Bureau of Energy Efficiency

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An International Conference on Building Energy Efficiency

9th-11th September, 2019 | Hotel The LaLiT, New Delhi

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THIS PRESENTATION WAS SHARED BY

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FOR THE SESSION:

"State-of-the-art Cooling Systems, including District Cooling System"

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District Cooling in India

ANGAN CONFERENCE

Sanjay Dube, President, IIEC

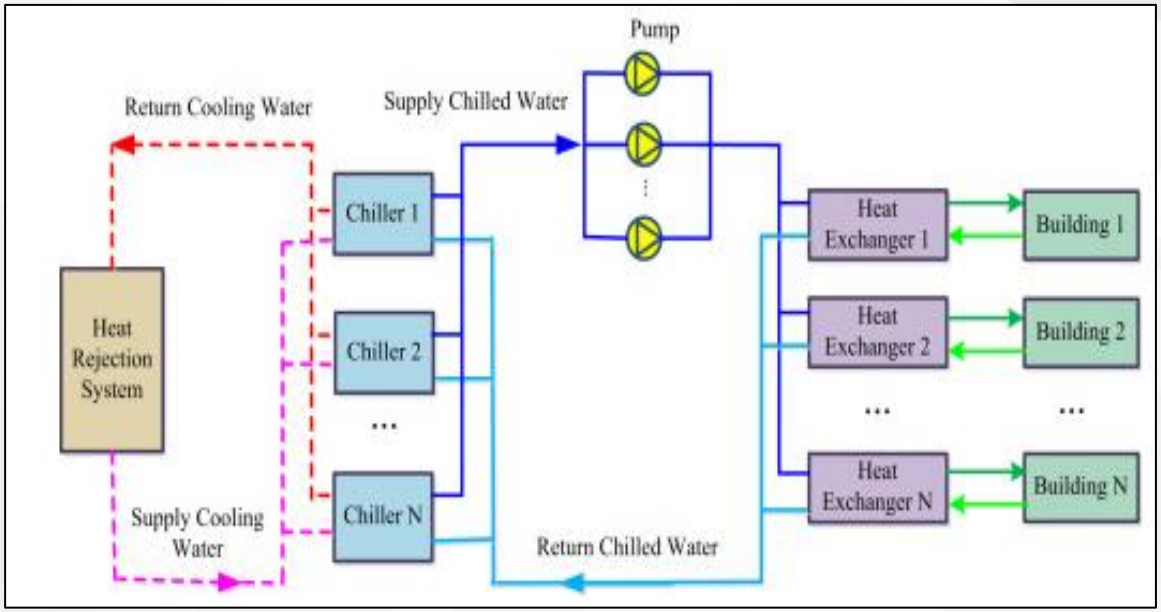
10th September 2019

New Delhi

Why District Cooling

- Global demand for space cooling and the energy needed to provide is growing and it will continue to grow;
- With growing demand for cooling, shaving of peaks during peak hours would be very difficult;
- The design of systems like district cooling will help in greatly reducing the peak demands and provide new generation capacity to meet cooling demand;
- Measures to replace individual ACs will lead to huge reduction in cooling-related CO2 emissions;
- The technology offers about 30-40 per cent savings for the air conditioning load.

What is District Cooling

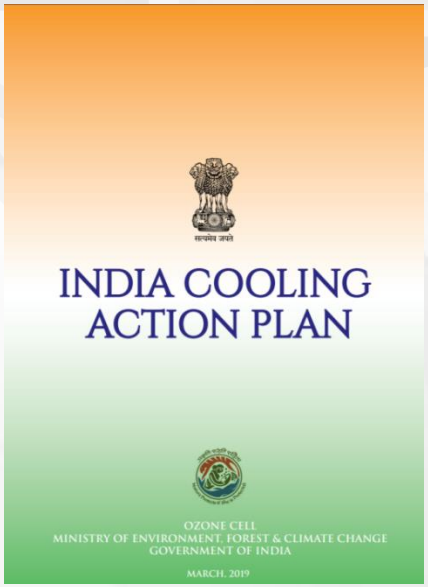


- District cooling refers to centralized production and distribution of cooling energy. Chilled water is delivered via underground insulated pipelines to different buildings, where heat exchangers are installed.
- This heat exchanger extract heat from hot air of buildings, cooling it and then recirculates cold air inside the building.
- The heated water returns back to centralised chiller, where water is cooled again either using compressors or through cooling towers

India Cooling Action Plan (ICAP)

Goals of the India Cooling Action Plan (ICAP)

- Reduction of cooling demand across sectors by 20% to 25% by year 2037-38.
- Reduction of refrigerant demand by 25% to 30% by year 2037-38.
- Reduction of cooling energy requirements by 25% to 40% by year 2037-38.
- Training and certification of 100,000 servicing sector technicians by the year 2022-23, in synergy with Skill India Mission.
- Recognize "cooling and related areas" as a thrust area of research under the National Science & Technology Program.



