

Kahramaa District Cooling Services Department

“District Cooling is a Sustainable Solution, if regulated properly



better living

لحياة أفضل

Agenda

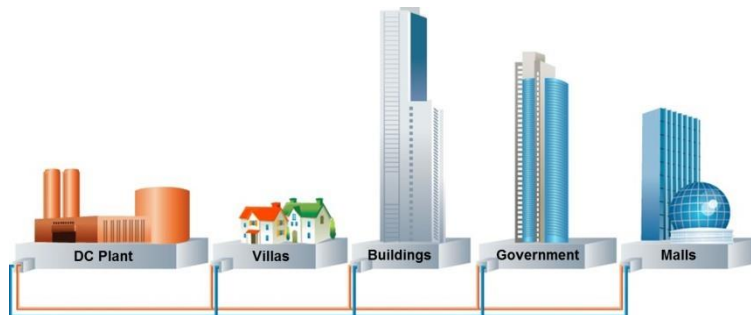
- ▶ District Cooling Department- Mandate
- ▶ District Cooling Capacity in Qatar
- ▶ CD alignment With QNV 2030
- ▶ District Cooling Design & Water Management Code
 - A) Design guideline for Energy Efficiency Improvement
 - B)Operational Plant KPI Compliance and Reporting.
- ▶ Recycled Water Use in District Cooling .
- ▶ Roadmap

▶ District Cooling Department ,Kahramaa

District Cooling is a centralized solution providing Chilled Water to multiple buildings through a network

Definition of District Cooling VS. Conventional Cooling

District Cooling



- Centralized plant producing and distributing chilled water for cooling through a network
- Economies of scale enable higher efficiency and improved cooling services

Conventional Cooling



- Systems providing air conditioning to stand-alone buildings/units/villas
- Lower efficiency than District Cooling, increasing energy consumption and impacting environmental sustainability

District Cooling Department Established









Qatar General Electricity & Water cooperation “KAHRAMAA” has established a District Cooling Services department (CD) with the intent to regulate and promote district cooling services in Qatar by utilizing best-in-class operational efficiencies in a more sustainable way. The department came into existence with the resolution from council of ministry vide reference 825 dated 2nd May 2012.

Mandate

1. Suggest general policies for District Cooling
2. Set up rules and regulations for District Cooling and ensuring that they are being complied with
3. Set up District Cooling standards and specifications and ensure that they are being complied with
4. Decide on areas to be served by District Cooling as per priorities and visibility (economically) in coordination with Concerned Authorities in the country
5. Suggest tariff structures for customers
6. Approve District Cooling activities
7. Develop Integrated Programs of whatever related to District Cooling

The main DC stakeholders in Qatar are the DC Providers, the Developers and the Government Entities

