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Qatar District Cooling Company ‘Qatar Cool’

Qatar Cool Overview

Scale

Largest
District cooling provider in Qatar

30,000 +
Corporate and private customers (individuals)

60%
Market shares of Qatar District Cooling

4.2 billion TR-HR
Produced cooling capacity

500 +
Buildings served

5
Cooling Plants

Environmental Highlights

3.3 billion KW-HR
Electricity savings to date

1.8 million Tons
CO2 avoided to date

6 million + m3
Potable water savings since 2015

2,088,770 + m3
TSE utilized in cooling plants

34 million (MMBtu)
Reduction in natural gas

Higher Operations Profile

20 year
long-term contracted revenue

End-to-End process **automation**

TSE and **smart metering** system

30-50 years
Average plant life cycle

99.99%
Around the clock reliability and availability

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District Cooling Technology

Conventional Cooling Technology

Split AC Units

Standard Window AC unit

Roof Top Chillers

Future Proof

- District cooling is a future-proof system that efficiently cools buildings through centralized distribution of chilled water
- By investing in the use of district cooling, cities will become much more energy efficient and significantly reduce greenhouse gas emissions
- District Energy represents a significant opportunity for cities to be more climate resilient, resource

Up to 50%
Reduction of cooling energy consumption through higher energy utilization

>50%
Reduction in CO2 Emissions and hazardous gases

Frees up Space
On rooftops and in basements for increased aesthetics

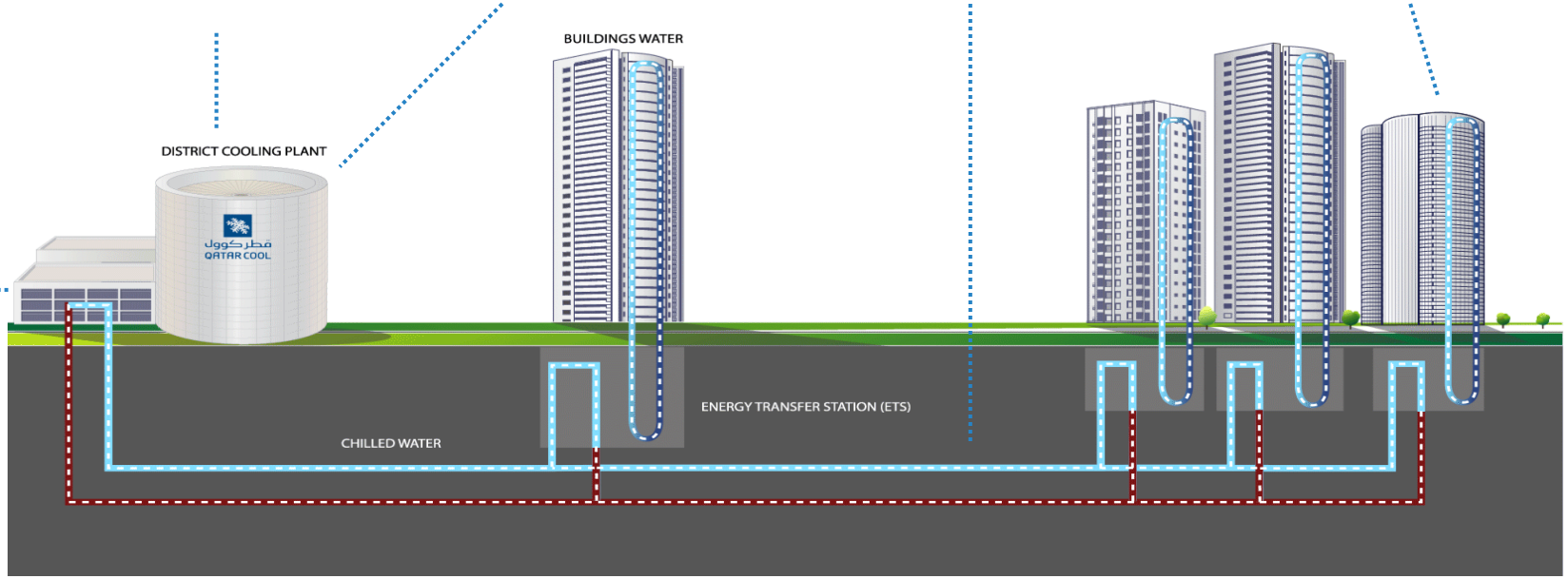
How District Cooling Works

1. District Cooling Plant
Produces and supplies chilled water at a temperature of around 4.4 °c

2. Thermal Energy Storage
Stores cooling to balance peak demand

3. Distribution Network
Underground insulated pipes, carries the chilled water

4. Energy Transfer Station
Customer-building interconnections (ETS)



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Why District Cooling is Important During Conceptional Design

District Cooling Importance from Design

Space Allocation

District cooling is a utility service that should be included in the master development infrastructure design in terms of **plot allocation** for **plants**, corridors for **pipe distribution network** and incoming **utility requirements**.

