6. Agriculture and Environment

- Agriculture
- Environment
- Energy and Water

6.2. Environment

In light of the rapid economic and urban development and parallel population growth, environment protection acquires a special significance in the agenda and strategic vision of Abu Dhabi Government as it becomes more profoundly recognized as an indispensable requirement if a sustainable, balanced and comprehensive social development is to be achieved.

Large-scale landscaping and tree plantation attest to the formidable effort being made and the achievements attained in this regard. Although the Emirate of Abu Dhabi is one of the largest exporters of oil worldwide, Abu Dhabi was fast to adopt clean, renewable energy sources, emerging as one of the countries at the forefront of the move towards reducing reliance on conventional energy sources, the underlying cause of increasing carbon dioxide emissions, global warming and climate change. The attention paid to environmental issues by the Emirate of Abu Dhabi has raised the emirate's international profile, especially in the fields of nature conservation, desertification control, protection of land and sea wildlife, establishment of nature reserves and international promotion of research to preserve various species of endangered animals and birds.

As a result, there is an increasing interest on the part of SCAD in providing environmental statistics covering various areas such as climate, air quality, pollutant emissions, water statistics, health and occupational safety and waste statistics. These statistics support policy makers to achieve a sustainable environment in the Emirate of Abu Dhabi.

In 2017, the average minimum temperature of Abu Dhabi Emirate was 22.9 C°, while the average maximum temperature was 35 C°. Average annual rainfall decreased from 60.7 mm in 2016 to 81.4 mm in 2017. Average minimum relative humidity was 27.9% while average maximum relative humidity was 75.9%. Average atmospheric pressure was 1,009.57 hPA. The average maximum daily solar radiation exceeded 8,000 Watt /m^2/h during summer months.

Regarding air quality, the concentrations of air pollutants in 2017 were within their permissible limits. Annual average concentration of particulate matter, with a diameter of 10 micron, ranged between 112.7 and 129.4 mcg/m^3 in the urban areas of the Emirate.

The quantity of treated wastewater in 2017 was 310.7 MCM, of which Abu Dhabi region accounted for approximately 76%, where Al Dhafra region did not exceed 4% of the total.

In 2016, more than 2263 people were diagnosed with transmitted diseases through food and food poisoning, caused by eating food or beverages contaminated with bacteria or viruses. People diagnosed with food poisoning accounted for the largest percentage 62% of the total number of patients, followed by Viral hepatitis A at 14%. Regarding waste statistics, the Emirate of Abu Dhabi generated a daily average up to 26 thousand tons of waste in 2017, which is up to approximately 9.477 million tons of non-hazardous waste annually. Construction and demolition waste accounted for the largest percentage 42% of the total amount of waste generated in the Emirate.

Location and Area

The Emirate of Abu Dhabi is located in the far west and southwest part of the United Arab Emirates along the southern cost of the Arabian Gulf between latitudes 22°40' and around 25° north and longitudes 51° and around 56° east. The total area of the Emirate is 67,340 square kilometers, occupying about 87% of the total area of the UAE, excluding islands. The territorial waters of the Emirate embrace about 200 islands off its 700 kilometers coastline.

The topography of the Emirate is dominated by low-lying sandy terrain dotted with sand dunes exceeding 300 meters in height in some areas southwards. The eastern part of the Emirate borders the western fringes of Al-Hajar Mountains.

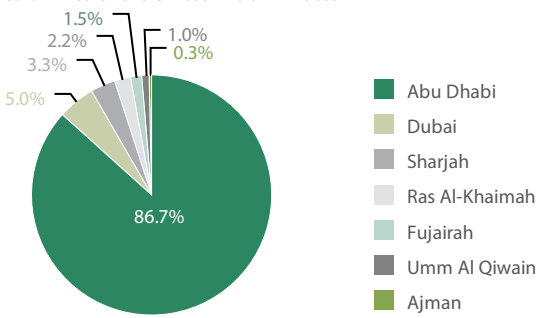
Hafeet Mountain, Abu Dhabi's highest elevation, rising about 1,300 meters, is located south of Al Ain city.

6.2.1 Area of the United Arab Emirates *

Emirate	Sq. mile	Sq. kilometre	%
Total	**30,000**	**77,700**	**100**
Abu Dhabi Region	26,000	67,340	86.7
Dubai	1,500	3,885	5.0
Sharjah	1,000	2,590	3.3
Ras Al-Khaimah	650.2	1,684	2.2
Fujairah	449.8	1,165	1.5
Umm Al Qiwain	300.0	777.0	1.0
Ajman	100	259.0	0.3

Source: Ministry of Economy
* Excluding islands

Figure 6.2.1 Area of the United Arab Emirates



Source: Ministry of Economy

Climate

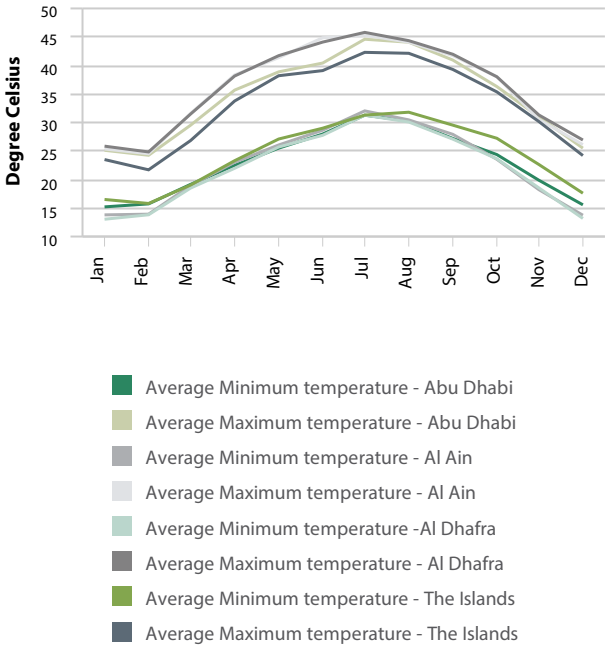
The Emirate of Abu Dhabi is located in the tropical dry region. The Tropic of Cancer runs through the southern part of the Emirate, giving its climate an arid nature characterized by high temperatures throughout the year, and a very hot summer.

The Emirate's high summer temperatures are associated with high relative humidity, especially in coastal areas. Abu Dhabi has warm winters with occasionally low temperatures.The air temperatures show a variations between the coastal strip, the desert interior and areas of higher elevation, which together make up the topography of the Emirate. Abu Dhabi receives scant rainfall but totals vary greatly from year to year.

