KAHRAMAA

المؤسسة العامة القطرية للكهرباء والماء

Qatar General Electricity & Water Corporation

KAHRAMAA

Annual Statistics Report

2018

Statistic Report 2018

Qatar General Electricity & Water Corporation “KAHRAMAA”

Prepared by: Planning & Quality Department
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KAHRAMAA Publications
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His Highness

Sheikh Tameem Bin Hamad Al-Thani

Emir of the State of Qatar

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MINISTER'S FOREWORD

Qatar continues to rise as one of the world's most dynamic and fastest growing economies to achieve phenomenal GDP increase. The National Vision 2030 guides the country's growth. The government is committed to creating a dynamic, competitive and broad-based economy by increasing economic diversification through the re-investment of Qatar's significant energy wealth. The outcome is evident in the rapid changes and urbanization during the last decade, brought about by wise national economic planning, stable state revenues and Qatar's vision of shaping Doha as a world-scale metropolis. This means continued buoyancy for the private sector in Qatar, and a surge in economic activities in infrastructure creation and building of civic amenities. Large opportunities for investment and energy trade are present, coupled with continuing lifestyle improvement, development of telecommunications, information technology, knowledge economy, renewable resources and business efficiency. Qatar's rapid public infrastructure expansions and real estate development are driving the continual population growth, primarily due to the need for more expatriate manpower. Large scale investments in transport, communications, tourism, sports facilities and other services are on-going, such as the development of the Lusail City, Qatar Economic Zones (Manateq), Qatar Rail and M'sheireb real estate projects and other major infrastructure developments. Continuing industrialization largely due to the oil and gas sector and rapid urbanization has generated increased demand for major improvements and expansion of basic infrastructure and services most notably electricity and water. Qatar's preparations to host the 2022 FIFA World Cup add more challenges to the readiness of KAHRAMAA. The Qatar National Development Strategy-II (NDS2) is providing the overarching framework and impetus for KAHRAMAA's efforts to ensure quality services, whilst ensuring sustainability of electricity and water production and consumption.

The unjust embargo imposed by neighbouring countries has shown the strength and diversity of Qatar's economy, which is evident by the excellent performance of economic indicators, as seen in the energy and water sectors.

Peak electricity demand in 2018 was 7,875 MW, grew by 0.25% as compared to 2017. Total energy transmitted in 2018 was 44,655 GWh with growth of 4.3% over 2017.Total water production in 2018 was 637 million cubic meters, an increase by 5.11% over 2017. The maximum monthly water production in 2018 was 57.1 million cubic meters in the month of July, an increase of 3.6% over 2017.

KAHRAMAA is implementing strategic planning and transformation program to enhance customer services, meet demand growth, improve business efficiency and strengthen its workforce. KAHRAMAA's continued vision is to transform itself into self-sustaining business, providing high quality and sustainable electricity and water by diversifying energy sources such as solar energy for better living in Qatar.

Thanks are due to His Highness, Sheikh Tamim Bin Hamad Al Thani, the Emir of the State of Qatar for his extensive support for KAHRAMAA business development, thus contributing towards the prosperity of the State of Qatar. Thanks are also due to all KAHRAMAA employees for their efforts towards achieving KAHRAMAA's objectives and enabling KAHRAMAA in achieving much success in 2018 and beyond.

H.E. SAAD SHERIDA AL-KAABI

Minister of State for Energy Affairs

PRESIDENT'S FOREWORD

In compliance with the mandate from the government of Qatar, Kahramaa publishes this annual statistical report. The purpose is to provide other Qatari government institutions, investors, the academe and the general public with information relevant to and provides the end-user an understanding and appreciation of the development of electricity, water and district cooling sectors in Qatar.

Tracing the development plan in the State of Qatar, one finds that the highest priority goes to the provision of services for all residents. It targets the promotion of the national economy and enhancement of productivity and organizational efficiency at all state authorities to cope with the international economic development. We serve a rapidly growing economy and population in a region with an abundance of fossil fuels, yet scarce in water sources. In this context, it is imperative that we use our resources and manage our growth efficiently and wisely. To address this need, in 2012 Kahramaa launched "Tarsheed", the National Conservation Program to create sustainable culture and lifestyle among its residents, the public and private sector in cooperating towards conservation & efficiency to ensure optimal use of water as well as electrical energy. Kahramaa has implemented legislative measures enforcing compliance to the national conservation laws. It aims to influence the lifestyle of Qatar's residents in domestic consumption, as well as implement water and electricity saving technologies. Along with this effort Kahramaa has plans in place to source 700 MW of electricity from solar energy, and has implemented alternative potable water production techniques such as reverse osmosis.

The State of Qatar has enough of its electricity and water production and it was not affected by the unjustified blockade imposed.

To align with Qatar National Vision (QNV 2030) and Qatar National Development Strategy-II (NDS2 2018-2022) Kahramaa continues to pursue its long term road map towards its vision to become world class utility via the following 10 strategic objectives: Optimize asset performance, Provide high quality water and electricity, Enhance processes and systems, Improve corporate governance and risk management, Ensure a safe and healthy working environment, Attract, develop and retain a high-performing workforce and support Qatarization, Increase social advocacy and environmental compliance, Excel at customer service, Strengthen financial performance to provide high quality and sustainable electricity and water for better living in Qatar.

Basic infrastructures are not an end in themselves; rather, they are means for ensuring the delivery of goods and services. They are crucial to achieving prosperity and growth in a way that enhances the quality of life, including the social well-being, health and safety of the people of Qatar, and the quality of their environment. We undertake these commitments seriously as we believe in the values of corporate social responsibility, customer centricity and teamwork in order to live our aspirations and to meet our mandate as a sole service provider.

KAHRAMAA seeks to achieve financial sustainability, which will be achieved with increased revenues and reduction in financial support from Government. Continual progress is being made to preserve the distinguished position that Kahramaa has reached to build the state economy by innovation and transformational initiatives.

Despite prevailing regional and international challenges, Kahramaa continues its successful march towards excellence. We are determined to exert all efforts to maintain the place of pride KAHRAMAA has achieved. We endeavour to promote and maintain the good relationship with our customers and other stakeholders. In fact, these objectives demand focus on sound and prudent business planning in order to achieve sustainability and KAHRAMAA is capable of realizing it. We look confidently into the future and feel proud to be part of Qatar's success story.

Essa Bin Hilal Al-Kuwari

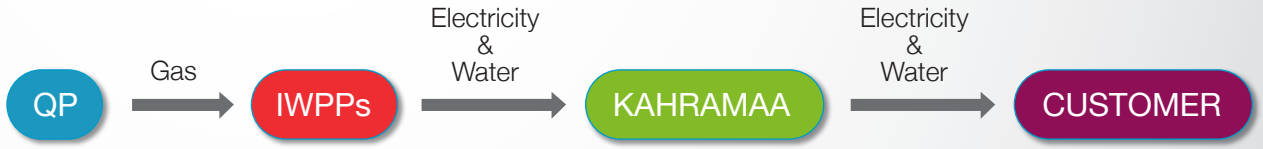
KAHRAMAA President

KAHRAMAA'S BUSINESS MANDATE

Up to the year 1999, electricity generation and water production, transmission and distribution services were carried out by the former Ministry of Electricity and Water (MEW).

To achieve some degree of deregulation and to encourage private investors, in the year 2000 power generation and water production services were separated and privatized into a business named Qatar Electricity and Water Company (QEWC). Since that date, several additional facilities have been built to accommodate Qatar's increasing power and water needs. Transmission and distribution of electricity and forwarding and distribution of water remained as a government service carried out by the new government corporation named KAHRAMAA (Qatar General Electricity and Water Corporation).
KAHRAMAA, now a more streamlined service organization, operates and maintains the sole electricity and water network in the country, focusing only in delivering these basic services to all consumers. The government continues to encourage its entrepreneur citizens to invest in the power generation and water desalination business, otherwise known as IPWP's (Independent Power and Water Providers), adopting global trends of deregulation.
QP (Qatar Petroleum) remains the sole source of natural gas as fuel for the Power & Water Production facilities run by the IPWP's.

The following diagram illustrates the linkage of four key business entities in Qatar that comprise the supply chain up to the consumer:



As it directly interfaces with consumers, forecasting of electricity and water demand in Qatar remains with KAHRAMAA. KAHRAMAA is intensively involved in initiating and negotiating with IWPP developers for the construction of new power stations and desalination plants. Forecasting of oil and gas and fuels consumption is centralized at QP.

EWT1 KEY GROWTH INDICATORS

In a nutshell, the following table lists key growth indicators for KAHRAMAA in the last five years.

	2014	2015	2016	2017	2018	Average % Change
A. ELECTRICITY						
Generated, GWh	38,693	41,499	42,307	45,555	47,913	**6.73%**
% Change	11.60%	7.30%	1.90%	7.68%	5.18%	
Sent Out, GWh	36,125	38,852	39,667	42,806	44,655	**6.79%**
% Change	12.10%	7.50%	2.10%	7.91%	4.32%	
Maximum Demand, MW	6,740	7,270	7,435	7,855	7,875	**5.67%**
% Change	12.30%	7.90%	2.27%	5.65%	0.25%	
No. of customers (billed & non-billed, based on number of meters)	310,107	329,310	344,445	364,597	376,636	**5.11%**
% Change	5.60%	6.20%	4.60%	5.85%	3.30%	
B. WATER						
Water Production Mm3	494	533	560	606	637	**6.52%**
% Change	6.20%	8.00%	5.07%	8.21%	5.11%	
Maximum Production, Mm3/Day	1.48	1.59	1.64	1.78	1.0	**-3.49%**
% Change	7.25%	7.43%	3.14%	8.54%	-43.82%	
No. of Water customers (billed & non-billed, metered plus served by water tankers)	262,018	277,433	297,261	317,215	329,832	**6.35%**
% Change	**8%**	**5.90%**	**7.15%**	**6.71%**	**3.98%**	

The average growth of peak demand for electricity and water are growing at about 6-7% which highlights rapid growth of Qatar economy.

EWT2 STRATEGIC ELECTRICITY & WATER INFRASTRUCTURE PROJECTS

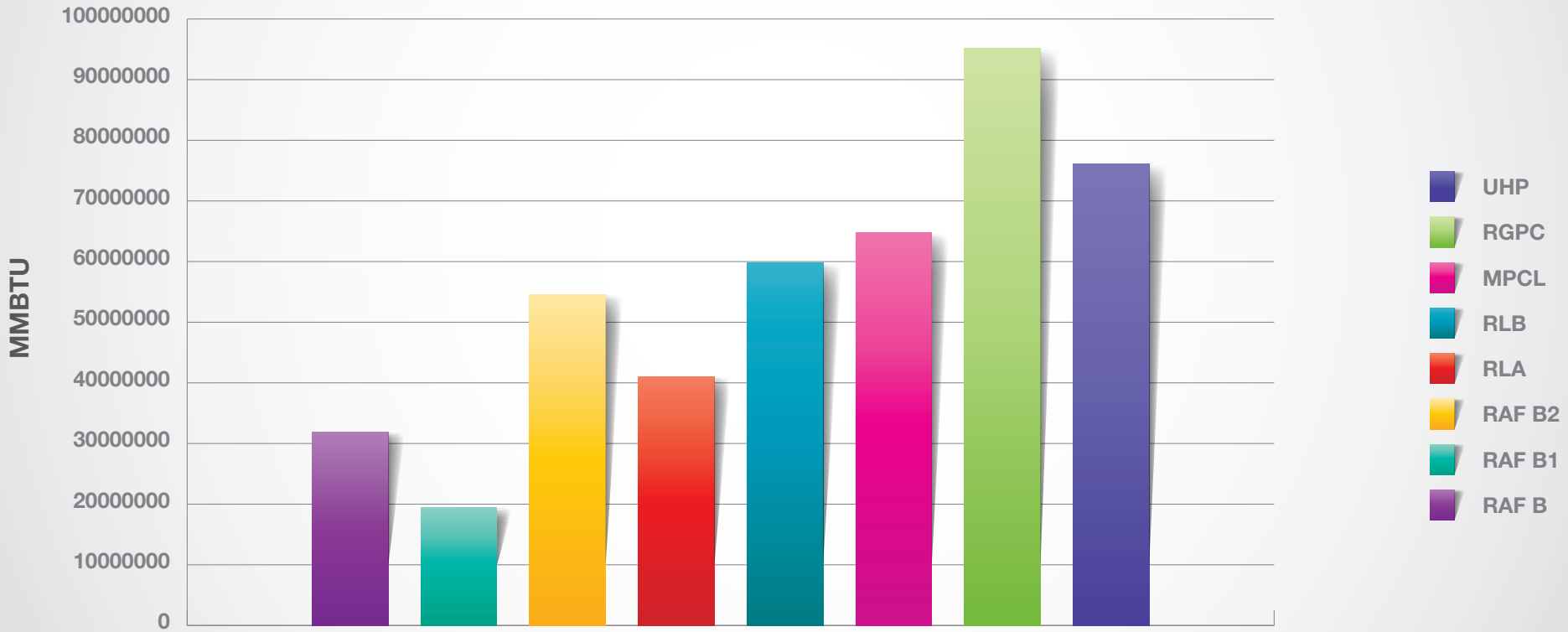
KAHRAMAA has initiated various projects for the construction of production, transmission, distribution and storage capacities to meet the escalating electricity and water demand and meet customer satisfaction.
Some of the key projects are given below.

- Additional Capacity from IWPPs – Facility E (In Progress)
- AMI/Smart meters project (In Progress)
- Solar project of 200 to 700 MW (In Progress)
- Billing and Customer Relationship Management Project (In Progress)
- Qatar Power System Expansion- Phase 13 (In Progress)
- Qatar Power System Expansion- Phase 10, 11, 12 (In Progress)
- Extension of Water Distribution Mains- Phase 6 (In Progress)
- Water Mega Reservoirs- Pipelines (In Progress)
- Water Mega Reservoirs- PRPSs (In Progress)

EWT3 GAS CONSUMPTION BY IWPP (MMBTU) IN 2018

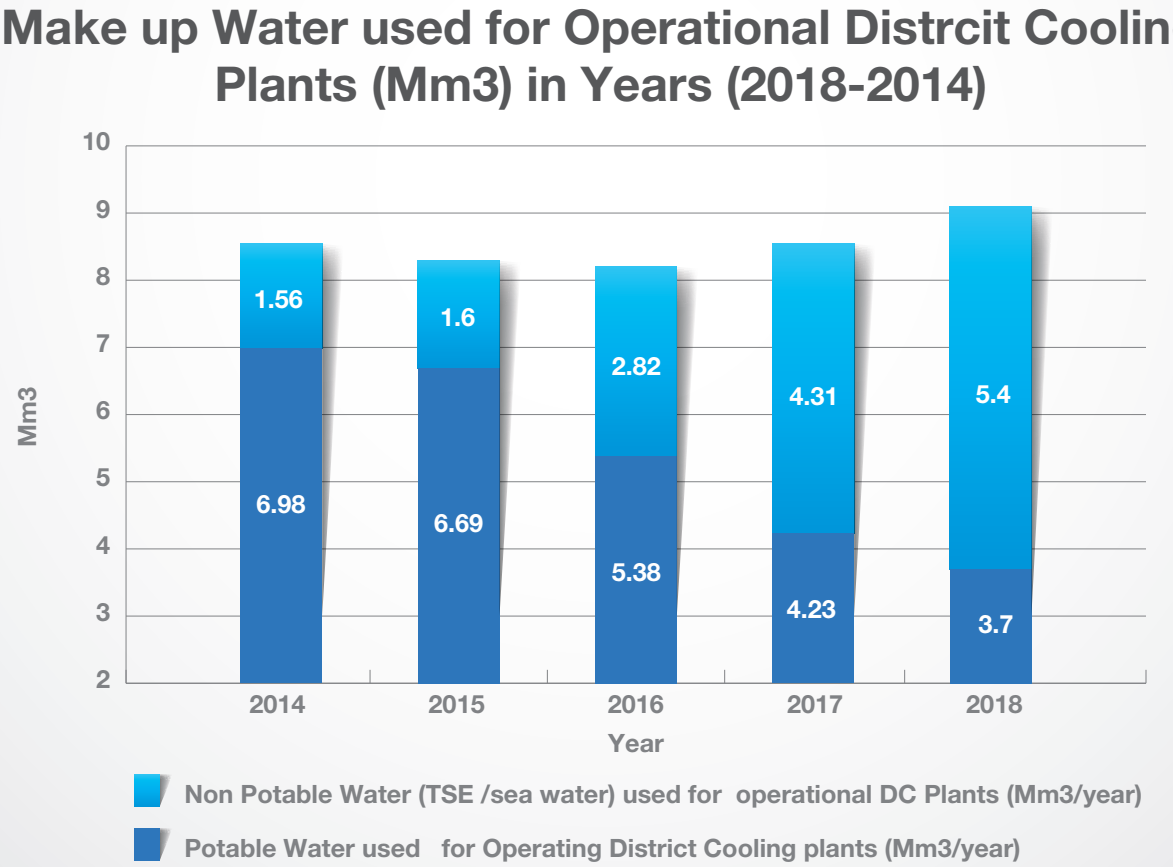
Month	RAF B	RAF B1	RAF B2	RLA	RLB	MPCL	RGPC	UHP	Total
Jan	2,620,982	2,251,657	5,260,519	3,376,471	4,127,602	2,188,474	5,529,177	3,150,760	**28,505,642**
Feb	2,634,950	2,067,958	4,776,504	3,095,334	3,850,539	2,267,181	4,892,389	3,501,749	**27,086,605**
Mar	3,030,517	2,681,217	4,683,765	3,755,687	3,340,650	2,779,428	5,420,124	6,769,064	**32,460,451**
Apr	2,915,819	2,375,886	5,037,246	3,327,149	4,158,835	3,748,757	5,988,244	7,115,769	**34,667,706**
May	2,718,350	1,689,443	4,956,376	3,313,894	5,839,732	6,092,889	7,731,315	8,106,359	**40,448,358**
Jun	2,749,361	1,110,703	4,694,161	3,211,419	5,805,439	7,944,243	10,079,024	7,927,561	**43,521,911**
Jul	2,842,739	1,163,223	4,898,644	3,338,955	5,999,267	8,773,941	11,183,734	7,548,155	**45,748,657**
Aug	2,643,213	1,164,796	4,828,566	3,631,208	5,889,210	8,688,600	11,401,908	7,091,294	**45,338,795**
Sep	2,985,934	1,058,807	4,601,809	3,591,424	5,764,664	8,700,230	11,402,634	7,165,957	**45,271,459**
Oct	2,662,924	1,128,834	4,016,340	3,574,718	5,744,699	7,208,510	9,349,188	6,215,255	**39,900,468**
Nov	1,898,848	1,521,591	3,409,349	3,404,106	4,998,115	4,060,868	6,248,039	5,675,413	**31,216,328**
Dec	2,155,452	1,163,040	3,406,101	3,370,056	4,239,529	2,271,747	5,906,973	5,835,390	**28,348,289**
Total	**31,859,089**	**19,377,155**	**54,569,381**	**40,990,421**	**59,758,280**	**64,724,867**	**95,132,748**	**76,102,727**	**442,514,668**

GAS CONSUMPTION BY IPPs IN YEAR 2018



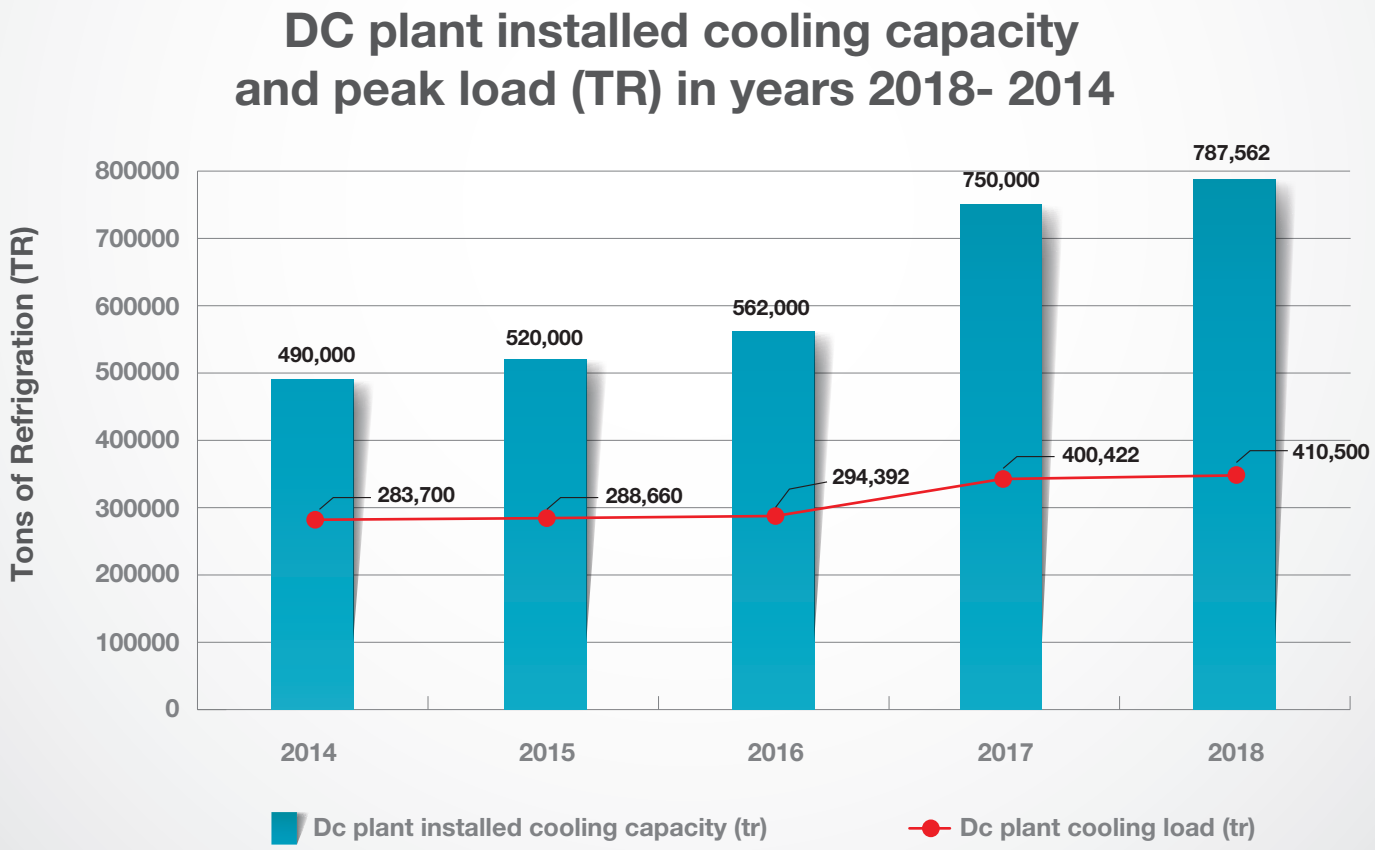
EWT4 NON-POTABLE WATER USED IN DISTRICT COOLING

Year	2014	2015	2016	2017	2018
Potable Water used for Operating District Cooling plants (Mm3/year)	6.98	6.69	5.38	4.23	3.70
Non Potable Water (TSE /sea water) Used for operational DC Plants (Mm3/year)	1.56	1.60	2.82	4.31	5.40
Total Makeup Water demand for Cooling (Mm3/year)	8.54	8.29	8.2	8.54	9.1



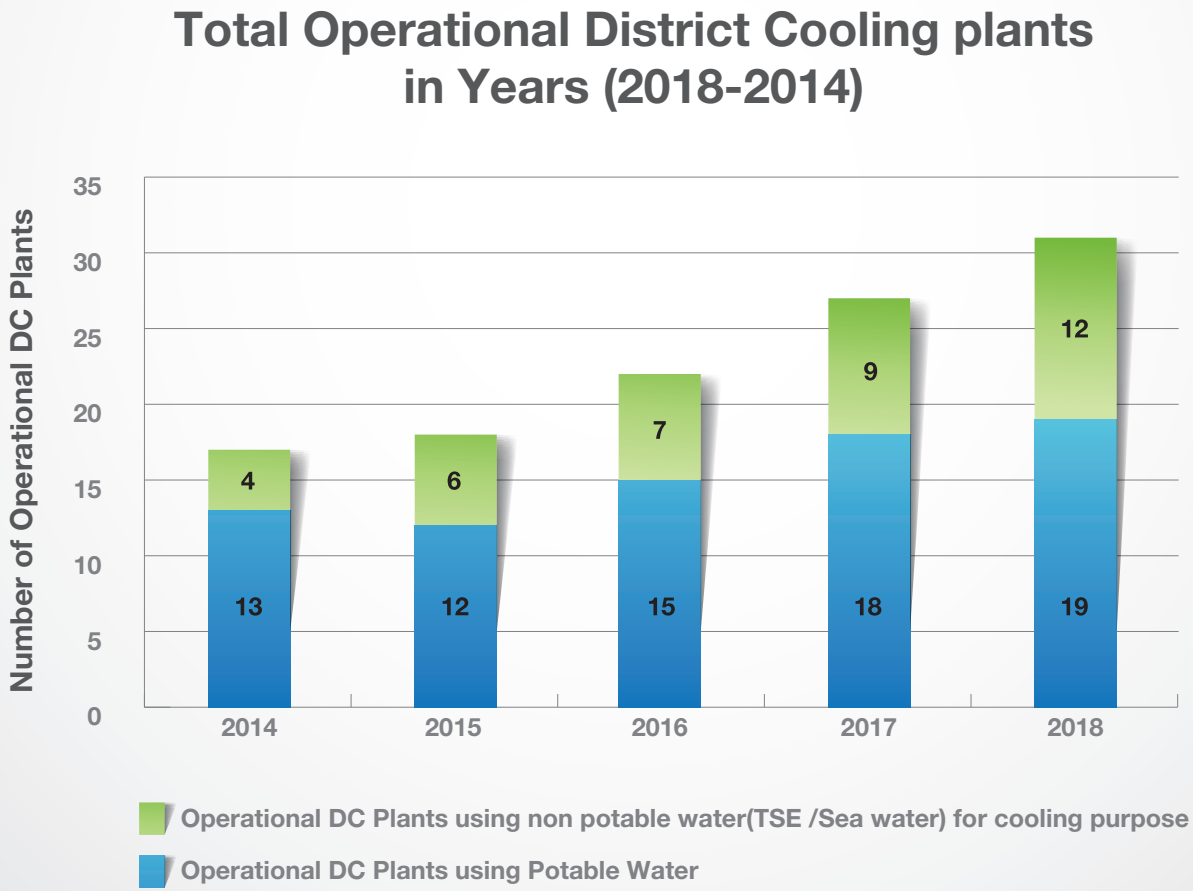
EWT5 OPERATIONAL PEAK DISTRICT COOLING LOAD IN YEARS 2014-2018