Greater Utilization

Higher utilization of the building areas and significant **reduction** of **electrical demand** of individual buildings.

Cost Optimization

Include and optimize the district cooling cost components within the **financial model** of the project and **allocate** the **charges** properly.

ESG Goals

Promote the project in the real estate market as an **environmentally friendly** project which will be a major **selling point** as it will contribute to achieving the **ESG** goals of the stakeholders.

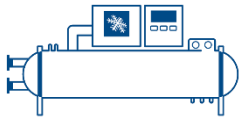
Robust Integrated End-to-End Solutions

Design

- **Unique approach** to projects
- **Cost-effective and inhouse design** of Energy Transfer Stations (ETS), heat exchangers, plant etc.

Procure & Build

- **Rapid deployment capabilities** for pipe network construction with **in-house project management, and construction teams**.
- **Deep relationship with key suppliers** (e.g., chiller manufacturers)



Operations and Maintenance

- **In-house dedicated 24/7 plant operators**
- **Computerized maintenance management systems** for planning, execution and monitoring in real time
- Ability to provide **emergency solutions** (e.g., mobile chillers)
- Selective **application of AI** to enhance performance

Command & Control Centre

- **State-of-the-art command and control centre (CCC) offering a technology platform to remotely monitor and control** plant operations **24/7**
- The **CCC** will ensure **equipment's performance**, enhance **service reliability** and ensure **compliance** with agreed upon thresholds on a real time basis

Metering & Billing System

- **100% smart meters**
- **Complete metering and sub-metering solutions**
- Potential **future demand site response capabilities**
- **End-to-end billing** solutions

Customer Support

- **Customized Customer Solutions (outdoor cooling etc.)**
- **Customer Support Centre** and **Call Centre** for handling customer service requests
- **Multiple payment channels** and **gateways**

Highlights & In-House Capabilities

- Optimum cost approach
- In-House project management
- Automated Maintenance
- Best-in-Class CCC
- Full deployment of smart meters
- Multi-channel customer support

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International Expansion: Key Regions

- **Balance sheet flexibility, access to capital** and **regional know-how** make Qatar Cool well positioned for regional expansion in nearby markets where district cooling is set to play an important societal role.

- Population growth, growing economies and temperature increases, constitute megatrends **accelerating the need for efficient and sustainable cooling at scale**, also in neighbouring GCC countries.

- **Growth** is notably expected to materialize further in the region particularly in **KSA** and **Qatar** and other **MENA countries** such as Egypt.

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The Preferred Cooling Solution for the Region

The Need for District Cooling - Accelerating Trends

Climate Change

Population Growth & Urbanization

Growing Economy

The Sustainable Cooling Solution

Higher Return on Investments

- Lower investment costs and operating costs, using 50% less power compared to traditional AC.
- Lower deterioration of equipment with longer life cycle (30-50 years) vs. traditional ACs (12-15 years).

Best Suited for regional Master Development

- Cooling is an essential aspect of the regions real estate development given the region's hot desert climate.
- Continued investments in infrastructure and increasing real estate density led to a significant and growing amount of aggregated district cooling demand.

Sustainable Cooling Infrastructure and Social Role

- Lower CO2 and other pollutant emissions.
- Reduction in power consumption and electricity system peak loads.
- Reduces overall tariffs for final consumer.

Easy Maintenance and Superior Reliability

- Outsourcing of cooling operations allow developers to focus on their core business.
- Around-the-clock and reliable (99.99%) availability.

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Qatar Cool's Commitment Proposition

Contribution to the UN SDG's

Electricity

CO2

Water

Effluent

Refrigerant leakage

Additional Social Impact

Strong health and safety measures

Diverse Workforce

Active leader within the community

CSR events aligned to the following SDG's

Governance Best Practices

- Comprehensive QHSE and Information Security Risk Management model
- Aligned with ISO certification regime
- Risk based internal audits and external audits
- Management committees & sub-committees (Finance & Audit Committee, Technical Committee and Information security steering committees)

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Environmental Controls

Selected Environmental Achievements and Initiatives Supporting Targets

Electricity

- **Electricity savings** to date **3.3bn kWh**
- Encouraging **responsible behaviour** with employees and customers.
- **DC efficiency of 0.87 kW/ton in 2022**

CO2

- **CO2 savings** to date **1.8mn tons**

Water

- **TSE usage** in operations (WB) in 2022 **98.2%**
- **Water recovery of 70.3%** in 2022 (P3)
- **c.81.7% more water savings** 2022 vs 2015 through increased TSE usage.
- **Currently operating 2 reverse osmosis plants onsite.**

