Decarbonising the Grid – District Cooling

Antonio Di Cecca
Chief Operating Officer – Tabreed
Tabreed at a Glance

- **87 plants in 4 countries**
- **>1.38m RT** delivered to clients
- Equivalent to cooling **124 towers the size of Burj Khalifa**

**Environmentally responsible operations**
- 2.31 billion kWh annual reduction in energy consumption in the GCC through Tabreed’s DC services (eq. to powering ~132,000 homes)
- Reduction in CO₂ emissions
- 50% more energy efficient
- 16% Lifecycle Cost Savings

**Top-tier and Diversified Customer Base**

**Exclusive Provider of DC Services to Iconic Projects**
- Burj Khalifa
- Cleveland Clinic Abu Dhabi
- Yas Mall
- Dubai Metro
- Sheikh Zayed Grand Mosque
- Etihad Towers
- WTC
- Ferrari World
- Aldar HQ
- Dubai Mall
- Abu Dhabi Global Market
- Dubai Parks & Resorts
- ICT
- Mubadala
Regional Presence

The only publicly listed and regional district cooling company in the world

4 GCC countries | 87 plants | 1.24m tons of cooling

Uniform utility infrastructure model implemented across GCC

New market entries in Egypt and India

Long term contracts underpinning stability of earnings and returns for shareholders

Announced capacity guidance of 120,000 RT to be added during 2022

Bahrain District Cooling Company (Tabreed 99.8%)
- Owns and operates 1 DC plant (33k RT) Plant runs using sea water to provide cooling to the most prestigious developments in Bahrain
- Landmark Projects: Reef Island, Financial Harbour, World Trade Centre

Tabreed and its UAE investments
- Plants in 6 of 7 emirates of the UAE - Abu Dhabi, Dubai, Ajman, RAK, Sharjah and Fujairah
- Landmark Projects in Abu Dhabi: Louvre Museum, Guggenheim Museum, Sheikh Zayed Grand Mosque, Yas Island, Al Maryah Island and Masdar City
- Landmark Projects in Dubai: Dubai Metro, Burj Khalifa, The Dubai Mall, Address Hotel and Dubai Opera

Tabreed Oman (Tabreed 61%)
- Owns and operates 7 plants serving Knowledge Oasis Muscat, Oman Avenues Mall, Remal Castle, Al Araimi Mall, Mall of Muscat and AlMouj Development
- Landmark Projects: Oman Avenues Mall, Mall of Muscat and AlMouj Development

Tabreed Egypt
- Owns 1 plant (contracted but not connected yet), in addition to a newly signed deal

Tabreed India (Tabreed 75% and IFC 25%)
- JV with IFC formed, team in India is working on a pipeline of several opportunities
Cooling is responsible for 70% of all electricity demand.*

District Cooling is up to 50% more efficient

Total Electricity Consumption

Industrial
Commercial
Residential
Transportation

Average Cooling Requirement

< 70%**
The study includes residential and other (mixed-use, hotels, hospitals and schools) buildings in Abu Dhabi island (highlighted in red above). Cooling tonnage is based on 12-30 sqm/RT depending on the building function. **

**Impact of Integrating DC to Decarbonise the Grid**

**DC - Business Model**

Compared to conventional cooling solutions (e.g. air-cooled chillers, water-cooled chillers, DX) DC has a better carbon footprint.

In 2021, space cooling energy consumption increased globally by 6.5% and, in the Middle East, by 5% *

**Benefits**

Approximate **40% reduction** in energy consumption versus air-cooled chillers**

Estimated **1.0 billion kWh reduction** in energy consumption from Abu Dhabi’s electric grid

Focus Area – Abu Dhabi

The study includes residential and other (mixed-use, hotels, hospitals and schools) buildings in Abu Dhabi island (highlighted in red above). Cooling tonnage is based on 12-30 sqm/RT depending on the building function. **

<table>
<thead>
<tr>
<th>Electrical Consumption Equivalent (kWh)</th>
<th>Yearly CO₂ Emissions (Kg)</th>
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<tbody>
<tr>
<td>2.6 bn</td>
<td>1.1 bn</td>
</tr>
<tr>
<td>1.6 bn</td>
<td>0.7 bn</td>
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</tbody>
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Aircooled Chillers | Connecting to DC
DC’s operating efficiency usually ranges between 0.8-1.05 kW/RT. This is more efficient than alternative cooling solutions and, consequently, reduces the load on the grid.

**Benefits**

- More than **5%** annual electrical efficiency improvement
- More than **2.21 billion** kWh reduction in energy consumed each year

**Operating Efficiency**

- Implementation of VFD retrofit program and investment in more efficient equipment
- Integrating OT with IT allowing for big data and AI driven operations
- Digitising across the value chain, enabling us to optimise energy use
- Unlocking value from big data and AI through live equipment condition monitoring
Impact of Integrating DC to Decarbonise the Grid

Cooling Storage

Thermal Energy Storage (TES) avoids the need to ramp up production, thus having a favourable effect on power grids by lowering peak electricity demand.

Benefits

Approx. 3% to 10% **electrical efficiency improvement, depending on cooling profile.

A plant was able to shed 2000 kW of power demand over four hours and shift 8000 kWh from peak hour to off-peak hours **
Impact of Integrating DC to Decarbonise the Grid

Innovation

- Use of innovative Nano Particles technology to improve the heat transfer of cooling systems

Benefits

- More than 5% annual CO₂ reduction

Demand Forecasting
Forecast of key operational parameters for energy-efficient operation


Renewable energy can be utilised to reduce electricity consumption to achieve a fully sustainable DC plant.

Minimal electrical energy required to drive some pumps, which can be sourced through Solar Energy and Power Cells to achieve a fully sustainable plant.

More than 10% annual CO₂ emissions prevention.
Adopting efficient and sustainable cooling solutions is crucial for achieving both development and environmental objectives, particularly in the Middle East region, where the need for cooling is high.

District cooling aligns with the UAE’s Energy Strategy 2050 to attain Net-Zero
Thank you