Year	2014	2015	2016	2017	2018
DC plant Cooling Load (TR)	283,700	288,660	294,392	400,422	410,500
DC plant Installed Cooling Capacity (TR)	490,000	520,000	562,000	750,000	787,562



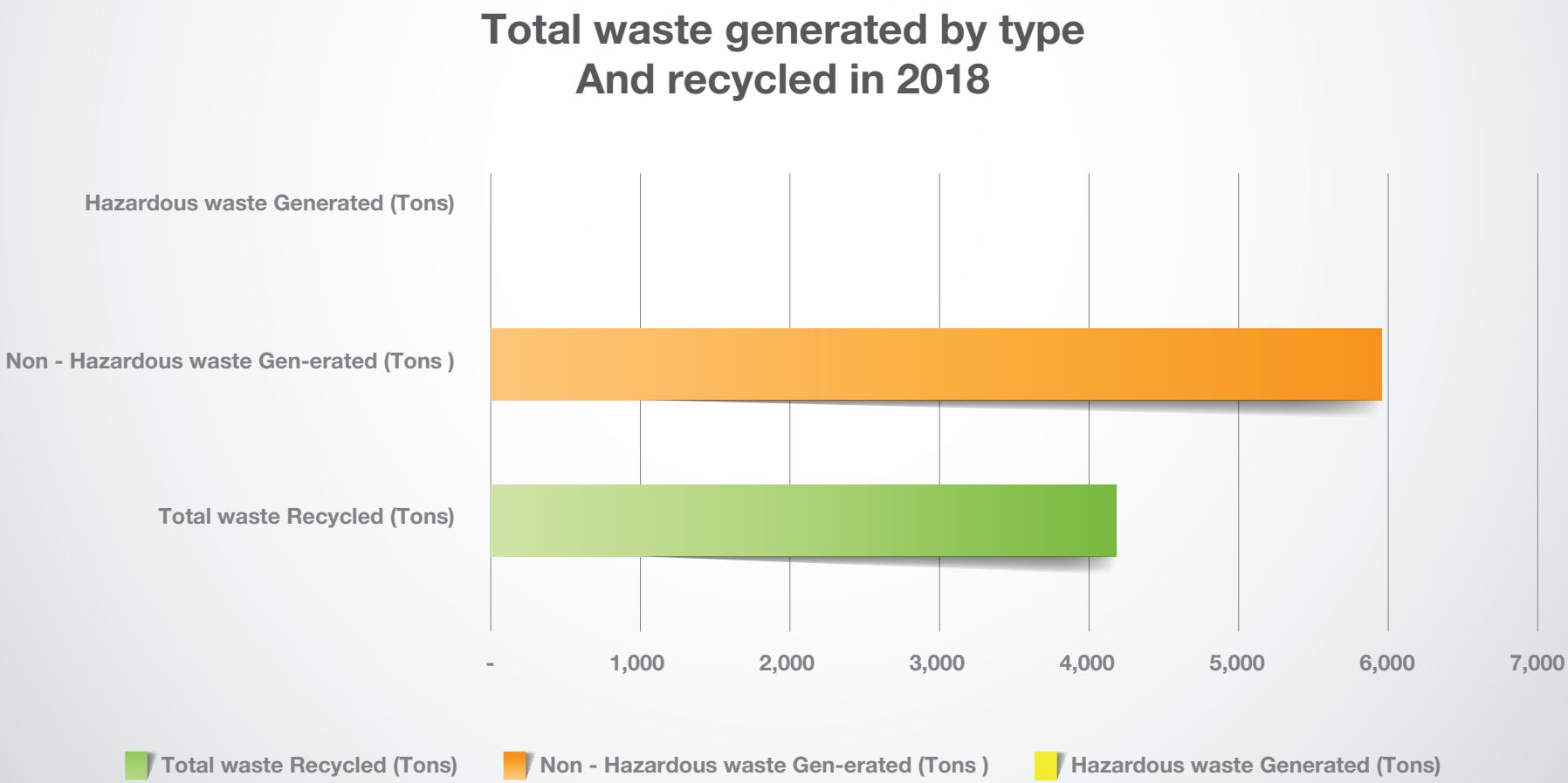
EWT6 OPERATIONAL DISTRICT COOLING PLANTS IN YEARS 2014-2018

Year	2014	2015	2016	2017	2018
Total Operational District Cooling plants	17	18	22	27	31
Number of operational DC Plants using non potable water(TSE /Sea water) for cooling purpose	4	6	7	9	12



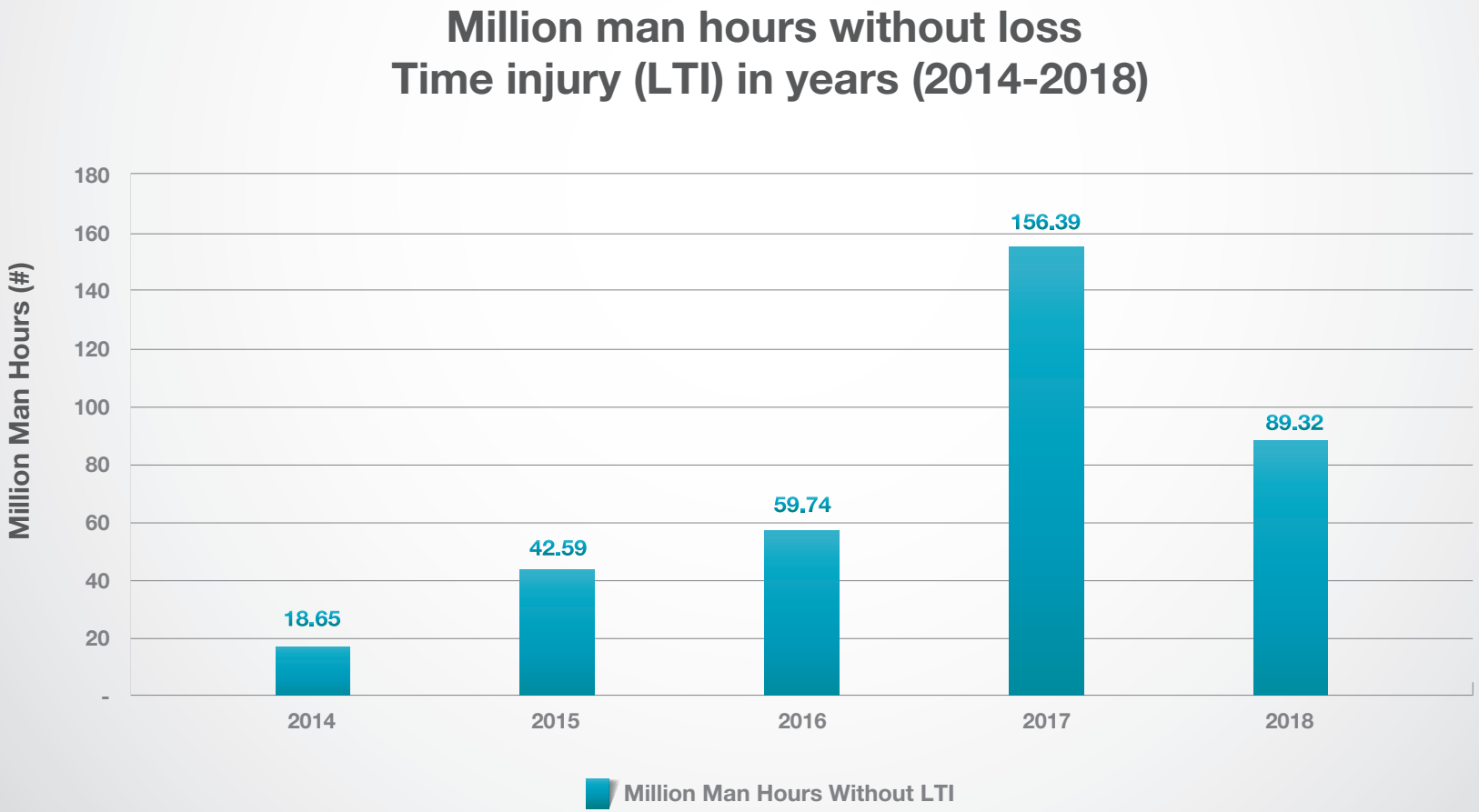
EWT7 TOTAL WASTE GENERATED BY TYPE AND RECYCLED IN 2018

Year 2018	Total waste Recycled* (Tons)	Non - Hazardous waste Gen-erated (Tons)	Hazardous waste Generated (Tons)
	4,180	5,957	0



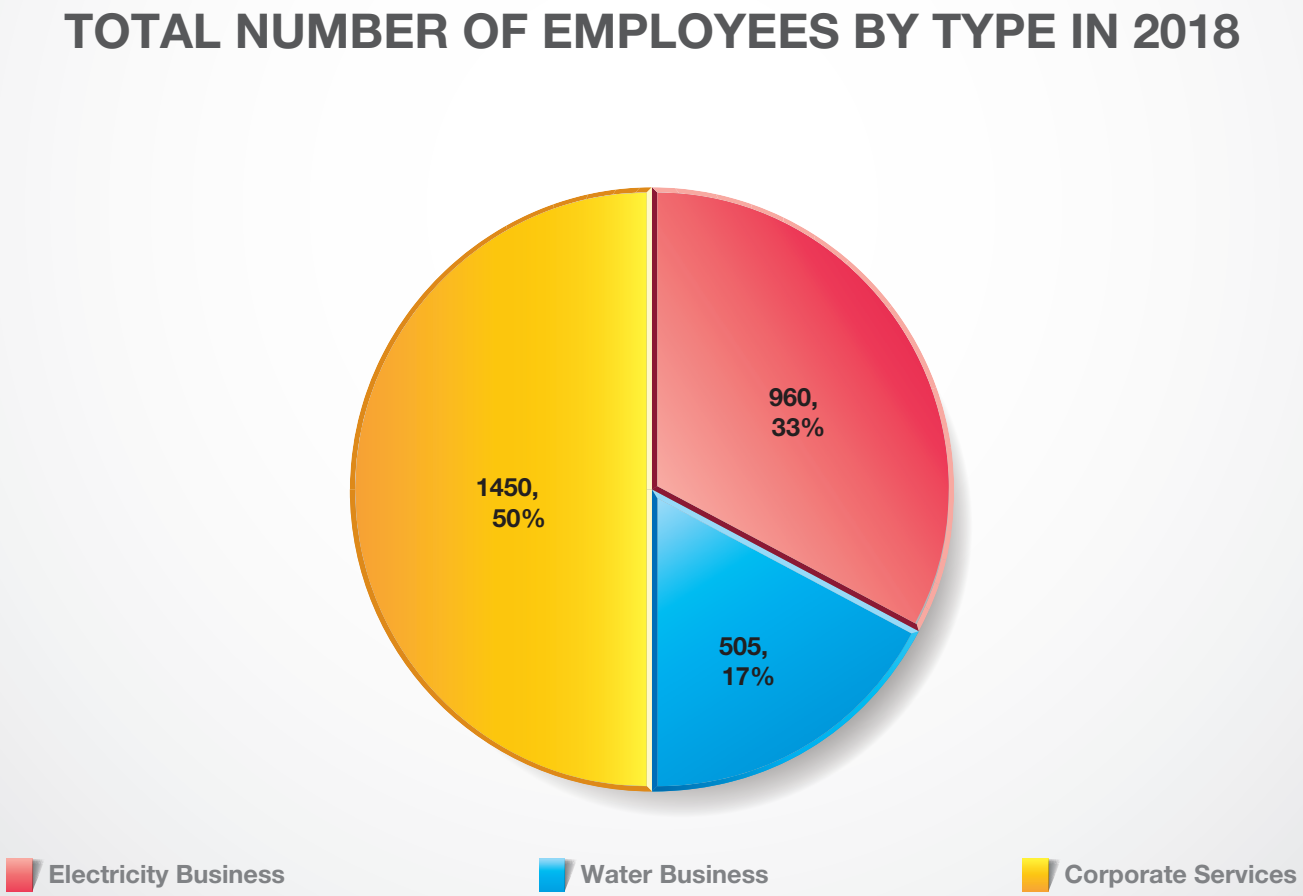
EWT8 MILLION MAN HOURS WITHOUT LTI IN YEARS (2014-2018)

Year	2014	2015	2016	2017	2018
Million Man Hours without LTI	18.65	42.59	59.74	156.39	14.98



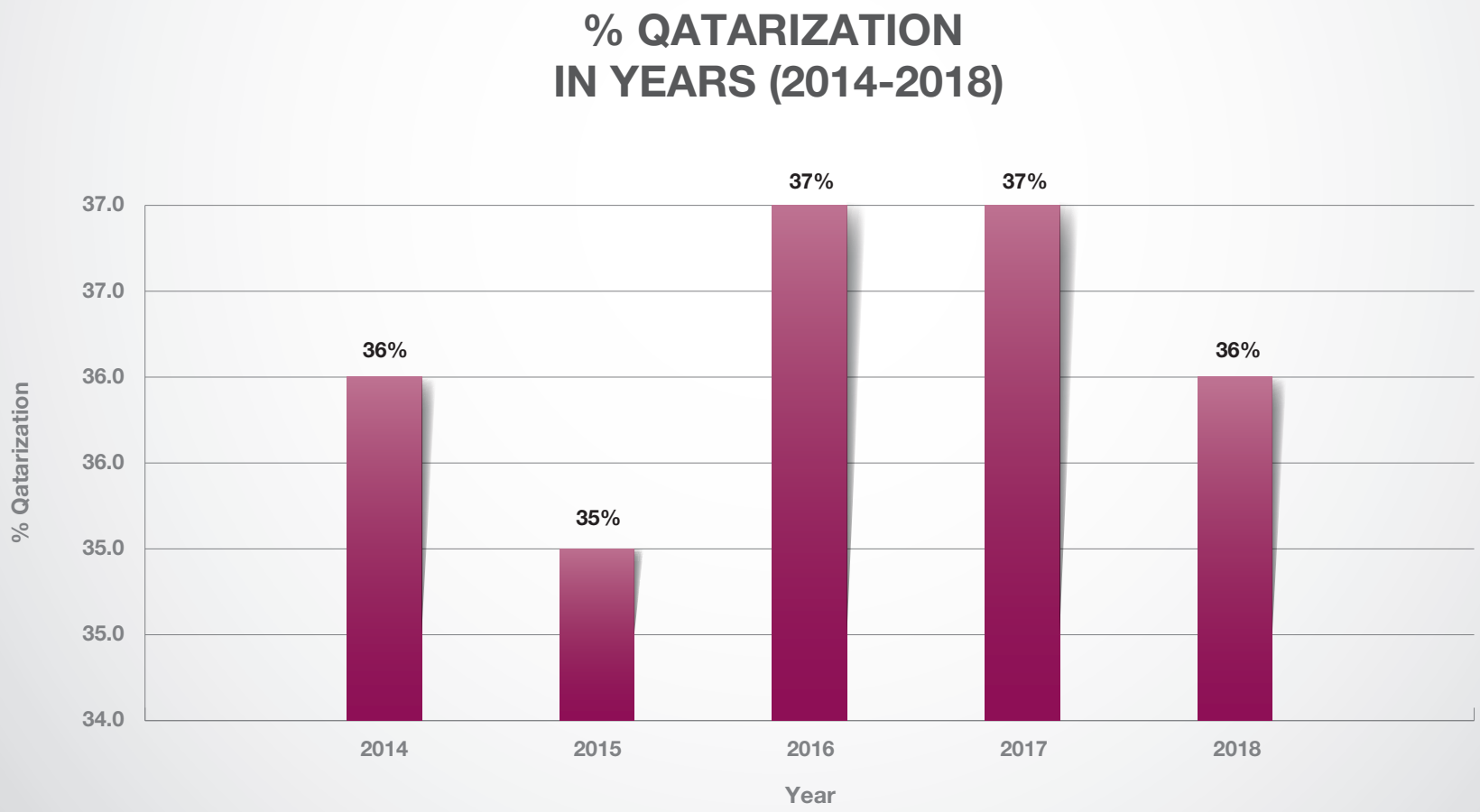
EWT9 TOTAL NUMBER OF EMPLOYEES BY TYPE IN 2018

Total Number of Employees by Type in 2018	Electricity Business	Water Business	Corporate Services
	960	505	1,450



EWT10 QATARIZATION IN LAST FIVE YEARS

% Qatarization	2014	2015	2016	2017	2018
	36%	35%	37%	37%	36%

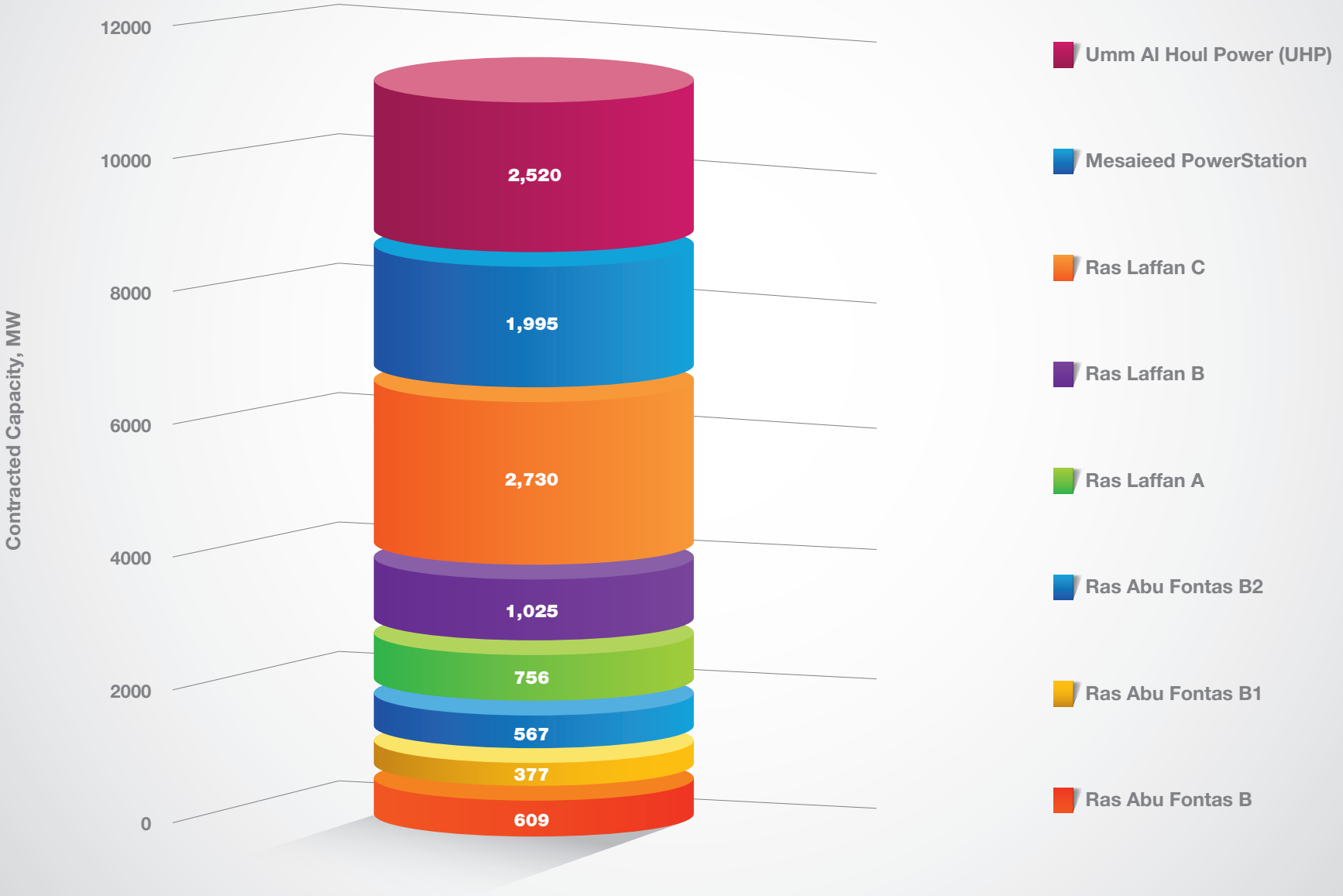


Electricity Statistics 2018

ET1 CONTRACTED CAPACITIES BY IWPPs

Independent Power & Water Producer	Contracted Capacity,MW
Qatar Electricity & Water Company	
Ras Abu Fontas B	609
Ras Abu Fontas B1	377
Ras Abu Fontas B2	567
Sub-Total	1,553
Ras Laffan	
Ras Laffan A (Ras Laffan Power Company)	756
Ras Laffan B (Q Power)	1,025
Ras Laffan C (Ras Girtas Power Company)	2,730
Sub-Total	4,511
Mesaieed Power Company Limited	
Mesaieed PowerStation	1,995
Umm Al Houl Power Company	
Umm Al Houl Power (UHP)	2,520
Total Capacity	**10,579**

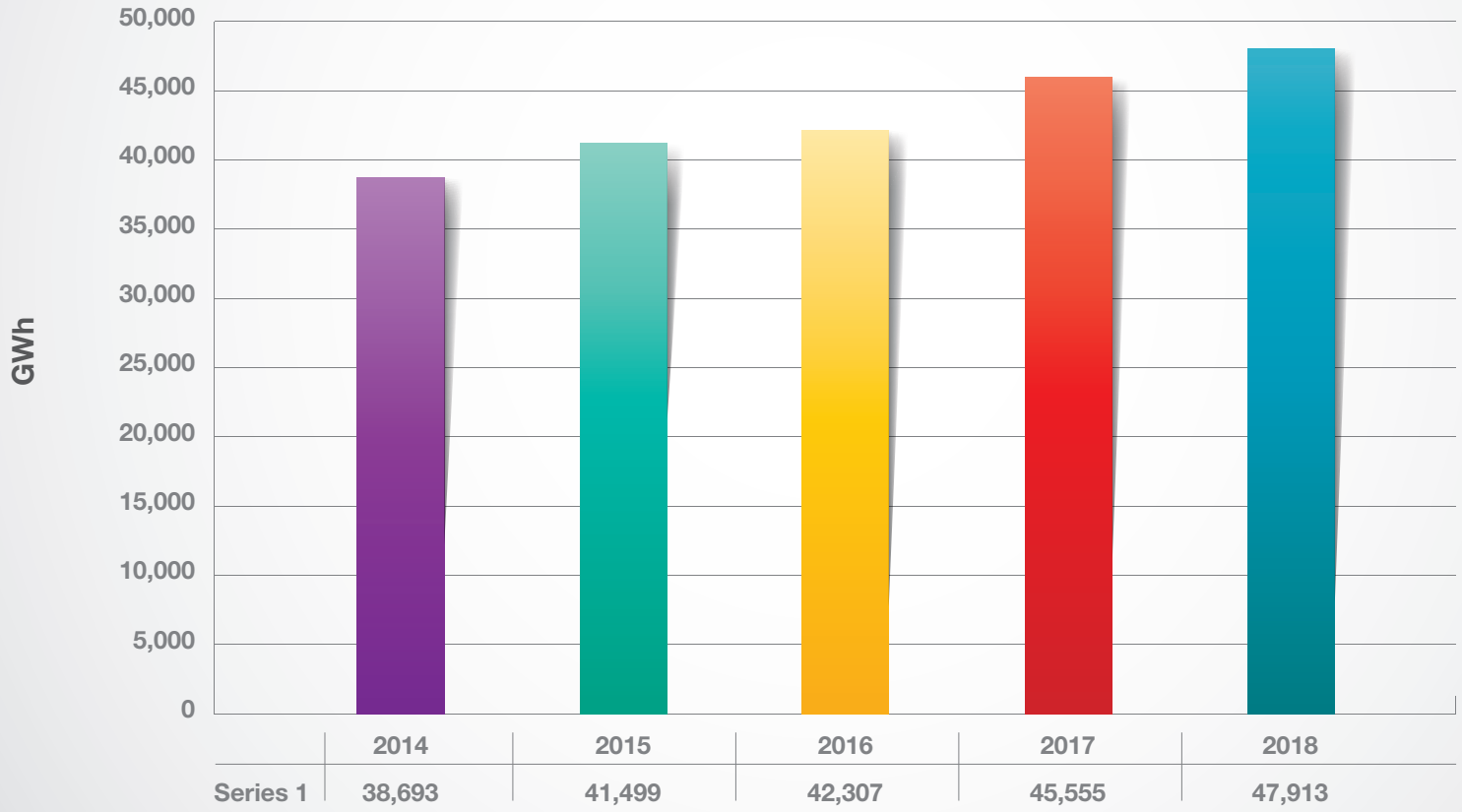
ELECTRICITY CONTRACTED CAPACITY BY IWPPs IN 2018