Waste & Effluent

- **100%** of **customers' bills** are sent **online**
- **Strict scrap process** promoting re-use and upcycle before recycling/disposal
- Campaigns to **eradicate single-use plastic** and to minimise waste
- **Waste minimization efforts**, such as electronic devices donations
- Continuous monitoring of effluent parameters

Refrigerant Leakage

- Installed refrigerant leakage detection system to **reduce leakage**
- **Systematic control to reduce spillage** with usage and refrigerant top up monitored

- **Leading energy efficiency** supports **additional CO2 savings**
- **Plants** undergo **energy efficiency** improvements
- **Thermal storage** ("TES") in plants to **reduce peak-time pressure on state power-grid** by producing chilled water during off-peak hours
- Use of **Artificial Intelligence** to manage TES to reduce energy consumption

Legend

- Quantifiable Achievements
- Initiatives

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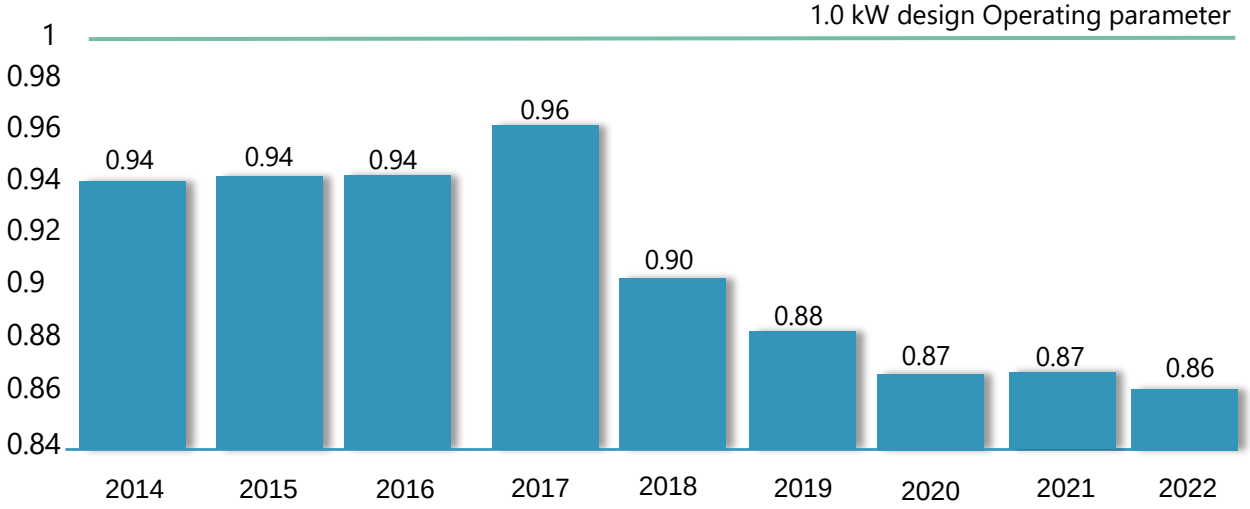
Innovative Efficiency and Reliability

Energy Efficiency

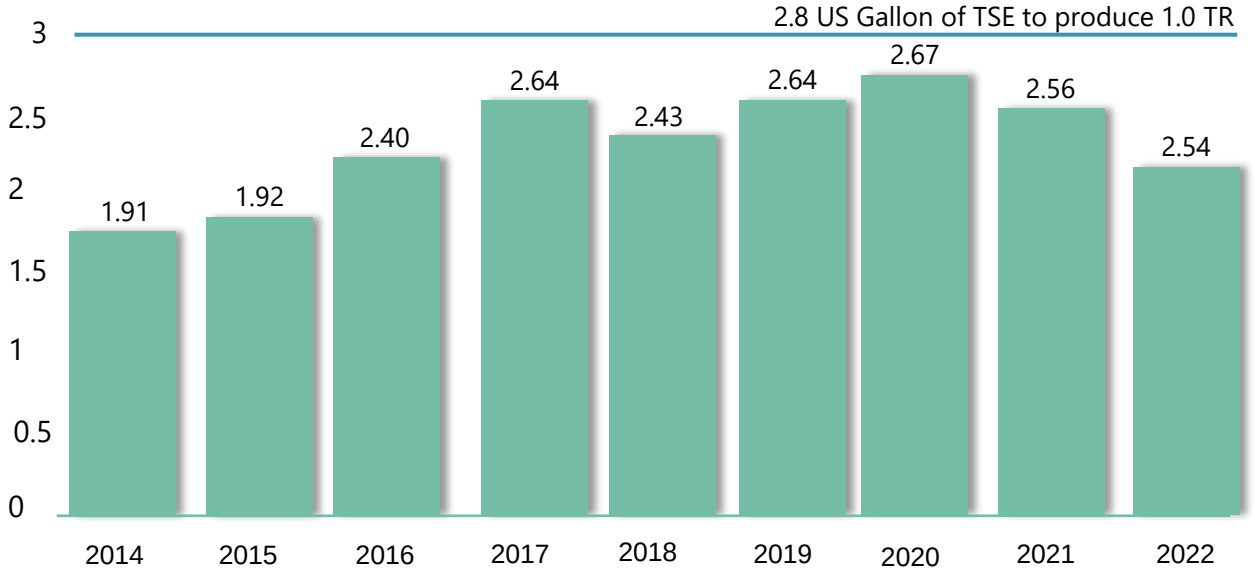
- Qatar Cool has been consistently overachieving the company's targets in terms of electricity usage KW/TR.
- During 2022, the operational efficiency is 13% higher compared to the design benchmark.