Broad objectives of the India Cooling Action Plan

- Assessment of cooling requirements across sectors in next 20 years and the associated refrigerant demand and energy use.
- Map the technologies available to cater the cooling requirement including passive interventions, refrigerant-based technologies and alternative technologies such as not-in-kind technologies.
- Focus on skilling of Refrigeration and Air Conditioning RAC service technicians.
- Develop an R&D innovation ecosystem for indigenous development of alternative technologies.

Ongoing Work: UN Environment – District Energy in Cities Initiative

- Central government has already considered District cooling system as a cross-cutting medium term technology in the "India Cooling Action Plan"

- District cooling may compliment the Smart Cities Initiative of India as well, by – improving efficiency and the quality of infrastructure, and thus delivering a more sustainable, liveable urban environment.

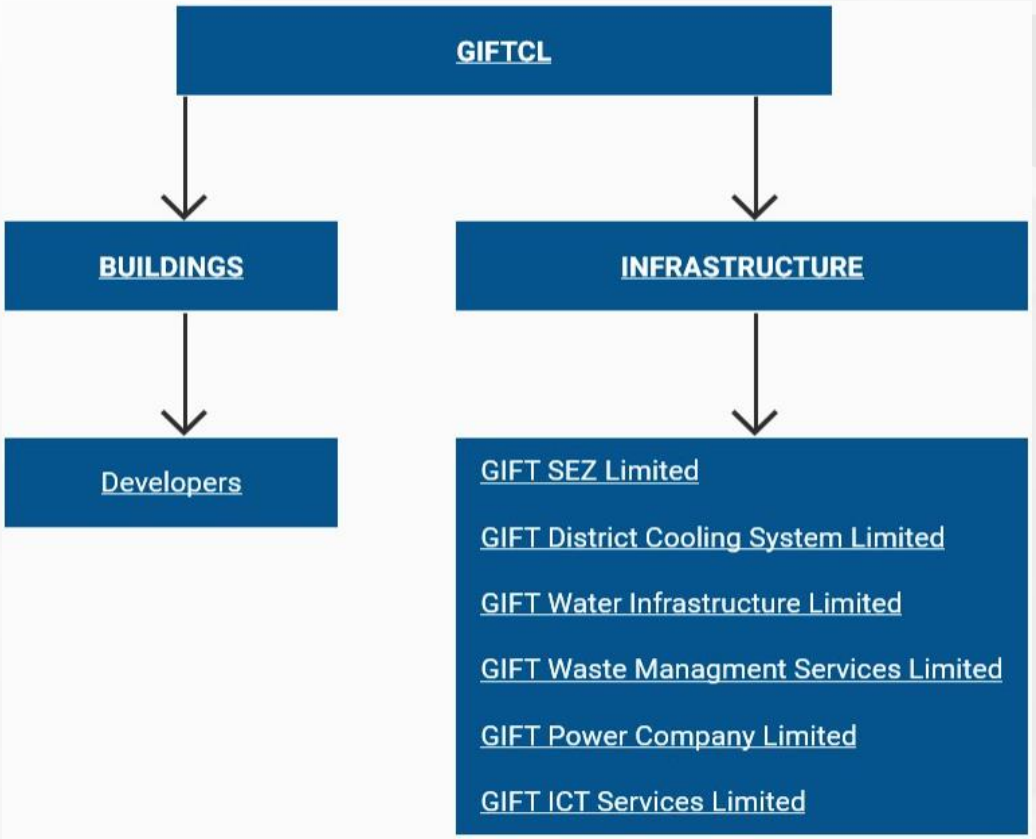
- In order to kick-start the District Cooling Initiative in India, **UN Environment has signed an agreement with Energy Efficiency Services Limited** to lead and coordinate the DES-related activities as the National Coordinating Agency till 2020

- At present**, assessments have been carried** out across **five cities: Bhopal, Rajkot, Thane, Pune, and Coimbatore**, which confirm that cooling large buildings through district cooling networks is more cost-effective and significantly better environmentally. Electricity and CO_2 reductions of at least 35% are forecasted as there are significant water and refrigerant reductions.