ET2 ANNUAL ELECTRICITY GENERATION (2014 – 2018)

Year	Annual Increase, %	GWh
2014	11.6%	38,693
2015	7.3%	41,499
2016	1.9%	42,307
2017	7.7%	45,555
2018	5.2%	47,913

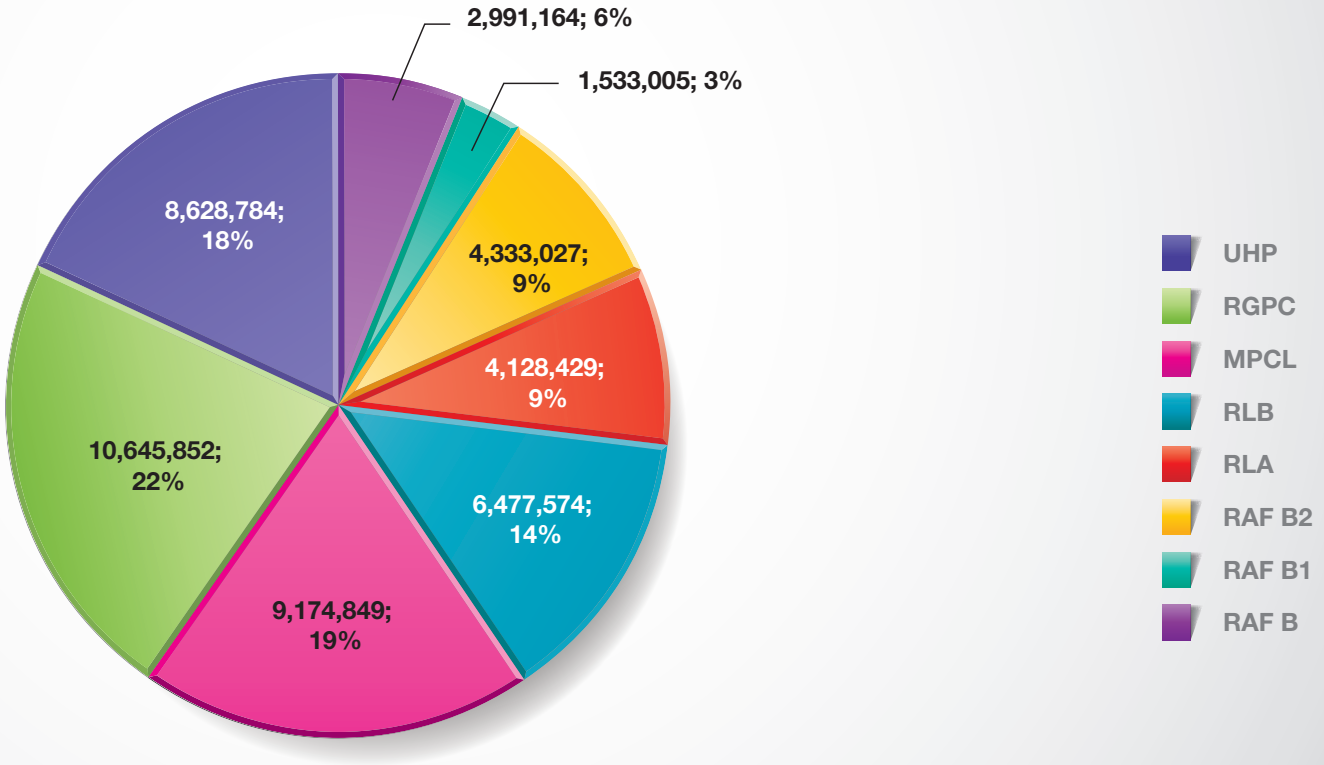
ELECTRCITY GENERATION (GWh) IN YEARS (2014-2018)



ET3 MONTHLY ELECTRICITY GENERATION IN 2018, MWh

Month	RAF B	RAF B1	RAF B2	RLA	RLB	MPCL	RGPC	UHP	Total
Jan	272,974	177,591	399,870	347,268	447,918	305,980	521,005	261,435	**2,734,041**
Feb	250,313	169,537	370,499	321,957	404,214	323,693	449,848	318,505	**2,608,566**
Mar	281,720	215,574	366,307	392,822	350,483	391,483	507,836	662,254	**3,168,479**
Apr	273,142	185,271	389,574	351,098	436,184	524,634	613,596	736,789	**3,510,288**
May	272,111	137,763	395,817	339,937	652,687	860,391	845,633	919,063	**4,423,402**
Jun	258,582	87,155	376,729	328,681	639,325	1,135,209	1,225,324	935,918	**4,986,923**
Jul	270,976	92,724	396,917	341,186	663,335	1,251,575	1,367,676	942,250	**5,326,640**
Aug	255,672	87,678	389,987	345,509	652,977	1,238,068	1,406,694	882,189	**5,258,774**
Sep	252,909	83,595	374,254	336,238	633,721	1,233,906	1,402,853	900,414	**5,217,889**
Oct	233,308	88,181	324,999	340,865	630,915	1,016,269	1,074,190	731,254	**4,439,981**
Nov	170,346	118,093	269,670	339,483	525,194	575,207	656,832	659,371	**3,314,197**
Dec	199,111	89,840	278,404	343,385	440,622	318,434	574,367	679,342	**2,923,505**
Total	**2,991,164**	**1,533,005**	**4,333,027**	**4,128,429**	**6,477,574**	**9,174,849**	**10,645,852**	**8,628,784**	**47,912,684**

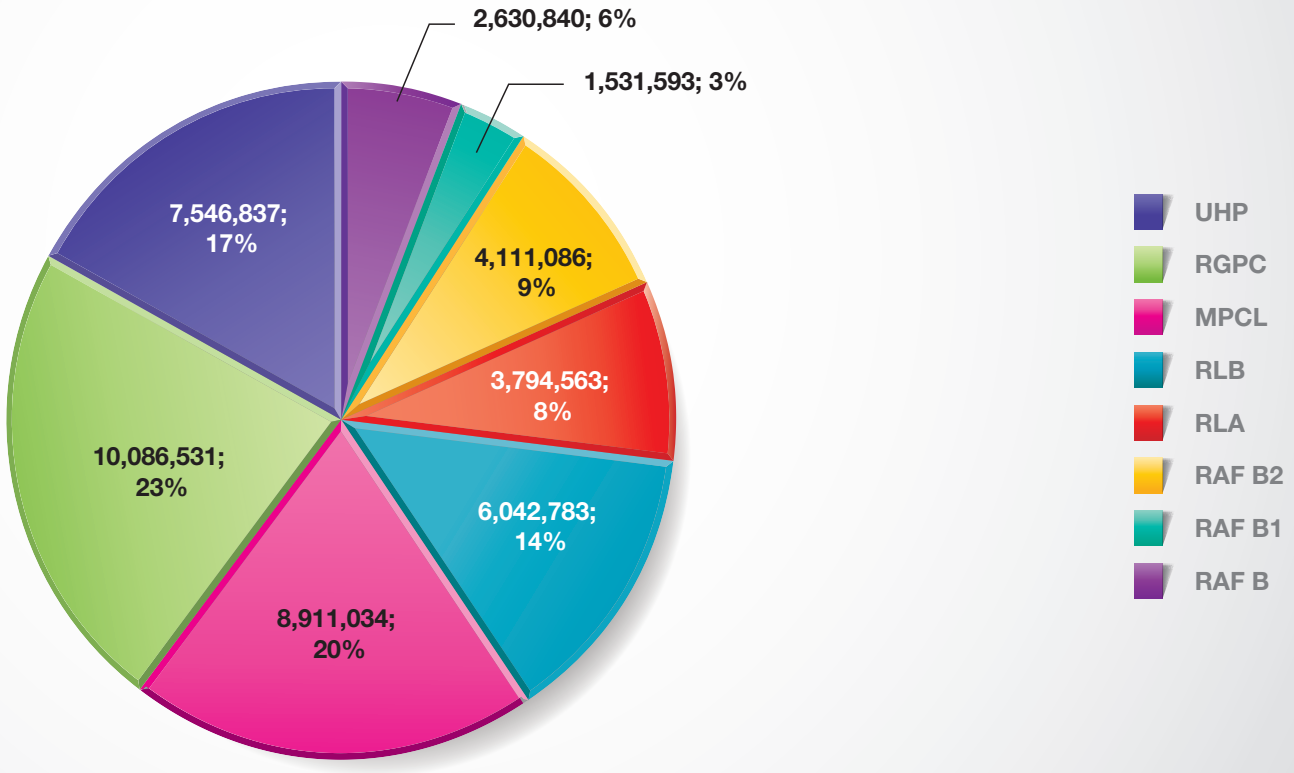
ELECTRICITY GENERATION BY IWPPs IN 2018 (MWh)



ET4 ENERGY TRANSMITTED IN 2018, MWh

Month	RAF B	RAF B1	RAF B2	RLA	RLB	MPCL	RGPC	UHP	Total
Jan	245,143	177,432	380,319	320,793	415,255	295,218	482,204	205,456	**2,521,820**
Feb	223,437	169,387	353,022	297,818	374,550	314,302	416,202	253,653	**2,402,372**
Mar	249,567	215,382	348,026	364,456	324,238	379,390	470,094	580,284	**2,931,437**
Apr	239,198	185,100	371,252	324,445	403,392	508,598	575,350	658,650	**3,265,984**
May	237,935	137,638	375,658	313,608	612,426	835,697	798,272	825,881	**4,137,114**
Jun	225,138	87,074	357,358	303,230	598,890	1,103,974	1,169,715	835,459	**4,680,838**
Jul	239,282	92,638	375,933	314,933	621,564	1,217,501	1,308,176	834,407	**5,004,435**
Aug	224,385	87,590	368,867	314,831	611,676	1,204,177	1,346,469	777,103	**4,935,099**
Sep	222,687	83,516	353,597	305,236	593,348	1,200,330	1,343,333	798,865	**4,900,912**
Oct	204,469	88,098	308,460	308,893	591,683	986,469	1,024,413	630,365	**4,142,850**
Nov	147,344	117,981	255,593	309,770	489,308	557,943	617,663	566,799	**3,062,401**
Dec	172,255	89,757	263,001	316,551	406,453	307,435	534,639	579,915	**2,670,006**
Total	**2,630,840**	**1,531,593**	**4,111,086**	**3,794,563**	**6,042,783**	**8,911,034**	**10,086,531**	**7,546,837**	**44,655,267**

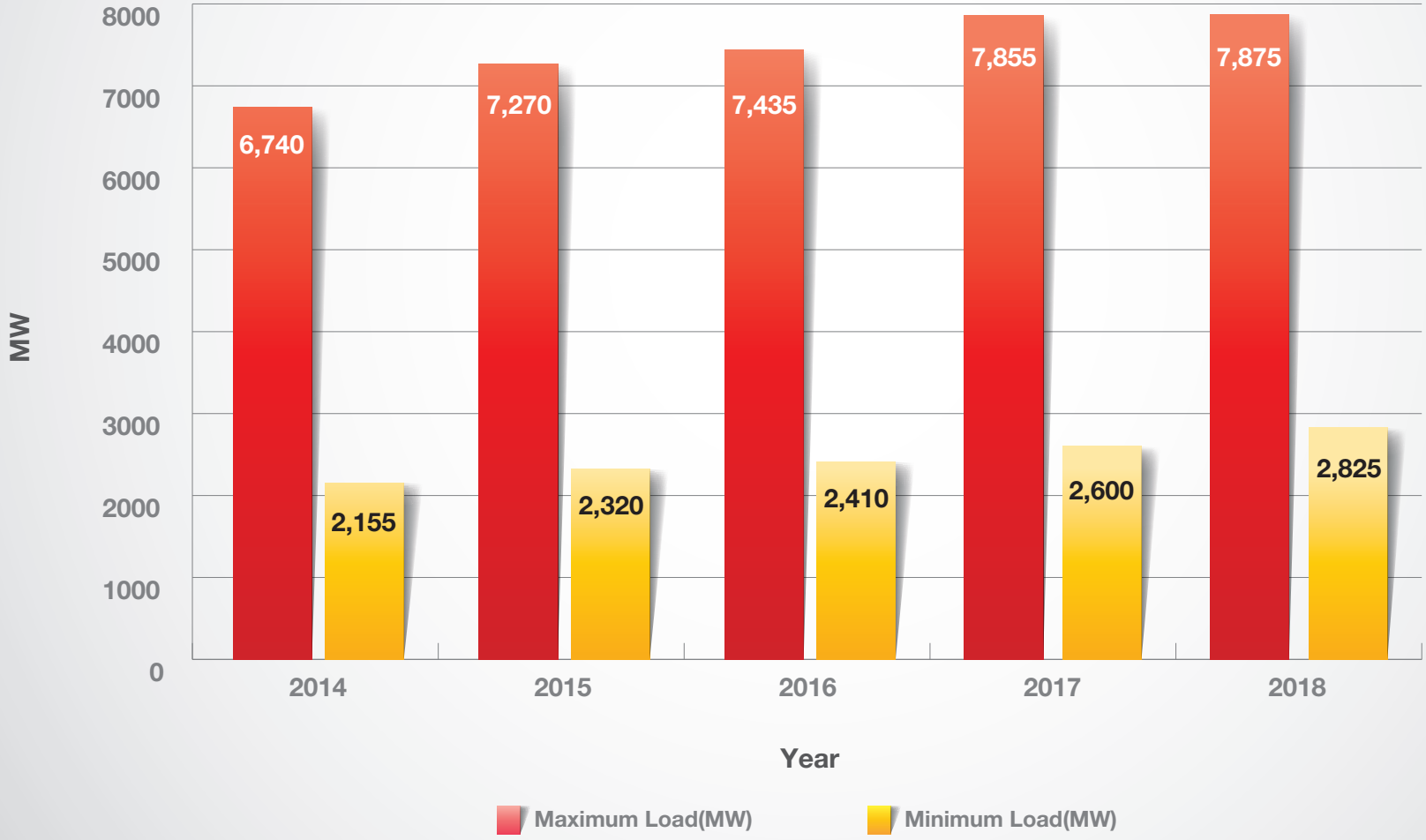
ELECTRICITY TRANSMITTED BY IWPPs IN 2018 (MWh)



ET5 MAXIMUM AND MINIMUM SYSTEM LOAD LAST FIVE YEARS, MW

Year	Maximum Load (MW)	Maximum Load Date (mm/dd/yyyy)	Minimum Load (MW)	Minimum Load Date (mm/dd/yyyy)
2014	6,740	9/7/2014	2,155	2/12/2014
2015	7,270	9/1/2015	2,320	2/24/2015
2016	7,435	9/3/2016	2,410	1/19/2016
2017	7,855	8/14/2017	2,600	2/25/2017
2018	7,875	7/12/2018	2,825	1/21/2018

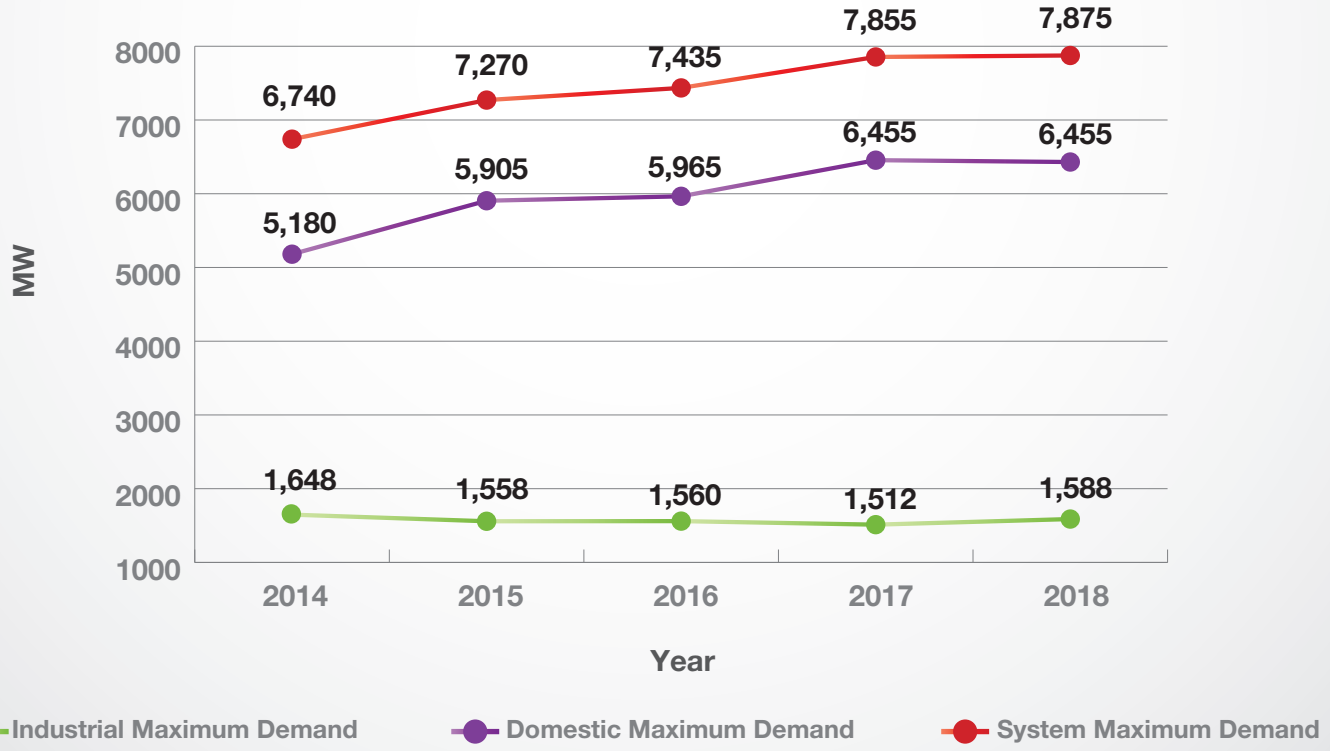
MAXIMUM AND MINIMUM SYSTEM LOAD IN YEARS (2014-2018)



ET6 MAXIMUM DEMAND BY SECTORS FROM 2014 TO 2018

Demand Type	2014	2015	2016	2017	2018
System Maximum Demand	6,740	7,270	7,435	7,855	7,875
Industrial Maximum Demand	1,648	1,558	1,560	1,512	1,588
Domestic Maximum Demand	5,180	5,905	5,965	6,455	6,430

MAXIMUM DEMAND (MW) BY SECTORS IN YEARS (2014-2018)



ET7 SECTORAL MAXIMUM DEMANDS IN 2018, MW

Demand Type	Magnitude (MW)	Demand Date (mm/dd/yyyy)
System Maximum	7,875	7/12/2018
Industrial Maximum	1,588	8/5/2018
Domestic Maximum	6,430	7/12/2018

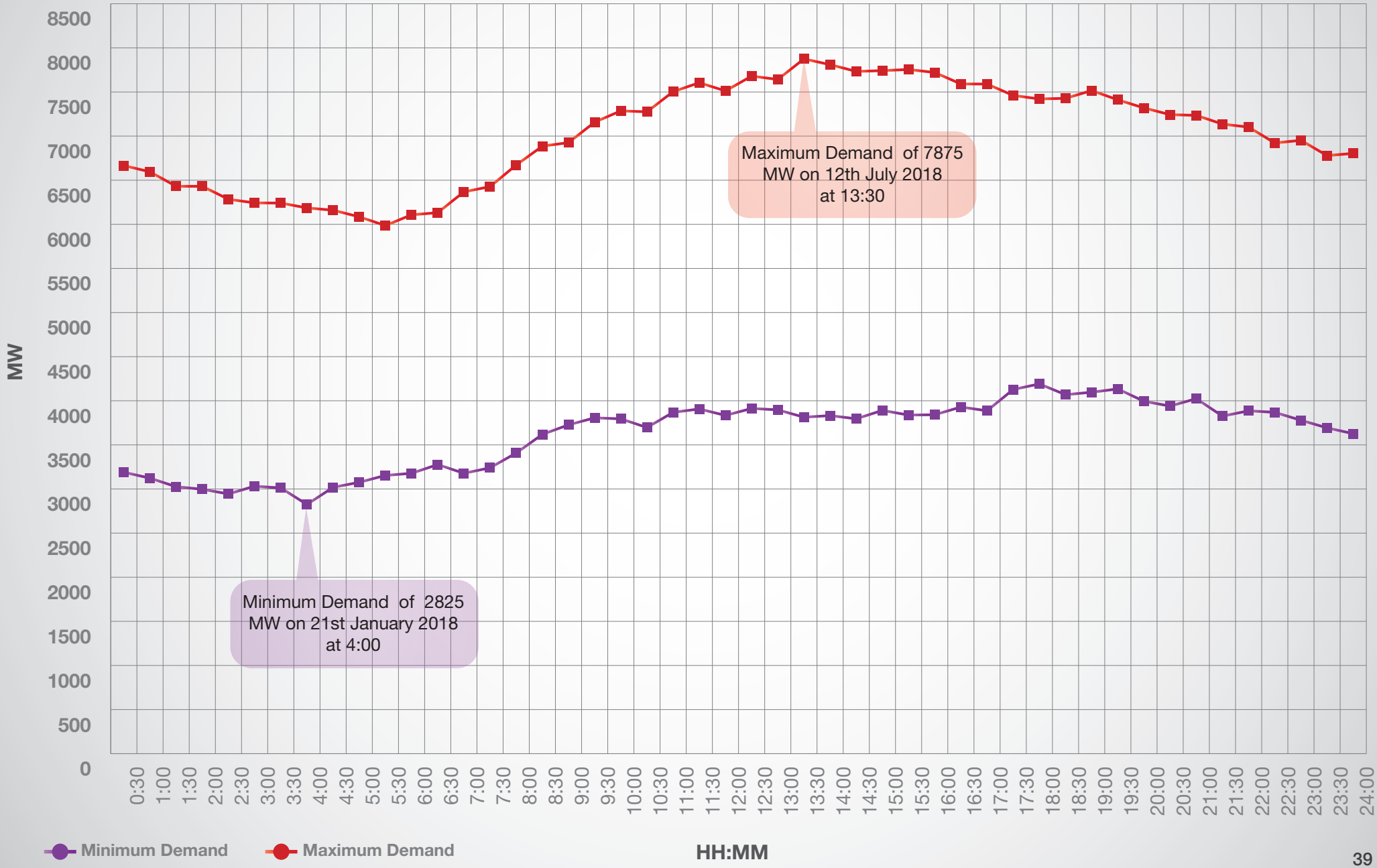
ET8 ANNUAL LOAD FACTORS IN 2018

Demand Type	Load Factor, %
System Maximum	66.02%
Industrial Maximum	79.57%
Domestic Maximum	59.21%