Seasonal northerly winds blow across the country, helping to ameliorate the weather, when they are not laden with dust, in addition to the brief moisture-laden south-easterly winds. The winds often vary between southerly, south-easterly, westerly, northerly and north westerly.

Another characteristic of the Emirate's weather is the high rate of evaporation of water due to several factors, namely high temperature, wind speed, and low rainfall. The National Center of Meteorology and Seismology provides Statistics Center - Abu Dhabi with climate data from stations throughout the Emirate of Abu Dhabi. The Statistics Centre - Abu Dhabi then process it and produce climate data classified into four main areas Abu Dhabi, Al Ain, Al Dhafra and the islands.

Figure 6.2.2 Average maximum and minimum air temperature by month and region, 2017



Source: Statistics Centre- Abu Dhabi

6.2.2 Air Temperature by Month - Abu Dhabi, 2017

(Degree Celsius)

Month	Absolute minimum	Average minimum	Absolute maximum	Average maximum
January	7.6	15.2	29.3	25.1
February	5.8	15.7	33.3	24.3
March	8.7	19.1	38.8	29.5
April	14.3	22.5	44.1	35.7
May	16.5	25.5	47.1	38.9
June	20.0	28.0	49.2	40.4
July	23.4	31.3	49.8	44.6
August	22.6	30.3	49.1	44.1
September	21.2	27.2	46.0	40.9
October	16.4	24.4	43.4	36.3
November	11.1	19.9	35.7	31.0
December	9.9	15.6	30.6	25.5

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.3 Air Temperature by Month - Al Ain, 2017

(Degree Celsius)

Month	Absolute minimum	Average minimum	Absolute maximum	Average maximum
January	7.9	13.8	31.3	25.4
February	2.0	13.9	33.0	24.5
March	11.1	18.9	39.5	31.6
April	14.8	23.0	44.4	38.3
May	19.0	26.1	49.1	41.4
June	22.9	28.6	50.4	44.9
July	26.7	32.0	51.3	45.3
August	22.5	30.5	49.8	44.1
September	21.8	27.9	47.5	41.7
October	18.5	23.5	44.7	38.0
November	13.0	18.2	37.8	30.5
December	5.6	13.7	32.7	26.1

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.4 Air Temperature by Month - Al Dhafra, 2017

(Degree Celsius)

Month	Absolute minimum	Average minimum	Absolute maximum	Average maximum
January	5.8	13.0	31.7	25.8
February	3.7	13.8	33.8	24.8
March	8.6	18.5	40.9	31.5
April	12.7	22.0	44.3	38.2
May	17.6	25.7	48.8	41.7
June	20.2	27.8	50.8	44.1
July	24.7	31.3	50.2	45.8
August	22.8	30.1	49.5	44.3
September	21.0	27.1	46.7	42.0
October	16.9	23.6	43.4	38.0
November	11.4	18.5	36.4	31.3
December	5.0	13.2	31.9	26.9

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.5 Air Temperature by Month - The Islands, 2017

(Degree Celsius)

Month	Absolute minimum	Average minimum	Absolute maximum	Average maximum
January	10.7	16.5	29.8	23.5
February	9.9	15.8	30.1	21.7
March	10.9	19.0	38.4	26.8
April	17.3	23.3	41.9	33.8
May	23.8	27.1	45.3	38.2
June	23.1	29.0	45.5	39.1
July	27.6	31.3	48.4	42.3
August	26.4	31.8	47.0	42.1
September	25.1	29.5	45.0	39.3
October	22.0	27.2	40.0	35.4
November	16.8	22.6	35.7	30.2
December	11.8	17.6	28.8	24.2

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

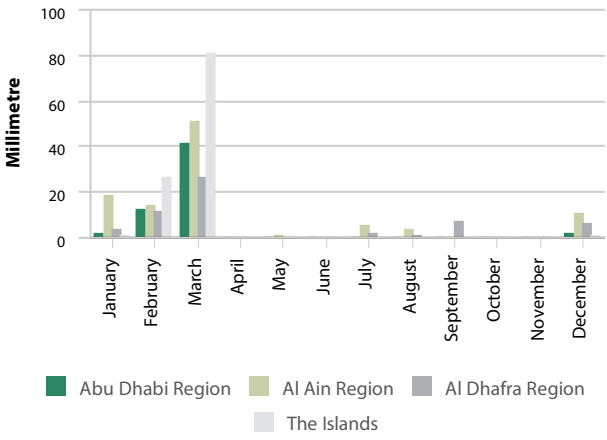
6.2.6 Average Rainfall by Month and Region, 2017

(Millimetres)

Month	Abu Dhabi	Al Ain	Al Dhafra	The Islands
January	1.4	18.1	3.3	0.8
February	12.0	14.1	11.4	26.5
March	41.5	50.6	26.4	80.3
April	0.0	0.0	0.0	0.0
May	0.0	1.1	0.2	0.0
June	0.0	0.0	0.0	0.0
July	0.2	5.2	1.5	0.1
August	0.1	3.2	0.6	0.0
September	0.0	0.1	7.2	0.0
October	0.0	0.0	0.0	0.0
November	0.0	0.0	0.0	0.0
December	1.4	10.5	6.5	1.0

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

Figure 6.2.3 Average Rainfall by Month and Region, 2017



Source: Statistics Centre- Abu Dhabi.

6.2.7 Rainfall in Abu Dhabi and Al Ain by Month, 2017

(Millimetres)

Month	Abu Dhabi		Al Ain	
	Heaviest fall in one day	Total for month	Heaviest fall in one day	Total for month
January	5.2	5.4	44.6	162.7
February	14.2	47.9	28.2	126.9
March	31.0	166.0	84.2	455.6
April	0.0	0.0	0.1	0.1
May	0.0	0.0	9.7	10.3
June	0.0	0.0	0.0	0.0
July	0.6	0.6	12.5	46.9
August	0.5	0.5	12.2	29.2
September	0.0	0.0	0.7	0.9
October	0.0	0.0	0.0	0.0
November	0.0	0.0	0.0	0.0
December	1.4	6.8	45.2	115.8

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.8 Rainfall in Al Dhafra and The Islands by Month, 2017

(Millimetres)

Month	Al Dhafra		The Islands	
	Heaviest fall in one day	Total for month	Heaviest fall in one day	Total for month
January	11.6	20.0	2.4	2.4
February	20.4	68.6	23.6	79.4
March	31.0	158.2	50.0	241.0
April	0.0	0.0	0.0	0.0
May	0.8	1.2	0.0	0.0
June	0.0	0.0	0.0	0.0
July	3.2	9.2	0.4	0.4
August	1.8	3.8	0.0	0.0
September	28.9	43.1	0.0	0.0
October	0.0	0.0	0.0	0.0
November	0.0	0.0	0.0	0.0
December	23.8	26.0	2.6	3.0

