

EmiratesGBC Technical Workshops

by EMICOOL

Decarbonization through district cooling
Advantages, Challenges, and Decarbonization Efforts

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Decarbonization through district cooling

Advantages, Challenges, and Decarbonization Efforts

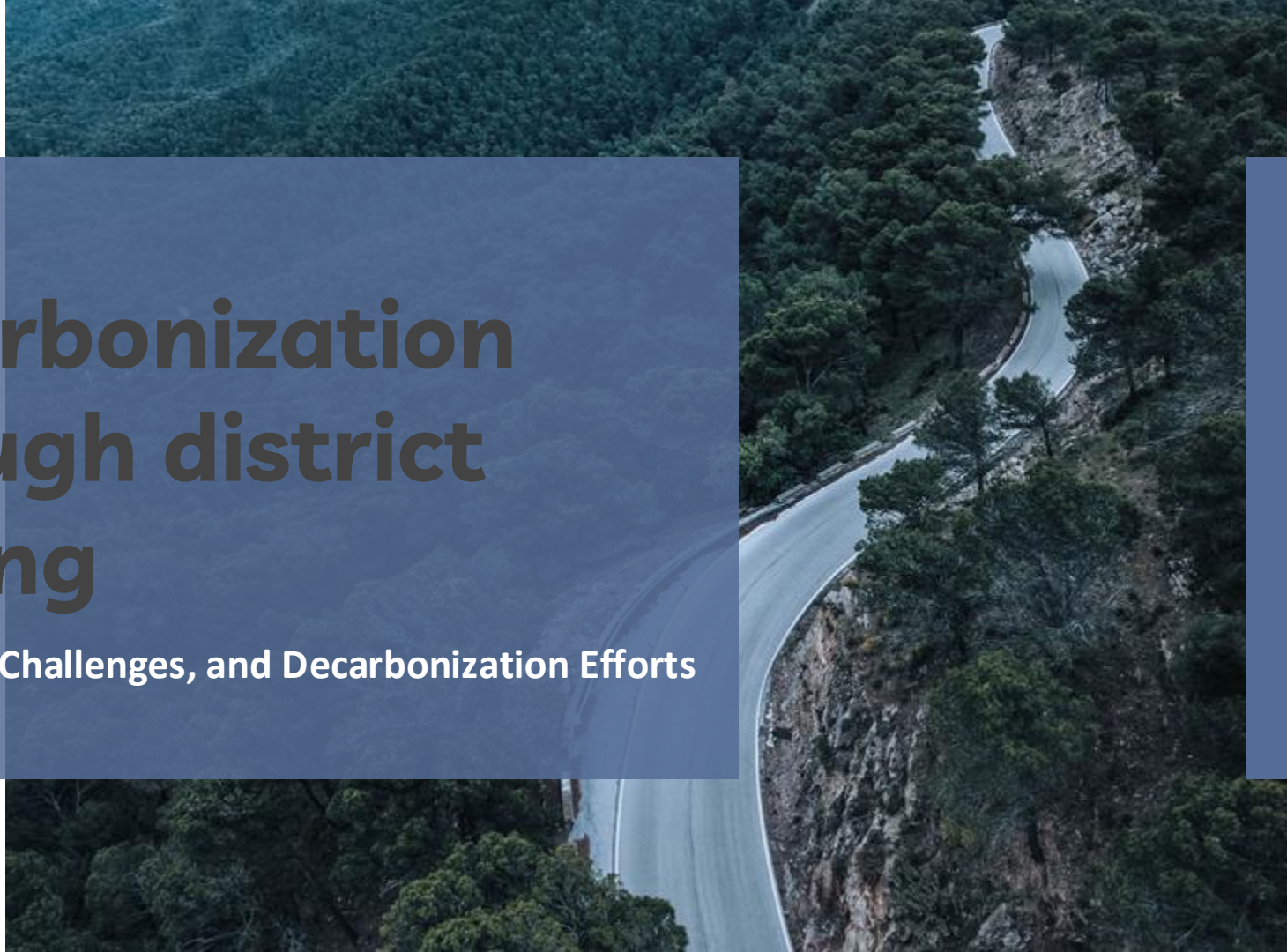


TABLE OF CONTENTS

01

What is District Cooling?

