Charrette on Development of Roadmap for District Cooling in India

Cooling Innovation: Cooling as a Service with District Cooling

India Smart Utility Week- 14 March 2024

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of
Federal Ministry for Economic Affairs and Climate Action
of the Federal Government of Germany

Alliance for an Energy Efficient Economy

BEE – Energy is Life, Conserve it

Format for the Charrette

1. Time duration: 60 minutes
2. Four broad discussion points will be covered
   - -Prioritization of sites and customers
   - -Making DCS projects attractive
   - -Business models
   - -Role of government and authorities at different levels
3. To kickstart the discussion, there will be a slide on each point
4. Audience is requested to raise their hands to share their perspectives or ask questions after each slide

Major Factors Influencing DCS Implementation

Building cluster Design and energy demand	Local Context	Resources	Policy and governance
• Cooling demand • Peak electricity demand • Demand density • Time distribution of energy demand • Availability of space • FAR/FSI • Diverse buildings use • Ownership	• Topography and slope • Existing or proposed utility network • Access to naturally cold water body • Access to renewable energy/Waste to energy • Road network	• Finances • Skilled Labour • Time • Machinery • Water and Power supply to meet current and proposed cooling demand	• Existing policies, programs and missions • Proactiveness of government • Administrative capacity • Ease of getting permissions and clearances

**The highlighted criteria have a higher priority*

Source: District Cooling Guidelines, 2023

Potential Sites and Customers for DCS

District Centres and Transit Oriented Developments

- High cooling density is required with diverse cooling requirements in such high density mixed use areas

Industries/Thermal Power Plants

- Plants require reliable and constant cooling

Factors covered and priority criteria:

- *Building Energy Demand*

-Cooling peak demand
-Cooling demand density and delivery density
-Cooling demand diversity
-Potential cooling energy demand

- *Local Context*

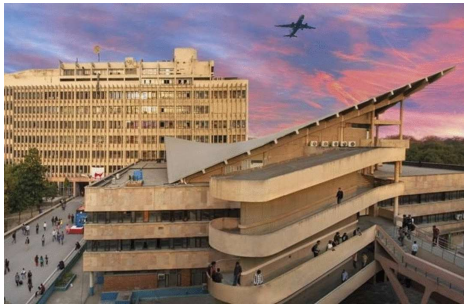
-Existing and proposed utility lines
-Road network

- Building Design and Use

-Availability of space for distribution centre or possibility of extension

Medi Cities and IT Campuses

- In the case of IT Campuses, usually multiple such facilities are located in the vicinity and a common DCS plant can be installed
- Medi cities require highly reliable cooling facilities



Academic Institutions

- Common DCS Plant for multiple campuses in the vicinity

Townships

- Such Facilities have multiple uses- Residential, offices, commercial, hospitals

Discussion Questions

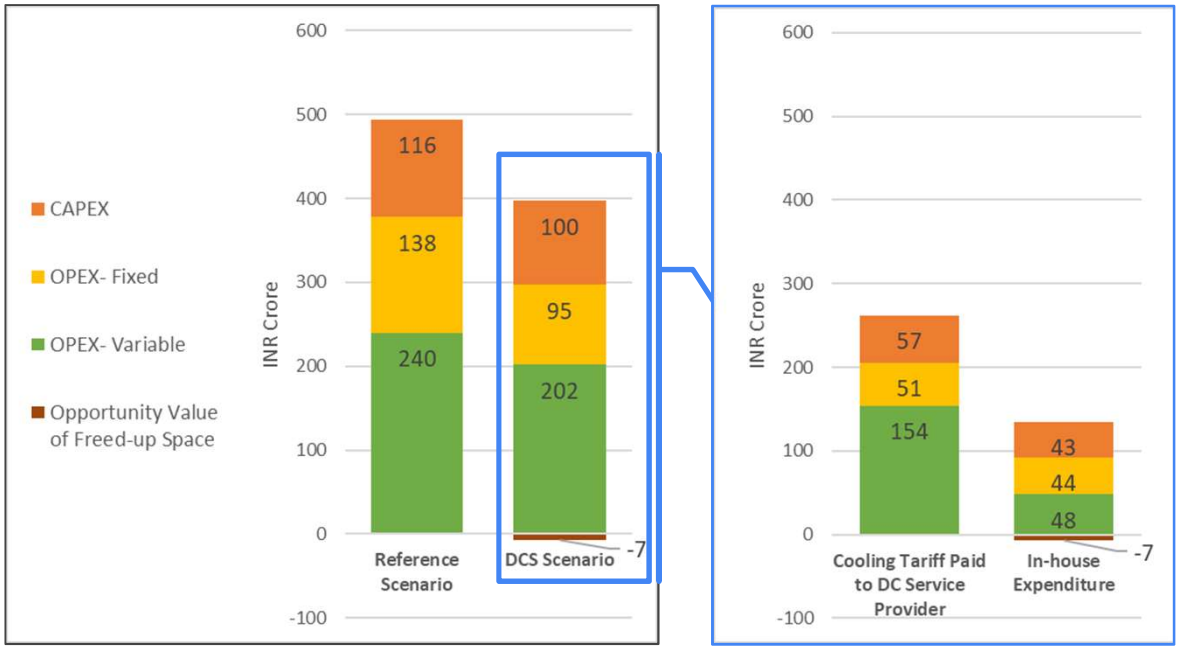
- Based on the presented criteria, what other areas in India do you see as potential candidates for district cooling implementation?
- Are there any specific data sets or metrics we should consider when identifying potential sites?
- How can we ensure equitable access to district cooling benefits across different income levels and demographics?