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.9 Average Atmospheric Pressure by Month and Region, 2017

(Hectopascal)

Month	Abu Dhabi	Al Ain	Al Dhafra	The Islands
January	1017.4	1018.6	1017.2	1019.0
February	1018.5	1019.2	1017.7	1019.7
March	1013.3	1013.8	1012.3	1013.9
April	1010.3	1010.8	1009.7	1011.2
May	1006.1	1007.0	1005.7	1007.0
June	999.5	999.9	999.2	1000.7
July	997.3	998.2	996.7	997.9
August	999.2	1000.3	998.9	999.9
September	1005.0	1006.0	1004.7	1005.8
October	1010.0	1010.8	1009.8	1011.2
November	1015.3	1016.3	1015.2	1016.5
December	1019.0	1019.6	1018.1	1020.5

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

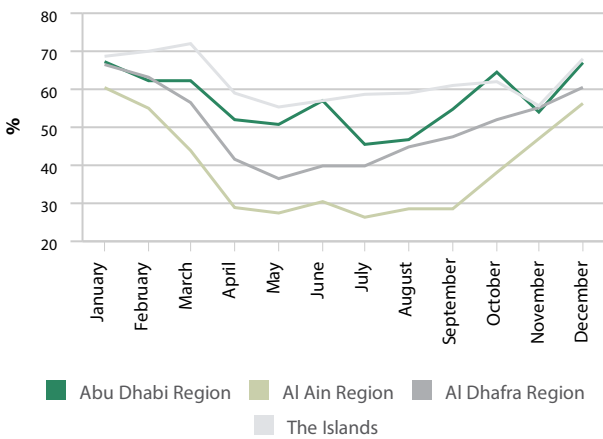
6.2.10 Average Relative Humidity by Month and Region, 2017

(%)

Month	Abu Dhabi	Al Ain	Al Dhafra	The Islands
January	67.3	60.4	66.5	68.7
February	62.3	55.0	63.2	70.0
March	62.3	43.9	56.5	72.0
April	52.0	28.9	41.6	59.0
May	50.8	27.4	36.5	55.3
June	57.0	30.4	39.8	57.0
July	45.5	26.3	39.8	58.7
August	46.8	28.6	44.8	59.0
September	54.8	28.6	47.5	61.0
October	64.5	38.1	52.0	62.0
November	54.0	47.0	55.2	55.7
December	67.0	56.3	60.5	68.0

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

Figure 6.2.4 Average Relative Humidity by Month and Region, 2017



Source: Statistics Centre- Abu Dhabi.

6.2.11 Relative Humidity by Month - Abu Dhabi, 2017

(%)

Month	Monthly average	Average minimum	Average maximum
January	67.3	44.5	86.0
February	62.3	41.0	81.8
March	62.3	36.5	82.8
April	52.0	24.3	76.8
May	50.8	24.0	74.5
June	57.0	30.0	82.3
July	45.5	18.5	70.3
August	46.8	17.8	74.5
September	54.8	21.5	82.5
October	64.5	32.3	90.5
November	54.0	31.0	76.0
December	67.0	43.8	84.2

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.12 Relative Humidity by Month - Al Ain, 2017

(%)

Month	Monthly Average	Average Minimum	Average Maximum
January	60.4	33.7	86.9
February	55.0	31.2	78.9
March	43.9	22.0	70.1
April	28.9	11.3	53.2
May	27.4	10.7	51.0
June	30.4	8.9	60.8
July	26.3	12.9	45.1
August	28.6	12.6	49.4
September	28.6	12.1	51.0
October	38.1	13.1	70.1
November	47.0	24.7	71.9
December	56.3	30.5	82.5

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.13 Relative Humidity by Month - Al Dhafra, 2017

(%)

Month	Monthly Average	Average Minimum	Average Maximum
January	66.5	39.7	91.0
February	63.2	40.0	86.2
March	56.5	31.8	82.5
April	41.6	19.2	69.8
May	36.5	17.2	62.5
June	39.8	18.2	68.7
July	39.8	18.2	65.7
August	44.8	20.8	71.5
September	47.5	20.7	75.3
October	52.0	23.2	82.7
November	55.2	31.8	79.2
December	60.5	32.3	88.0

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.14 Relative Humidity by Month - The Islands, 2017

(%)

Month	Monthly Average	Average Minimum	Average Maximum
January	68.7	49.3	84.7
February	70.0	52.0	83.7
March	72.0	47.3	89.7
April	59.0	29.3	82.7
May	55.3	23.7	81.7
June	57.0	28.7	80.7
July	58.7	25.7	83.7
August	59.0	27.0	82.3
September	61.0	30.7	82.3
October	62.0	38.0	80.0
November	55.7	38.7	72.0
December	68.0	49.0	83.3

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.15 Average Wind Speed by Month and Region, 2017

(Knot)

Month	Abu Dhabi	AL Ain	Al Dhafra	The Islands
January	11.8	10.0	11.3	15.3
February	15.3	12.7	16.0	20.3
March	14.8	12.9	15.0	18.0
April	12.8	11.7	13.8	17.0
May	12.8	11.4	12.5	14.7
June	13.0	11.4	14.2	17.3
July	13.8	12.4	12.5	14.0
August	14.0	11.7	12.3	15.0
September	11.8	10.9	10.7	12.0
October	10.5	9.3	10.2	13.7
November	11.3	9.0	10.7	14.3
December	11.4	10.2	9.8	16.7

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.
* Knot = 1.15 mph

6.2.16 Wind Speed by Month - Abu Dhabi, 2017

(Knot)

Month	Average	Absolute Maximum	Average Maximum
January	11.8	35.0	29.5
February	15.3	59.0	29.5
March	14.8	73.0	31.3
April	12.8	38.0	26.3
May	12.8	42.0	25.3
June	13.0	44.0	25.5
July	13.8	47.0	27.5
August	14.0	43.0	28.0
September	11.8	36.0	25.8
October	10.5	37.0	22.5
November	11.3	42.0	23.0
December	11.4	50.0	23.2

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.
* Knot = 1.15 mph

6.2.17 Wind Speed by Month - Al Ain, 2017

(Knot)

