Customized and Sustainable District Cooling System
What is a District Cooling System?
A District Cooling System ("DCS") produces chilled water within a centralized energy plant and distributes it through underground pipes to buildings connected to the system and provides them with air-conditioning. Therefore, individual buildings do not need split systems, chillers and/or cooling towers.

Once used in customer buildings, the water is returned to the central plant to be chilled again and then re-circulated through the closed-loop piping system.

A DCS consists of three primary components: the centralized energy plant, the distribution network and the Energy Transfer Station ("ETS"), which comprises heat exchangers between the primary (DCS side) and secondary networks (Building side).

Why DCS (District Cooling System)?
Veolia is a leading provider of district energy services worldwide and manages over 455 district energy networks including over 42 district cooling networks.

We understand that masters and cities are strongly committed to end-users satisfaction and the protection of environment as well; more than ever, they also need to control their costs and reduce their risk, while guaranteeing reliability and creating a safe environment.

With this in mind, we have developed our suite of offers with three custom-made solutions, specifically adapted to the Middle East, to ensure the following:

- 24/7 Energy Availability
- Quality of Energy
- Competitive Operation & Maintenance Cost
- Efficiency of Plant & Distribution
- Sustainable Asset Management

What are the benefits of a DCS?
There are technical, commercial and environmental benefits by using a DCS compare to a decentralized cooling system:

- Guaranteeing chilled water tariffs and performance to End-users
- Reducing overall electricity infrastructure cost and capital expenditure
- Reducing energy consumption
- Reducing operational and maintenance costs
- Increasing reliability and efficiency by a 24/7 professional O&M team
- Increasing comfort and safety
- Enhancing real-estate net space and urban landscape
- Enhancing a sustainable development
- Allowing building managers to focus on core business

Overall, the implementation of a DCS scheme benefits to End-users, Governments, Master Developers, Real Estate Developers and the Community as a whole.

Why Veolia?
Veolia is a leading operator and developer of energy efficiency solutions. Operating around 76,000 energy systems, we are positioned to apply optimal methods and procedures to the management of electrical, thermal and other energy infrastructure assets.

We are not tied to any particular manufacturer, which gives us the total flexibility to choose the right equipment solution for a particular project for the best interests of the parties as we do believe that each project has different specificities.

We have established a strong presence in the Middle East for 25 years, and therefore we are able to provide our clients with customized solutions based on the best technology available and adapted to the local conditions.
Performance Guarantees by Solution

Related to availability, quality, cost and efficiency, as applicable to the solution implemented.

<table>
<thead>
<tr>
<th>Guarantees</th>
<th>Reliable O&amp;M</th>
<th>Energy Performance</th>
<th>Full Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of Energy</td>
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<td></td>
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<tr>
<td>Cost of Operation &amp; Maintenance</td>
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<tr>
<td>Quality of Energy</td>
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<tr>
<td>Efficiency of Energy Supply</td>
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<tr>
<td>Asset Management</td>
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</table>
Three Levels of Solutions

Energy Performance

- **Our Commitments**: In addition to the commitments from the Energy Performance solution, we will also take care of the Asset Management. We can also propose financial solutions to develop your project.

- **How We Deliver**: We ensure the efficiency of your installations, and we also assume the responsibility for the management of your asset. This will allow us to further provide competitive energy price by reducing the lifecycle cost of the assets. This is the highest level of guarantees that we can offer.

Reliable O&M

- **Our Commitments**: Availability and quality of energy, as well as the guarantee of the operations and maintenance cost.

- **How We Deliver**: We assume the responsibility for the operations and maintenance of the cooling system, including plants, distribution network and energy transfer stations. We ensure that they are operated to reliably deliver the service level required.

Full Performance

- **Our Commitments**: In addition to the commitments from the Energy Performance solution, we will also take care of the Asset Management. We can also propose financial solutions to develop your project.