02

Advantages of district cooling

03

What are the challenges faced in district cooling industry?

04

How District Cooling is Helping Communities in Energy Transition?

05

Decarbonizing the District Cooling Supply Chain

About Emicool



Established in 2003, Emicool is A joint venture between Dubai Investments & Actis- UK based sustainability investment firm. Emicool is a strategic player among top-tier district cooling service providers in the region.



**30,000
Customers**



2,522 Budlings



19 Plants



**Total capacity
355,000 TR**

01 What is District Cooling?

District cooling is an innovative and efficient system that provides chilled water from a central source to multiple buildings through a network of underground pipes. It is primarily used for air conditioning purposes, ensuring a consistent and reliable cooling solution for urban areas.

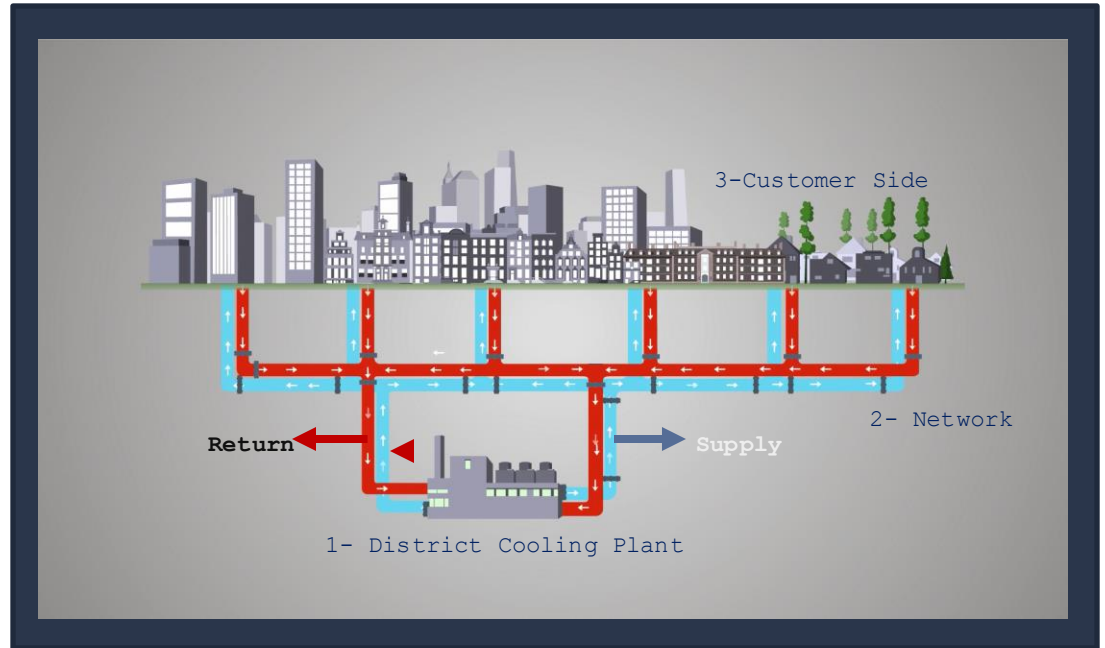
Energy Efficiency: This centralized approach allows for significant energy savings compared to individual air conditioning units.