Month	Average	Absolute Maximum	Average Maximum
January	10.0	39.0	28.6
February	12.7	81.0	27.3
March	12.9	84.0	29.9
April	11.7	71.0	27.2
May	11.4	72.0	27.1
June	11.4	54.0	26.8
July	12.4	64.0	29.7
August	11.7	70.0	27.9
September	10.9	54.0	26.6
October	9.3	52.0	23.4
November	9.0	54.0	22.2
December	10.2	51.0	22.4

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.
* Knot = 1.15 mph

6.2.18 Wind Speed by Month - Al Dhafra, 2017

(Knot)

Month	Average	Absolute Maximum	Average Maximum
January	11.3	30.0	37.8
February	16.0	77.0	31.2
March	15.0	102.0	32.5
April	13.8	58.0	29.2
May	12.5	58.0	29.2
June	14.2	53.0	30.2
July	12.5	52.0	29.0
August	12.3	49.0	27.7
September	10.7	54.0	24.7
October	10.2	39.0	23.8
November	10.7	50.0	23.5
December	9.8	41.0	21.5

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.
* Knot = 1.15 mph

6.2.19 Wind Speed by Month - The Islands, 2017

(Knot)

Month	Average	Absolute Maximum	Average Maximum
January	15.3	46.0	33.0
February	20.3	66.0	34.7
March	18.0	73.0	35.0
April	17.0	55.0	31.3
May	14.7	43.0	28.0
June	17.3	56.0	31.0
July	14.0	45.0	26.7
August	15.0	39.0	27.7
September	12.0	38.0	23.7
October	13.7	42.0	24.3
November	14.3	49.0	25.0
December	16.7	44.0	26.7

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.
* Knot = 1.15 mph

6.2.20 Average Daily Sunshine in Abu Dhabi and Al Ain by Month, 2017

(Hours)

Month	Abu Dhabi	Al Ain
January	9.0	9.0
February	6.6	8.7
March	7.8	9.6
April	10.7	11.0
May	10.9	11.5
June	11.3	11.7
July	10.8	11.2
August	10.6	11.1
September	10.0	10.5
October	9.6	10.0
November	9.1	9.4
December	7.9	8.9

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

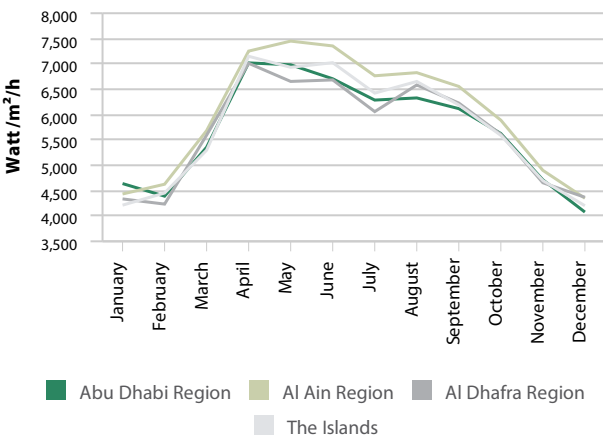
6.2.21 Average Daily Total Solar Radiation by Month and Region, 2017

(Watt /m²/h)

Month	Abu Dhabi	Al Ain	Al Dhafra	The Islands
January	4640	4434	4337	4214
February	4391	4626	4235	4453
March	5357	5684	5594	5298
April	7020	7253	7012	7150
May	6983	7450	6654	6933
June	6707	7355	6684	7024
July	6287	6766	6059	6424
August	6329	6828	6585	6653
September	6118	6556	6228	6190
October	5627	5890	5613	5590
November	4713	4900	4656	4699
December	4077	4350	4369	4202

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

Figure 6.2.5 Average Daily Total Solar Radiation by Month and Region, 2017



Source: Statistics Centre- Abu Dhabi.

6.2.22 Average Daily Total Solar Radiation by Month - Abu Dhabi, 2017

(Watt /m^2/h)

Month	Average	Minimum	Maximum
January	4640	3378	5628
February	4391	1316	6458
March	5357	1390	7281
April	7020	6067	7803
May	6983	4124	7728
June	6707	5288	7481
July	6287	5067	6985
August	6329	5448	6968
September	6118	5192	6787
October	5627	5055	6178
November	4713	4083	5183
December	4077	3177	4679

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.23 Average Daily Total Solar Radiation by Month - Al Ain, 2017

(Watt /m^2/h)

Month	Average	Minimum	Maximum
January	4434	2916	5329
February	4626	1456	6377
March	5684	1020	7148
April	7253	6601	7836
May	7450	5331	8159
June	7355	6285	7834
July	6766	5632	7538
August	6828	5509	7421
September	6556	5442	7243
October	5890	5344	6440
November	4900	4169	5323
December	4350	2403	5027

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.24 Average Daily Total Solar Radiation by Month - Al Dhafra, 2017

(Watt /m²/h)

Month	Average	Minimum	Maximum
January	4337	2703	5044
February	4235	1614	6098
March	5594	1996	6983
April	7012	5914	7598
May	6654	4502	7565
June	6684	6012	7206
July	6059	4800	6740
August	6585	4973	7096
September	6228	4914	6911
October	5613	5054	6176
November	4656	4060	5123
December	4369	3333	4872

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

6.2.25 Average Daily Total Solar Radiation by Month - The Islands, 2017

(Watt /m²/h)

Month	Average	Minimum	Maximum
January	4214	2695	4954
February	4453	950	6228
March	5298	2335	7058
April	7150	5363	8026
May	6933	4240	8032
June	7024	6172	7571
July	6424	5546	7437
August	6653	5879	7244
September	6190	5033	6909
October	5590	5072	6115
November	4699	3637	5214
December	4202	1905	4877

Source: The National Center of Meteorology and Seismology, Statistics Centre- Abu Dhabi.

Air Statistics

Air pollution comes from stationary sources such as power plants and factories and mobile sources such as trucks, cars, and buses. Emissions from these sources reduce air quality, leaving a negative impact on people's health and the balance of ecosystems. Major air pollutants monitored are sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10}), ground level-ozone, and carbon monoxide.

Air quality in the Emirate of Abu Dhabi is generally good. However, readings vary with different locations, readings from stations close to roads record high rates of pollution due to vehicle exhaust emissions. Likewise, readings taken within the vicinity of oil installations and industrial facilities are the highest in the Emirate.

In 2017 annual average concentration of PM_{10} ranged between 112.7 and 129.4 mcg/m^3 in the urban areas of the Emirate while annual average concentration of sulphur dioxide ranged between 6.5 and 13.7 mcg/m^3, which is below the national maximum allowable limit (60 mcg/m^3).