The overall energy efficiency is calculated based on the total energy consumed by our customers divided by the energy used in our production process.

Water Efficiency

- Qatar Cool continues to integrate additional water conservation into operations.
- Current water efficiency KPIs indicate an optimal level of water efficiency with reverse osmosis treatment processes contributing to consistently lowering the water consumption / RT vs. industrial design



During 2013 to 2015, P1 and P2 were still utilizing potable water. The transition of maximum TSE utilization started in 2016.

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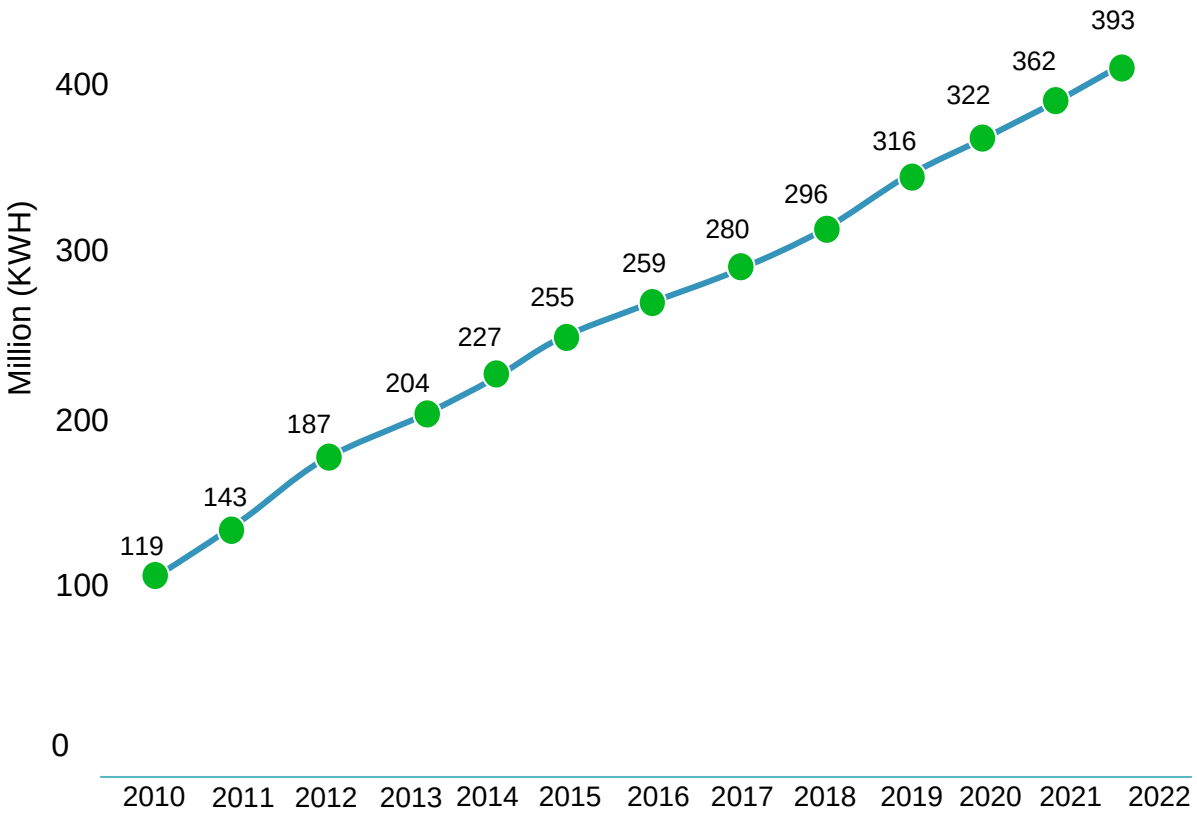
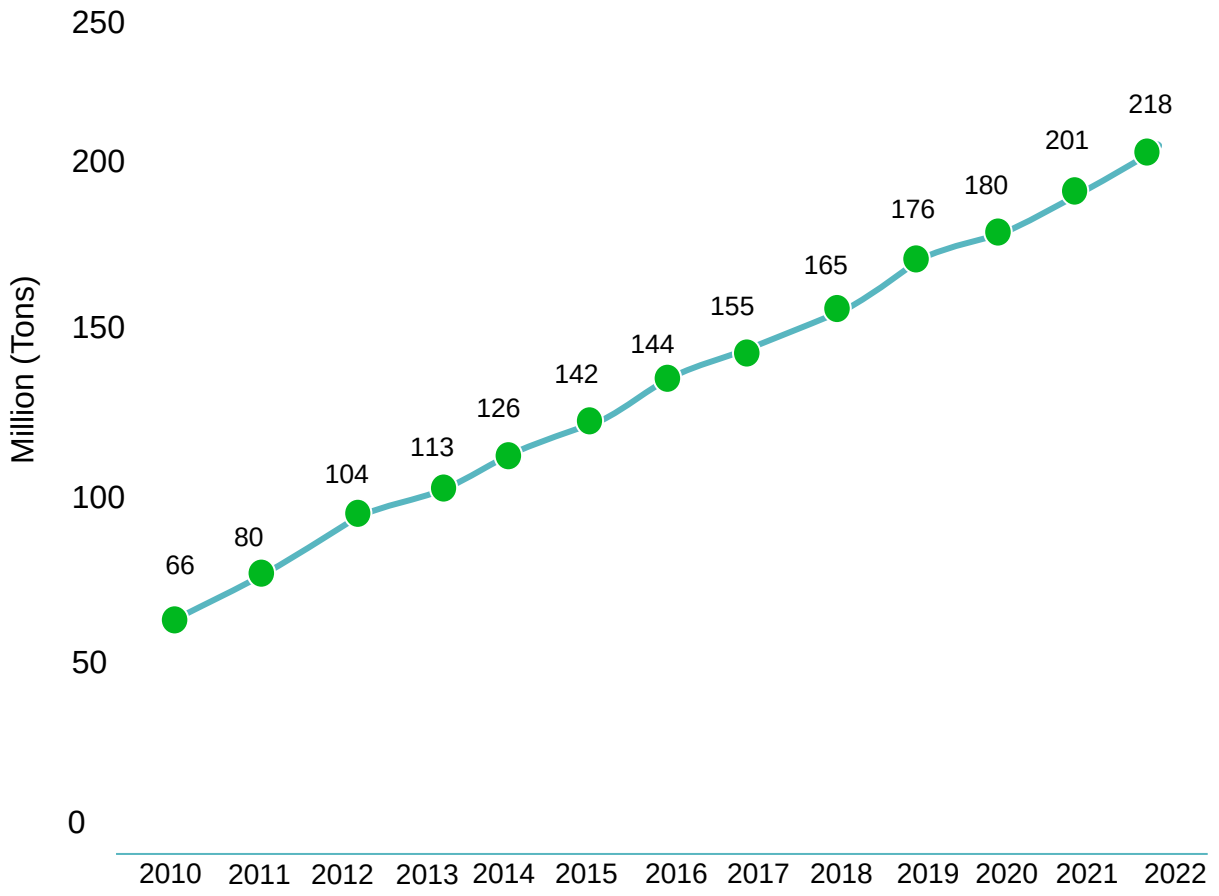
Energy Reduction & GHG Reduction