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### Comparison of our DCS Service Offerings

<table>
<thead>
<tr>
<th>Services</th>
<th>Reliable O&amp;M</th>
<th>Energy Performance</th>
<th>Full Performance</th>
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<tbody>
<tr>
<td>Operation &amp; Maintenance</td>
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<tr>
<td>Condition-based Predictive Maintenance</td>
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<td></td>
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<tr>
<td>Major Maintenance &amp; Replacement</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Energy Sourcing (incl. Renewable &amp; Recovered Energies)</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
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<tr>
<td>Energy Supply</td>
<td></td>
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<tr>
<td>Energy Distribution</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
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<tr>
<td>Thermal Storage</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Combined Heat &amp; Power (CHP) &amp; Trigeneration (CCHP)</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Technical Assistance to Support Urban Planning</td>
<td></td>
<td>Optional</td>
<td></td>
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<tr>
<td>Project Management &amp; Site Supervision (Construction Phase)</td>
<td>Optional</td>
<td>Optional</td>
<td></td>
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<tr>
<td>User Awareness</td>
<td></td>
<td>Optional</td>
<td></td>
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<tr>
<td>Project Development &amp; Financing Solutions</td>
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<td>Optional</td>
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**Related Service Options**

Veolia has developed an extensive expertise in DCS; therefore, we could provide additional services on top of our core offers defined above.

- **Performance Management**
  - Contract for the Cooling System
  - Energy Audit
  - Performance Program

- **End-user Management** (individual metering, billing & collection)

- **Certificate Management to Comply with Performance, Safety & Environmental Standards**

- **Energy Performance Contracts to Connected Buildings**
Definition of Veolia’s Solution

Veolia Business Model for District Cooling System

1 Design
Concept Design and choice of technology: analysis of the demand load curve, choice of equipment.

2 Construction/Procurement
Tendering for selection of EPC Contractor. Review of EPC Contractor’s design. Construction supervision and witnessing of commissioning.

3 Financing with partners
Possibilities of different business models: BOT, BOO, DBO, etc.

CORE BUSINESS

4 Supply
Secure supply & optimize energy mix (including renewable & recovered energies). Optimization and supervision of supply.

5 Operation
Multi-energy management. Operation and maintenance, major maintenance and asset replacement.

6 Performance guaranteed
Technical, environmental and financial performance guarantees.
Veolia now operates over 40 district cooling networks worldwide for a total cooling capacity of over 900,000 RT (3,150 MWc) and provides its customers around the world with high value added energy solutions that meet their reliability, quality, availability and cost requirements. Our customers benefit from the combined expertise of our local teams and our worldwide network of experts and operators. In the Middle East, Veolia builds or operates district cooling plants for a combined cooling capacity of around 250,000 RT (875 MWc). The following references are international examples:

**Saadiyat Island, Abu Dhabi, United Arab Emirates**
- 29-year BOT with TDIC (Abu Dhabi Government) as a client.
- Saadiyat Island is a mixed-use development with a total built-up area of over 1.6 million m² and which comprises museums (Louvre, Guggenheim, Zayed National Museum), hotels (St Regis, Rotana, Park Hyatt) and a variety of residential and hospitality centric developments.
- 3 cooling plants for an ultimate total capacity of 70,000 RT (245 MWc).

**Bahrain Bay, Manama, Bahrain**
- 50-year BOT between Bahrain Bay Development and Bahrain Bay Utilities, a JV between Veolia and Arcapita.
- Bahrain Bay is a mixed-use waterfront development with a total built-up area of over 1.1 million m² which comprises hotels (Four Season, Marriott, Wyndham), offices (Arcapita’s Headquarters, Al Baraka Bank) and a variety of residential developments.
- Cooling plant of 45,000 RT (155 MWc) capacity, cooled by seawater.

**Marina Bay, Singapore**
- BOO under a 30-year license (renewable) granted by the Government of Singapore to Singapore District Cooling Pte Ltd, a JV between Veolia and Singapore Power.
- Marina Bay is a new business and financial district under progressive development, located on a reclaimed land adjacent to the existing downtown. The total commercial area will ultimately reach 8 million m².
- 5 cooling plants forecasted to run for an ultimate total capacity of 260,000 RT (900 MWc). The JV currently builds and operates 95,000 RT (330 MWc).

**Kai Tak District Cooling System, Hong Kong**
- 8+8 years DBO contract for the first Public DCS in Hong Kong granted to HKDC DHY JV, a JV of which Veolia is responsible for O&M.
- Located on the site of the previous Hong Kong airport, the new district of 1.7 million m² GFA will comprise offices, shops, hotels, hospitals, schools and the new regional cruise hub.
- 2 cooling plants using seawater cooling for a total capacity of 81,000 RT (284 MWc).
Resourcing the world