6.2.26 Annual Average of Air Pollution Indicators in Urban Areas by Region and Station, 2017

(Microgram/m^3)

Indicator (maximum allowable limit)	Sulphur dioxide (60 mcg/m^3)	Nitrogen dioxide	Ground level ozone	Particulate matter - PM_{10}
Abu Dhabi Region				
Khalifa School	11.9	33.1	90.3	120.0
Baniyas School	9.1	34.0	70.0	129.4
Khalifa City	10.7	32.1	83.2	120.0
Al Maqta	10.6	45.2	90.2	117.9
Al Ain Region				
Al Ain School	6.5	34.3	68.9	116.5
Suweihan	9.1	16.8	92.3	114.4
Zakher	7.5	33.8	-	125.2
Al Tawia	7.1	33.3	86.9	112.7
Al Dhafra Region				
Bida Zayed	13.7	15.1	87.6	128.8

Source: Environment Agency - Abu Dhabi.

6.2.27 Annual Average of Sulphur Dioxide Concentration in Ambient Air by Region *

(Microgram/m^3)

Station location	2014	2015	2016	2017
Abu Dhabi Region				
City centre - Khadija School	9.1	8	13.6	13.6
Urban/ residential - Khalifa School	5.6	8.7	11.2	11.9
Road side - Hamdan Street	5	9.4	13.4	13.1
Urban/ residential - Baniyas School	5.4	7.3	9.4	9.1
Industrial - Mussafah	7.5	11.6	12.4	12.5
Industrial - Al Mafraq	2.4	5.9	10	10.1
Urban/ residential - Khalifa City	9.2	10	10.4	10.7
Urban/ residential - Al Maqta	4.2	8.1	10.8	10.6
Al Ain Region				
Urban/ residential - Al Ain School	7.7	6.4	6.4	6.5
Road side - Al Ain Street	8.7	4.9	5.4	5.6
Regional background - Al Qua'a	4.3	4.5	5.6	5.0
Urban/ residential - Suweihan	4.1	6.4	8.1	9.1
City centre - Zakher	4.3	8.9	8.1	7.5
Urban/ residential - Al Tawia	6.4	5.8	6.4	7.1
Al Dhafra Region				
Urban/ residential - Bida Zayed	15.2	15.1	15.4	13.7
Industrial - Ruwais	17.6	15.6	20.2	19.1
City centre - Gayathi School	10.2	11.2	12.9	14.0
Regional background - Liwa Oasis	6.5	14.1	10.2	11.7
Regional background / Industrial - Habshan	11.1	17	17.7	17.4

Source: Environment Agency - Abu Dhabi.

* The annual maximum allowable limit for sulphur dioxide average concentration is 60 mcg/m^3

6.2.28 Annual Average of Nitrogen Dioxide Concentration in Ambient Air by Region

(Microgram/m^3)

Station location	2014	2015	2016	2017
Abu Dhabi Region				
City centre - Khadija School	28.8	35.7	30.8	34.6
Urban/ residential - Khalifa School	27.8	28.3	27.8	33.1
Road side - Hamdan Street	47.7	49.9	50.1	51.3
Urban/ residential - Baniyas School	32.5	30.7	32.2	34.0
Industrial - Mussafah	53.3	49.8	52.4	54.4
Industrial - Al Mafraq	49.8	47.7	45.8	48.9
Urban/ residential - Khalifa City	34.7	25.4	28.2	32.1
Urban/ residential - Al Maqta	42	36.9	38.7	45.2
Al Ain Region				
Urban/ residential - Al Ain School	36.3	34.3	32.4	34.3
Road side - Al Ain Street	52	42	42.7	42.2
Regional background - Al Qua'a	6.5	4.9	4.5	5.3
Urban/ residential - Suweihan	15.1	13.8	13.2	16.8
City centre - Zakher	28.4	31.5	35.2	33.8
Urban/ residential - Al Tawia	20.5	25.2	33.4	33.3
Al Dhafra Region				
Urban/ residential - Bida Zayed	17	16.5	14	15.1
Industrial - Ruwais	28.7	25.6	24.8	21.7
City centre - Gayathi School	16.8	15.6	14.9	15.6
Regional background - Liwa Oasis	4.6	3.8	4.1	5.8
Regional background / Industrial - Habshan	17.2	13.8	13.1	13.4

Source: Environment Agency - Abu Dhabi.

6.2.29 Annual Average of Ground Level Ozone Concentration in Ambient Air by Region

(Microgram/m^3)

Station location	2014	2015	2016	2017
Abu Dhabi Region				
City centre - Khadija School	89.2	88.9	79.9	91.4
Urban/ residential - Khalifa School	94.3	99.8	91.2	90.3
Urban/ residential - Baniyas School	103.9	115.4	70.9	70.0
Urban/ residential - Khalifa City	102.6	114.4	93.3	83.2
Urban/ residential - Al Maqta	78.5	101.6	80.7	90.2
Al Ain Region				
Urban/ residential - Al Ain School	74.6	94.5	65	68.9
Regional background - Al Qua'a	98.5	117.3	91.7	72.9
Urban/ residential - Suweihan	101.5	118.2	90.2	92.3
Urban/ residential - Al Tawia	102.5	97.5	92.7	86.9
Al Dhafra Region				
Urban/ residential - Bida Zayed	99.7	123.8	95.9	87.6
Industrial - Ruwais	117.7	115.4	91.9	89.1
City centre - Gayathi School	100.5	105.7	91.8	87.8
Regional background - Liwa Oasis	104.1	117.8	106.6	99.4
Regional background / Industrial - Habshan	96.6	106.3	91.9	86.6

Source: Environment Agency - Abu Dhabi.