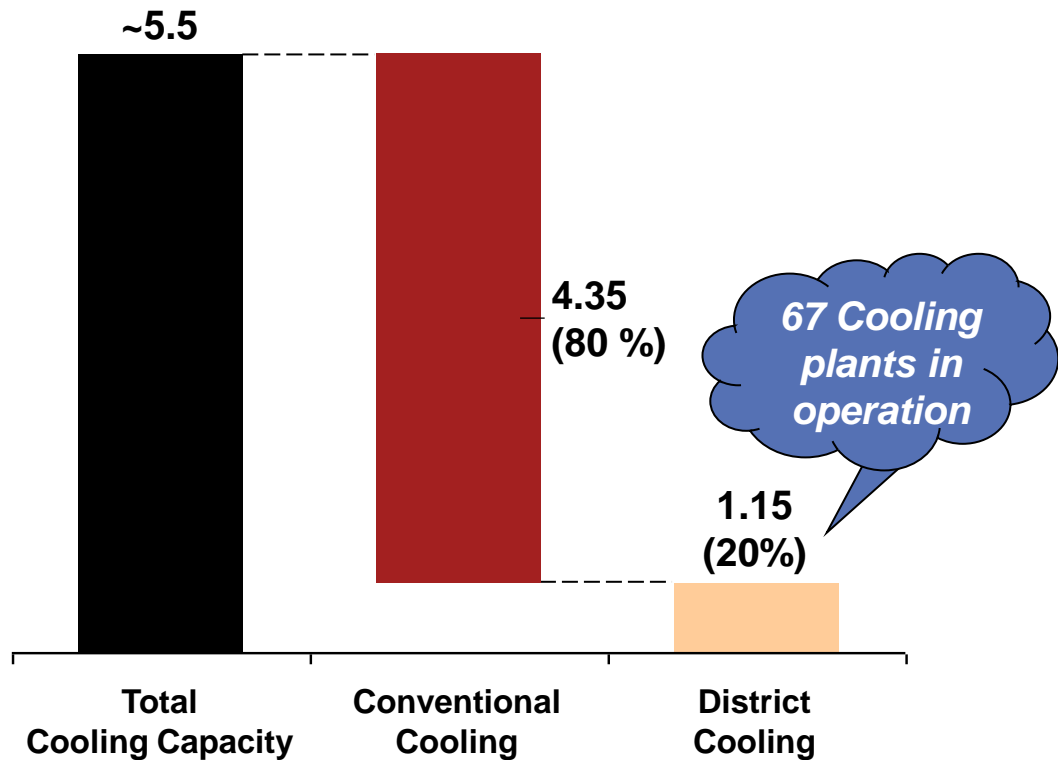
DC Stakeholders List

DC Player	Definition	Examples	Description
DC Provider	Operates DC plants and sells cooling services to customers	Qatar Cool 	<ul style="list-style-type: none"> DC market leader with 24 % of market share Currently owns and operates DC plants in Pearl Qatar and in West Bay (3 plants)
		Lusail City District Cooling Company 	<ul style="list-style-type: none"> DC operator in Lusail City with 7% market share and expanding its capacity
Developer	Owns development and provides cooling services to its tenants	Qatar Foundation 	<ul style="list-style-type: none"> Non-profit organization for education, science and community development Owns and operates several DC plants for non-commercial purposes- 17% of the total installed capacity.
		Msheireb Properties 	<ul style="list-style-type: none"> Real estate development company and subsidiary of QF Owns and Operates one DC plant in Msheireb Downtown Doha
Government Entities	Interact with Kahramaa CD and with DC operators	Ashghal 	<ul style="list-style-type: none"> Responsible for collection, treatment and distribution of recycled water Owns drainage assets including sewage treatment plants
		Ministry of Commerce 	<ul style="list-style-type: none"> Issues related to district cooling tariff and customer complaints
		Ministry of Municipality 	<ul style="list-style-type: none"> environment. The law that defines the limits is applicable to the DC plants. Determines appropriate use of land with respect of infrastructures Provides GFA projections to Kahramaa CD
		Ministry of Public Health	<ul style="list-style-type: none"> Provides health precautions for the use of the recycled water for cooling purposes
		Other KM Departments 	<ul style="list-style-type: none"> Departments responsible for activities related to DC: for Planning (electricity & water), Energy efficiency, Customers' Service and HSE