ET9 ANNUAL GROWTH (%) FROM 2017 TO 2018

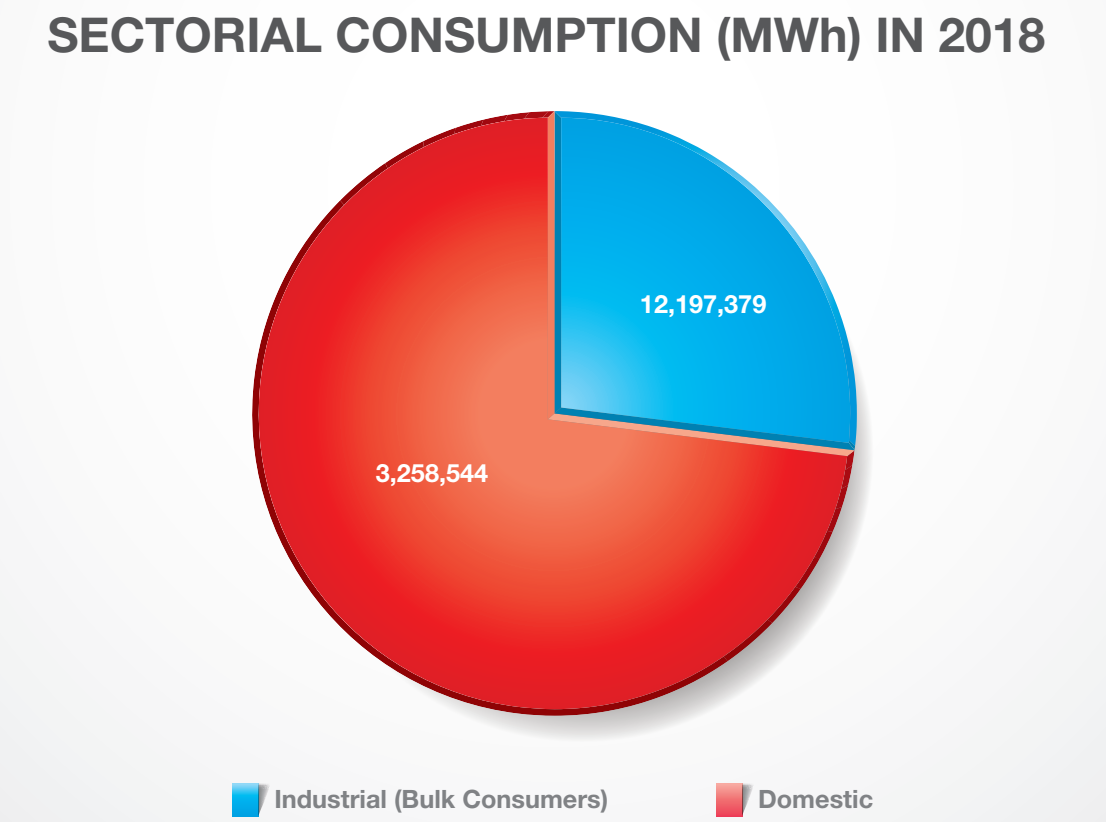
Demand Type	Peak Demand (MW) Growth
System Maximum	0.3 %
Industrial Maximum	5.0 %
Domestic Maximum	-0.4 %

SYSTEM MAXIMUM AND MINIMUM DEMAND (MW)
HALF HOURLY LOAD CURVE IN 2018



ET10 SECTORAL CONSUMPTION IN 2018, MWH

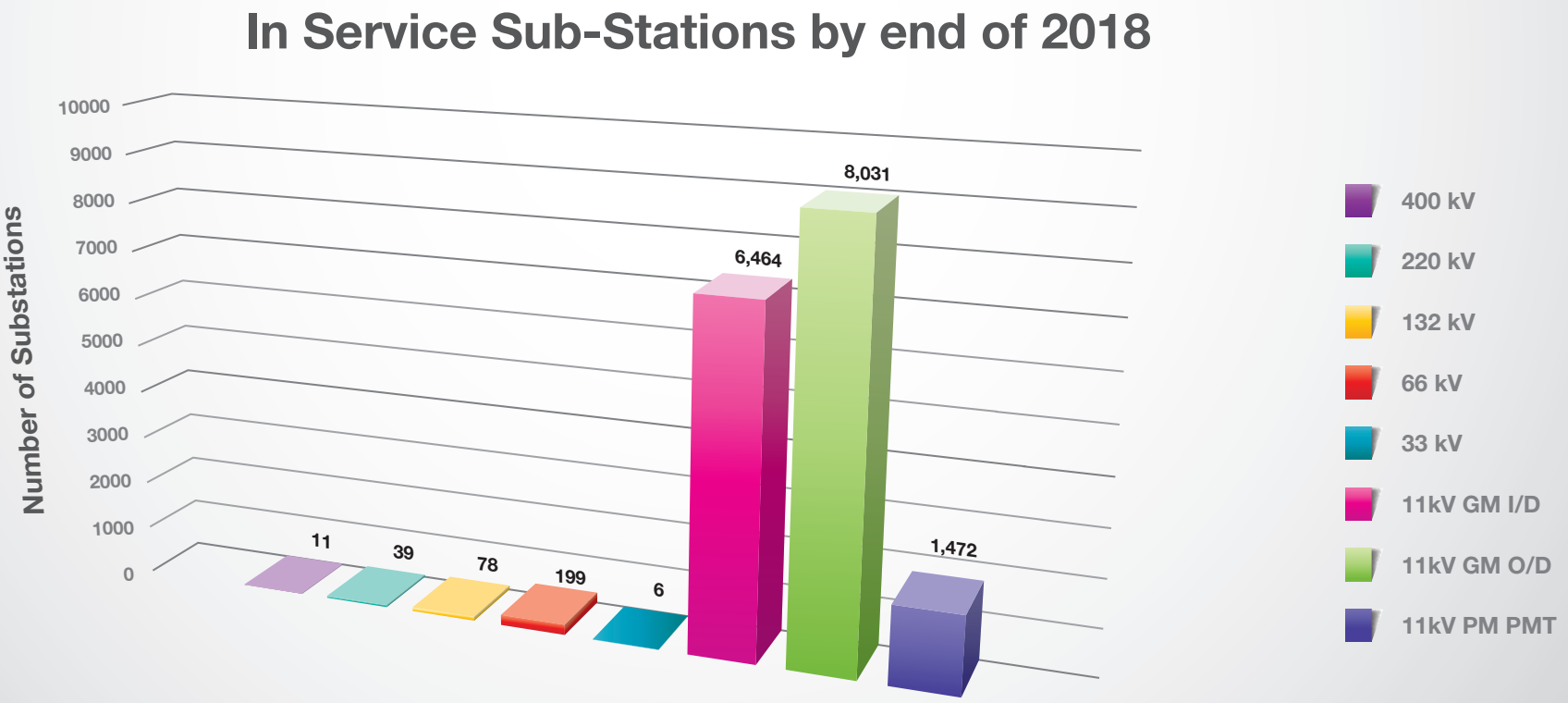
Sector	Bulk (Industrial)	Domestic	Auxiliary	Transmission and Distribution Losses	Total Injected Generation	Total Electricity Generation
Consumption, MWh -2018	12,197,379	32,765,544	3,258,544	2,786,404	45,065,903	47,912,684



ET11 SUB-STATIONS

SUBSTATIONS	400 kV	220 kV	132 kV	66 kV	33 kV	11kV GM I/D	11kV GM O/D	11kV PM PMT
In service (as at 31/12/2013)	9	25	37	172	7	3,993	6,246	1,337
Commissioned -2014	2	2	3	10	-	407	425	44
Commissioned -2015	-	8	5	10	-	437	447	38
Commissioned -2016	-	2	7	6	-	375	579	38
Commissioned -2017	2	2	6	25	-	593	474	55
Commissioned -2018	1	1	17	14	-	599	413	58
In service (as at 31/12/2018*)	11	39	78	199	6	6,464	8,031	1,472

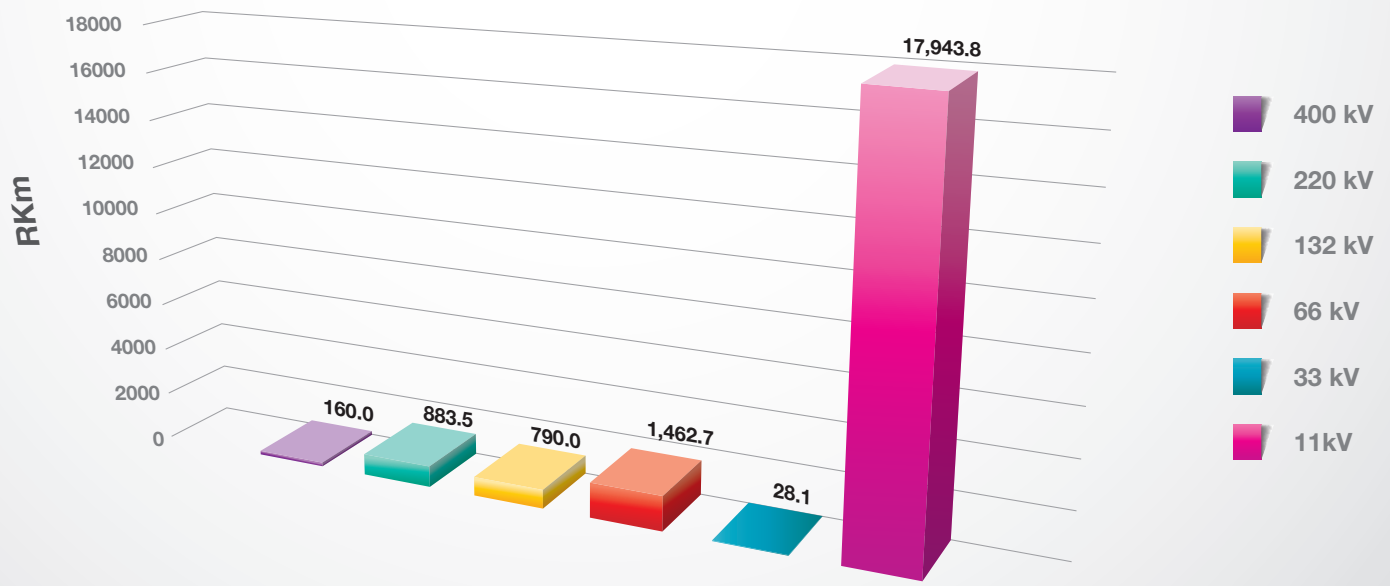
*Note: Starting 2018, number of substations is based on those owned, operated and maintained by Kahramaa.



ET12 CABLES LAID (RKM)

Period Commissioned	400 kV	220 kV	132 kV	66 kV	33 kV	11 kV
In service (as at 31/12/2013)	133.0	601.0	619.0	1,299.0	54.9	9,671.0
Commissioned -2014	48.5	45.6	17.8	31.0	-	1,053.0
Commissioned -2015	0.7	166.4	84.0	38.8	-	1,129.9
Commissioned -2016	-	27.9	21.2	53.5	8.8	14,056.7
Commissioned -2017	43.9	36.9	28.4	156.6	-	1,904.1
Commissioned -2018	0.4	5.7	83.5	63.3	2.7	1,983.0
In service (as at 31/12/2018)	160.0	883.5	790.0	1,462.7	28.1	17,943.8

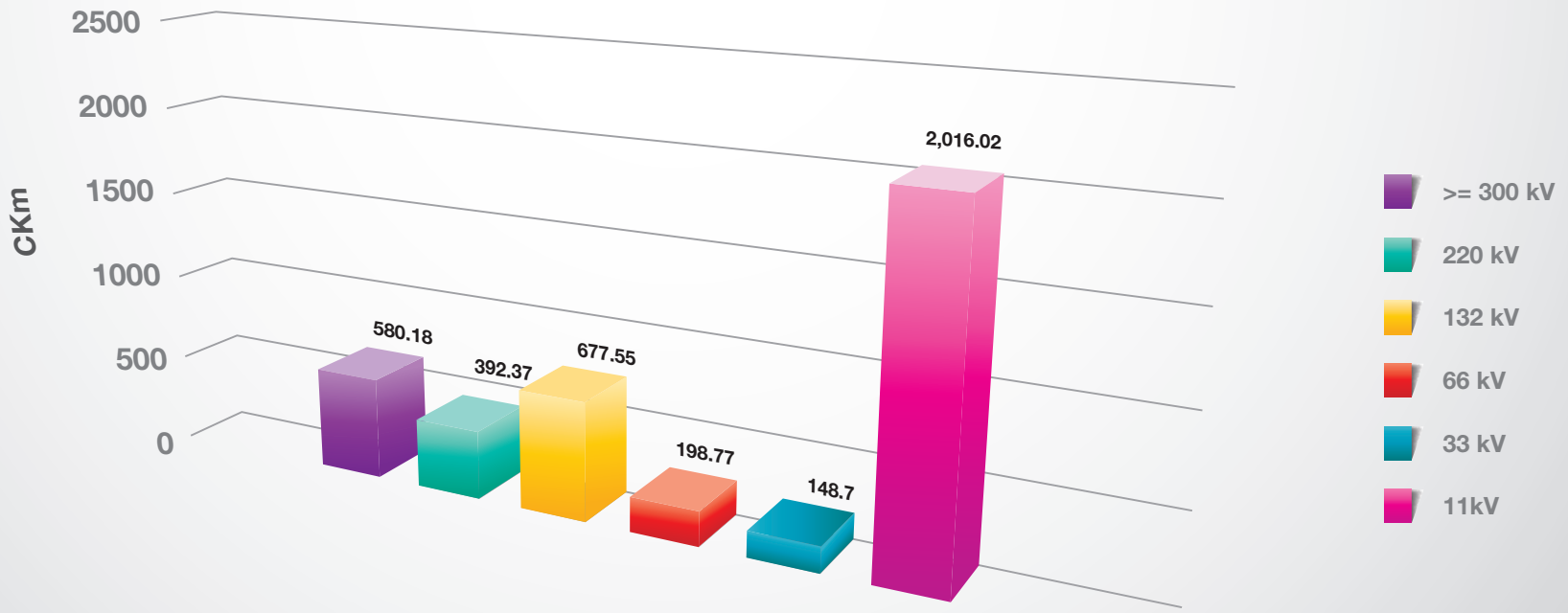
In Service Cables Laid (RKm) by end of 2018



ET13 HIGH VOLTAGE OVERHEAD LINES (CKM)

Period	>= 300 kV	220 kV	132 kV	66 kV	33 kV	11 kV
In service (as at 31/12/2013)	513.8	466.36	621.73	214.06	148.7	1,860
Commissioned -2014	34.18	8	8.77	0	0	67
Commissioned -2015	0	0	0	0	0	0
Commissioned -2016	0	0	16.888	0	0	1,979.51
Commissioned -2017	0	0.85	121.16	0	0	58.69
Commissioned -2018	31.9	0	51.58	0	0	22.18
In service (as at 31/12/2018)	580.18	392.37	677.55	198.77	148.7	2,016.02

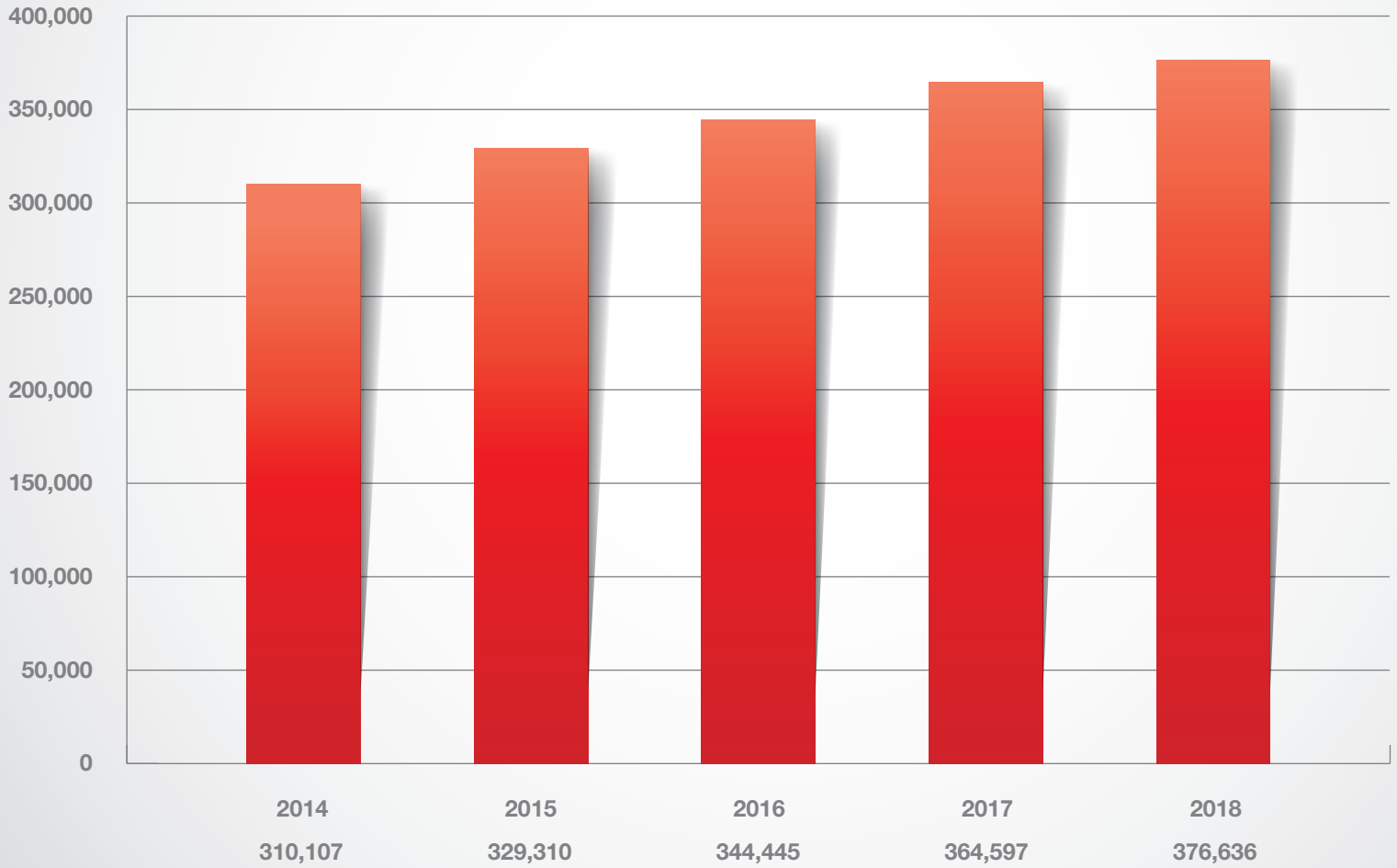
In service High Voltage Overhead Lines (CKm) by end of 2018



ET14 NUMBER OF ELECTRICITY CUSTOMERS FROM 2014 TO 2018

Year	2014	2015	2016	2017	2018
No Of Customers	310,107	329,310	344,445	364,597	376,636
Annual Growth (%)	5.6%	6.2%	4.6%	5.9%	3.3%

NUMBER OF ELECTRICITY CUSTOMERS IN YEARS (2014-2018)

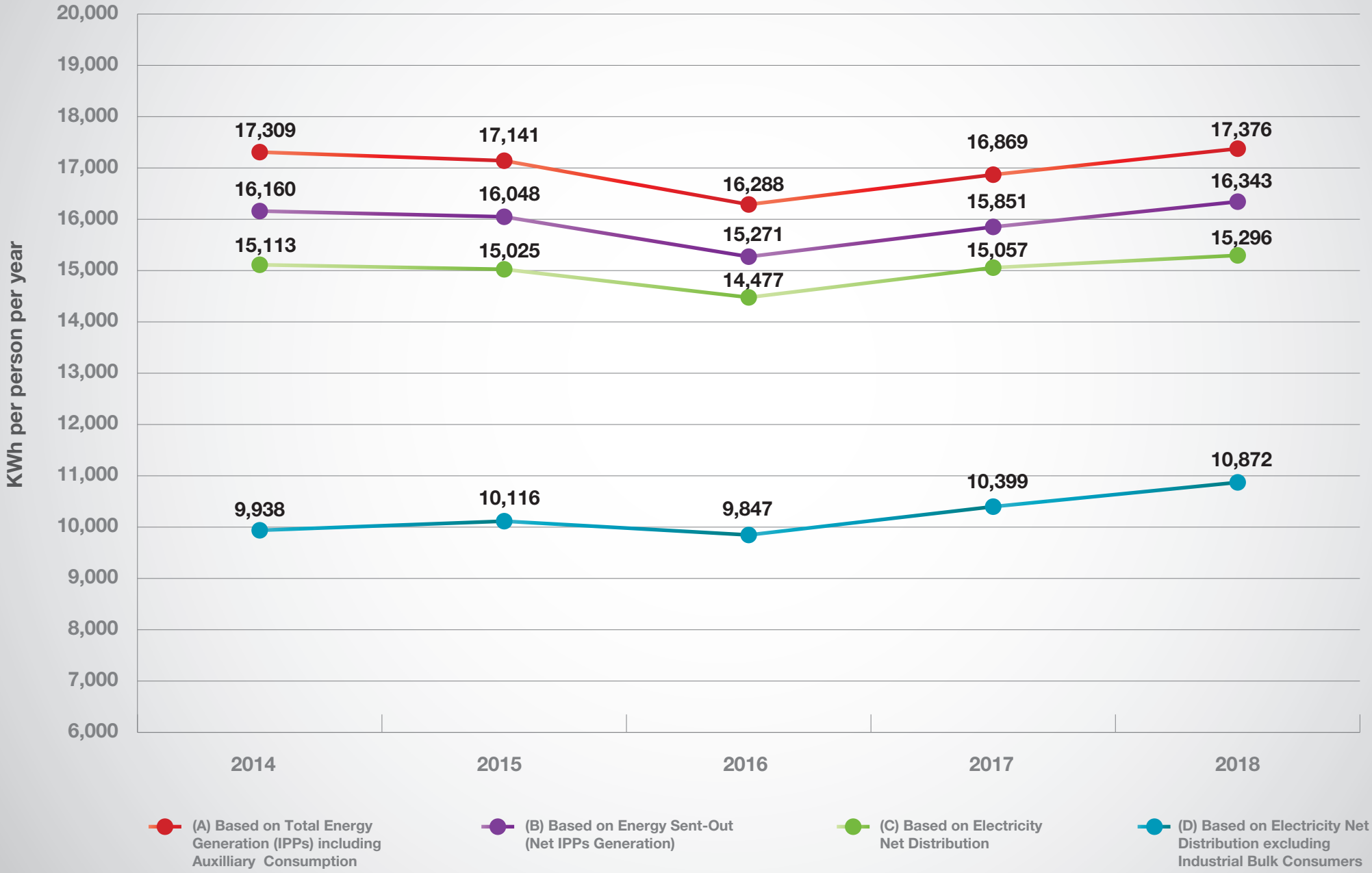


ET15 AVERAGE ELECTRICITY PER CAPITA CONSUMPTION

Year	2014	2015	2016	2017	2018
Population	2,235,431	2,421,055	2,597,453	2,700,539	2,757,437
Population Annual Increase(%)	9.30%	8.30%	7.30%	4.00%	2.10%
Total Energy Generation inlcuding all auxilliary consumption GWh	38,693	41,499	42,307	45,555	47,913
Energy Transmitted (Sent out) GWh = Generation minus Auxilliary Consumption	36,125	38,852	39,667	42,806	44,654
Electricity Net Distribution GWh = Injected Generation minusExport to GCCIA- minus Real losses	33,777	36,752	37,603	40,663	42,177
Electricity Consumption GWh (Excluding Bulk Industrial)	22,216	24,491	25,108	27,428	30,082
Average Electricity Per Capita Consumption: (KWh Per Person per Year)					
(A) Based on Total Energy Generation including Auxilliary Consumption	17,309	17,141	16,288	16,869	17,376
(B) Based on Energy Transmitted (Sent out), Including Losses thereafter	16,160	16,048	15,271	15,851	16,343
(C) Based on Energy Taken Into KM Network (Injected Generation), Net of Real Losses	15,113	15,025	14,477	15,057	15,296
(D) Based on Energy Taken Into KM Network, Net of real Losses and Net of Bulk Industrial Consumption	9,938	10,116	9,847	10,399	10,872

* Electricity Net Distribution GWh = Injected Generation – Export to GCCIA – T&D losses
** Electricity Net Distribution GWh excluding Industrial Bulk Consumers = Injected Generation – Export to GCCIA – T&D losses - Industrial Bulk Consumers. Starting 2017, “Electricity Consumption” term revised to “Electricity Net Distribution GWh excluding Industrial Bulk Consumers”
Note: Starting from year 2017, Per Capita Consumption calculation is based on maximum population for the year.