6.2.30 Annual Average of Particulate Matter (PM_{10}) Concentration in Ambient Air by Region

(Microgram/m^3)

Station location	2014	2015	2016	2017
Abu Dhabi Region				
City centre - Khadija School	92.8	138.3	117.1	111.8
Urban/ residential - Khalifa School	82.5	118.6	127.1	120.0
Road side - Hamdan Street	123.5	171.6	101.0	114.0
Urban/ residential - Baniyas School	67.8	142.4	130.0	129.4
Industrial - Mussafah	142.3	172.1	158.1	146.3
Industrial - Al Mafraq	163.8	174.9	206.9	177.9
Urban/ residential - Khalifa City	83.5	136.1	155.9	120.0
Urban/ residential - Al Maqta	112.6	144	136.4	117.9
Al Ain Region				
Urban/ residential - Al Ain School	105.4	124.1	111.7	116.5
Road side - Al Ain Street	97.7	100.8	102.3	103.3
Regional background - Al Qua'a	95.5	138.1	108.9	130.3
Urban/ residential - Suweihan	92.8	132.9	90.8	114.4
City centre - Zakher	94.2	101.9	94.0	125.2
Urban/ residential - Al Tawia	100.6	136.2	100.1	112.7
Al Dhafra Region				
Urban/ residential - Bida Zayed	98.7	134.8	128.7	128.8
Industrial - Ruwais	121.9	139.7	125.6	108.5
City centre - Gayathi School	95.7	115.9	112.4	111.0
Regional background - Liwa Oasis	110.9	168.3	112.8	113.8
Regional background / Industrial - Habshan	106	208.1	128.8	119.7

Source: Environment Agency - Abu Dhabi.

6.2.31 Annual Average of Carbon Monoxide Concentration in Ambient Air by Region

(Microgram/m^3)

Station location	2014	2015	2016	2017
Abu Dhabi Region				
Road side - Hamdan Street	1.1	1.8	1.4	1.2
Urban/ residential - Al Maqta	0.7	0.8	0.6	0.8
Al Ain Region				
Road side - Al Ain Street	0.9	1	0.6	0.7
Regional background - Al Qua'a	0.3	0.6	0.3	0.3
Urban/ residential - Suweihan	0.5	0.7	0.5	0.5
Al Dhafra Region				
Industrial - Ruwais	0.3	1.1	0.8	1.0

Source: Environment Agency - Abu Dhabi.

6.2.32 Annual Average of Noise Level by Region

(Decibels)

Station location	2014	2015	2016	2017
Abu Dhabi Region				
City centre - Khadija School	-	-	-	-
Urban/ residential - Khalifa School	42.8	29.1	49	49.3
Road side - Hamdan Street	65.7	64.4	58.7	58.7
Urban/ residential - Baniyas School	50.2	44.6	45.5	
Industrial - Mussafah	60.7	54.5	53.4	54.1
Industrial - Al Mafraq	53	53.3	50.6	47.6
Urban/ residential - Khalifa City	49.7	45.1	45.8	45.3
Urban/ residential - Al Maqta	49.3	47.5	48.5	49.6
Al Ain Region				
Urban/ residential - Al Ain School	51.5	50.3	50.2	50.1
Road side - Al Ain Street	62	61.4	61.3	61.4
Regional background - Al Qua'a	51.5	51.3	47.6	41.6
City centre - Zakher	49.1	51.3	49.2	-
Urban/ residential - Al Tawia	51.7	51.7	52.2	-
Al Dhafra Region				
Urban/ residential - Bida Zayed	45.5	39.2	-	50.0
Industrial - Ruwais	53.2	51.6	39.1	37.3
City centre - Gayathi School	54.8	51.5	-	-
Regional background - Liwa Oasis	45.3	42.8	-	-
Regional background / Industrial - Habshan	55.1	54.9	50.9	45.7

Source: Environment Agency - Abu Dhabi.

6.2.33 Sulphur Oxides Emissions - Oil and Gas Sector

(Tons)

Business sector	2014	2015	2016	2017
Total	**276,206**	**363,692**	**220,249**	**192,931**
Exploration and Production	13,069	11,677	10,067	12,264
Processing and Refining	207,420	301,021	156,219	131,163
Marketing and Distribution	11,719	9,694	7,913	3,396
Independent Operators	43,999	41,300	46,050	46,108

Source: Source : Abu Dhabi National Oil Company - ADNOC.
Note: Business sectors had been re-arranged by data source.

6.2.34 Nitrogen Oxides Emissions - Oil and Gas Sector

(Tons)

Business sector	2014	2015	2016	2017
Total	**56,116**	**54,335**	**70,820**	**69,175**
Exploration and Production	12,324	8,263	13,229	14,122
Processing and Refining	34,160	33,126	39,598	39,993
Marketing and Distribution	7,308	10,339	15,324	12,854
Independent Operators	2,324	2,607	2,669	2,206

Source: Abu Dhabi National Oil Company - ADNOC.
Note: Business sectors had been re-arranged by data source.

6.2.35 Volatile Organic Compounds Emissions - Oil and Gas Sector

(Tons)

Business sector	2014	2015	2016	2017
Total	**67,355**	**64,457**	**88,491**	**109,438**
Exploration and Production	53,199	51,608	51,086	48,803
Processing and Refining	6,227	9,367	7,689	7,413
Marketing and Distribution	6,906	2,795	28,577	52,177
Independent Operators	1,023	687	1,138	1,045

Source: Abu Dhabi National Oil Company - ADNOC.
Note: Business sectors had been re-arranged by data source.

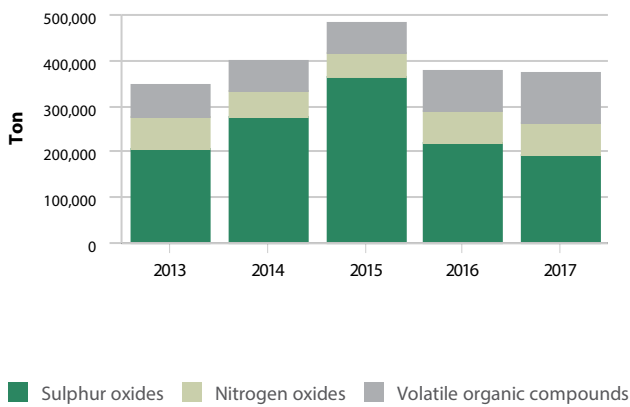
6.2.36 Air Pollutant Total Emissions - Oil and Gas Sector

(Tons)

Pollutant	2014	2015	2016	2017
Total	**399,676**	**482,485**	**378,456**	**371,544**
Sulphur oxides (SOx)	276,206	363,692	220,249	192,931
Nitrogen oxides (NOx)	56,116	54,335	69,716	69,175
Volatile organic compounds (VOC)	67,355	64,457	88,491	109,438

Source: Abu Dhabi National Oil Company - ADNOC

Figure 6.2.6 Air Pollutant Total Emissions - Oil and Gas Sector



Source: Statistics Centre- Abu Dhabi.

6.2.37 Per Capita Air Pollutant Total Emissions - Oil and Gas Sector

(Tons)

	2014	2015	2016	2017
Total	**0.1**	**0.2**	**0.1**	**0.1**
Sulphur dioxide (SO)	0.1	0.2	0.1	0.1
Nitrogen oxides (NOx)	0	0	0	0.0
Volatile organic compounds (VOC)	0	0	0	0.0

Source: Abu Dhabi National Oil Company - ADNOC, Statistics Centre- Abu Dhabi.

