

Spotlight on District Cooling



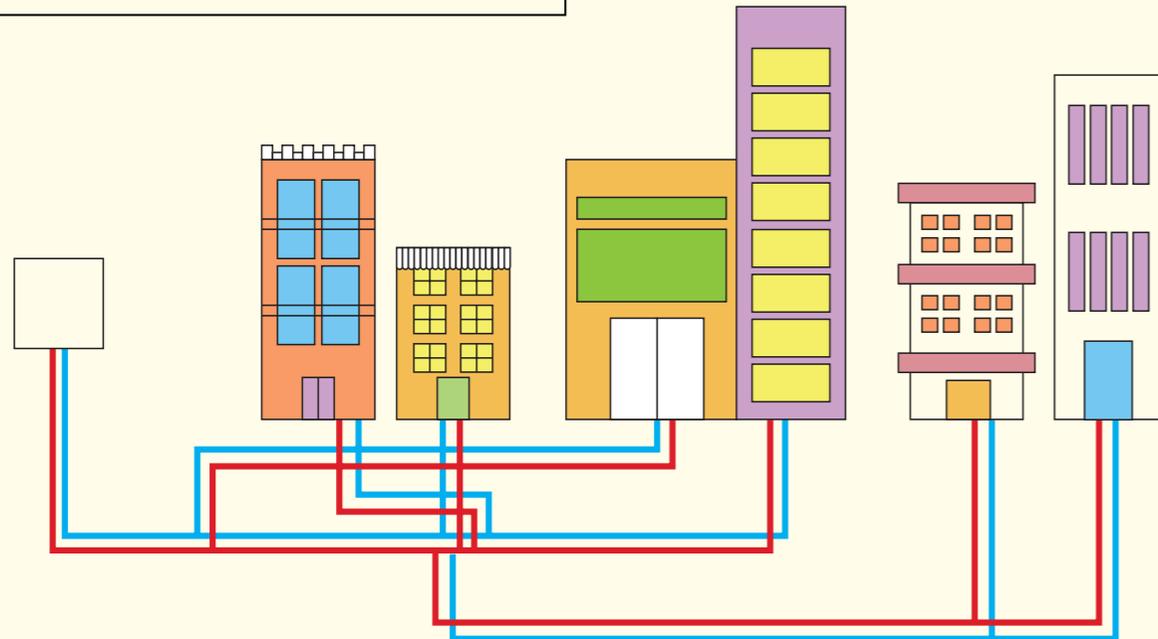
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The spotlight is once again on District Cooling, thanks to various government initiatives promoting it, bringing to fore challenges utility providers and end-users have to combat. Omnia Halawani analyses them and offers solutions, while making a plea for a streamlined sector.

There is no doubt that District Cooling can be an integral part of cities aiming to achieve sustainable development. In Abu Dhabi, the new utility rates by Abu Dhabi Distribution Company (ADDC) are regarded to be in favour of District Cooling and central cooling systems. In Dubai, the Dubai Supreme Council of Energy has positioned District Cooling as the third pillar in its governance framework to rationalise energy use in the emirate of Dubai, known as the Demand Side Management (DSM) Strategy. The strategy looks into means of increasing the penetration of District Cooling in the market through new schemes and Existing Buildings retrofits.

One of the outcomes of a study that was concluded by GRFN (within a consortium) for the Dubai Regulatory and Supervision Bureau (RSB) calculated the current District Cooling penetration in Dubai at 17.7%. The study was commissioned out of an understanding that “any strategy intended to raise energy efficiency will have to tackle cooling – both efficiency in its supply and in its use”.

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The low ΔT syndrome

The ultimate goal of any District Cooling utility is to minimise the total energy and equipment costs, while keeping end-users comfortable. Perhaps the lingering and most common issue facing District Cooling is low chilled water temperature differential (low ΔT), which takes its toll on lost cooling capacities, increased energy consumption, added costs and system complexities. Incentive-based chilled water rates that are lowered with higher ΔT have been adopted by some global District Energy schemes. Locally, some District Cooling providers have taken the step to enforce low ΔT penalties on end-users failing to return chilled water at the required minimum temperature. The go-to solution by many DCPs to combat ΔT is reducing the flow on the network, which can simply shift issues from the DCP to the buildings themselves.

We have been approached on multiple occasions by both District Cooling providers and customers, for advice on solutions to combat the low ΔT syndrome. On most cases, we have found that the root cause (and solution) to low ΔT lie in the selection of building cooling coils and the performance of control valves. Both issues entail high retrofit costs (more prevalent in the case of wrong cooling coil selections), unfeasible payback periods and prolonged implementation durations.

Another contributor to the ΔT syndrome is the oversizing of buildings’ cooling load requirements, which also takes its toll in the form of increased charges, as will be discussed in the next section. All of these emphasise the importance of sound engineering design and adopting integrated design strategies that bring all stakeholders to the table at the design stages.

Bloated capacities & costs

The other issue, which becomes more prevalent with the public and end-users, is the general consensus that District Cooling costs more than other conventional cooling systems. District Cooling is generally perceived as being artificially expensive. And this flatters the conventional cooling techniques. A lot of the hype targets the District Cooling providers themselves. While this perception might hold true in some aspects, it is often overseen that in-building cooling capital is factored into purchase price or rental payments. DCP involves recurrent capacity charges + metered usage, which is a continuous reminder to the end-user of the costs incurred.

It is true that the District Cooling industry is yet to see the benefits of reduced electricity rates (in Abu Dhabi, for example) and lowered costs associated with the use of treated sewage effluent (TSE) water passed on to the end-users. However, placing the entire solution/blame in the court of the District Cooling providers alone is improper. It is a fact that a majority of the buildings’ cooling capacities here are oversized. Chronologically speaking, the number one solution stems out of this fact. If building owners were more conscious in this aspect, requiring their consultants to ditch the unrealistic safety factors, which I like to call “ignorance” factors, when calculating cooling loads, they can save thousands in District Cooling capacity charges.

Capacity charges are normally within the range of AED 750-900 per tonne enforced through a contract that typically extends up to 20 years. A mere oversizing of 500 tonnes, which is not uncommon, will cost the building’s owner, and eventually the building’s occupants, up to AED 450,000 a year, translating into AED 9,000,000 over the course of 20 years.

We have been faced with incidents where our clients were reluctant to approve our cooling load calculations, as the load was significantly lower than their previously designed similar buildings. It would be a major aid to the market to have a more transparent industry, where actual buildings’ peak loads are published by the District Cooling providers. It would help tune the expectations of the developers and building owners of the adequate square metre per tonne for their buildings, and will also exert the much-needed pressure on consultants to improve their performance and design approaches.

In conclusion...

To sum up, governmental efforts have started to move in favour of District Cooling and more efficient cooling systems. This move has to be welcomed with relayed costs reduction to the end-customers. The construction design industry needs an overhaul to abide by best practices and sound engineering design approaches. A lot of the issues facing building owners, like penalties and high District Cooling charges, are issues that can be taken into their own hands by raising their expectations of the design consultants. Finally, a more transparent District Cooling industry with published actual peak loads would aid the drive towards a more sustainable construction industry as a whole. ■