01 What is District Cooling?

It consists from 3 main parts:

- 1. District Cooling Plant- Centralized Production:** Chilled water is produced at a central plant using large-scale, high-efficiency chillers.
- 2. Distribution Network:** The chilled water is then distributed through a network of insulated pipes to multiple buildings.
- 3. Customer Side**



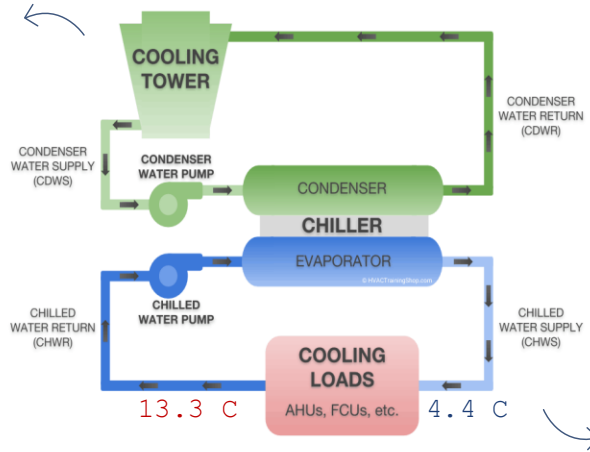
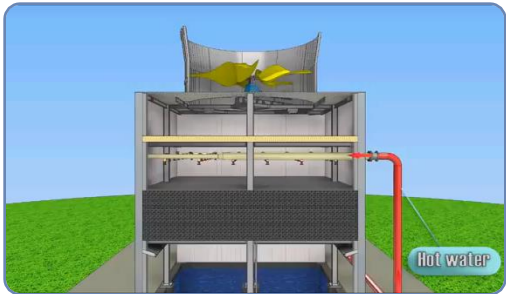
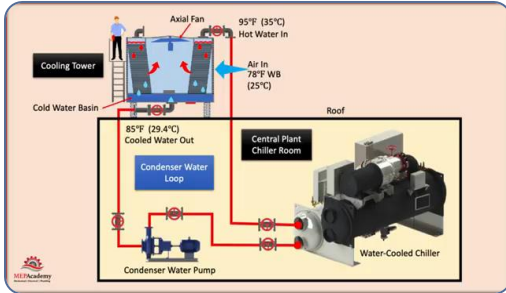
01 What is District Cooling?

- Mostly **Water-Cooled Chillers**
- Heat Rejection Through **Cooling Towers**
- Can use Potable Water, Polished TSE, **Direct TSE**

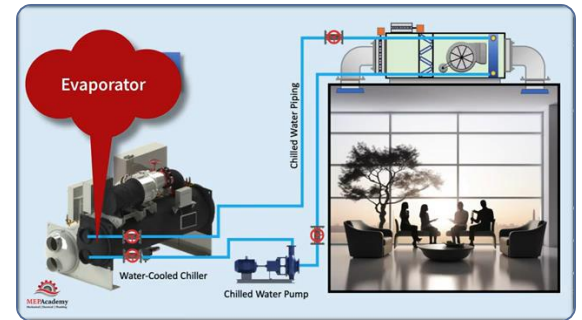
- Underground Network spread across more than **300 KMs**
 - Branches out to **Various Facilities**
 - Connected Through **Energy Transfer Station (direct/indirect connection)**
-

01 What is District Cooling?

Reject Heat



Absorb Heat



02 Advantage of District Cooling

Energy Efficient

DC are up to **30%- 40% more energy efficient** than conventional cooling systems