6.2.38 Carbon Dioxide Emissions - Oil and Gas Sector

(Million tons)

Business sector	2014	2015	2016	2017
Total	**29.4**	**33.7**	**34.1**	**35.8**
Exploration and Production	3.6	3.9	4.4	4.5
Processing and Refining	23.9	27.6	27.4	28.7
Marketing and Distribution	1.3	1.4	1.4	1.8
Independent Operators	0.6	0.8	0.9	0.9

Source: Abu Dhabi National Oil Company - ADNOC.
Note: Business sectors had been re-arranged by data source.

6.2.39 Per Capita Carbon Dioxide Emissions - Oil and Gas Sector

(Tons)

Business sector	2014	2015	2016	2017
Total	**11.1**	**12.1**	**11.7**	**12.3**
Exploration and Production	1.4	1.4	1.5	1.5
Processing and Refining	9.0	9.9	9.4	9.9
Marketing and Distribution	0.5	0.5	0.5	0.6
Independent Operators	0.2	0.3	0.3	0.3

Source: Abu Dhabi National Oil Company - ADNOC, Statistics Centre- Abu Dhabi.
Note: Business sectors had been re-arranged by data source.

6.2.40 Sulphur Dioxide Emissions - Water and Electricity Production Sector

(Tons)

Source	2013	2015	2016	2017
Total	**1,274**	**1,910**	**1,885**	**1,278.9**
Arabian Power Company	430.5	399.7	412	339.5
Shuweihat CMS International Power Company	245	218	243	236.0
Emirates CMS Power Company	76.5	78.8	27.2	50.4
Gulf Total Tractebel Power Company	20.7	27.1	28.2	28.2
Taweelah Asia Power Company	265	641.3	623.5	336.7
Al Mirfa Power and Distillation Plant	61.2	14.3	0	14.6
Ruwais Power Company	175.2	127.4	145.6	188.8
Shuweihat Asia Power Company	-	403.8	405.3	84.7

Source: Abu Dhabi Water and Electricity Authority - ADWEA.

6.2.41 Nitrogen Oxides Emissions - Water and Electricity Production Sector

(Tons)

Source	2013	2015	2016	2017
Total	**13,391**	**14,381**	**16,544**	**15,303**
Arabian Power Company	3,801	4,196	4,300	3,739
Shuweihat CMS International Power Company	2,385	2,566	2,936	3,174
Emirates CMS Power Company	547.9	478.3	466	486
Gulf total Tractebel Power Company	2,333	2,215	2,293	2,153
Taweelah Asia Power Company	2,042	2,515	3,383	2,744
Al Mirfa Power and Distillation Plant	634.5	270.3	-	17
Ruwais Power Company	1,649	1,242	2,064	1,881
Shuweihat Asia Power Company	-	898.4	1,102	1,109

Source: Abu Dhabi Water and Electricity Authority - ADWEA.

6.2.42 Volatile Organic Compounds Emissions - Water and Electricity Production Sector

(Tons)

Source	2013	2015	2016	2017
Total	**219.8**	**248.6**	**258.8**	**260.2**
Gulf Total Tractebel Power Company	190.1	248.6	258.8	260.2
Al Mirfa Power and Distillation Plant	29.7	-	0	0

Source: Abu Dhabi Water and Electricity Authority - ADWEA.

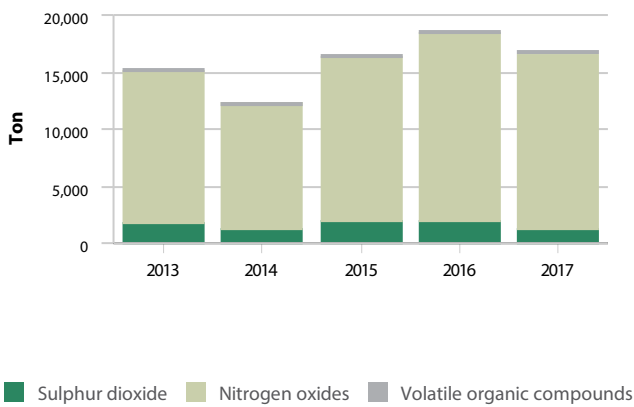
6.2.43 Air Pollutant Total Emissions - Water and Electricity Production Sector

(Tons)

Pollutant	2013	2015	2016	2017
Total	**15,357**	**16,540**	**18,686**	**16,842**
Sulphur dioxide (SO)	1,745	1,910	1,885	1,279
Nitrogen oxides (NOx)	13,391	14,381	16,543	15,303
Volatile organic compounds (VOC)	219.8	248.6	258.8	260.2

Source: Abu Dhabi Water and Electricity Authority - ADWEA.

Figure 6.2.7 Air Pollutant Total Emissions - Water and Electricity Production Sector



Source: Statistics Centre - Abu Dhabi.

6.2.44 Carbon Dioxide Emissions - Water and Electricity Production Sector

(Million tons)

Source	2013	2015	2016	2017
Total	**29.6**	**35.4**	**34.6**	**37.2**
Arabian Power Company	7.1	7.5	8.5	8.4
Shuweihat CMS International Power Company	4.9	5.3	5.4	5.0
Emirates CMS Power Company	2.5	2.8	0	2.8
Gulf Total Tractebel Power Company	4.1	5.3	5.9	5.6
Taweelah Asia Power Company	7.9	8.2	8.8	8.8
Al Mirfa Power and Distillation Plant	0	0	0	0.0
Ruwais Power Company	3	2.8	3	2.9
Shuweihat Asia Power Company	-	3.5	3	3.8

Source: Abu Dhabi Water and Electricity Authority - ADWEA.

6.2.45 Other Emissions - Water and Electricity Production Sector

(Tons)

Pollutant	2013	2015	2016	2017
Carbon monoxide (CO)	7,375	7,995	9,681	7,212
Lead (Pb)	0	0	0	0
Methane (CH)	80	104	108	109
Nitrous oxide (NO)	22	29	30	30

Source: Abu Dhabi Water and Electricity Authority - ADWEA.

Water

The rapid economic and agricultural development and sharp population increase in the Emirate of Abu Dhabi has led to large increases in water demands On the other hand, reliance on non-conventional water resources, such as desalinated water and reuse of treated wastewater, increased to fill the imbalance between supply and demand.