ELECTRICITY PER CAPITA CONSUMPTION
(KWh Per Person per Year)

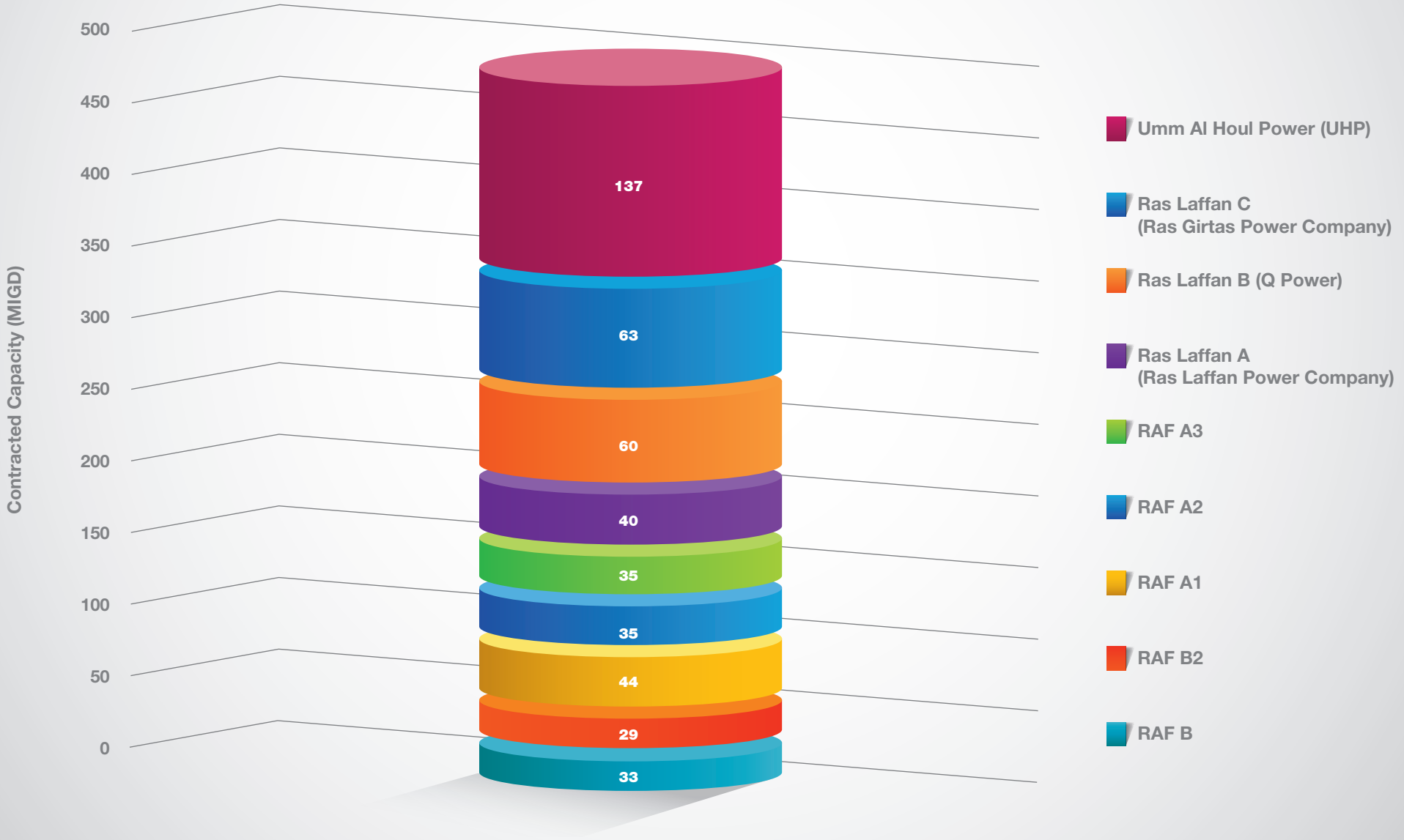


Water Statistics 2018

WT1 CONTRACTED CAPACITIES BY IPWP AT END OF 2018

Independent Power & Water Producer	Contracted Capacity - Water (MIGD)	Mm3/Day
Qatar Electricity & Water Company		
Ras Abu Fontas RAF A1	44.31	0.20
Ras Abu Fontas RAF A2	35.14	0.16
Ras Abu Fontas RAF A3	35.14	0.16
Ras Abu Fontas RAF B	33.00	0.15
Ras Abu Fontas RAF B2	29.14	0.13
Sub-Total	176.73	0.80
Ras Laffan		
Ras Laffan A (Ras Laffan Power Company)	40.00	0.18
Ras Laffan B (Q Power)	60.00	0.27
Ras Laffan C (Ras Girtas Power Company)	63.00	0.29
Sub-Total	163.00	0.74
Umm Al Houl Power Company		
Umm Al Houl Power (UHP)	136.50	0.62
Total Capacity	**476.23**	**2.16**

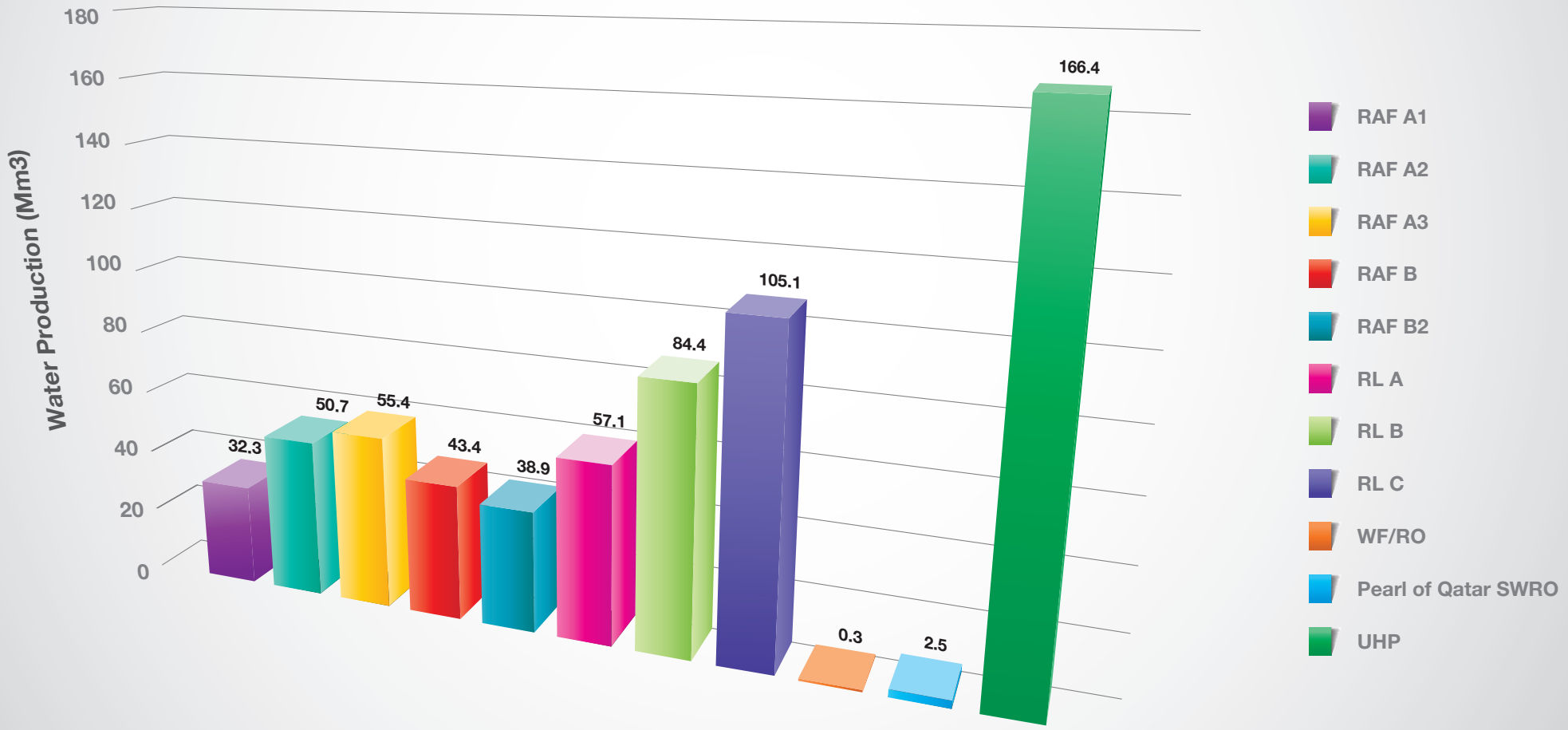
WATER CONTRACTED CAPACITY BY IWPPs IN YEAR 2018



WT2 WATER PRODUCTION IN 2018

IWPPs	Water Production (Million Cubic Meters)	Million Imperial Gallons (MIG)
RAF A1	32.3	7,114
RAF A2	50.7	11,162
RAF A3	55.4	12,187
RAF B	43.4	9,554
RAF B2	38.9	8,555
RL A	57.1	12,570
RL B	84.4	18,570
RL C	105.1	23,130
WF/RO	0.3	77
Pearl of Qatar SWRO	2.5	550
UHP	166.4	36,605
Total	**636.70**	**140,074**

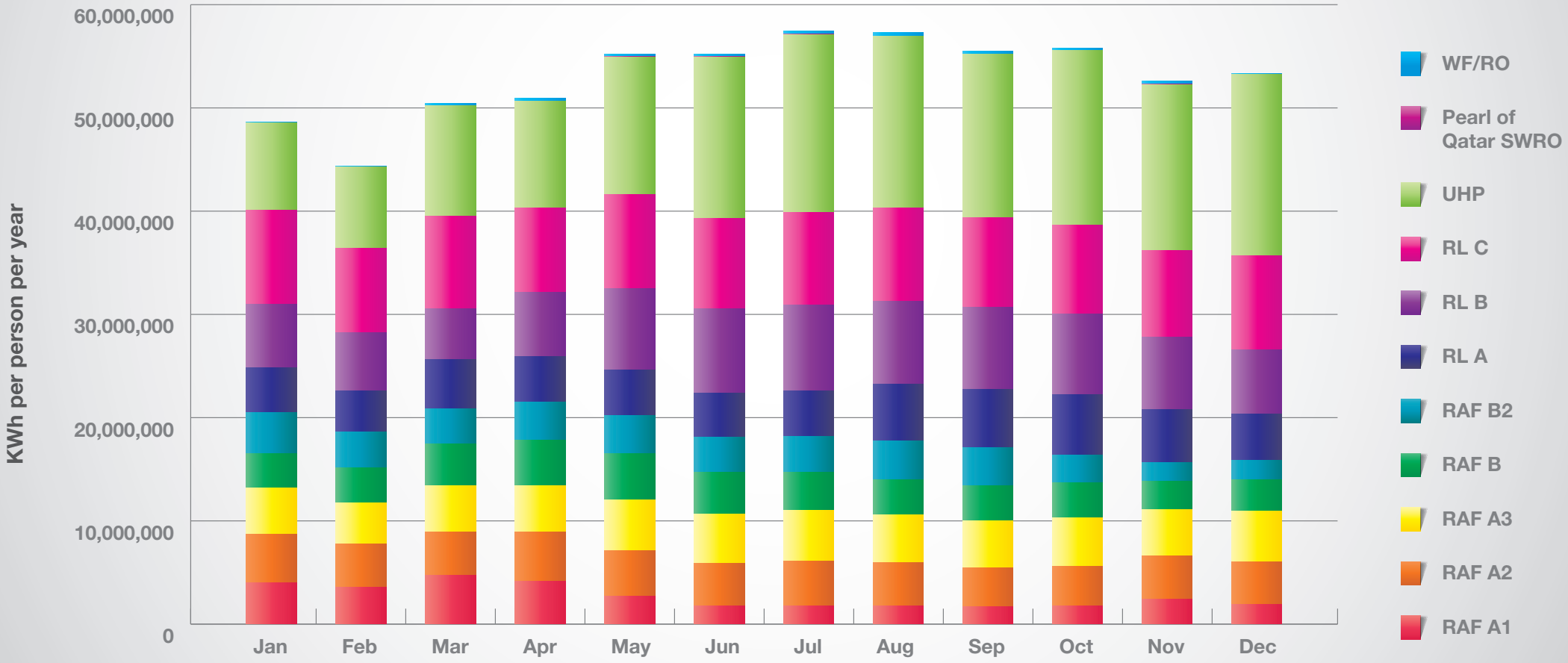
WATER PRODUCTION (Mm3)
IN YEAR 2018



WT3 MONTHLY WATER PRODUCTION, CUBIC METERS IN 2018

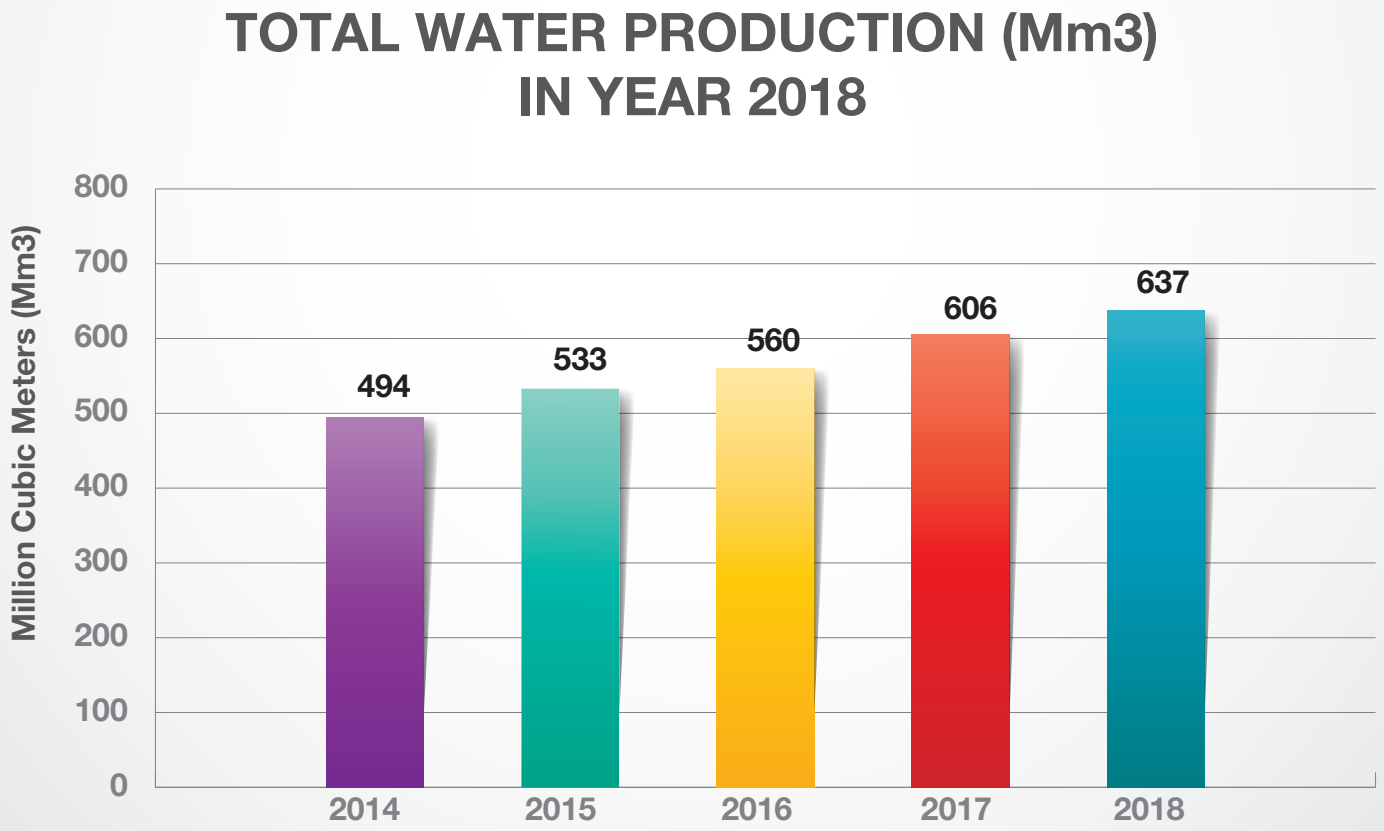
Month	RAF A1	RAF A2	RAF A3	RAF B	RAF B2	RL A	RL B	RL C	UHP	Pearl of Qatar SWRO	WF/RO	Total
Jan	4,025,196	4,711,206	4,435,375	3,373,197	3,939,066	4,363,192	6,155,113	9,087,591	8,453,952	20,088	73,725	**48,637,701**
Feb	3,566,722	4,231,346	3,972,680	3,362,620	3,504,483	3,991,476	5,636,771	8,159,416	7,839,678	20,655	77,827	**44,363,674**
Mar	4,764,006	4,166,200	4,451,343	4,066,394	3,429,075	4,721,192	4,972,204	8,967,379	10,676,488	24,132	205,026	**50,443,439**
Apr	4,152,138	4,776,939	4,498,084	4,429,695	3,652,083	4,415,564	6,201,713	8,190,017	10,340,645	25,225	262,163	**50,944,266**
May	2,736,176	4,355,084	4,909,584	4,541,271	3,693,416	4,369,364	7,909,006	9,097,303	13,343,641	25,950	258,888	**55,239,683**
Jun	1,787,301	4,078,928	4,806,238	4,044,197	3,359,541	4,319,004	8,169,040	8,761,399	15,599,618	37,226	241,305	**55,203,797**
Jul	1,753,689	4,346,035	4,946,731	3,661,794	3,493,319	4,400,940	8,308,876	8,991,009	17,195,851	43,317	282,097	**57,423,658**
Aug	1,801,344	4,127,540	4,662,405	3,419,845	3,712,432	5,495,288	8,085,659	9,031,956	16,597,275	27,258	309,518	**57,270,520**
Sep	1,684,978	3,765,643	4,555,307	3,406,087	3,692,641	5,645,072	7,944,526	8,701,631	15,808,482	31,946	241,883	**55,478,196**
Oct	1,757,548	3,817,903	4,738,098	3,371,281	2,725,596	5,835,392	7,815,087	8,603,649	16,894,719	28,095	203,511	**55,790,879**
Nov	2,394,261	4,216,050	4,516,678	2,702,308	1,827,416	5,117,948	6,992,190	8,425,972	16,079,764	27,041	275,152	**52,574,780**
Dec	1,915,125	4,142,262	4,905,161	3,048,834	1,855,727	4,462,140	6,219,623	9,118,292	17,555,142	38,564	69,460	**53,330,330**
Total	**32,338,484**	**50,735,136**	**55,397,684**	**43,427,523**	**38,884,795**	**57,136,572**	**84,409,808**	**105,135,614**	**166,385,255**	**349,497**	**2,500,555**	**636,700,923**

MONTHLY WATER PRODUCTION (m3) IN YEAR 2018



WT4 TOTAL ANNUAL WATER PRODUCTION, MILLION CUBIC METERS

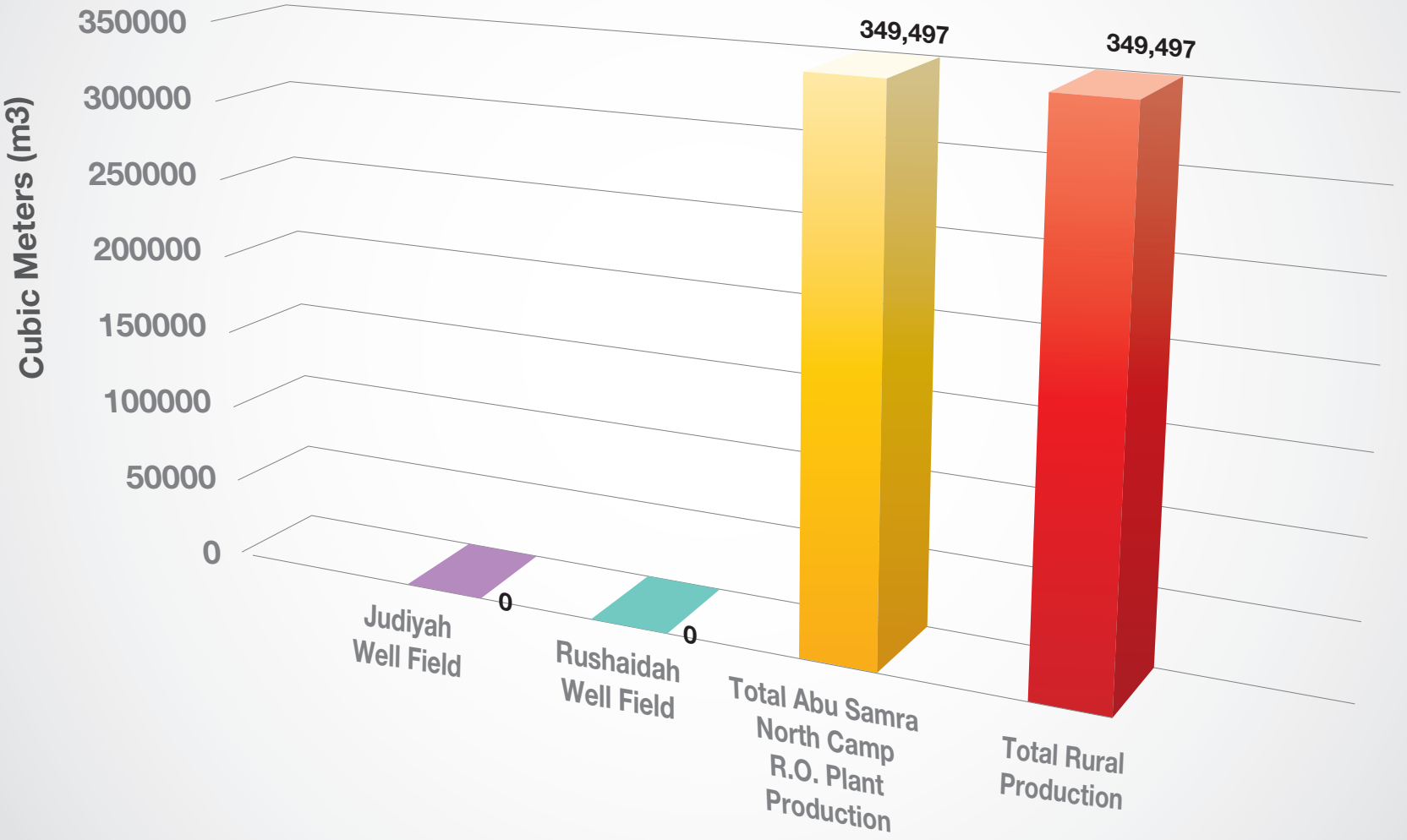
Water Production	2014	2015	2016	2017	2018
Production, MM3	494	533	560	606	637
Annual Growth (%)	6.2%	8.0%	5.1%	7.7%	5.1%
Average Growth last five years (%)					6.4%



WT5 RURAL POTABLE WATER PRODUCTION, CUBIC METERS

Month	Judiyah Well Field*	Rushaidah Well Field*	Total Abu Samra North Camp R.O. Plant Production	Total Production
Jan	0	0	20,088	20,088
Feb	0	0	20,655	20,655
Mar	0	0	24,132	24,132
Apr	0	0	25,225	25,225
May	0	0	25,950	25,950
Jun	0	0	37,226	37,226
Jul	0	0	43,317	43,317
Aug	0	0	27,258	27,258
Sep	0	0	31,946	31,946
Oct	0	0	28,095	28,095
Nov	0	0	27,041	27,041
Dec	0	0	38,564	38,564
Total	**0**	**0**	**349,497**	**349,497**

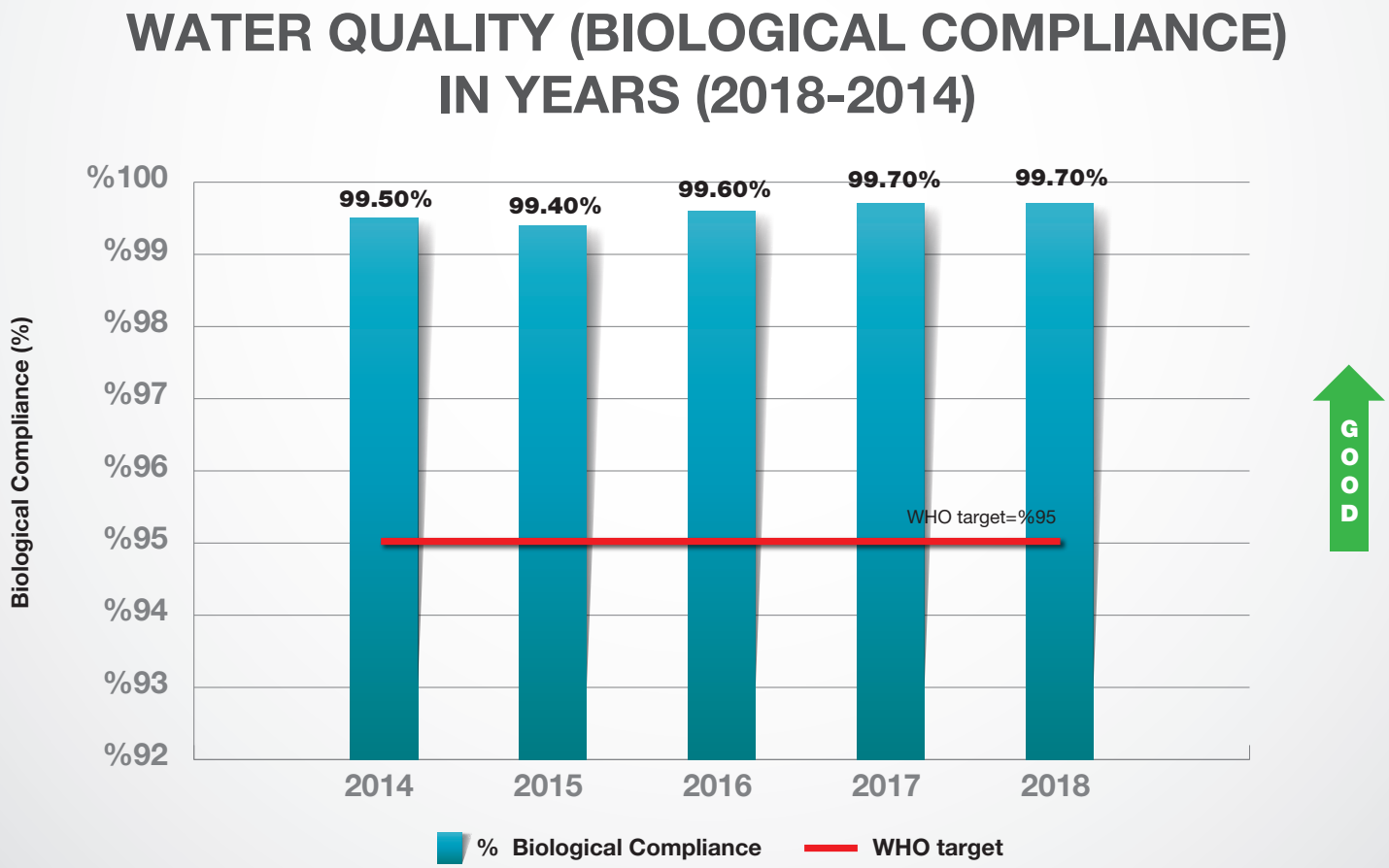
RURAL POTABLE WATER PRODUCTION (m3) IN YEAR 2018