Economic Assessment for DCS

Assumptions	Reference scenario	DCS
DCS contract duration (only applicable for DCS) (years)	NA	30
Distribution Network Losses (°C per km of network length)	-	0.1
Annual Cost Escalations (CAPEX, O&M, Electricity & Water Tariffs, Monetisation of Freed-up Space)	5%	5%
Discount Rate (for NPV analysis)	12%	12%
Space Required for Chilled Water Plant Installation (sq.ft./TR)	2.00	2.00
Opportunity Value of Freed-up Space (INR/sq.ft./month)	NA	25.0
Cooling requirement (TR)	9714	9714 (realised as 6800)
Installed cooling capacity (TR)	11600	7200

The NPV of DCS over the life of the project (30 years) is 21% better compared to standalone chilled water systems

Incorporating GST and service fees levied by the DCS company will affect the cost advantages of DCS



Any Suggestions that can be incorporated in the model?

Business Models for Merchant type DCS

Public Owned and Operated

- Ownership- Local authority builds, owns, and operates* the DCS plant
- Public Procurement- EPC and Operator*
- Revenue- CaaS

*can also be operated by private sector

Private Owned and Operated

- Ownership- DCS provider builds, owns, and operates the DCS plant
- Revenue- CaaS

Hybrid Model (Ownership with Public and Private both)

- Ownership- Mixed. The DCS provider (concessionaire) builds and operates the DCS plant and shares risk with the public entity
- Public Procurement- Concessionaire
- Revenue- CaaS

Discussion Questions

- Considering the Indian market landscape, which business models seem most promising for successful district cooling implementation?
- What role can private companies and investors play in developing and operating district cooling systems?
- How can we ensure fair risk-reward allocation between different stakeholders involved in the business model?

		Central	State	City/District
Demand Creation	**Potential Locations**	Smart Cities, Airports, Large Green Field developments under central jurisdiction, SEZs	Large Green Field developments under state jurisdiction, Thermal Power plants and Industries, SEZs	Transit Oriented Developments, District Centres, Planned Townships, Industries, SEZs
	Initiatives	Skill-building and awareness workshops, Cooling centric initiatives like CITIIS, benefits in Environment Impact Assessment, creating net-zero/circular zones	Skill-building and awareness workshops, State government initiatives like Tamil Nadu, policies for assured offtake in feasible commercial/ industrial/ government sites	Skill-building and awareness workshops, easy Land allocation for DCS plants, FAR/FSI benefits, policies for assured offtake in feasible commercial/ industrial/ government sites
Financing		Fiscal and financial incentives, Funding feasibility studies, National Infrastructure Pipeline inclusion, Regulator	Infrastructure development funds, easy and low interest loans, Regulator	Property tax breaks for connected buildings, PPP (ULB and Private developer)
Inclusion in the existing plans		URDPFI Guidelines, Modal Building By-Laws	State Climate Action Plans, Development Control Regulations, building codes	Regional Plans, Master Plans, City Development Plans, Zonal Plans
Authorities Involved		Ministry of Power, Ministry of Housing and Urban Affairs, Ministry of Environment Forest and Climate Change, Ministry of Finance, Department of Science and Technology	State Planning Departments (TCPDs), State DoEFCC, Renewable Energy Departments	Urban Local Bodies (Development Authorities), Municipal Corporations

Discussion Questions

- What specific policy changes or regulations can encourage the adoption of district cooling across different levels of government?
- How can government agencies/Ministries collaborate to streamline permitting processes and ensure project feasibility?
- What type of financial support (subsidies, tax breaks) would be most effective in driving initial district cooling projects?

THANK YOU

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