The Abu Dhabi Region ranked top in the treatment of wastewater accounting for 76% of the Emirate's total treated wastewater in 2017 while Al Dhafra came last in this regard, producing only 4% of the total.

6.2.46 Total Non-Conventional Water Resources by Type
(Million cubic metre)

Type	2013	2015	2016	2017
Total	**1,252.5**	**1,338.5**	**1,295.6**	**1,295.5**
Desalinated water consumption	1,098.7	1,167.7	1,129.1	1,121.1
Treated wastewater reuse	153.8	170.8	166.5	174.4

Source: Statistics Centre - Abu Dhabi.

6.2.47 Quantity of Treated Wastewater by Region
(Million cubic metre)

Region	2013	2015	2016	2017
Total	**283**	**332.3**	**325.9**	**310.7**
Abu Dhabi Region	209.4	251.7	247.1	236.0
Al Ain Region	59.1	67.6	65.3	62.3
Al Dhafra Region	14.5	13	13.5	12.4

Source: Abu Dhabi Sewerage Services Company.

6.2.48 Quantity of Treated Wastewater Reuse by Region
(Million cubic metre)

Region	2013	2015	2016	2017
Total	**153.8**	**170.8**	**166.5**	**174.4**
Abu Dhabi Region	86.5	95.7	91.1	101.8
Al Ain Region	58	64.6	63.7	61.3
Al Dhafra Region	9.3	10.5	11.7	11.3

Source: Abu Dhabi Sewerage Services Company.

6.2.49 Total Wastewater Treatment Plants Capacity by Region

(Million cubic metre)

Region	2013	2015	2016	2017
Total	**470.5**	**470.5**	**474.7**	**473.2**
Abu Dhabi Region	344.4	369.9	370.6	369.4
Al Ain Region	112.7	81.7	82.4	82.2
Al Dhafra Region	13.4	18.8	21.7	21.6

Source: Abu Dhabi Sewerage Services Company.

6.2.50 Total Conventional Wastewater Treatment Plants Capacity by Region

(Million cubic metre)

Region	2013	2015	2016	2017
Total	**469.3**	**465.3**	**469.9**	**468.7**
Abu Dhabi Region	343.8	365.4	366.4	365.4
Al Ain Region	112.3	81.3	82.2	81.9
Al Dhafra Region	13.1	18.6	21.3	21.3

Source: Abu Dhabi Sewerage Services Company.

6.2.51 Total Non-Conventional Wastewater Treatment Plants Capacity by Region

(Million cubic metre)

Region	2013	2015	2016	2017
Total	**1.2**	**5.2**	**4.8**	**4.5**
Abu Dhabi Region	0.6	4.6	4.2	4.0
Al Ain Region	0.4	0.4	0.2	0.2
Al Dhafra Region	0.3	0.3	0.4	0.3

Source: Abu Dhabi Sewerage Services Company.

Waste

Interest in waste management and treatment has increased with the accelerated pace of human and economic development. Waste management refers to the collection, transfer, sorting, treatment and disposal of waste materials produced by human and economic activity, with the aim of reducing their effect on environment, health and landscape.

In 2017 a total of 9.477 million tons of waste were in the Emirate of Abu Dhabi, at a rate of 25.96 thousand tons per day.Construction and demolition waste generated had the highest percentage of waste with 42% from total waste generated in the Emirate of Abu Dhabi, followed by Industrial and commercial waste with a percentage of 33%.

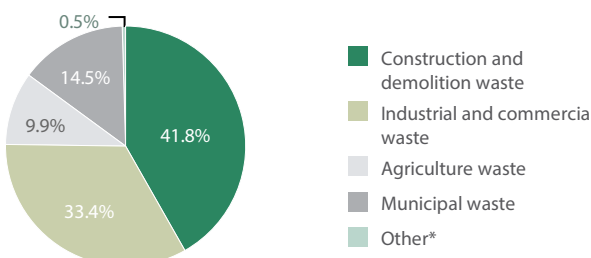
6.2.52 Non-Hazardous Solid Waste Generation by Region and Source Activity, 2017

(Tons)

Source	2014	2015	2016	2017
Total	**9,918,590**	**8,420,998**	**9,598,969**	**9,477,037**
Daily average	27,174	23,071	26,227	25,964
Construction and demolition waste	4,419,665	2,876,313	4,532,379	3,959,319
Industrial and commercial waste	3,312,125	3,306,644	2,692,768	3,169,212
Agriculture waste	561,991	493,106	745,644	933,505
Municipal waste	1,466,590	1,678,983	1,561,680	1,372,140
Other*	158,219	65,952	66,499	42,861

Source: The Centre of Waste Management - Abu Dhabi , ADNOC.
* includes sludge and oil and gas sector waste.

Figure 6.2.8 Percentage Distribution of Non-Hazardous Solid Waste Generation by Region, 2017



Source: Statistics Centre - Abu Dhabi.

Health and Safety

Food safety and occupational health and safety are two major areas that receive a great deal of attention from the government of the Emirate of Abu Dhabi. In 2016, there were more than 2263 cases of foodborne illnesses and food poisoning caused by consuming foods or drinks contaminated with bacteria and viruses, comparing to 2015, percentage of illnesses caused by food poisoning and foodborne increased upto 19% from year 2015.

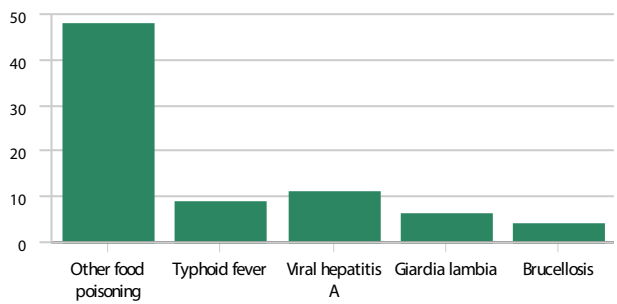
People diagnosed with food poisoning accounted for the largest percentage 62% of the total number of patients, followed by Viral hepatitis A at 14%. Regarding waste statistics

6.2.53 Number of Food Poisoning and Foodborne Illnesses by Type

Type	2013	2014	2015	2016
Total	**1,949**	**955**	**1,895**	**2263**
Other food poisoning	1,237	360	1,233	1392
Typhoid fever	248	222	275	251
Viral hepatitis A	271	224	173	318
Giardia lambia	94	100	139	184
Brucellosis	99	49	75	118

Source: Health Authority - Abu Dhabi.

Figure 6.2.9 Rate of food poisoning cases per 100,000 person by Type - 2016



Source: Statistics Centre - Abu Dhabi.