Facility Space Utilisation

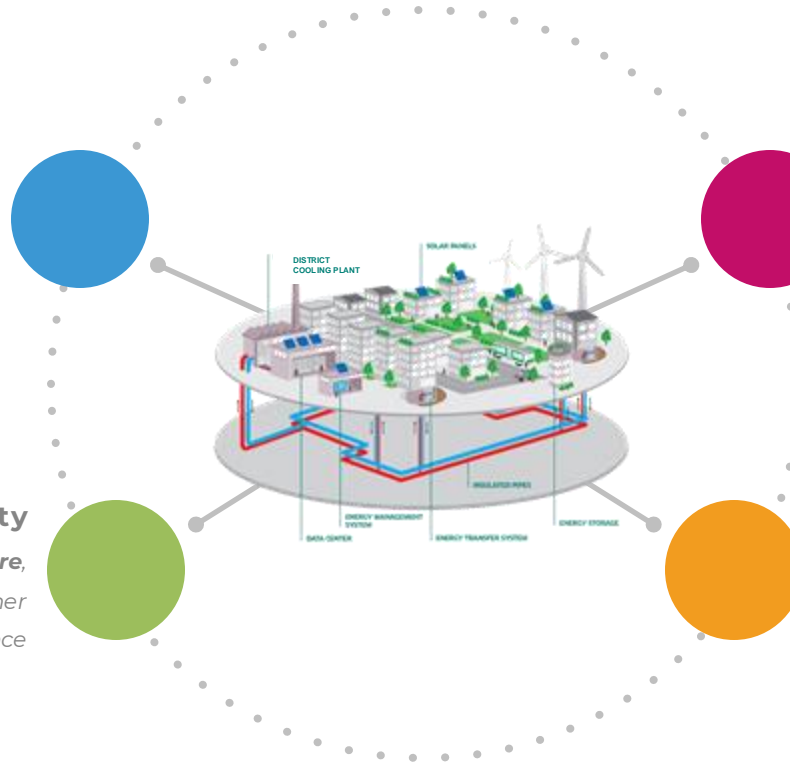
The Facilities doesn't require Bulky chillers or individual cooling units. Hence **provide better aesthetics and space utilisation**

High Reliability

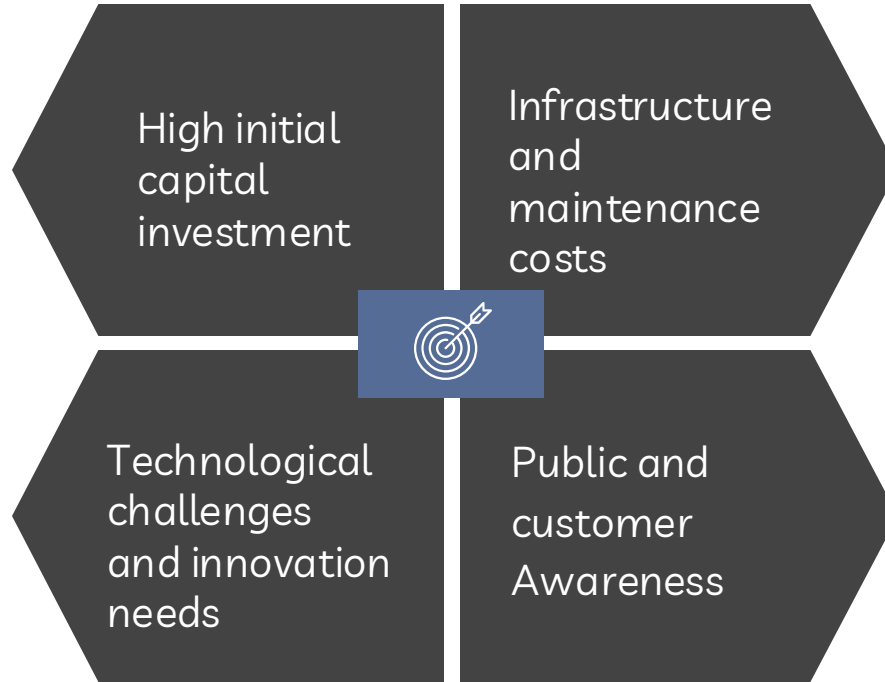
Due to **Centralised Infrastructure**, Industry Grade Equipment, Higher Redundancy, and Better Maintenance

Low Environment Impact

District Cooling Plants **has lower GHG emissions**, reduces noise pollution and minimises urban heat island effect



03 Challenges in the District Cooling Industry



04 How District Cooling is Helping Communities in Energy Transition



Reduces Carbon Footprint

40-60% reduction in CO2 emissions



Enhances Energy Efficiency

Integrates renewable energy (up to 30%), reducing fossil fuel dependence



Promotes Urban Sustainability

Mitigates urban heat island effect, improves energy efficiency, and ensures reliable cooling during peak demand



Offers Cost Savings

10-25% lower operational costs for building owners due to centralized systems



Scalable and Adaptable

Meets growing urban cooling needs, adaptable for new developments

05 Decarbonizing the District Cooling Supply Chain

A- Energy Efficiency Retrofits

B- Energy Management Information System

C- Integration of Solar and Renewable

05 Decarbonizing the District Cooling Supply Chain

A- Energy Efficiency Retrofits

Plant Energy Efficiency:



The less KW and IG Used to produced 1 TR chilled water the better the efficiency

Energy Retrofit is the process of making improvement to existing systems or building to enhance Energy Efficiency and reduce Energy consumption.

