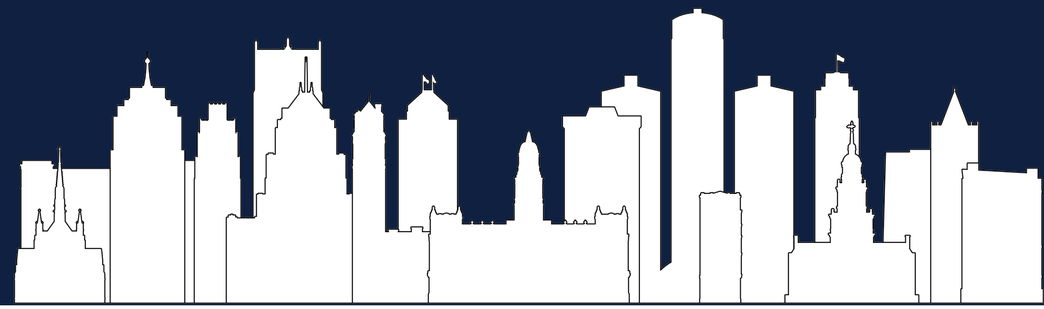
Cool Talks

The UNEP Cool Coalition webinar series

EPISODE 12 • THURSDAY 30 APRIL 2026 • 15:00 CEST / 09:00 EDT

District Cooling as Urban Energy Infrastructure



Danfoss

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

EMPOWER ENERGY SOLUTIONS

THE WORLD BANK

UN environment programme

Cool Coalition

CoolTalks

The UNEP Cool Coalition webinar series

OPENING REMARKS

Setting the stage

Rob Thornton

President & CEO

International District Energy Association

Cool Talks

The UNEP Cool Coalition webinar series

WELCOME

Housekeeping

01 12th Cool Talk in UNEP's webinar series

02 Webinar is being recorded

03 Cameras and microphones are disabled by default

04 Submit questions in the Q&A box throughout the webinar

District Cooling as Urban Energy Infrastructure

Scaling efficiency, grid resilience, and climate action in a warming world.

Robert Thornton
President & CEO
International District Energy Association

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

IDEA

- **Founded in 1909** with headquarters near Boston, MA, USA
- A nonprofit industry association representing **~3,000 members from 28 countries**.
- Advancing best practices and advocating for community-scale thermal energy systems for more than 115 years.
- Members span district energy systems in cities, communities and campuses, alongside equipment, technology, and service providers.

Urbanization is Accelerating the Cooling Imperative

4.6B

people live in cities today

As more people concentrate in urban centers, demand for reliable, efficient heating and cooling at scale becomes impossible to ignore.

50%

of primary energy used for heating & cooling

Individual AC units drive peak electricity demand precisely when grids are most vulnerable—during heatwaves.