Energy Savings



CO2 reductions



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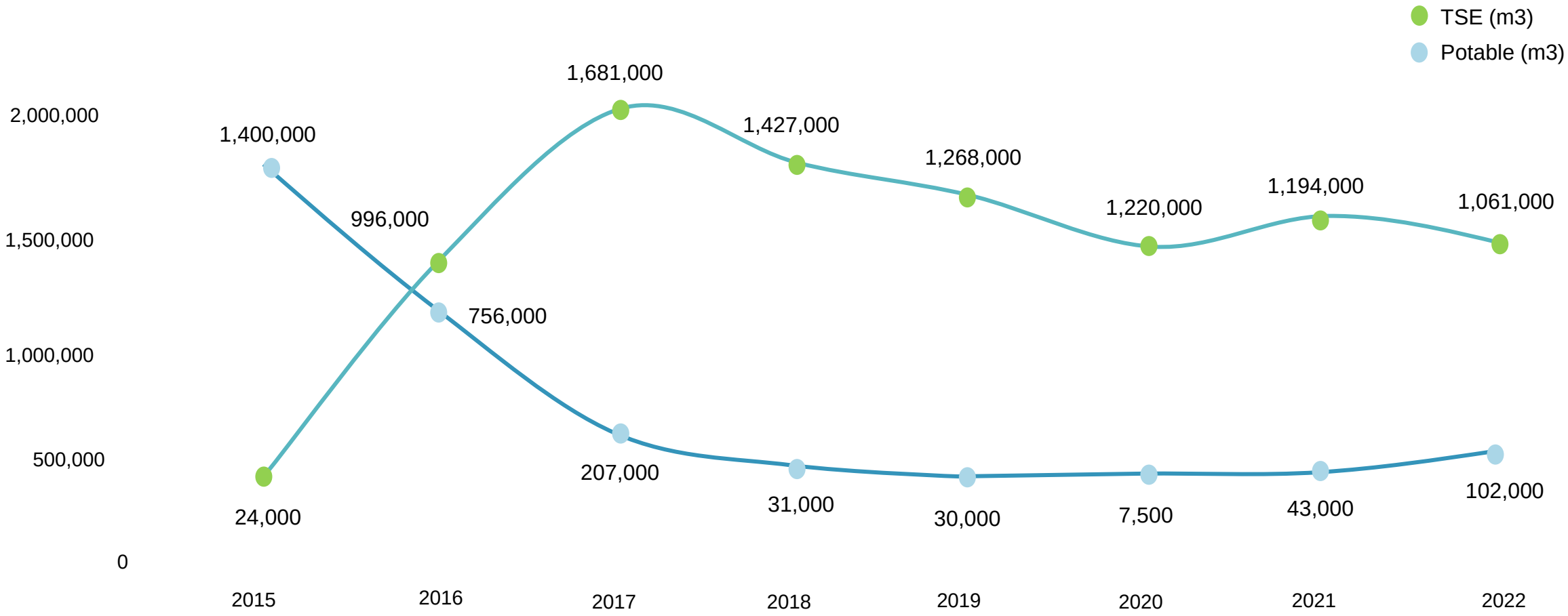
Responsible Water Management

Potable Water and TSE Utilization



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Maximizing the use of Wastewater to Increase Savings and System Efficiency

Use of TSE in operations leads to cost savings, and a more sustainable operational service

Minimizing the use of water from Kahramaa

Fresh domestic water produced using water desalination is distributed throughout the whole country.

By Using TSE

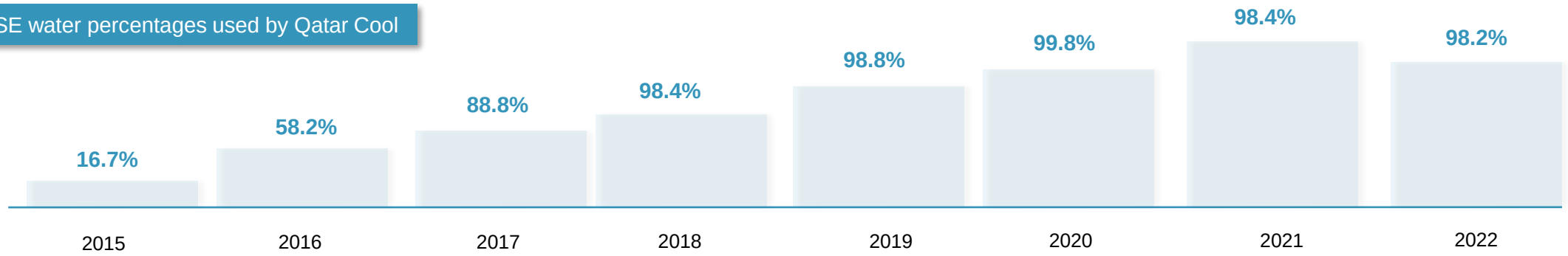
Reverse osmosis polished TSE Water is used to reduce the amount of domestic water in the district cooling operations.

Advantages

Key Advantages of Using TSE Water vs Fresh Domestic Water

- Significant reduction in capital and operational costs.
- Environmentally-friendly solution reducing the demand for fresh domestic water.
- TSE water is c.34x cheaper than the cost of fresh domestic water in Qatar.