Gujarat International Finance Tec-City Company Ltd. (GIFTCL)

GIFT project is being implemented by **Gujarat International Finance Tec-City Company Ltd. (GIFTCL)**.

GIFTCL has been set up as a Joint Venture (JV) Company between the Government of Gujarat (GoG) represented by Gujarat Urban Development Company Limited (GUDC) and Infrastructure Leasing & Financial Services Limited (IL&FS).



GIFT: DCS Project Highlights

Engineering, Procurement and Development Contractor	• ETA Engineering Pvt. Ltd.
Client	• GIFT City (Gujarat International Finance Tech City)
Design Review Consultant	• Tata Consulting Engineers
Scope of Work	• Design, Supply, Construction, Erection, Testing and Commissioning and Operation and Maintenance of Chilled water system of 10000 ton of refrigeration (TR), in the modular format of 5000 TR in series counter flow arrangement for stage-1 and 5000 TR for stage-2 and 10000 Tons of refrigeration hours (TRH) Thermal Energy Storage (TES) Tank. • Total three DCS plants of equal capacity (60,000 TR each), Total: 180,000TR • The plant will use Centrifugal chillers with 2500 TR capacity each
Electrical demand	• 135 MW
Cost of Project	• Approx. 100 Crores.

Stakeholder Landscape

Requirement of Collaborative Efforts

Ministry of Housing and Urban Affairs	Ministry of New and Renewable Energy	Ministry of Power	Ministry of Environment, Forest and Climate Change	State Urban Development Department/Agency
State Designated Agencies/State Energy Departments	Bureau of Energy Efficiency	CERC/SERCs	Bureau of Indian Standards (BIS)	Indian Society of Heating, Ventilation and Air Conditioning (ISHRAE)
Municipal Corporation and Town Planners	Smart City SPVs	Power Utilities	Central Electricity Authority	Financial Institutions / Public/Private Sector Banks
International Development Agencies / Development Aid Agencies	Industry Associations	Infrastructure Building Developers	ESCOs (e.g. EESL)	Technology Providers / System Integrators

Stakeholder Responsibility Matrix

District Cooling in India

	Union Government	State Government	Local Government/ Municipality/ Municipal Corporation	Financial Institutions	International Development Agency	System Integrator (SI)/ Technology Provider (TP)
Policy Framework	✔	✔				
Regulatory Framework	✔	✔				
Project Implementation & Maintenance		✔	✔			✔
Mobilization of Finance	✔	✔		✔	✔	
Monitoring, Reporting and Verification (MRV)			✔			✔

Key updates in District Cooling from India

•A workshop on **'Cooling Smart Cities - The Arrival of District Energy in India'** in Rajkot was organised by UN Environment along with ICLEI South Asia, Energy Efficiency Services Limited (EESL), the International Solar Alliance as partners and hosted by the Rajkot Municipal Corporation in the state of Gujarat (Feb 2018).

•UN Environment report on high-level national analysis undertaken alongside five district energy rapid assessments of the Indian cities of Bhopal, Coimbatore, Pune, Rajkot and Thane.

•City of Amrawati in AP is planning for a 20,000 TR (tonnes of refrigeration) district cooling system probably with support from an UAE based company called Tabreed.

•District cooling system is being implemented in India at Gujarat International Finance Tec-City (GIFT City) – India's 1st Smart City. The first phase of this District cooling system with a capacity of 10,000 TR is in operation since April 2015.

Public and Private Partnership for District Cooling in India

In association with Smart City Sweden – In India, Sweco is preparing proposals for a district cooling system to serve the city of Pimpri, India. The assignment is part of an Indian initiative to develop 100 smart and sustainable cities. Sweden is one of six countries that India has chosen to collaborate with in this initiative, which has also given rise to the formation of the Smart City Sweden – in India platform, which Sweco is part of.

In the spring of 2018, Sweden carried out a feasibility study to explore the opportunities to transform Pimpri, where some 20 Swedish companies are already established, into a smart and sustainable city. Based on the results of the feasibility study, India wants to move forward with plans for a district cooling system covering the city's 95-hectare exhibition and convention centre. District cooling is used for applications such as refrigeration rooms and air conditioning.

Sweco's assignment includes the proposal of a district cooling system for the Pune International Exhibition and Convention Centre. By using coolants and energy sources with low emissions, the ambition is to make the exhibition and convention centre fully carbon neutral.
https://www.sweco.se/en/our-offer/project/district-cooling-in-india/