▶ District Cooling Capacity in Qatar

District Cooling Capacity in 2023

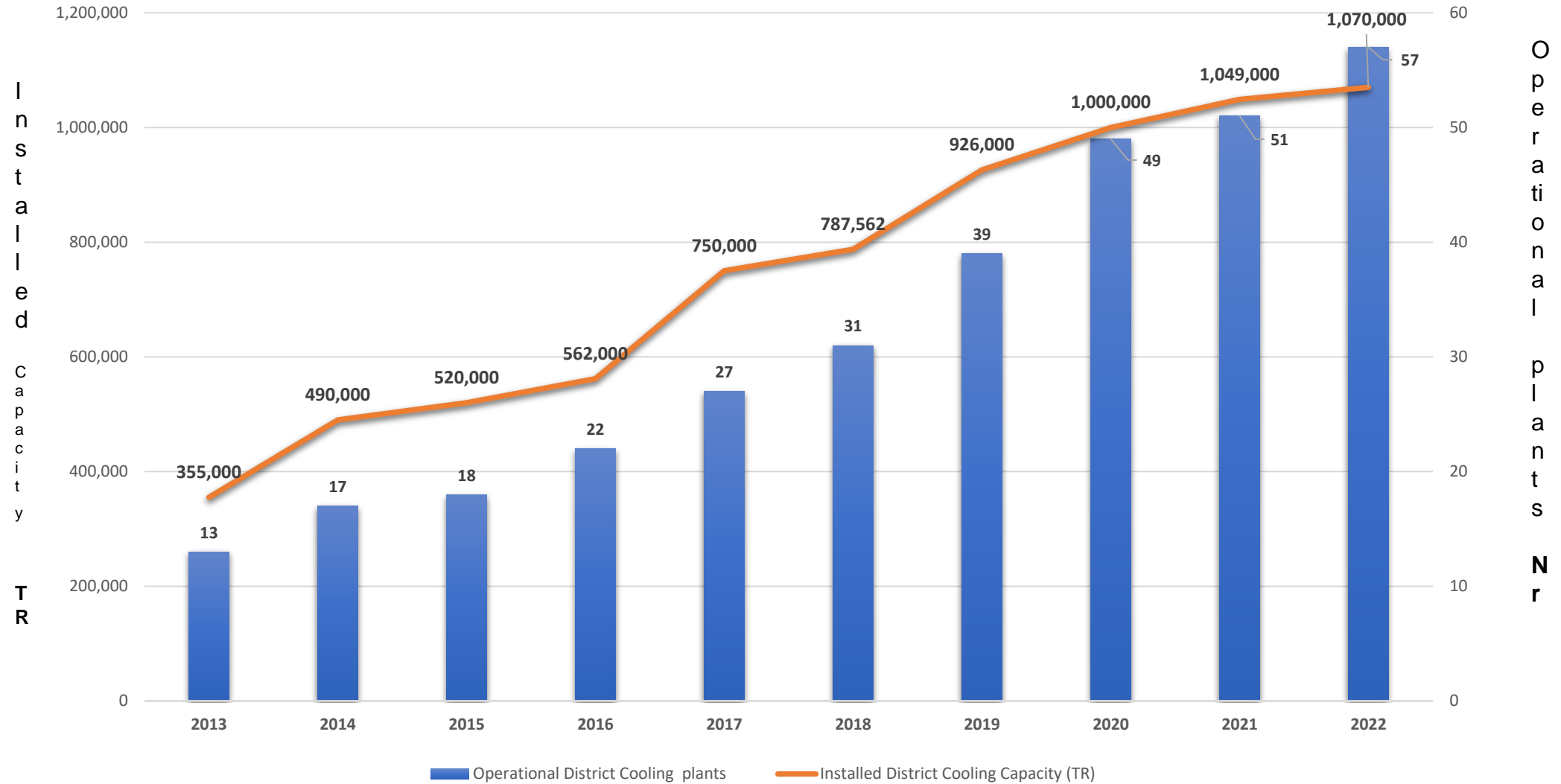
Current Cooling Capacity and DC Penetration In Million TR, 2023



- 67** Cooling Plants in operation
- 31** Cooling Plants using TSE (recycled water) for cooling plant make up
- 2** Cooling Plants using Sea Water for cooling plant make up
- 75%** Make up water use in Cooling Tower by non potable water







1) Total Cooling Capacity based on 2022 Electricity Peak Demand load: Source 1: PQ Electrify Demand Projection .
2) 65% demand is considered for Cooling