Evolution of TSE water percentages used by Qatar Cool



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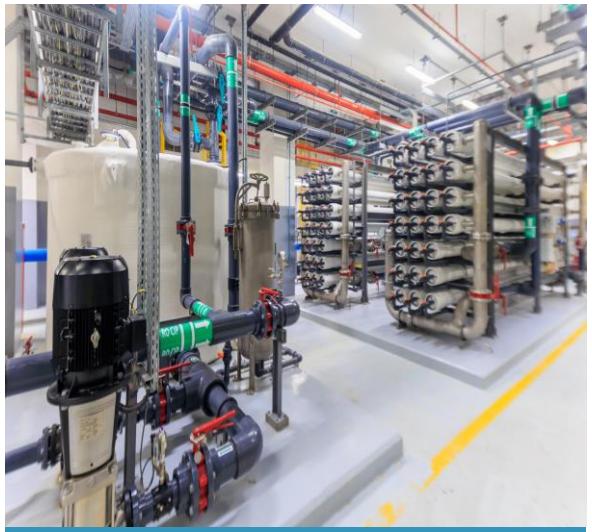
Sustainable Management of Natural Resources & Safeguarding Water Ecosystems

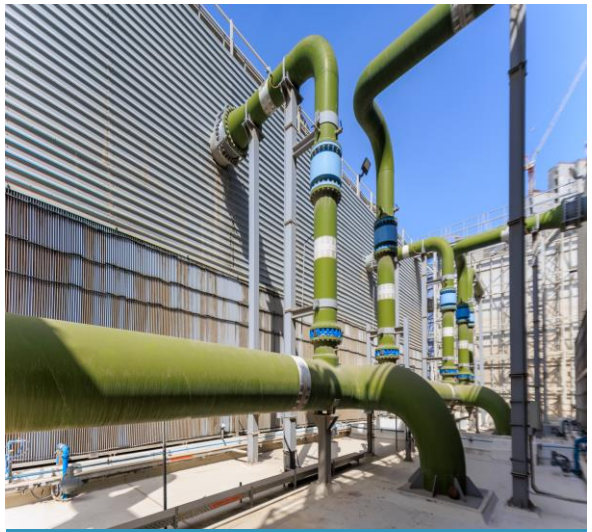


Reverse Osmosis

- Pearl Plants – RO using seawater
- West Bay Plants – RO using TSE

Thermal Storage Energy

- The TES tanks allow the storage of cold energy, for peak periods.
- Allowing significant energy savings



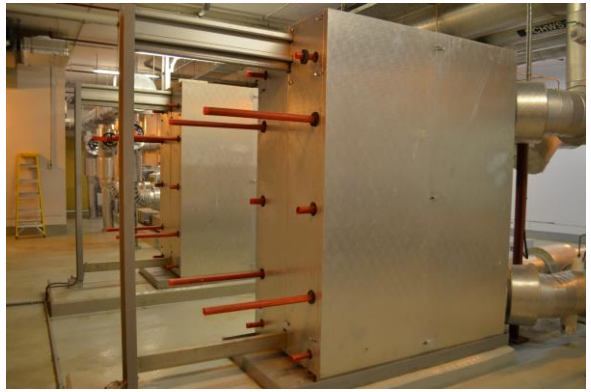
Cycle of Concentrate

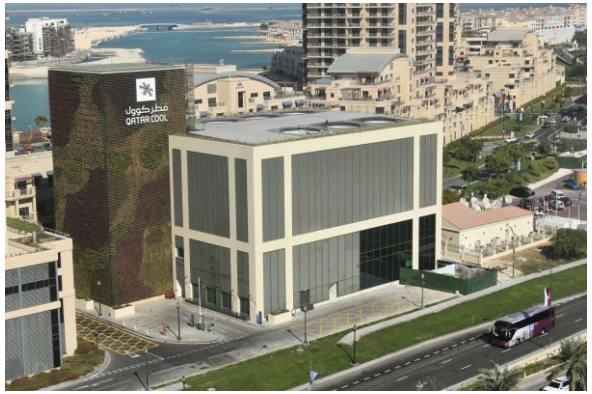
- Saved over 406 million m3 of water
- Introduced new chemicals to treat the water which increases the CoC

Water Efficiency

- Irrigation feature
- Low-flow fixtures
- TSE

Innovation and Technology





Artificial Intelligence

We have several ongoing projects that look at brining in AI, into our operations and our office functions.

One such project is using AI to enhance our efficiency, by improving Delta T, this is achieved by using AI to improve the return water temperature from the ETS's.

Optimization

Energy Transfer Station (ETS) optimization research and testing concluded last year, successfully, it is now being rolled out.

Feasibility study on state-of-the-art control software which will provide continuous system-level optimization of the cooling plants.

Waste Management

We have a circular mindset when it comes to waste. Ensuring the lifecycle is kept in motion, where possible.

- Refrigerant recycling
- Asset repurposing
- Brine repurposing
- CO2 capturing/off-setting
- TSE Utilization

GHGs and Pollution

District cooling by design reduces GHG's and pollution, further efforts are made by Qatar Cool, such as the green vertical garden on the newest cooling plant, building our cooling plants to LEED certified standards and actively reducing habits and functions to reduce the impact, companywide.

Global Greenhouse Gas Emissions

Raise in Emissions

The GCC region is a significant contributor to global greenhouse gas (GHG) emissions, with a particular focus on the refrigeration gas emissions resulting from air conditioning systems.