05 Decarbonizing the District Cooling Supply Chain

A- Energy Retrofit

Energy Retrofit Measures Examples

- a. Upgrading equipment:** Replacing or upgrading chillers, pumps, and cooling towers with more advanced technology can significantly improve system performance.
 - b. Insulation and leak reduction:** Enhancing insulation in pipes and ducts, as well as addressing leaks, helps minimize energy losses and improve overall system efficiency.
 - c. Variable Speed Drives (VSDs):** Implementing VSDs on pumps and fans to adjust the speed according to demand, reducing energy consumption.
 - d. Integration with renewable energy sources:** Integrate renewable energy sources, such as solar or geothermal, to supplement or replace traditional energy sources, further reducing environmental impact.
-

A- Energy Retrofit

Case Study - Underground Chilled Water Leak Detection System



Optical Fiber Breakthrough:

Utilizes advanced optical fiber cable technology.

Precision Detection:

Accurately identifies chilled water leaks within 5 meters.

Timely Response:

Provides quick detection within minutes of a leak, preventing prolonged losses.



Financial Impact:

Averts monetary losses to the District Cooling Company.

Environmental Conservation:

Reduces negative environmental impact by preventing undetected leaks

B- EMIS

Definition: EMIS is a software-based tool designed to monitor, analyze, and optimize the energy performance of district cooling systems.

Key-Features:



Real-Time Monitoring

Continuously tracks energy usage, cooling demand, and system performance.



Data Analytics

Utilizes advanced analytics to identify inefficiencies and optimize energy consumption.



Energy Reporting

Generates detailed reports on energy consumption, cost savings, and environmental impact.



Predictive Maintenance

Predicts potential system failures and schedules maintenance to prevent downtime.

A Glimpse of Data Points in District Cooling

Plant Operation:

- Cooling Capacity (in tons or megawatts)
- Energy Consumption (kWh or megajoules)
- Coefficient of Performance (COP)
- Maintenance Downtime (hours)
- Water Usage (cubic meters)

Customers:

- Number of Connected Customers
- Peak Cooling Demand (in tons or megawatts)
- Customer Satisfaction Score
- Complaints per Month
- Average Contract Duration (year)

Supply Chain:

- Coolant Supply Reliability (% uptime)
- Inventory of Spare Parts (quantity and types)
- Lead Time for Coolant Procurement (days)
- Supplier Performance Metrics
- Cost of Coolant per Unit (currency per ton)

Facilities it Caters to:

- Types of Buildings Served (residential, commercial, industrial)
- Total Square Footage of Served Buildings
- Cooling Requirements for Different Facility Types
- New Customer Acquisition Rate
- Facility Expansion Projects in Progress

Weather and Climate:

- Average Daily Temperature (in Celsius or Fahrenheit)
- Humidity Levels (%)
- Seasonal Cooling Degree Days
- Extreme Weather Events (heatwaves, cold snaps)
- Climate Change Impact Assessment

Underground Network:

- Length of Piping Infrastructure (kilometers)
- Pipe Leakage Rate (%)
- Pipe Maintenance Frequency (months)
- Insulation Effectiveness (thermal conductivity)
- Pumping Energy Consumption (kWh)

Demand:

- Peak Demand Time Distribution (hours of the day)
- Load Forecast Accuracy (% variance)
- Demand Response Participation Rate (%)
- Planned Outages for Maintenance (frequency and duration)
- Customer Churn Rate



B- EMIS

Key Benefits



Improved Efficiency

Enhances operational efficiency by optimizing cooling production and distribution



Cost Savings

Reduces energy costs through better management and optimization of resources



Sustainability

Supports sustainability goals by lowering greenhouse gas emissions and energy waste.