Installed Cooling Capacity Increase



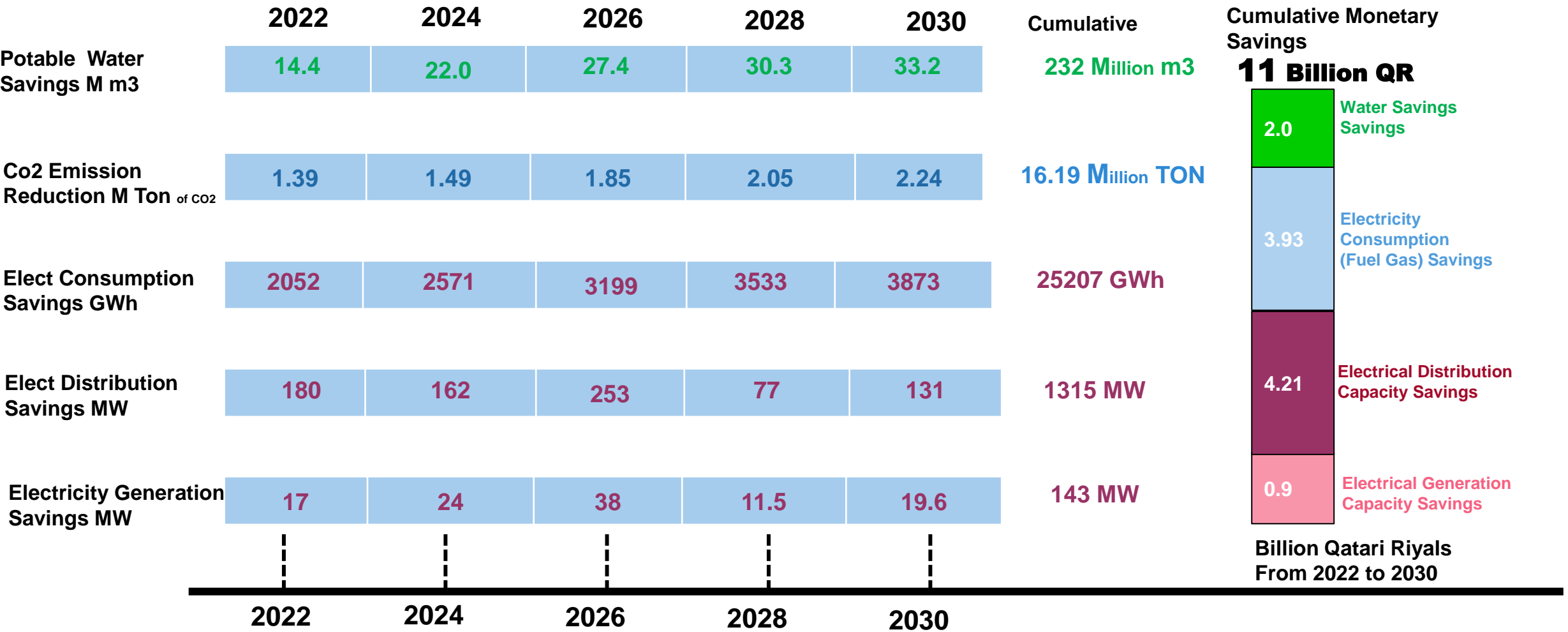
1) Cooling Capacity Based on Actual installed Capacity of Cooling plants .

Regulating the DC sector and allowing it to reach its full potential will result in several benefits to the State of Qatar

Category	Total Savings from 2022 to 2030	Description
 Generation Capacity	~ 143 MW	<ul style="list-style-type: none"> Savings in installed power generation capacity
 Distribution Capacity	~ 1,315 MW	<ul style="list-style-type: none"> Savings in electricity distribution infrastructure
 Electricity Consumption	~ 25000 Gwh	<ul style="list-style-type: none"> Savings in Electricity consumption
 CO₂ Equivalent Emissions	~ 16 MTons	<ul style="list-style-type: none"> Reduced CO₂ equivalent emissions from lower natural gas consumption and lower refrigerant leakage
 Potable Water Consumption	~ 232 Mm ³	<ul style="list-style-type: none"> Reduced potable water consumption by mandating utilization of recycled water as source for DC plants
 Enhanced Standard of Living	Qualitative	<ul style="list-style-type: none"> Increased real estate value Improved reliability and availability Upgraded user experience

1) Based on 50% DC penetration on incremental cooling load –
 2) Cumulative savings from 2022 to 2030

District Cooling Saving Projection(2022-2030)*



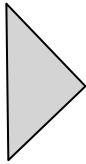
District Cooling Projected saving is ~ 1.2 Billion Qatari Riyals Per Year

* Saving Estimation based on assumption that 40% of annual increase in cooling load will be DC.

- ▶ District Cooling Department Alignment with QNV 2030

CD Alignment to Qatar National Vision 2030

Qatar National Vision

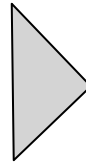


Economic Development

Environmental Development

Social Development

CD Strategic Objective



Energy Efficiency & Sustainable Consumption of Natural Resources
 Promote better energy efficiency practices related to electricity and water and Promote Recycle Water use by driving acceptance and utilization of efficient DC schemes

Environmental Protection & Health
 Ensure that Environmental protection and public Health goals and targets are met and all DC services comply with environmental standards and regulations

Customers' Protection
 Regulate the DC market according to approved legislative mandate ensuring customers' protection



Reduction in Electricity & Water Consumption



CO2 Emission Reduction through Fuel use reduction and Environmental Friendly refrigerant use



Regulate DC Tariff And promote Transparency & Fairness



Increased use of Recycled Water



Improving DC plant Safety By CD Monitoring through Inspection Visit & Quarterly Water Report Submission



Improvement of Cooling Services Reliability



Reduction in building new Utilities Infrastructure Cost.