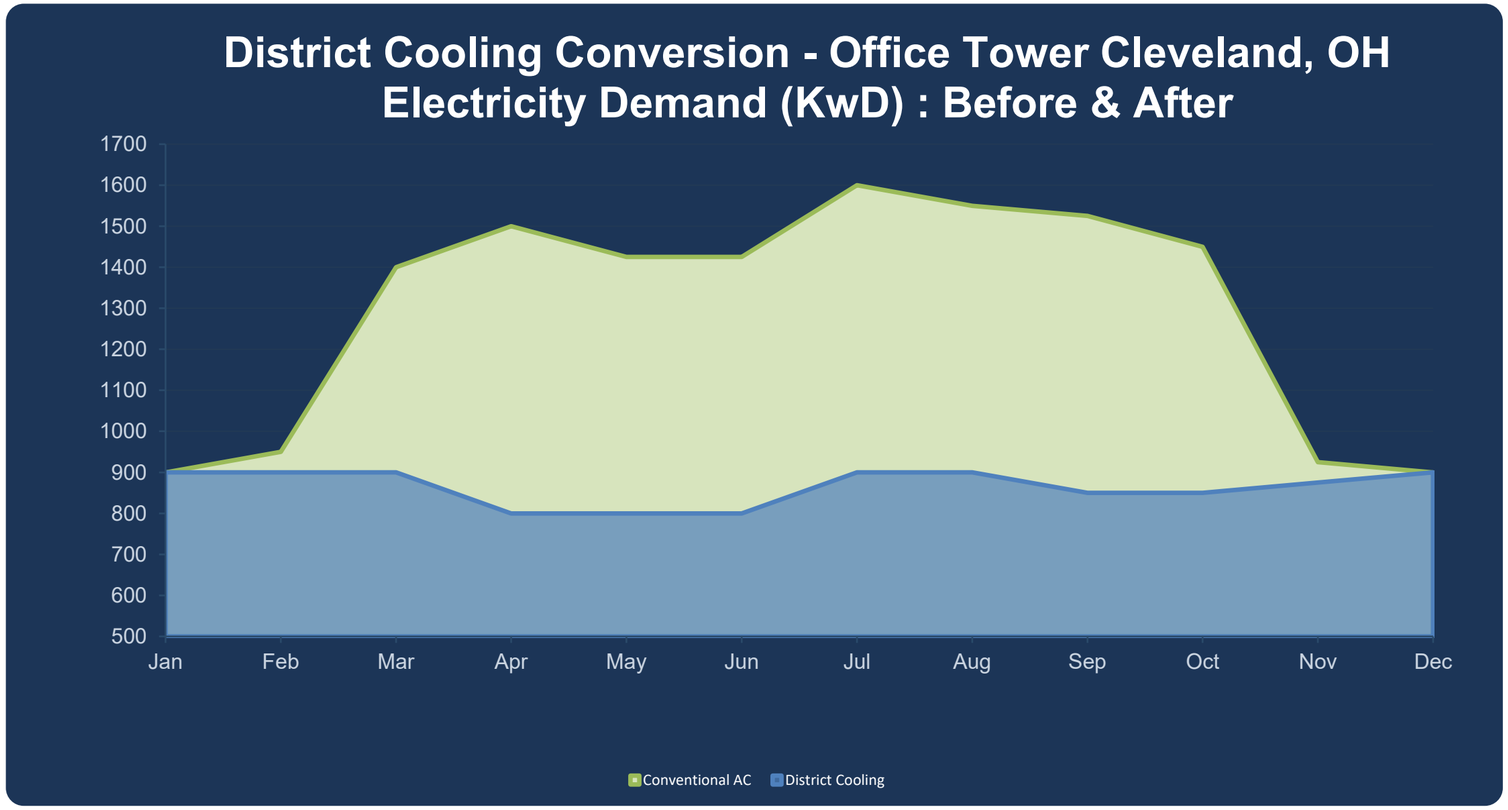
1-3°C

urban heat island effect from individual AC units

As cities grow denser and temperatures rise, cooling becomes a public health necessity.

District Cooling: The Value Proposition

District cooling delivers comfort while cutting peak power demand—essential infrastructure for cities in a warming world.



Source: IDEA member data—Commercial building, Cleveland OH

Peak Shaving

Removing on-site electric chillers from the building flattens electricity demand—avoiding peak power usage during extreme pricing and grid events

Community Scale Solution

Central plant scale enables thermal storage; renewables integration; industrial heat pumps; heat recovery/reuse; geo-exchange and lake/ocean/river water for condenser/seasonal.

