fishing (ISIC 01-03) whether abstracted directly from water sources for own use or obtained from the water supply industry.
Agricultural irrigation	The artificial application of water to land to help grow crops and pastures.
Fresh water abstracted by manufacturing industry (ISIC 01-33)	The amount of water used in economic activities involved in the manufacturing industry (ISIC 01-33), whether abstracted directly from water sources for self-use or obtained from the water supply industry.
Fresh water abstracted by electricity industry (ISIC 351)	The volume of water used in economic activities involved in the generation, transmission and distribution of electricity (ISIC 351), whether abstracted directly from water sources for self-use or obtained from the water supply industry. Water used for hydroelectric power generation (eg water behind dams) is excluded from this calculation.
Fresh water abstracted by other economic activities	The volume of water used in all other economic activities not specified above, whether abstracted directly from water sources for self-use, or obtained from the water supply industry.
Total fresh water supplied by the water supply industry (ISIC 36)	Water supplied by the water supply industry to users. This includes losses during transport, but excludes water supplied by the water supply industry for the operation of irrigation canals.
Net fresh water supplied by the water supply industry (ISIC 36)	The total fresh water supplied by the public water supply industry less freshwater losses during transport. Distributions of net volume of fresh water supplied by the water supply industry to end users are based on households and by major categories of economic activity of end users (according to ISIC Rev.4)
Total population obtaining water from the water supply industry (ISIC 36)	Percentage of the resident population connected to water supply from the water supply industry (ISIC 36)
Urban population obtaining water from the water supply industry (ISIC 36)	Percentage of the urban population using water supplied by the water supply industry (ISIC 36)
Rural population obtaining water from the water supply industry (ISIC 36)	Percentage of the rural population using water supplied by the water supply industry (ISIC 36)
Total wastewater produced	Wastewater is water that has no other value for the purposes for which it was used because of its quality, quantity or time of production. Gross wastewater produced is the total amount of wastewater produced by economic activities (agriculture, forestry and fishing, manufacturing, electricity industry, other economic activities and households). However, water used for cooling is excluded.
Wastewater produced by other economic activities	Excluding wastewater produced under classification category ISIC 37 (Sewage)

Term	Definition
Urban wastewater treatment	Urban wastewater treatment is all the treatment processes for wastewater in treatment plants located in urban areas. This treatment is usually carried out by the public authorities or private companies operating under the instructions of public authorities. It includes wastewater transported to treatment plants by tankers. These plants are classified under ISIC Class 37 (Sewage)
Other wastewater treatment	Wastewater treatment includes any other non-public treatment plant, such as industrial wastewater treatment plants. Wastewater treated in sewage tanks is excluded from "other wastewater treatment". Industrial wastewater treatment plants may also be classified under ISIC Category 37 (Sewage), or under the main activity category of the facilities to which these plants belong.
Primary wastewater treatment	Primary treatment is a mechanical, physical or chemical process involving settlement of suspended solids, or other process in which the Biochemical Oxygen Demand (BOD5) of the incoming water is reduced by at least 20% before discharge and the total suspended solids of the incoming water are reduced by at least 50%. To avoid double calculation, water subjected to more than one type of treatment should be reported at the top treatment level only.
Secondary wastewater treatment	Secondary treatment is a process, following primary treatment of water, generally involving biological or other treatment with a secondary settlement or other process, resulting in a Biochemical Oxygen Demand (BOD5) removal of at least 70% and a Chemical Oxygen Demand (COD) removal of at least 75%. To avoid double calculation, water subjected to more than one type of treatment should be reported at the top level only.
Tertiary wastewater treatment	Tertiary treatment is a process, following secondary treatment, of removing nitrogen, phosphorous or any other pollutant affecting the quality or a specific use of water, for example microbiological pollution, colour etc. For organic pollution in water the treatment efficiencies that define a tertiary treatment are the following: organic pollution removal of at least 95% for BOD and 85% for COD, and at least one of the following: nitrogen removal of at least 70%, phosphorus removal of at least 80%, or microbiological removal. This is an exclusive treatment. To avoid double calculation, water subjected to more than one type of treatment should be reported only at the highest level of treatment.
Independent wastewater treatment	Collection, pre-treatment, treatment, filtration, or disposal of domestic wastewater from residential places whose population generally ranges between 1 and 50, and which are not connected to a wastewater collection network, e.g. septic tanks. This does not include systems of storage tanks from which wastewater is regularly transported by tankers to a wastewater treatment plant.
Fecal sludge production (dry substance)	The accumulated settled solids, wet or mixed with a liquid component as a result of natural or artificial processes and have been separated from various types of wastewaters during treatment. Dry weight data should be provided. If only wet weight data is available, please fill in the wet weight data and indicate this specifically in the footnote.
population connected to a wastewater collection network	Percentage of resident population connected to wastewater collection networks (sewerage). Wastewater collection networks may transport water to treatment plants or discharge it into the environment without treatment.

Term	Definition
Population connected to a wastewater treatment network	Percentage of resident population whose wastewater is treated in wastewater treatment plants.
Population connected to independent wastewater treatment (eg septic tanks)	Percentage of resident population whose wastewater is treated in independent facilities, often private facilities, such as septic tanks.
Population not connected to wastewater treatment network	Percentage of resident population whose wastewater is not treated in independent treatment plants or facilities.
Fresh water	Fresh water is water that contains only minimal amounts of dissolved salts, especially sodium chloride, to distinguish it from sea water or semi-saline water.
Semi-saline water	It is water that is more salty than fresh water but less salty than seawater. Technically, this water contains between 500 and 30,000 milligrams of salt per liter. However, the concentration of dissolved salts in most semi-saline waters is in the range of 1,000 to 10,000 milligrams per liter (mg/l).
Seawater	Seawater is water brought from the sea or ocean. On average, seawater in the world's oceans has a salinity of less than 35,000 milligrams per liter.

Glossary

الاختصار Abbreviation	English	عربي
Mm^3	Million Cubic Meters	مليون متر مكعب
BOD5	Biological Oxygen Demand	الطلب البيولوجي على الأكسجين ٥
COD	Chemical Oxygen Demand	الطلب الكيميائي على الأكسجين
GDP	Gross Domestic Product	الناتج المحلي الإجمالي
LTAA	Long-term Annual Average	المتوسط السنوي طويل الأمد
PSA	Planning and Statistics Authority	جهاز التخطيط والإحصاء
QMD	Qatar Meteorological Department	إدارة الأرصاد الجوية
Kahramaa	Qatar General Electricity and Water Corporation	المؤسسة العامة القطرية للكهرباء والماء
Ashghal	Public Works Authority	هيئة الاشغال العامة
UWWTP	Urban Wastewater Treatment Plant	محطة معالجة مياه الصرف الصحي في المناطق الحضرية
TSE	Treated Sewage Effluent	مياه الصرف الصحي المعالجة
Q.R	Qatari Riyal	ريال قطري

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Tables