Enhanced Decision Making

Provides actionable insights for better decision-making and strategic planning.

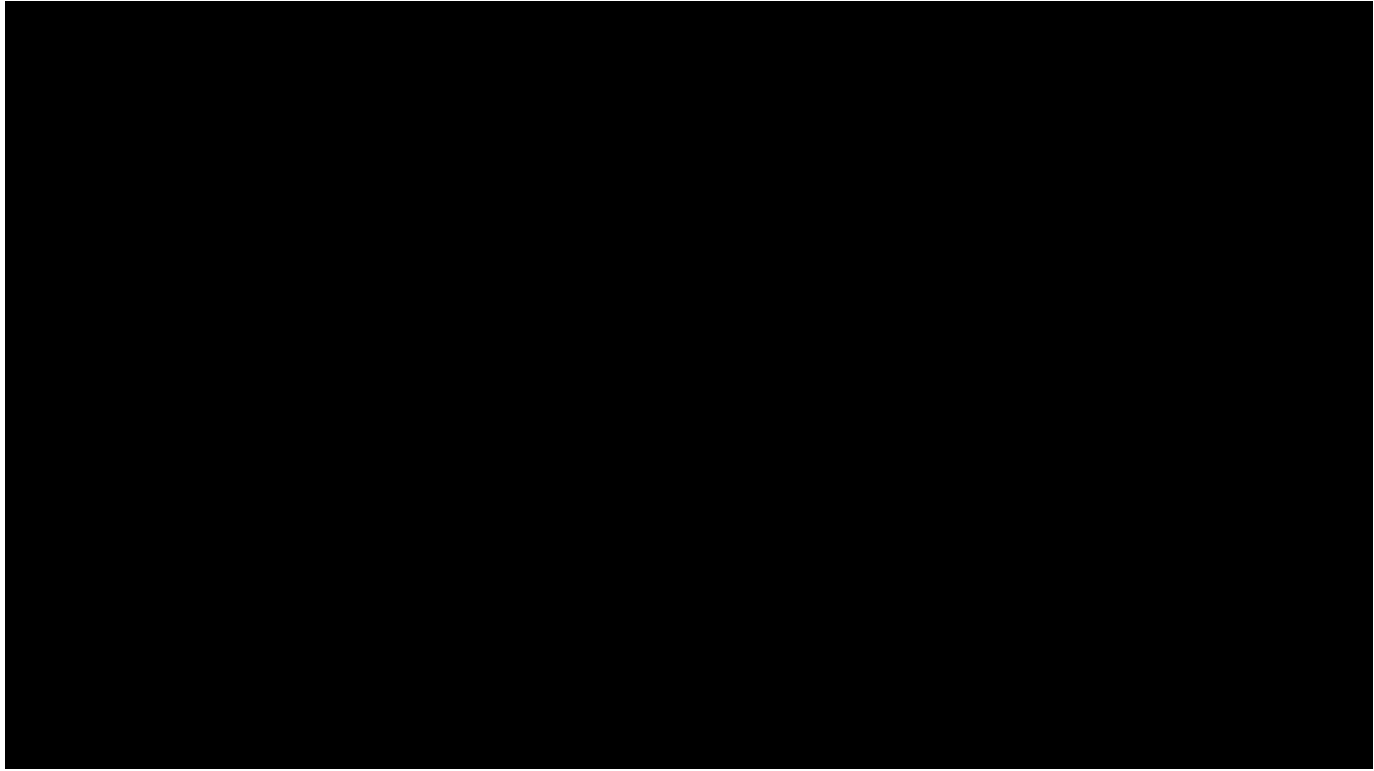


C- Renewable Energy and Solar

Solar projects implementation in plants adds to EMICOOL sustainability profile as well as it helps in compensating energy consumption in plants by subtracting it from energy produced using green energy generation.



Our journey



Conclusion

Since EMICOOL is part of the value chain , decarbonizing efforts in the industry will reflect to decarbonizing the whole value chain