Note: Judiyah and Rushaidah wellfields has been rehabilitated and ready to use during emergency

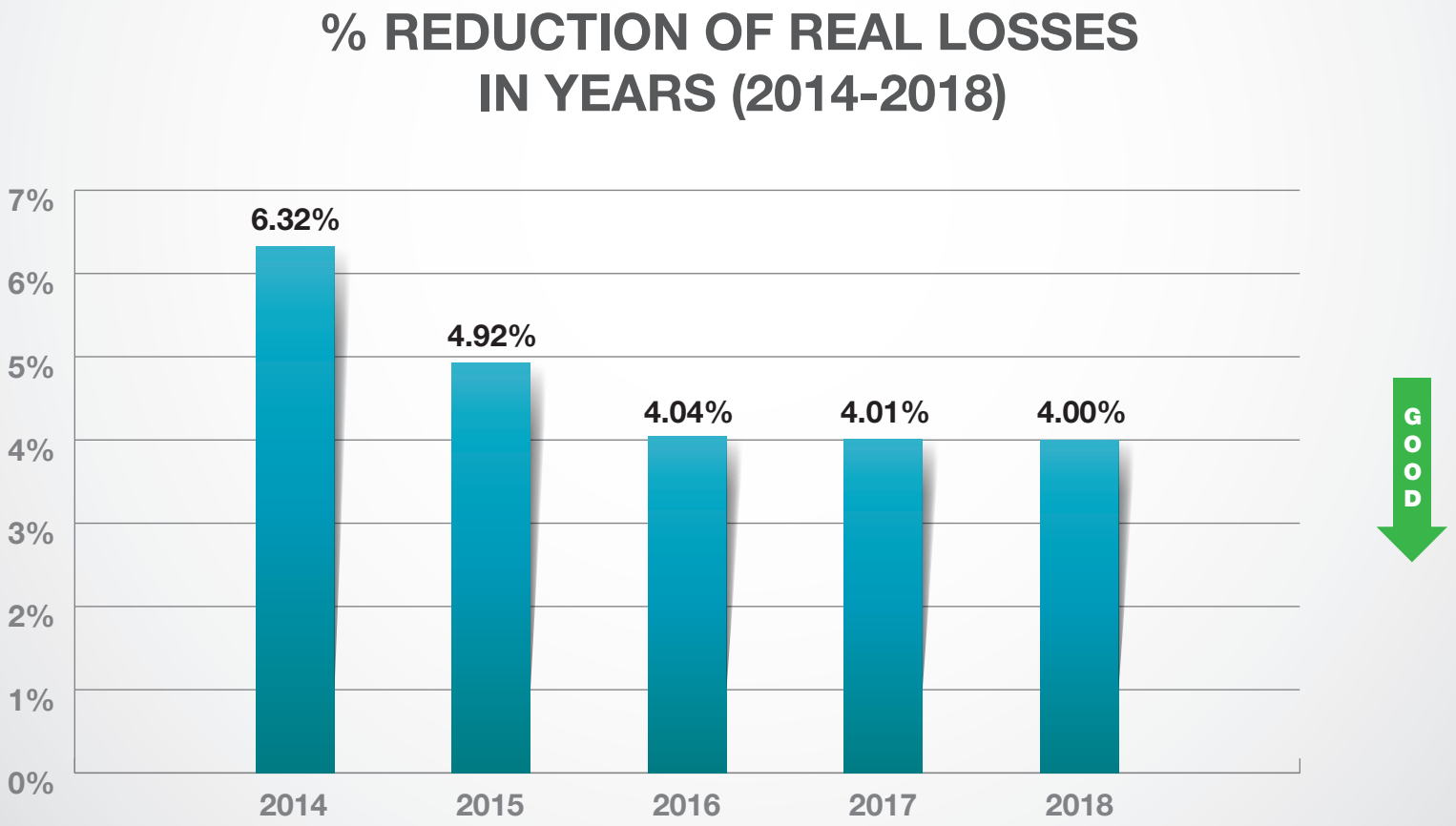
WT6 WATER QUALITY (BIOLOGICAL COMPLIANCE)

Year	% Biological Compliance	WHO Target
2014	99.50%	95%
2015	99.40%	95%
2016	99.60%	95%
2017	99.70%	95%
2018	99.70%	95%



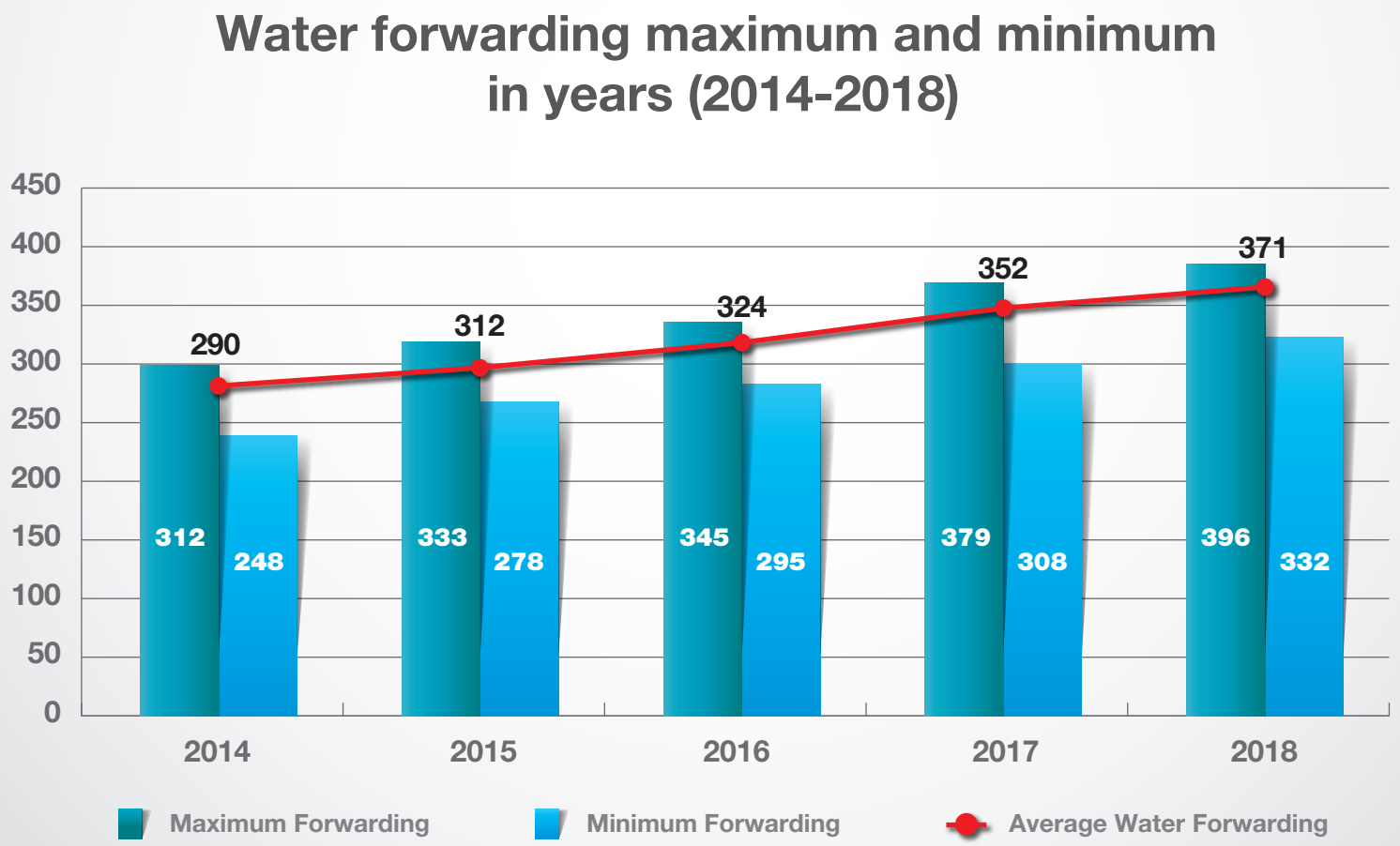
WT7 WATER REAL LOSSES REDUCTION

Year	% Real Losses
2014	6.32%
2015	4.92%
2016	4.04%
2017	4.01%
2018	4.00%



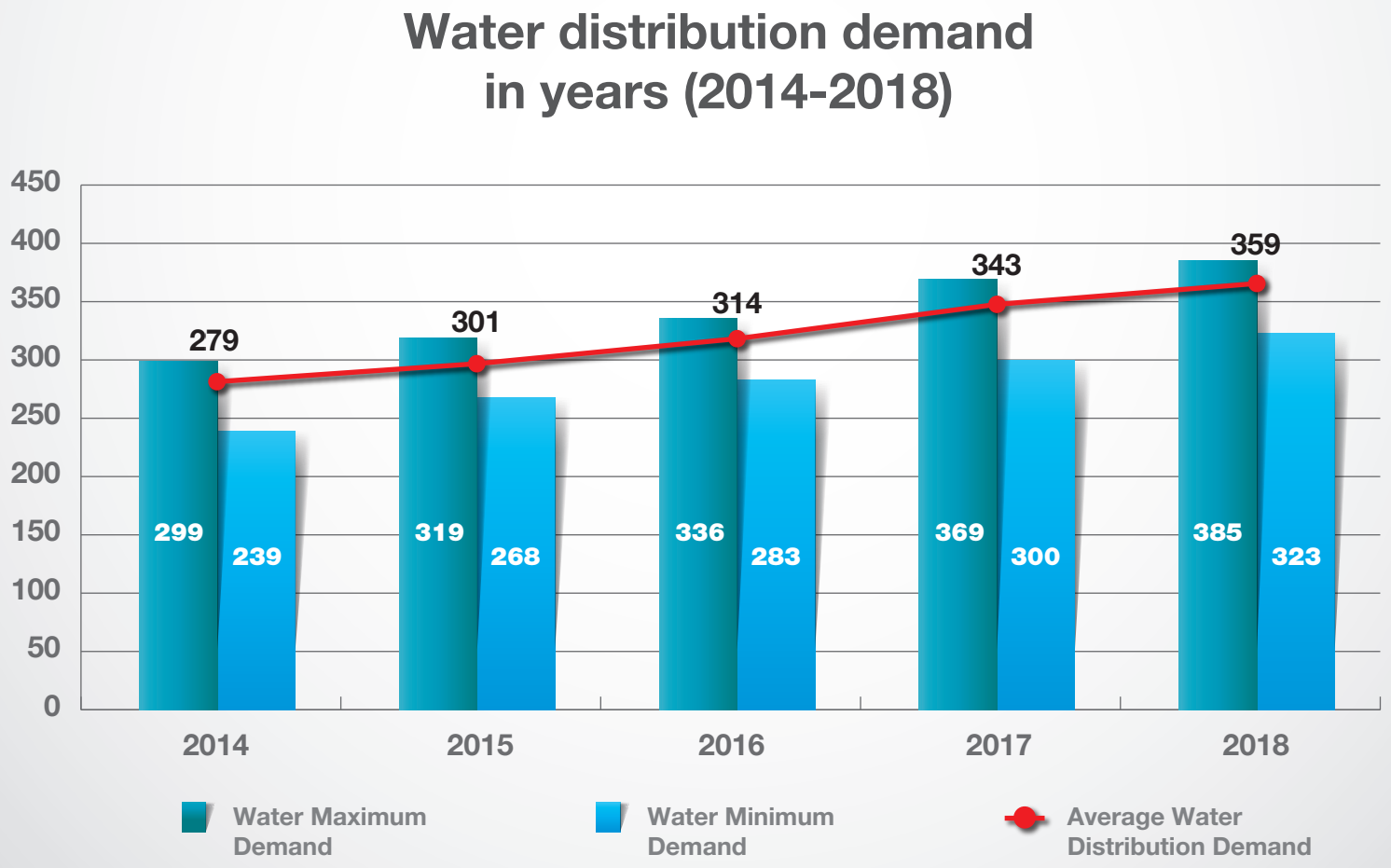
WT8 WATER FORWARDING MAXIMUM & MINIMUM DEMAND IN YEARS (2014-2018)

Year	Average Forwarding, MIGD	Maximum Forwarding Month	Minimum Forwarding, MIGD	Minimum Forwarding Month
2014	290	September	248	January
2015	312	August	278	January
2016	324	October	295	January
2017	352	August	308	February
2018	371	September	332	January



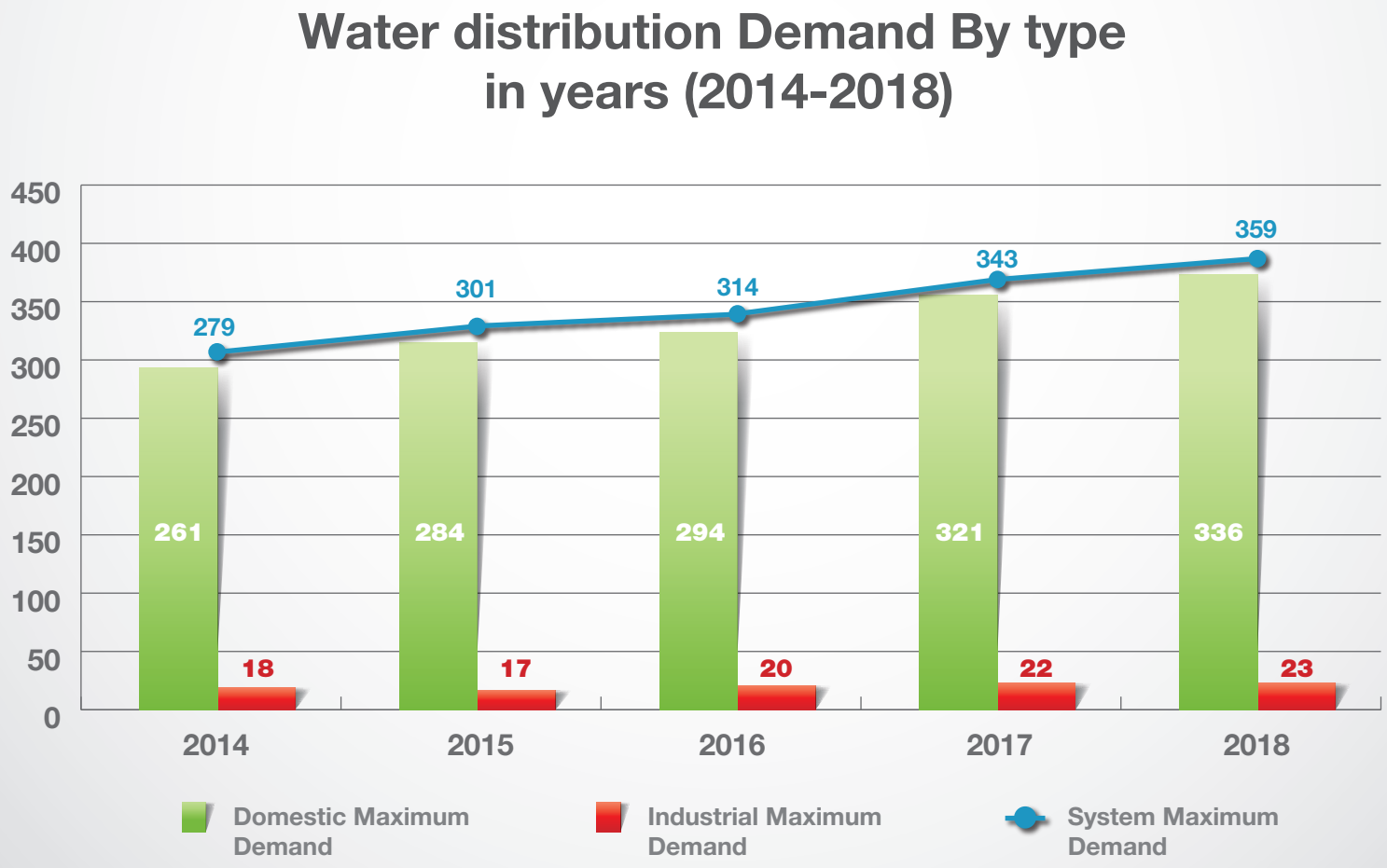
WT9 WATER DISTRIBUTION MAXIMUM AND MINIMUM DEMAND IN YEARS (2014-2018)

Year	Average Distribution Demand, MIGD	Growth (%)	Maximum Demand, MIGD	Maximum Demand Month	Minimum Demand, MIGD	Minimum Demand Month
2014	279	6.1	299	September	239	January
2015	301	7.6	319	August	268	January
2016	314	4.4	336	October	283	January
2017	343	9.2	369	August	300	February
2018	359	4.8	385	September	323	January



WT10 WATER DEMAND BY TYPE IN YEARS (2014-2018)

Water Demand By Type, MIGD	2014	2015	2016	2017	2018
Average Distribution Demand	279	301	314	343	359
Average Industrial Demand	18	17	20	22	23
Average Domestic Demand	261	284	294	321	336



WT11 LENGTH OF MAINS LAID FROM 2014 TO 2018 IN METERS

Pipe Diameter, millimetres	2014	2015	2016	2017	2018
100	104,970	33,110	60,565	49,112	78,210
1000	-	-	6	362	712
110	-	871	2,842	247	348
1200	13,354	60,186	66,277	15,544	10,727
125	-	16,949	12	145	602
1400	17,605	48,707	61,162	8,850	8,509
150	67,129	57,169	104,010	73,540	88,909
1600	1,752	143,836	177,400	35,855	17,198
180	-	7,961	894	40	97
200	63,408	81,526	61,999	42,467	45,314
225	-	1,044	96	-	40
2400	-	76	203	1,249	2,583
250	-	8,771	1,234	316	974
280	-	6,109	-	-	0
300	49,659	59,915	100,715	62,082	55,613
315	-	503	2,614	13	60
355	-	3,087	2,325	492	3,591
400	34,823	27,358	41,683	35,410	17,862
450	-	-	29	4	05
500	-	2,186	3,536	257	933
600	35,572	32,979	34,868	36,069	29,608
700	-	474	15	-	30
80	171	1,238	11	478	676
800	-	167	650	3,755	1,631
900	19,091	53,913	33,209	27,400	21,818
Total	**407,534**	**648,135**	**756,355**	**393,687**	**386,050**

WT12 NUMBER AND LENGTH OF SERVICE CONNECTIONS IN 2018, IN METERS

Service size from 15 mm up to 54 mm (Copper pipe) – Domestic & Commercial (meters)

Type of Service	15mm Length	15mm Nos	22mm Length	22 mm Nos	28 mm Length	28 mm Nos	42 mm Length	42 mm Nos	54 mm Length	54 mm Nos	Total Length	Total Nos.
New Service	-	0	52,526	3,423	15,923	271	2,050	79	11,510	150	82,009	3,923
Reconnection	-	-	-	-	-	-	-	-	-	-	-	-
Disconnection	-	-	-	423	-	-	-	-	-	-	-	423
Maintenance or Replacement	-	-	73,571	4,487	19,541	676	509	69	1,569	124	95,189	5,356
Transpose	-	-	672	90	154	4	15	3	16	3	856	100
Size Increase	-	-	-	-	2	1	-	-	-	-	2	1
New Water Meter Installation	-	16,216	-	47	-	185	-	247	-	-	-	16,695
Water Meter Re-placement	-	12,872	-	2	-	109	-	65	-	-	-	13,048

WT13 NUMBER AND LENGTH OF SERVICE CONNECTIONS IN 2018, IN METERS

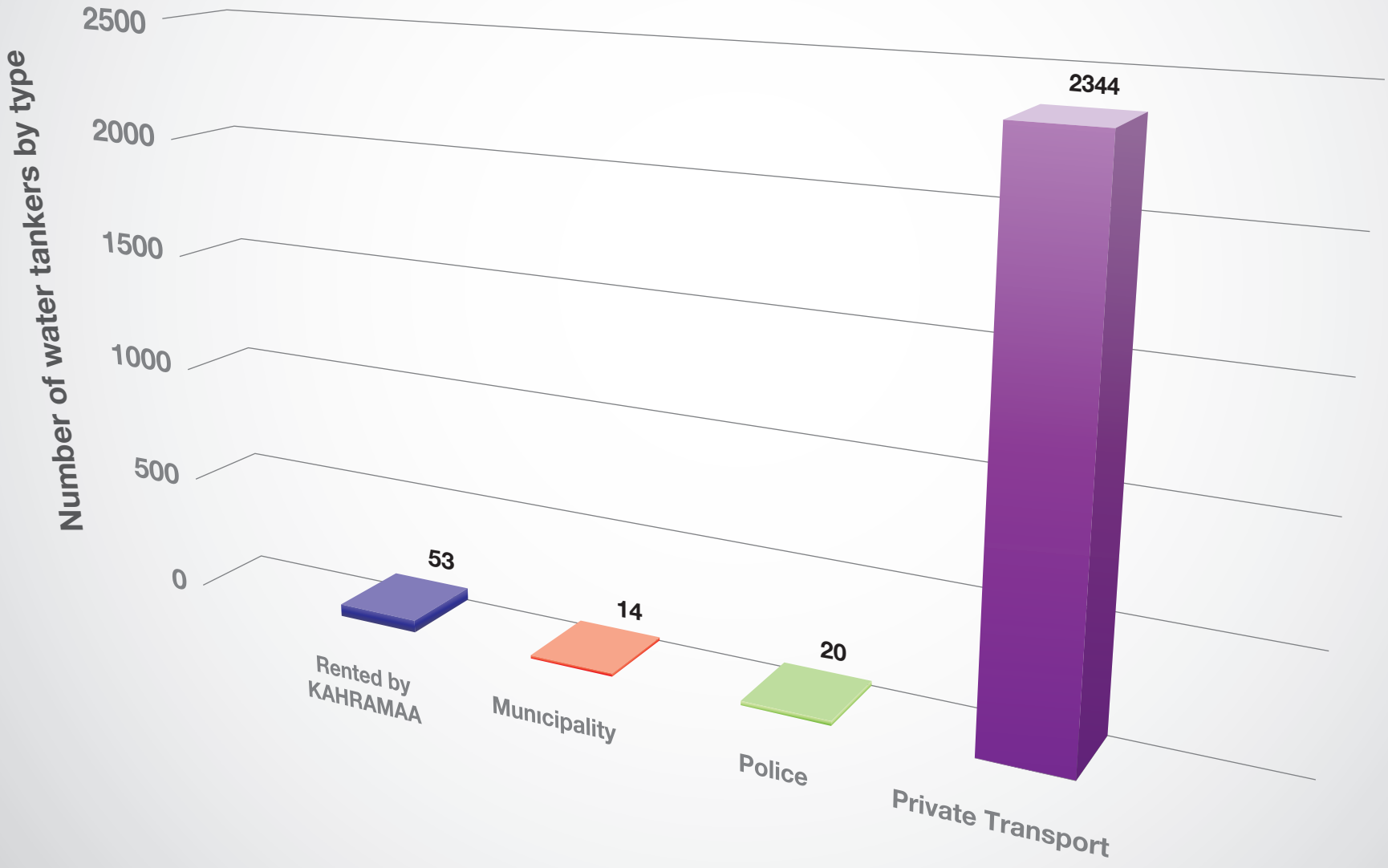
Service size from 80mm (3”) up to 400mm (16”) – Bulk

Type of Ser-vice	80 mm Length	80 mm Nos	100 mm Length	100 mm Nos	150 mm Length	150 mm Nos	200 mm Length	200 mm Nos	250 mm Length	250 mm Nos	300 mm Length	300 mm Nos	400 mm Length	400 mm Nos	Total Length	Total Nos.
New Service	215.39	25	482	2	9	2	0	0	0	0	0	0	0	0	706.39	29
Reconnection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disconnection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maintenance or Replacement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transpose	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Size Increase	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Water Meter Installation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Meter Replacement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

WT14 TANKER WATER SUPPLY IN 2018

Station	Rented by KAHRAMAA	Municipality	Education	Defence	Police	Other	Rural Tankers	Private Transport
AL SAILIYA	26	1	-	-	7	-	-	843
UMM SALAL	1	2	-	-	3	-	-	767
AL KHOR	1	1	-	-	2	-	-	135
AL SHAHANIYAH	5	0	-	-	2	-	-	142
AL WAKRAH	11	5	-	-	4	-	-	265
AL JAMELIYAH	9	2	-	-	1	-	-	34
AL SHAMAL	-	1	-	-	1	-	-	39
MESAIEED	-	1	-	-	0	-	-	78
AL MAZROUA	0	0	-	-	0	-	-	0
AL GHUWARIYAH	-	1	-	-	0	-	-	30
GHARAFFA	-	0	-	-	0	-	-	0
SEALINE	-	0	-	-	0	-	-	11
Total	53	14	-	-	20	-	-	2,344