- ▶ District Cooling Design & Water Management Code

DISTRICT COOLING DESIGN & WATER MANAGEMNET CODE



Objective of District Cooling (DC) Code :

- Human health and environmental safety
- Reliability
- Efficient use of water
- Efficient use of energy
- Sustainability
- Cost-effectiveness

DC Code includes two parts.

Part 1 :District Cooling Design and Water Management Standards, which are mandatory, minimum requirements for the design of DC Systems that are deemed essential for meeting the KPIs.

Part 2 :District Cooling Services Key Performance Indicators (KPIs), which are mandatory, minimum requirements for the performance of DC Systems.

KM DC Code ,DCP Electricity Consumption KPI requirement

1.4 Energy Efficiency

The following tables provide minimum required performance levels for New Plants, Existing Plants and Temporary Plants with respect to electricity consumption. Energy efficiency KPI requirements for DC Providers utilizing unconventional DC Plant designs (e.g. natural gas chillers) or that otherwise do not fit into the categories listed shall be established by the Regulator based on the design characteristics of the DC Plant(s).

- KPIs 2.1 – 2.9 (Table 2) shall be in effect for New Plants after a period of one (1) year (or more, at the Regulator’s discretion) from initial start-up.
- KPIs 3.1 – 3.2 (Table 3) shall be in effect for Existing Plants.
- KPIs 4.1 – 4.2 (Table 4) shall be in effect for Temporary Plants.

Compliance with the Energy Efficiency KPIs shall be calculated as follows:

- KPI: Plant electricity consumption in kWh divided by Cooling Energy (TR-hrs) produced at the DC Plant(s).
- Electricity consumption refers to total DC Plant consumption including chillers, Cooling Towers, Polishing Plant (if applicable), process pumps, distribution pumps, HVAC power and all other auxiliary equipment.

Table 2

KPI 2 -- Electricity Consumption in New Plants

KPI #	DC Plant Type	TES	Condenser Cooling Type	Water Source	KPI Level (Max kWh/TR-hr)
2.1	New	CHW	Cooling Towers	TSE/RW or Potable Water	0.87
2.2	New	None	Cooling Towers	TSE/RW or Potable Water	0.91
2.3	New	Ice	Cooling Towers	TSE/RW or Potable Water	1.17
2.5	New	None	Cooling Towers	Seawater	0.96
2.6	New	Ice	Cooling Towers	Seawater	1.23
2.7	New	CHW	Direct (once-through)	Seawater	0.93

Online System for District Cooling department Applications

The screenshot shows a web browser window with the URL `km.qa:83/?lang=en-us`. The page header includes the Kahramaa logo and the text "المؤسسة العامة للطاقة الكهربائية والماء" and "Qatar General Electricity & Water Corporation". The main heading is "District Cooling Department Applications". Below the heading, there are two navigation tabs: "Emergency Potable Water Request Form" (highlighted in blue) and "DC Plant Annual Information Returns and Key performance indicators (KPI)" (highlighted in purple). The central content area features a login form with the following elements:

- Login Using:** Two radio buttons, with "Water Meter Number" selected.
- Water Meter Number:** A text input field.
- Password:** A text input field.
- Login:** A blue button.
- Reset/Forgot Password?:** A link.

At the bottom of the page, the copyright notice reads: "© Copyright 2020 KAHRAMAA | All Rights Reserved" and "جميع الحقوق محفوظة 2020 كهرباء | جميع الحقوق محفوظة".

District Cooling department process are automated and can access from Kahramaa Website . Three applications available in KM website are Emergency Potable water request , DC Plant Annual information return and water quality reporting .

Inspection Visit to check DC Code KPI Compliance



- ▶ Recycled Water use in District Cooling

Potable Water Prohibition Directive for Cooling .