Grid Resilience

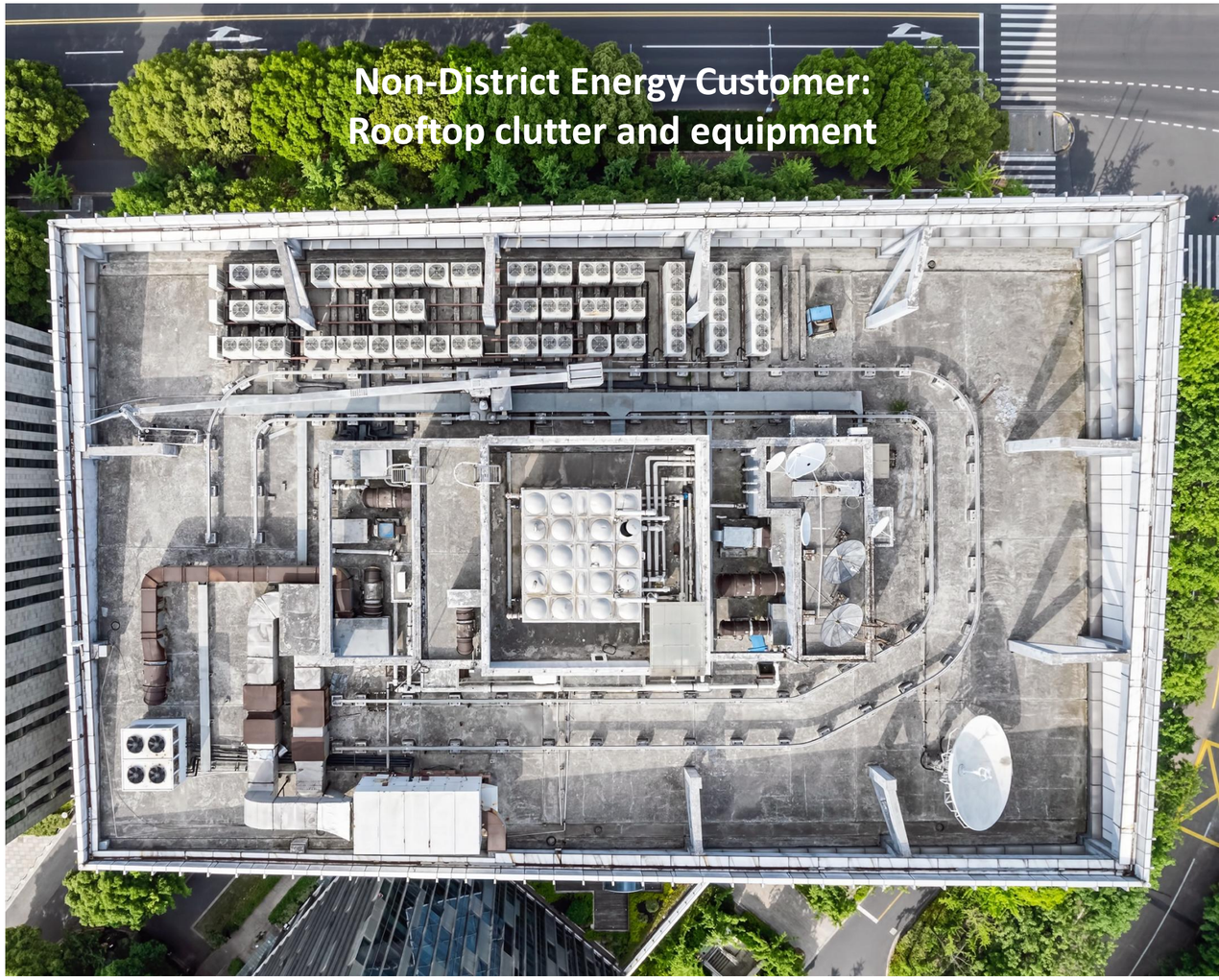
Industrial-grade centralized systems support critical loads and support demand response in constrained grid locations