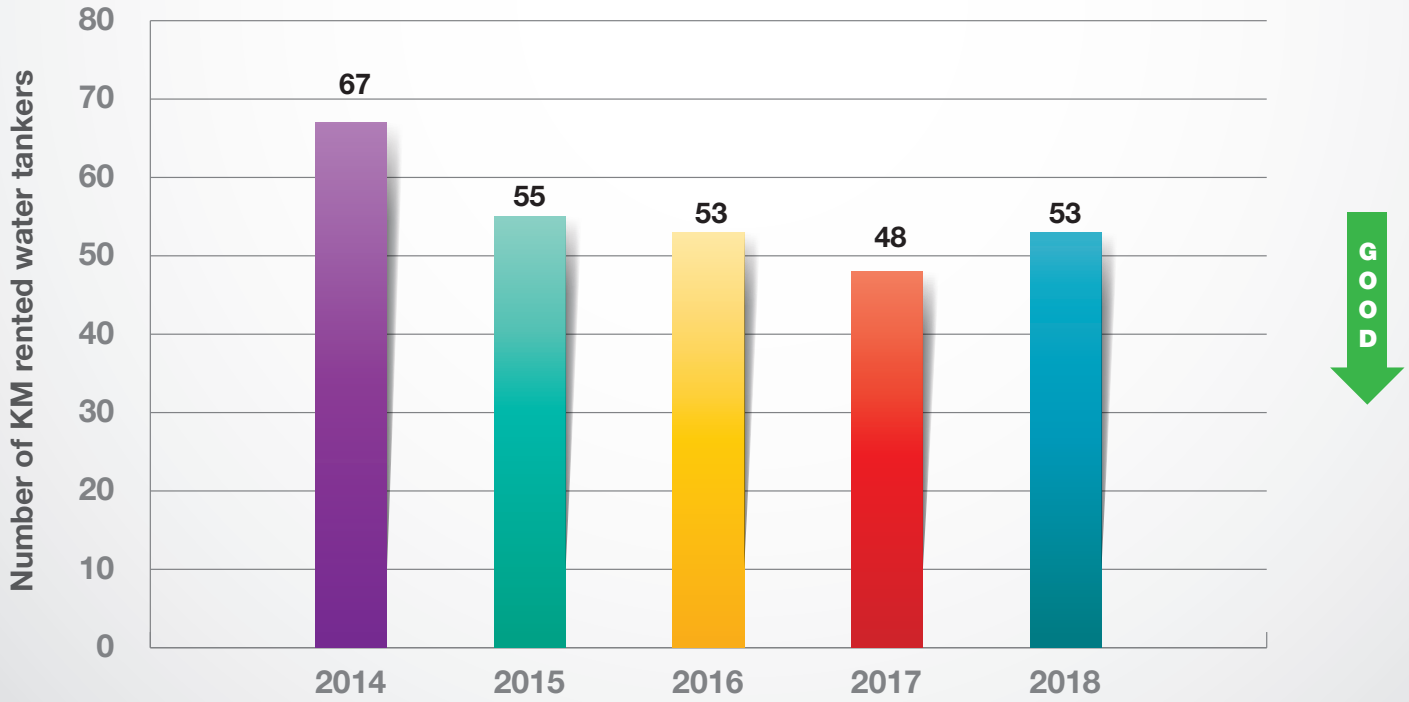
WATER TANKERS SERVED IN 2018 BY TYPE



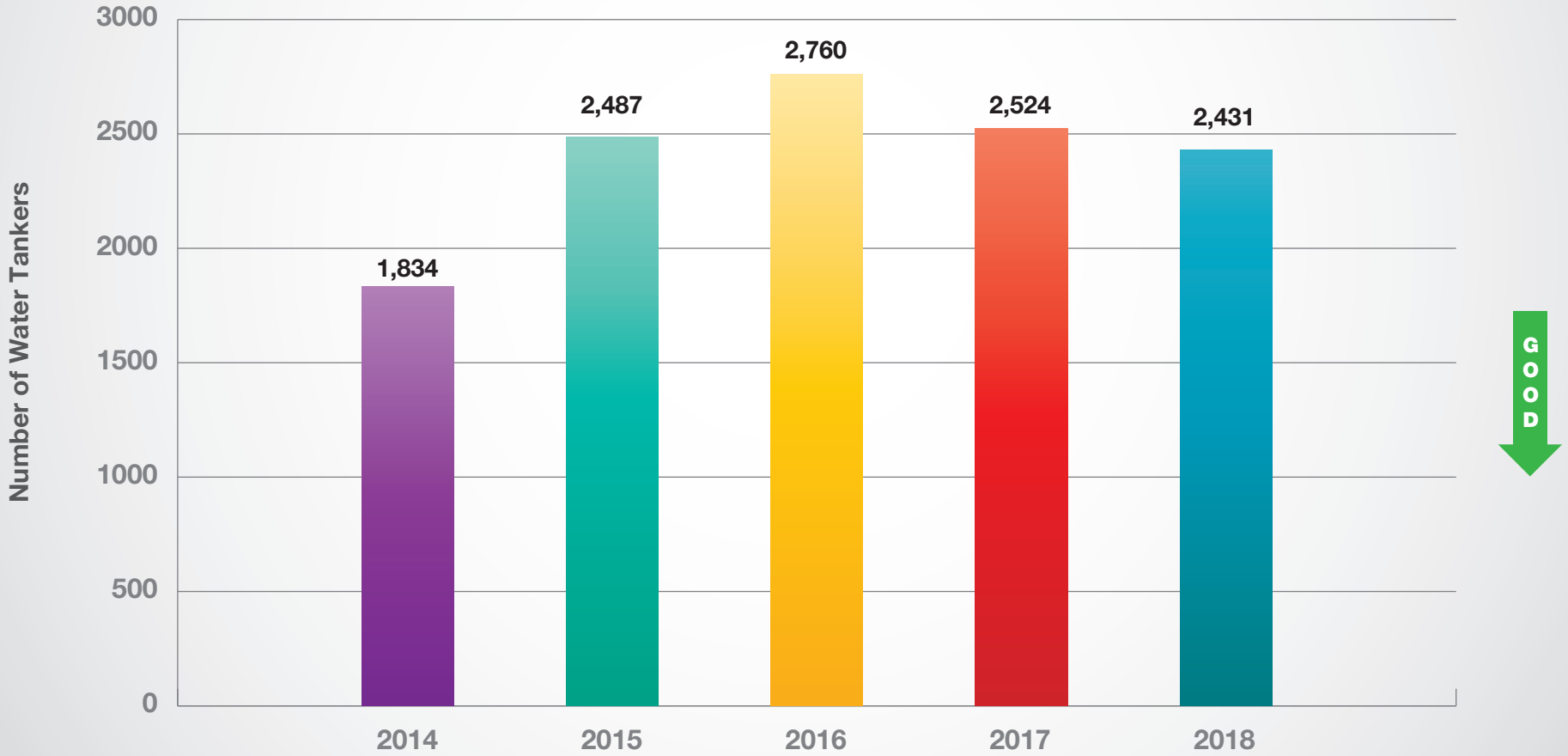
WT15 WATER TANKER SERVICES LAST 5 YEARS

Water Production	2014	2015	2016	2017	2018
No of Water Tankers	1,834	2,487	2,760	2,524	2,431
No of KM Rented Water Tankers	67	55	53	48	53
Total Reduction	-294	-653	-273	236	93
Total Reduction (%)	-19.1%	-35.6%	-11.0%	8.6%	3.68%
KM - Rented Reduction	9	12	2	5	-5
KM - Rented Reduction (%)	11.8%	17.9%	3.6%	9.4%	-10.42%

TOTAL NUMBER OF WATER TANKERS RENTED BY KAHRAMAA IN YEARS (2014-2018)

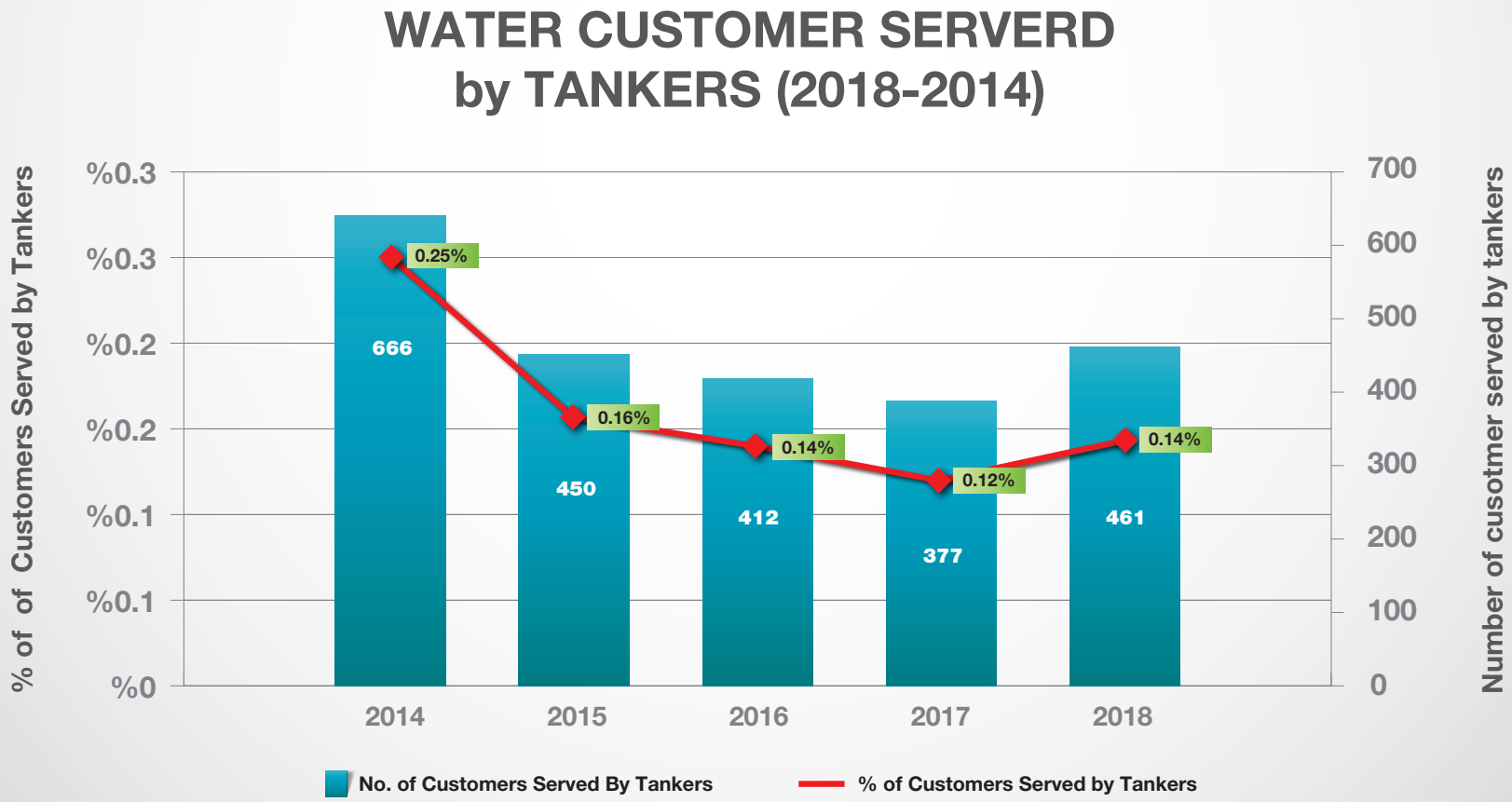


TOTAL NUMBER OF WATER TANKERS IN YEARS (2014-2018)



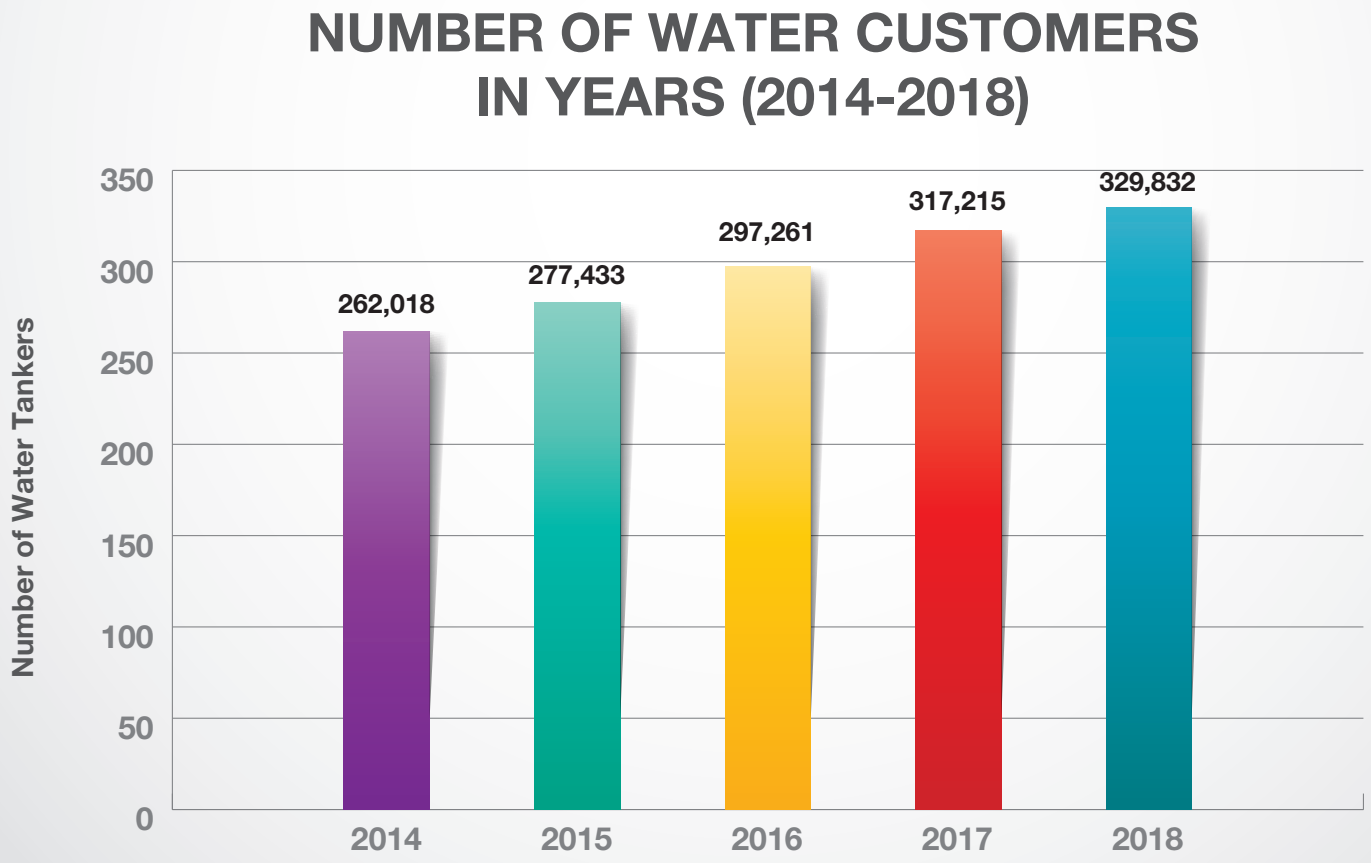
WT16 PERCENTAGE OF CUSTOMERS SERVED BY TANKERS

Water Production	2014	2015	2016	2017	2018
Total No. of Water Customers	262,018	277,433	296,846	316,838	329,832
No Of Customers Served By Tankers	666	450	412	377	461
Percentage of Customers Served by Tankers (%)	0.25%	0.16%	0.14%	0.12%	0.14%
Reduction	228	216	38	35	-84
Percentage Reduction (%)	0.12	0.09	0.02%	0.02%	-0.02%



WT17 NUMBER OF WATER CUSTOMERS

Year	No Of Customers	Annual Growth
2014	262,018	8.0 %
2015	277,433	5.9 %
2016	297,261	7.1%
2017	317,215	6.7%
2018	329,832	4.0%

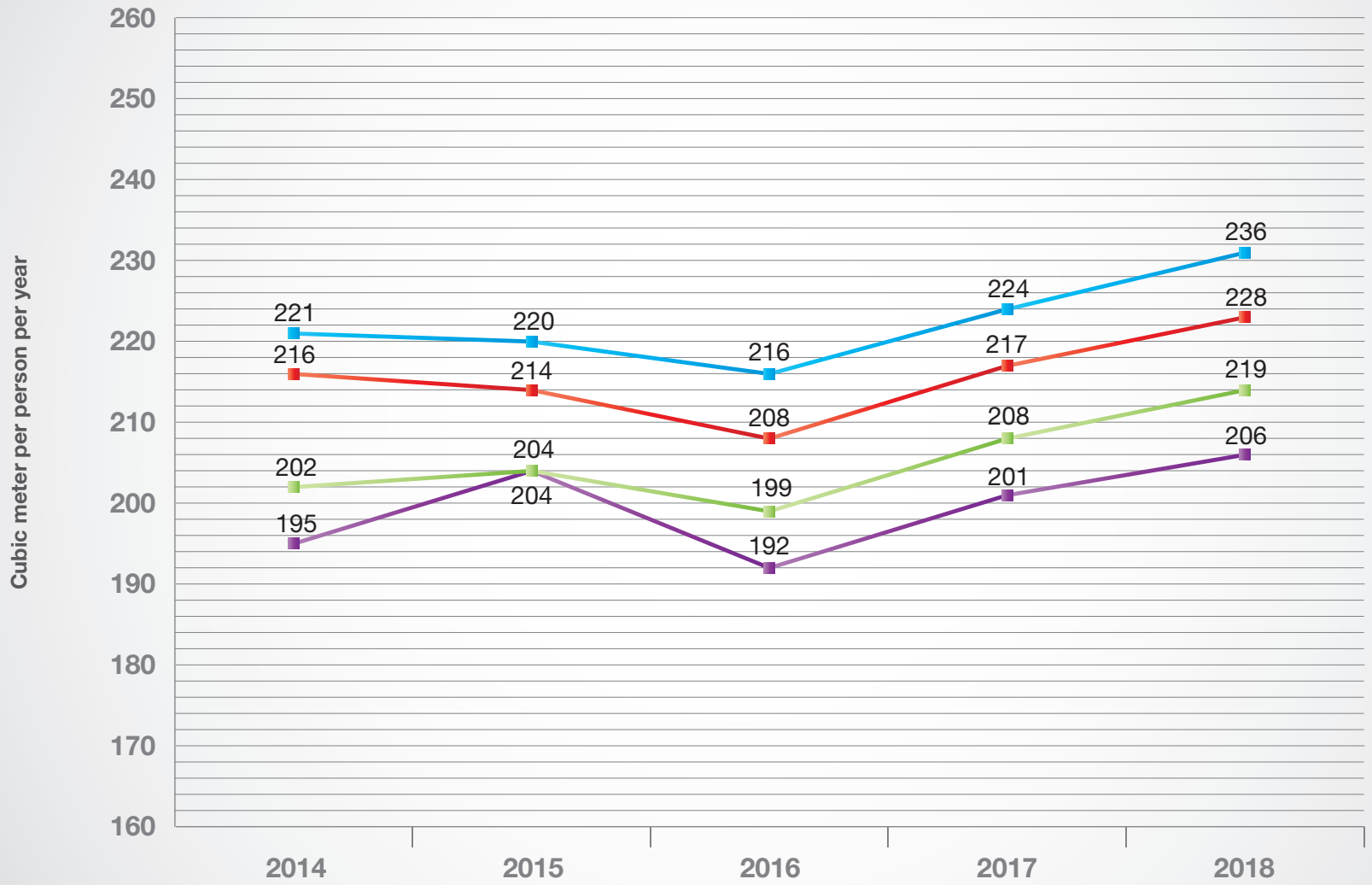


WT18 AVERAGE WATER PER CAPITA CONSUMPTION, LAST FIVE YEARS

Year	2014	2015	2016	2017	2018
Population	2,235,431	2,421,055	2,597,453	2,700,539	2,757,437
Population Annual Increase(%)	9.30%	8.30%	7.30%	4.00%	2.10%
Total Water Production Mm3	494	533	560	606	637
System Input Volume (Forwarding) Mm3	482	518	540	585	616
Water Net Distribution Mm3 = System Input Volume Mm3 (Forwarding) - Real Losses	452	493	518	562	591
Total Potable Water Distribution (Mm3)= ((Net Distribution - Distilled water) – Total Distribution Real Losses)	443	484	506	544	568
Average Water Per Capita Consumption:	40	20	20	181,818	90,909
(Cubic meter per person per year)			60	272,727	-
A) Based on Total Water Production	221	220	216	224	236
B) Based on Water System Input Volume (Forwarding)	216	214	208	217	228
C) Based on Water Net Distribution	**202**	**204**	**199**	**208**	**219**
D) Based on Total Potable Water Distribution = ((Net Distribution - Distilled water) – Total Distribution Real Losses)	**195**	**204**	**192**	**201**	**206**

Note: Starting from year 2017, Per Capita Consumption calculation is based on maximum population for the year.

WATER PER CAPITA CONSUMPTION
(Cubic meters Per Person per Year)



WT19 WATER STORAGE IN IWPP RESERVOIRS IN 2018

Station	Total Installed Capacity, MIG	Non-Operating Capacity, MIG	Operating Capacity, MIG	Total Installed Capacity, M3	Non-Operating Capacity, M3	Operating Capacity, M3	Remarks
RAF A1	45	-	45	204,545	-	204,545	
RAF A2	36	-	36	163,636	-	163,636	
RAF A3	36	-	36	163,636	-	163,636	
RAF B	19	-	19	87,727	-	87,727	
RAF B2	29	-	29	131,818	-	131,818	
RL A	40	-	40	181,818	-	181,818	
RL B	60	-	60	272,727	-	272,727	
RL C	63	-	63	286,364	-	286,364	
UHP	136	-	136	618,182	-	618,182	Station was commissioned on 18 May 2018 (Final Water Date) with total contracted capacity of 136.5 MIGD
Total	**464**	**-**	**464**	**2,110,455**	**-**	**2,110,455**	

WT20 WATER STORAGE IN KM RESERVOIRS IN 2018

Station	Total Installed Capacity, MIG	Non-Operating Capacity, MIG	Operating Capacity, MIG	Total Installed Capacity, M3	Non-Operating Capacity, M3	Operating Capacity, M3	Remarks
Airport	30	-	30	136,364	-	136,364	
Old Salwa	0	-	0	-	-	-	
New Salwa	30	-	30	136,364	-	136,364	
Salwa Industrial	51	-	51	231,818	-	231,818	
Doha South	84	-	84	381,818	-	381,818	
Mesaimeer	108	-	108	490,909	-	490,909	
Wakrah	10	-	10	45,455	-	45,455	
Mes Town	24	-	24	109,091	-	109,091	
Mes Industrial	28	-	28	127,273	-	127,273	
Garrafa	50	-	50	227,273	-	227,273	
Westbay	56	-	56	254,545	-	254,545	
Duhail	142	-	142	645,455	-	645,455	
Umm Qarn	71	-	71	322,727	-	322,727	
Bani Hajr	36	-	36	163,636	-	163,636	
Muaither	105	-	105	477,273	-	477,273	
Al Khor 2	6	-	6	27,273	-	27,273	

WT20 WATER STORAGE IN KM RESERVOIRS IN 2018

Station	Total Installed Capacity, MIG	Non-Operating Capacity, MIG	Operating Capacity, MIG	Total Installed Capacity, M3	Non-Operating Capacity, M3	Operating Capacity, M3	Remarks
Al Khor 3	18	-	18	81,818	-	81,818	
Al Khor 1	4	-	4	18,182	-	18,182	
Umm Salal 1	6	-	6	27,273	-	27,273	
Shahaniyah 2	12	-	12	54,545	-	54,545	
Shahaniyah 3	12	-	12	54,545	-	54,545	
Guwairiyah	0.5	-	0.5	2,273	-	2,273	
M. Shamal	10	-	10	45,455	-	45,455	
Pearl of Qatar	4	-	4	18,182	-	18,182	
Small And Medium	7.9	-	7.9	35,909	-	35,909	
Umm Salal 2	18	-	18	81,818	-	81,818	
Wukair	36	-	36	163,636	-	163,636	
Labor City	6.6	-	6.6	30,000	-	30,000	
Umm Salal Mega RPS	48	-	48	218,182	-	218,182	
Total	**1,014**	**-**	**1,014**	**4,609,091**	**-**	**4,609,091**	

WT21 WATER STORAGE IN GROUND TANKS IN 2018

Location	Ground Tank Non-Operating (MIG)	Ground Tank Operating (MIG)	Ground Tank Non-Operating (M3)	Ground Tank Operating (M3)	Remarks
North Camp	0.00	0.68	-	3,073	
Abu Samra	0.00	0.50	-	2,273	
Al Ghuwairiyah	0.00	0.50	-	2,273	
Shahaniyah 1	1.50	0.00	6,818	-	GST not in service since 27/11/2018 as ET not operational due to major roof defects.
Mazruah	1.50	0.00	6,818	-	Station is not in service (On Standby)
New Jemiliyah	0.50	0.00	2,273	-	GST not in service since 19/05/2014 as ET not operational due to leakage.
Dukhan	0.50	0.00	2,273	-	Station is not in service (On Standby)
Total	**4.00**	**1.68**	**18,182**	**7,618**	