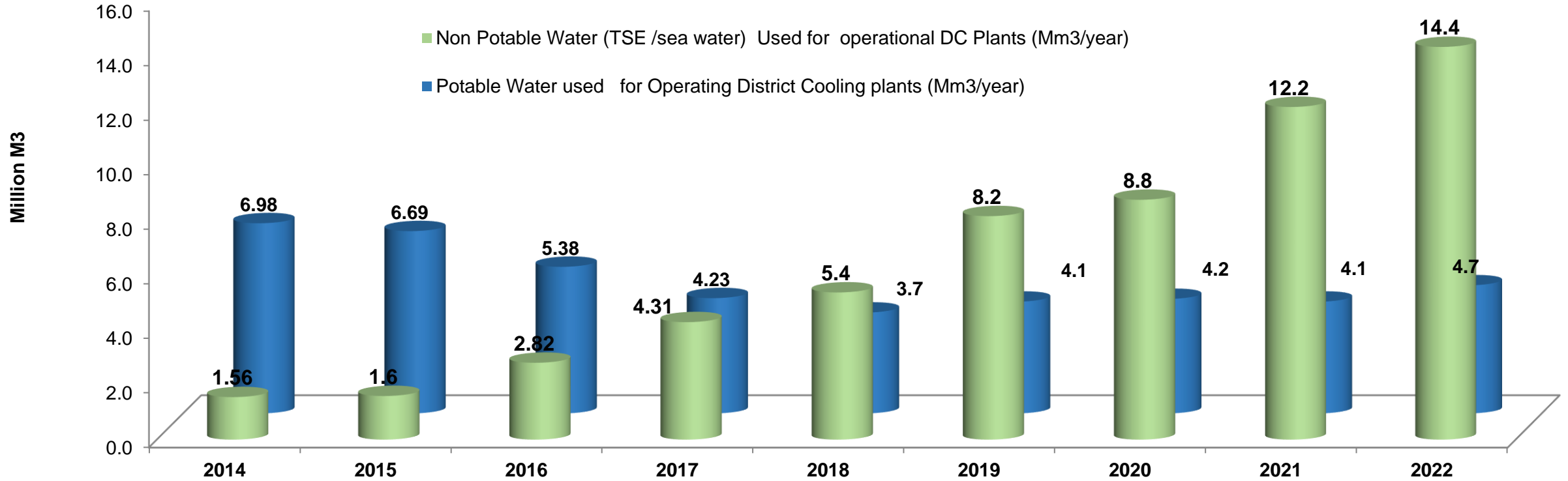
Space cooling represents approximately 65% of the peak electricity demand in Qatar, which makes it the most important contributor to energy consumption. In the last decade, considerable demand growth in both electricity and water due to cooling has been experienced and is expected to continue in near future.

Demand for cooling load is met by water cooled centralized chiller plants, which are the most efficient option in terms of electricity consumption. However, utilizing water cooled chillers poses a threat to the scarcity of water resources in the region. Bearing in mind that Qatar water resources are 100% from desalinated water, increase use of water resources has an overall negative impact on the environment

First step taken after the Establishment of Department was to advice PWRC to Prohibit the use of Potable water for Cooling purpose .

As per Ministerial Directive 20/2013, Prohibited the use of desalinated water for cooling purposes and Cooling Plant operators should replace the use of desalinated Water with Treated Sewage Effluent (TSE) or sea water. This action will save a substantial amount of potable water in Qatar.

80% of Make up water use in Cooling is by Recycled Water



CD Road Map

Draft Qatar DC Law Initial Approval Received

1. The current mandate of the department does not provide the power to act as a full-fledged Regulator. In order to act as Full-Fledged DC Regulator, District Cooling law developed by the department and has got initial approval in 2020. CD has initiated to draft Qatar DC law which will mandate the role of the Regulator with regards to the different Regulatory Framework dimensions.
2. Executive regulations for DC law prepared by District Cooling department in coordination with LA department and waiting for Final Approval from Ministers Council.

CD -Road Map

DC law Approval and Full DC regulatory framework implementation

DC Consumers' protection fully enabled with adequate service levels

95% of licenses provided to DC operators. Non-potable water supply fully secured to all DC operators with adequate quality standards in a timely manner

At least 30% DC penetration on incremental cooling load achieved through effective mandating

Full Fledged Regulator

2022

Interim Regulator

2025

2027

Regional DC Champion

2030

DC World Class Champion

Best-in-class energy efficiency targets achieved through investments in innovative DC solutions

100% consumers' satisfaction through top-level service standards

Role-model in environmental sustainability achieving world-class HSE performance levels

50% DC penetration on incremental cooling load

Effective implementation of Technical regulation

Bulk Projects review .

**DC Stakeholders Coordination .
Automation of all DC processes**

80% consumers' satisfaction through top-level service standards.

Exclusive website for DC and all Licensing process through online

100% use of Recycled Water for Cooling Purposes.

22% DC Capacity Comparing to Total Cooling Capacity

End