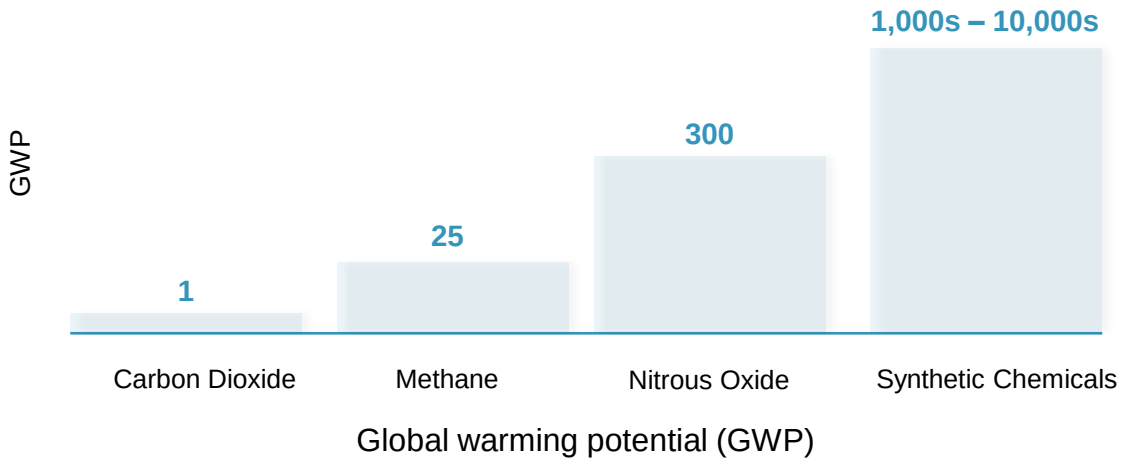
The rise in emissions is contributed to the increase in populous, but a warmer climate increases the demand for cooling, often from an unsustainable ‘quick fix’ and unstable source, conventional cooling.

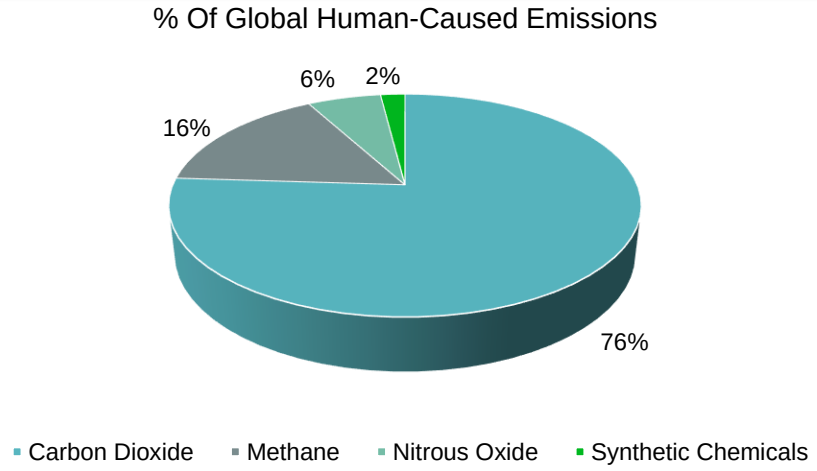
Impact

A warmer climate is expected to both increase the risk of heat-related illnesses and deaths and increase certain types of air pollution.

More severe heat waves, floods, and droughts are expected in a warmer climate. These may reduce crop yields.

Global Warming Potentials





Source: EPA

Barriers and Solutions

Barriers

- **Non-aggregated development decisions**
  - Developers of individual buildings make decisions that discourage consideration of district cooling. Developers are not aware of the advantages of collaborating with its neighbour developers to share a district cooling network.
- **Cost misperceptions**
  - The way in which developers pass on the cooling costs to end-users, appears artificially expensive, while flattering conventional cooling.
- **Poor load Planning**
  - Poor load planning results from developers over or underestimating the load required.
- **Non-economic utility pricing**
  - Low electricity tariffs in the GCC obscure the economic advantages of district cooling. Making district cooling look advantageous in high density areas only.
- **Risk of early investment**
  - District cooling required front-loaded investment
- **Inconsistency of cost recovery model**
  - Inconsistent cost recovery, each project is different and require a unique approach to recovering costs

Solutions

- **Designation of appropriate zones**
  - Governments should mandate district cooling in designated areas, where density levels render it appropriate
- **Tariff regulation**
  - Consistent national tariffs for district cooling
  - Correct allocation of charges, end-users to pay only consumption charges.
- **Services Standard and Technical Guidelines**
  - Defined basic levels of reliability and performance standards
  - Setting economic roles

Thank You