WT22 WATER STORAGE IN ELEVATED TANKS IN 2018

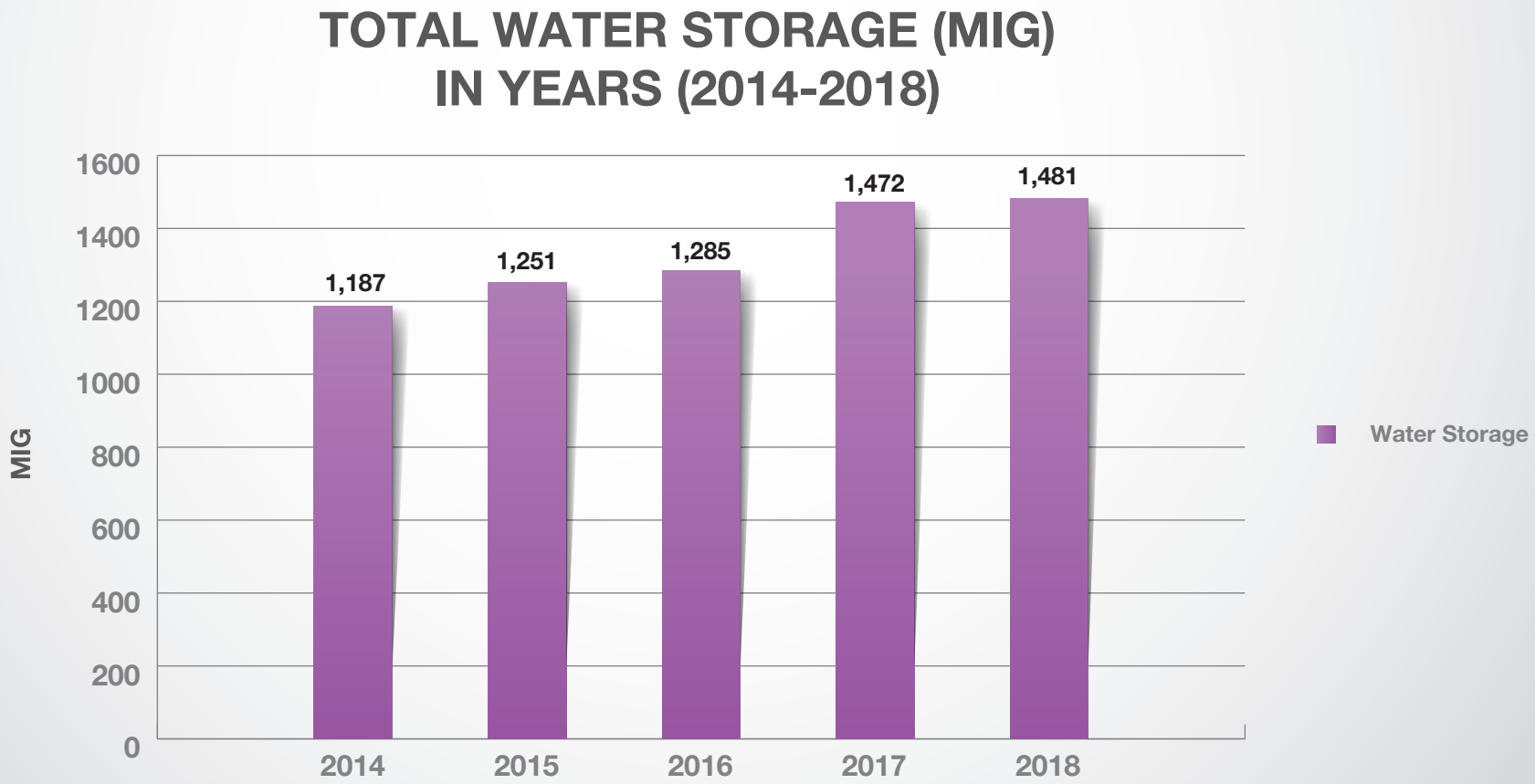
Location	Elevated Tank Capacity (Imperial Gallons)	Elevated Tank Operating Capacity (Imperial Gallons)	Capacity (M3)	Operating Capacity (M3)	Remarks
Madinat Shamal	55,000	0	250	-	Demolished
Al Ghuwairiyah	55,000	0	250	-	Bypassed
Al Khor 1	55,000	55,000	250	250	
Mazruah	200,000	0	909	-	Standby
Shahaniyah 1	69,000	0	314	-	Elevated tank is not operational due to major roof defects.
Abu Samra	55,000	55,000	250	250	
New Jemiliyah	80,000	0	364	-	Elevated tank is not operational due to leakage.
North Camp	88,000	88,000	400	400	
Total	**657,000**	**198,000**	**2,986**	**900**	

WT23 WATER STORAGE IN TOWERS IN 2018

Location	Capacity (Imperial Gallons)	Capacity (M3)	Remarks
WT-1 (Airport)	495,000	2,250	Not in Service (Bypassed)
WT-3 (Luqta)	275,000	1,250	Not in Service (Bypassed)
WT-12 (Naeeja)	250,000	1,136	Not in Service (Bypassed)
WT-14 (Museum)	495,000	2,250	Not in Service (Bypassed)
WT-15 (Asiri)	495,000	2,250	Not in Service (Bypassed)
WT-17 (Ghanim Jadeed)	275,000	1,250	Not in Service (Bypassed)
WT-18 (Rumaillah)	495,000	2,250	Not in Service (Bypassed)
WT-19 (Hitmi)	275,000	1,250	Not in Service (Bypassed)
WT-20 (Garrafa)	275,000	1,250	Not in Service (Bypassed)
WT-21 (Khalifa Town)	275,000	1,250	Not in Service (Bypassed)
WT-22 (Messaieed Town)	495,000	2,250	In Service
WT-23 (Muraykh)	495,000	2,250	Not in Service (Bypassed)
WT-24 (Wakrah)	495,000	2,250	Not In Service
WT-25 (Salwa Industrial)	495,000	2,250	In Service
WT-26 (Bani Hajr)	495,000	2,250	Not in Service (Bypassed)
Total	6,080,000	27,636	

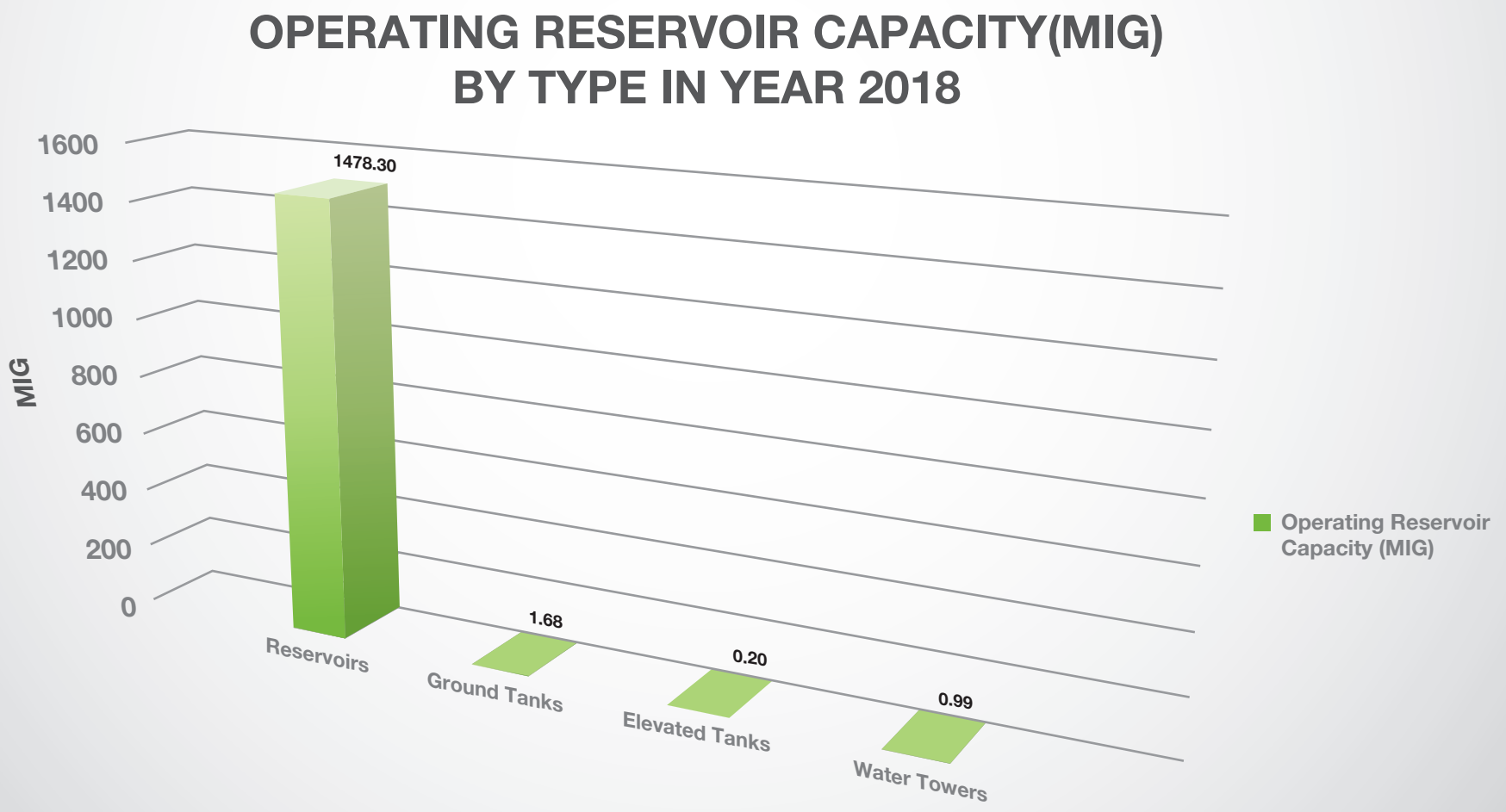
WT24 TOTAL WATER STORAGE 2014-2018

Water Storage	2014	2015	2016	2017	2018
Imperial Gallons (IG)	1,186,718,000	1,251,169,000	1,285,274,000	1,472,170,000	1,481,170,000
Meter Cube(M3)	5,394,173	5,687,132	5,842,155	6,691,682	6,732,591
Million Meter Cube (MM3)	5.4	5.7	6.0	6.7	6.7
Million Imperial Gallons (MIG)	1,187	1,251	1,285	1,472	1,481



WT25 TOTAL WATER STORAGE BY TYPE 2014-2018

Type	Operating Reservoir Capacity (MIG)	%	Remarks
Reservoirs	1478.30	99.81%	-
Ground Tanks	1.68	0.11%	-
Elevated Tanks	0.20	0.01%	-
Water Towers	0.99	0.07%	Water Towers in Service are considered
Grand Total	1481.17	100.00%	-



GLOSSARY OF TERMS & ABBREVIATIONS

Abbreviation	Description
AMR	Automatic meter reading, or AMR, is the technology of automatically collecting data from water meter or energy metering devices (water, gas, and electric) and transferring that data to a central database for billing and/or analysing. This means that billing can be based on actual consumption rather than on an estimate based on previous consumption, giving customers better control of their use of electric energy, gas usage, or water consumption.
Arab D	AMR technologies include handheld, mobile and network technologies based on telephony platforms (wired and wireless), radio frequency (RF), or power line transmission.
Auxiliary power consumption	Several major projects have been completed including the development of Dukhan petroleum fields leading to raising oil production to 335,000 b/d, Arab D project to develop the production of gas and condensates in two stages inaugurated by H.H. the Emir of Qatar in 1998. The Arab D project will increase production of natural gas to about 1,500 tons p/d to supply LNG Plant 4 in Mesaieed, which is in the final phase, as well as a project to inject gas into dead wells (in its final stage) and Al-Shu'la project for all oil production stations in Dukhan for the purpose of environmental protection.
Black Start	Refers to the energy consumed internally by various integrated components of the main plant and supporting equipment necessary for the complete cycle of generating electrical energy and desalination of water, such as air compressors, pumps and fans.
Combined cycle	A black start is the process of restoring a power station to operation without relying on external energy sources. Normally, the electric power used within the plant is provided from the station's own generators. Often a transmission line will be installed to provide this station service power if all the main generators are shut down. However, during a wide-area outage, this off-site power supply will not be available. In the absence of grid power, a so-called black start needs to be performed to bootstrap the power grid into operation.
PQ	Combined cycle describes when a power producing engine or plant employs more than one thermodynamic cycle. Heat engines are only able to use a portion of the energy their fuel generates (usually less than 50%). The remaining heat from combustion is generally wasted. Combining two or more "cycles" such as the Brayton cycle and Rankine cycle results in improved overall efficiency.
CPR	Corporate Performance Report: A report presented to the KAHRAMAA Board of Directors on a quarterly basis, which depicts the progress of KAHRAMAA's business and activities. In this report, the progress or achievement level of many activities are measured in terms of Key Performance Indicators (KPI's).
CSD	Customer Services Department: A department level business unit in KAHRAMAA that processes requests for building permits, service connections and customer billing.
Distribution substation	A distribution substation's purpose is to transfer power from the transmission system to the distribution system of some area. It is uneconomical to directly connect electricity consumers to the main transmission network (unless they use large amounts of energy); so the distribution station reduces voltage to a value suitable for connection to local loads.
Domestic	Refers to consumption of electricity or water that is not industrial in nature. In KARAMAA the National Control Centre tracks Qatar's entire electrical loads at two levels: industrial and domestic. Domestic loads cover residential, commercial and government demand.
DSM	Demand Side Management
ENA	Electricity Network Affairs: Directorate level business unit in KAHRAMAA that takes care of electricity network expansion and maintenance.

Abbreviation	Description
ESCWA	Economic and Social Commission for Western Asia
GT, Gas turbine	A type of engine using ignited gas running through a huge and very carefully designed multi-stage turbine to spin an output shaft that drives the plant's generator. In a gas turbine, a pressurized gas spins the turbine. In all modern gas turbine engines, the engine produces its own pressurized gas, and it does this by burning something like propane, natural gas, and kerosene or jet fuel. The heat that comes from burning the fuel expands air, and the high-speed rush of this hot air spins the turbine.
GDP	Gross Domestic Product: The total output of a country's economy.
Grid	A power transmission system is sometimes referred to colloquially as a "grid"; however, for reasons of economy, the network is not a mathematical grid. Redundant paths and lines are provided so that power can be routed from any power plant to any load centre, through a variety of routes, based on the economics of the transmission path and the cost of power. Much analysis is done by transmission companies to determine the maximum reliable capacity of each line, which, due to system stability considerations, may be less than the physical or thermal limit of the line. Deregulation of electricity companies in many countries has led to renewed interest in reliable economic design of transmission networks.
GW	Gigawatt = billions of watts (capacity)
GWh	Gigawatt Hour = billions of watts in 1 hour (electrical energy)
IWPP	Independent Water and Power Producers
KAH S/S	KAHRAMAA substation
KAHRAMAA	KAHRAMAA
KM	KAHRAMAA
kV	Kilovolt = 1,000 volts (capacity)
kW	Kilowatt = 1,000 watts (capacity)
kWh	Kilowatt-Hour = 1,000 watts in 1 hour (electrical energy)
Loading desk	Refers to a desk at NCC (National Control Centre) equipped with the required and hardware, software and connectivity used in tracking loads on the electricity grid and managing the loads in real-time.
m3	Cubic Meters, unit of measurement for volume of water

Abbreviation	Description
MIC	Mesaieed Industrial City, south of Doha
MIG	Million Imperial Gallons, unit of measurement for volume of water
MIGD	Million Imperial Gallons per Day, unit of measurement for volume of water. Normally used to indicate the capacity of a water desalination plant.
Mm	Millimetre, normally used in measuring water pipe diameter
MMSCF	Million Standard Cubic Feet, a measure of gas volume
MOF	Ministry of Finance, Qatar government agency
MPC	Mesaieed Power Company, owns & operates power & desalination plants south of Doha
MSF	Multi-Stage Flash (MSF) is the most commonly used process for seawater desalination. A MSF facility is typically located so that it uses steam from a nearby electricity generation facility. Seawater is heated in a “brine heater” and proceeds to another receptacle, called a stage, where it immediately boils (flash) due in part to the ambient pressure. The steam yielded is the condensed on heat exchanger tubes that in turn heat up the incoming water, thereby decreasing the amount of thermal energy needed to heat the feed water.
MW	Megawatt = 1 million watts (capacity)
MWh	Megawatt Hour, 1 million watts in 1 hour (electrical energy)
n-1 policy or criteria	The supply system must be maintained stable during and after the disturbance in the system resulting in the loss of one generating unit or one circuit of transmission lines, as well as no loss of load is allowed.
NGL	Natural Gas Liquid(s)
NODCO	Qatar's National Oil Distribution Company
NWRMDS	National Water Resources Management and Development Strategy, a study sponsored by PWRC
PASS-OUT	Pass-Out: Refers to the steam passed out from combined-cycle gas turbines (CCGT). The pass-out steam from the steam turbine can be used to meet on-site heat requirements increasing overall efficiencies. This lowers electricity production, but improves overall economics.
Power Factor	The cos , where is the angle between the current and voltage. Rated Power Factor = The minimum power factor at which a generator can supply the rated active power. The ratio of Active over Apparent Power (a typical value is around 0.9). The power factor can vary from customer to customer, as it depends on the electrical characteristics of the customer’s installed equipment.

Abbreviation	Description
PPA	Power Purchase Agreement
PWPA	Power & Water Purchase Agreement
P/S or PS	PowerStation: A power station (also referred to as generating station or power plant) is a facility for the generation of electric power. 'Power plant' is also used to refer to the engine in ships, aircraft and other large vehicles. Some prefer to use the term energy centre because it more accurately describes what the plants do, which is the conversion of other forms of energy, like chemical energy, gravitational potential energy or heat energy into electrical energy. Not all thermal energy can be transformed to mechanical power, according to the second law of thermodynamics. Therefore, there is always heat lost to the environment. If this loss is employed as useful heat, for industrial processes or district heating, the power plant is referred to as a cogeneration power plant or CHP (combined heat-and-power) plant. In countries where district heating is common, there are dedicated heat plants called heat-only boiler stations. An important class of power stations in the Middle East uses by-product heat for desalination of water.
PWRC	Permanent Water Resources Committee, an organization that plans and oversees security & sustainability of water supply in Qatar
QAFAC	Qatar Fuel Additives Company Limited
QAFCO	Qatar Fertilizer Company
QAPCO	Qatar Petrochemicals Company
QASCO	Qatar Steel Company
Q-Chem	Qatar Chemical Company, Ltd.
QNCC	Qatar National Cement Company
QVC	Qatar Vinyl Company, Ltd.
QEWC	Qatar Electricity and Water Company, one of the independent power producers (IPP's) in Qatar, supplying KAHRAMAA
QTS	Qatar Power Transmission System, one of the independent power producers (IPP's) in Qatar, supplying KAHRAMAA
RAA	Ras Abu Aboud, an area south of Doha
RAF	Ras Abu Fontas, an area south of Doha

Abbreviation	Description
RL	Ras Laffan, an area north of Doha
UHP	Umm Al Houl Power
RLPC	Ras Laffan Power Company, one of the independent power producers (IPP's) in Qatar, supplying KAHRAMAA
RO	Reverse Osmosis s used to reduce dissolved solids from feed waters with salinities up to 45,000 ppm TDS (total dissolved solids). Municipalities and industrial facilities are able to use RO permeate as a consistently pure drinking water supply and to transform drinking water to high purity water for industrial use at microelectronics, food and beverage, power, and pharmaceutical facilities. The technology is also very effective at removing bacteria, pyrogens, and organic contaminants.
S/S or SS (Substation)	Substation – normally refers to electrical power substation.An electrical power substation is a subsidiary station of an electricity generation, transmission and distribution system where voltage is transformed from high to low or the reverse using transformers.
SCADA	Supervisory Control & Data Acquisition System SCADA refers to a system that collects data from various sensors at a factory, plant or in other remote locations and then sends this data to a central computer which then manages and controls the data. SCADA is a term that is used broadly to portray control and management solutions in a wide range of industries. Some of the industries where SCADA is used are Water Management Systems, Electric Power, Traffic Signals, Mass Transit Systems, Environmental Control Systems, and Manufacturing Systems.
TA	Technical Affairs: Directorate level business unit in KAHRAMAA that manages large electricity and water network expansion and maintenance projects.
Transmission Substation	A transmission substation's main purpose is to connect together various transmission lines.The simplest case is where all transmission lines have the same voltage. In such cases, the substation contains high-voltage switches that allow lines to be connected together or isolated for maintenance.Transmission substations can range from simple to complex. A small "switching station" may be little more than a bus plus some circuit breakers. The largest transmission substations can cover a large area (several acres/hectares) with multiple voltage levels, and a large amount of protection and control equipment (capacitors, relays, switches, breakers, and voltage and current transformers).

<table>
<tr><th>Abbreviation</th><th>Description</th></tr>
<tr><td>Watt, W</td><td>The watt (symbol: W) is the SI derived unit of power, equal to one joule per second. A human climbing a flight of stairs is doing work at the rate of about 200 watts. A first class athlete can work at up to approximately 500 watts for 30 minutes. An automobile engine produces mechanical energy at a rate of 25,000 watts (approximately 30 horsepower) while cruising. A typical household incandescent light bulb uses electrical energy at a rate of 40 to 100 watts. The watt is named after James Watt for his contributions to the development of the steam engine, and was adopted by the Second Congress of the British Association for the Advancement of Science in 1889 and by the 11th Conference Générale des Poids et Mesures in 1960.

SI multiples

<table>
<tr><th>Multiple</th><th>Name</th><th>Symbol</th></tr>
<tr><td>10^{0}</td><td>watt</td><td>W</td></tr>
<tr><td>10^{1}</td><td>decawatt</td><td>daW</td></tr>
<tr><td>10^{2}</td><td>hectowatt</td><td>hW</td></tr>
<tr><td>10^{3}</td><td>kilowatt</td><td>kW</td></tr>
<tr><td>10^{6}</td><td>megawatt</td><td>MW</td></tr>
<tr><td>10^{9}</td><td>gigawatt</td><td>GW</td></tr>
<tr><td>10^{12}</td><td>terawatt</td><td>TW</td></tr>
</table>
</td></tr>
<tr><td>Waste heat</td><td>Waste heat refers to heat produced by machines and technical processes for which no useful application is found, and is regarded as a waste by-product.The electrical efficiency of thermal power plants, defined as the ratio between the primary product and input energy, ranges from 30 to 70%. It is often difficult to find useful application for large quantities of low quality heat, so the heat is qualified as waste heat and is rejected to the environment.</td></tr>
<tr><td>Well field</td><td>Multiple borings into the ground 30 meters deep or deeper to extract water deposits.</td></tr>
<tr><td>WNA</td><td>Water Network Affairs: Directorate level business unit in KAHRAMAA that takes care of water reservoirs & network expansion and maintenance.</td></tr>
<tr><td>WPA</td><td>Water Purchase Agreement</td></tr>
<tr><td>Air Conditioning</td><td>“Air Conditioning” means the process of treating air to simultaneously control its temperature, humidity, and cleanliness and distribution of this air to meet the requirements of the conditioned space</td></tr>
<tr><td>District Cooling</td><td>“District Cooling” means the centralized production and distribution of Cooling Energy in the form of Chilled Water from a central chiller plant to multiple Buildings through a network of underground pipes</td></tr>
</table>

Abbreviation	Description
DC Plant	“DC Plant” means the plant, including pumping stations, chillers, TES facilities, Cooling Towers, associated electrical substations, emergency power supply equipment, systems control, switchgear, electrical installation auxiliary equipment, piping and other installations and ancillary equipment, used or useful in the production of Cooling Energy and the distribution of Chilled Water, operated and maintained for purposes of supporting the provision of DC Provider Services, to be installed on a DC Plot
DC Provider	“DC Provider” means an entity which generates and distributes Cooling Energy by means of Chilled Water using a DC System.
Ton of Refrigeration “(TR)”	“Ton of Refrigeration “(TR)” or means ton of refrigeration, a unit used to measure instantaneous Cooling Load, which is equivalent to 12,000 BTUs per hour (3,514 Watts).
Treated Sewage Effluent”(TSE)	“Treated Sewage Effluent” (TSE) An environmentally safe fluid waste stream which has been treated to standards required for its various uses (i.e. made fit-for-purpose) and made available by Ashghal.
GST	Ground Storage Tank. Used for water storage.
Air Conditioning	“Air Conditioning” means the process of treating air to simultaneously control its temperature, humidity, and cleanliness and distribution of this air to meet the requirements of the conditioned space
District Cooling	“District Cooling” means the centralized production and distribution of Cooling Energy in the form of Chilled Water from a central chiller plant to multiple Buildings through a network of underground pipes
DC Plant	“DC Plant” means the plant, including pumping stations, chillers, TES facilities, Cooling Towers, associated electrical substations, emergency power supply equipment, systems control, switchgear, electrical installation auxiliary equipment, piping and other installations and ancillary equipment, used or useful in the production of Cooling Energy and the distribution of Chilled Water, operated and maintained for purposes of supporting the provision of DC Provider Services, to be installed on a DC Plot
Cooling Load	“Cooling Load “ means rate of removal of heat energy expressed in Tons of Refrigeration .
Peak Cooling Load	“Peak Cooling Load ”means The maximum instantaneous cooling load occurred during the year expressed in Tons of Refrigeration .