From Desert Heat to Urban Cool: Dubai's Global Model for District Cooling

Dubai, UAE, 2 September 2026: As climate change intensifies, cities around the world are experiencing increasingly frequent and severe heat waves, placing unprecedented pressure on energy systems, urban infrastructure, and public services. These rising temperatures are driving a surge in cooling demand, compelling city planners and policymakers to rethink how urban areas can meet future cooling needs in an efficient, resilient, and sustainable manner.

Europe has emerged as one of the regions most visibly affected by this trend. During the summer of 2026, large parts of Western and Southern Europe experienced prolonged and intense heat waves, with temperatures exceeding 40°C across several countries. In June alone, temperatures reached 43.8°C in France, while parts of Spain recorded temperatures above 42°C, highlighting the scale and severity of the heat-related challenges facing European cities.

This comes at a time when air conditioning usage rates across Europe remain relatively low, with the International Energy Agency (IEA) indicating that only around 20% of European households own air conditioners. As heat waves become more frequent and temperatures continue to rise, the need for more efficient solutions that can meet growing cooling demand without placing additional strain on electricity grids or depleting resources becomes increasingly evident.

This equation presents cities with a challenge that extends beyond simply meeting their cooling needs. As temperatures rise and demand for cooling increases, the widespread adoption of individual air conditioning systems can place greater pressure on electricity networks, particularly during peak periods, and require additional investment in grid infrastructure. Household energy consumption for space cooling in the European Union nearly doubled between 2018 and 2024, rising from 40.5 thousand terajoules (equivalent to approximately 11.3 terawatt-hours), to 80.4 thousand terajoules (equivalent to approximately 22.3 terawatt-hours). While cities in traditionally temperate climates are actively exploring solutions to meet rising cooling demand, cities in the Gulf offer a contrasting perspective. Faced with persistently high temperatures for decades, Gulf cities have developed large-scale cooling infrastructure designed to deliver reliable, efficient, and sustainable cooling services across entire districts and urban developments.

From Cooling a Building to Cooling a City

District cooling offers a model based on producing chilled water at highly efficient central plants and distributing it through insulated pipe networks to meet the cooling needs of multiple buildings and facilities. Consolidating cooling demand within a single system enables the use of larger and more efficient equipment, improves load management, and reduces electricity consumption compared with operating separate systems for individual buildings.

District cooling systems can deliver electricity savings of up to 50% compared with traditional cooling systems, requiring approximately 0.9 to 1 kilowatt of electricity per ton of refrigeration,

compared with 1.6 to 1.8 kilowatts for traditional systems. This difference becomes even more significant as the network expands to serve entire neighbourhoods and urban areas.

Dubai is Building Cooling as Infrastructure

Dubai has developed district cooling as a core component of its sustainable urban infrastructure. For more than two decades, the city has pursued a different model for addressing cooling needs, based on an early recognition that cooling in a hot city is not merely a building-related service, but an integral part of the infrastructure that supports urban growth and energy efficiency. With the rapid expansion of residential, commercial, and tourism projects, district cooling services have evolved into a comprehensive urban infrastructure system across the city, capable of meeting growing cooling demand on a large scale.

Empower has emerged as one of the most prominent examples of this approach in practice. Since commencing operations in 2004 with a cooling capacity of 5,400 refrigeration tons (RT), the company has continued to expand its plants and networks in parallel with Dubai's urban growth, becoming the world's largest district cooling services provider.

This approach has contributed to the development of a comprehensive district cooling infrastructure in Dubai, which, by the end of 2025, comprised 90 district cooling plants and a network of distribution pipelines extending more than 430 kilometres. Empower continued its expansion during the first half of 2026, increasing its connected capacity to 1.71 million RT and its contracted capacity to 2.02 million RT, while its service network grew to encompass 1,796 buildings and more than 161,000 individual and corporate customers.

"Climate change has demonstrated that cooling is no longer merely a building service but has become an essential component of urban infrastructure. Dubai's experience over more than two decades has underscored the importance of proactive planning and investment in district cooling plants and networks to keep pace with urban growth, enhance energy efficiency and ensure service reliability. Today, this experience offers valuable lessons for cities around the world seeking to build more efficient and resilient infrastructure capable of responding to rising temperatures and growing cooling demand," said **H.E. Ahmad Bin Shafar, CEO of Empower, Member of the Board of Directors of the International District Energy Association (IDEA), Special Advisor on District Cooling to the 'District Energy in Cities' global initiative of United Nations Environment Programme (UNEP), and Chairman of the District Cooling Operators Association-GCC**.

Cooling at the Heart of Urban Planning

The feasibility of district cooling varies across cities and neighbourhoods, depending on factors such as population density, cooling demand and the potential to develop the necessary networks and infrastructure. Its suitability is particularly evident in high-density areas, mixed-use developments, business districts, airports, hospitals and university campuses, where consolidating cooling loads enables systems to take advantage of variations in peak demand periods and reduce overall capacity requirements.

Dubai's experience demonstrates how cooling can be integrated into long-term infrastructure planning, enabling networks to expand in parallel with urban growth while meeting rising demand efficiently and reliably. As temperatures continue to rise and cooling needs increase worldwide, this experience is becoming increasingly relevant, demonstrating how proactive cooling planning can help cities accommodate growth, enhance energy efficiency, and reduce pressure on electricity grids.

The challenge, therefore, is no longer simply how to cool buildings, but how to develop infrastructure capable of keeping pace with sustainable urban growth in an increasingly hotter climate. Dubai offers a practical model demonstrating that effective cooling planning does not begin when temperatures rise, but at the stage of planning the city itself.

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