Building electricity demand reduced ~50%

Variance <2% year-round with district cooling

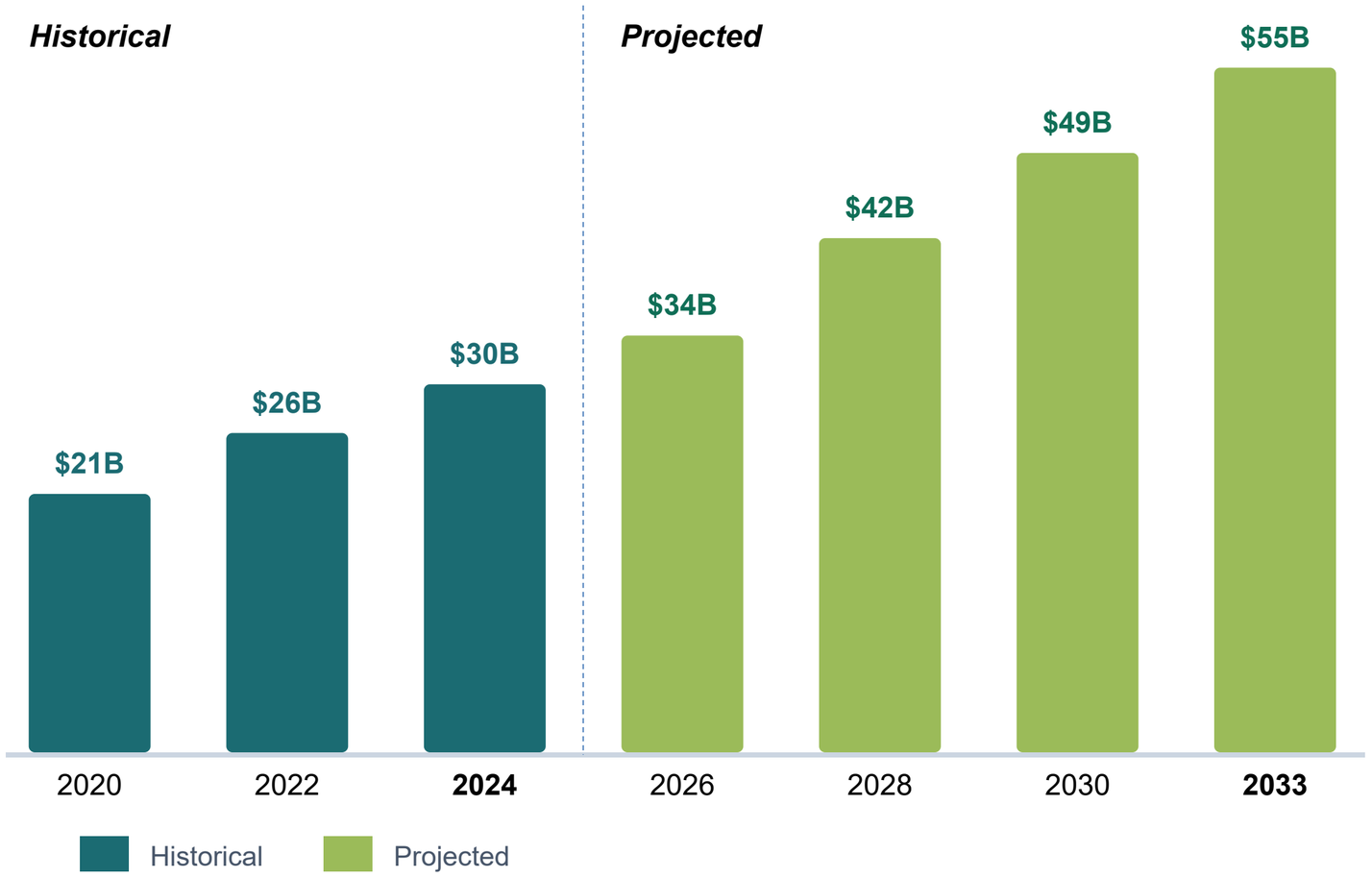
Generating Value for Customers

District energy unlocks real estate value by eliminating bulky rooftop and basement equipment—freeing space for tenant amenities, leasable square footage, and higher property value.



Global Market Momentum

The global district cooling market is projected to double over the next decade.



Cities Are Advancing Cooling Plans

National cooling action plans in Southeast Asia, the Middle East, and South Asia are embedding district cooling as a primary demand-side management pathway.

Middle East Sets the Scale Template

Dubai's Empower system—the world's largest district cooling provider at 1.64M RT—demonstrates what strategic investment over 20 years achieves.

Policy + Finance Are Aligning

IFC, World Bank, and development banks are actively structuring district cooling projects in new markets, lowering first-mover risk for cities and developers.

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Analysis based on market forecasts from Straits Research, Fortune Business Insights, and Data Bridge Market Research

The Scale Template: From Dubai to the World

What 20 years of strategic investment looks like—and what new markets can replicate.

Best Practice Case:

District Cooling Development in Dubai

1.7M RT (installed) 2.0M RT (contracted)

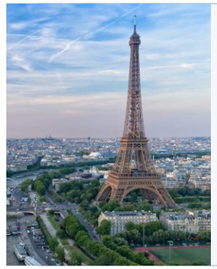
Over 20 years, Empower Energy Solutions used an innovative risk/revenue business model with anchor-load contracts to support planned, incremental growth for mixed-use developments, government buildings, and airports, providing revenue certainty aligned with successive plant investments.

The result: Empower is the world's largest district cooling service provider, and Dubai's electricity grid carries significantly less peak cooling load than comparable cities—and the infrastructure is positioned to further decarbonize as the UAE's grid evolves.

Other Proven Systems

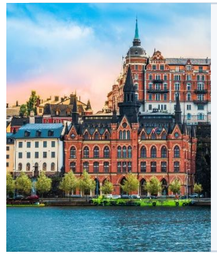
Singapore: Marina Bay

District cooling built into the urban design of a new CBD from day one—demonstrating replicability in high-density Asian markets.



Paris: Fraîcheur de Paris

The City of Paris intends to double capacity of district cooling infrastructure to meet growing urban cooling demand, address public health & safety and preserve landmark architecture.



Stockholm: Fortum

Integrated district heating and cooling in a Nordic climate—showing that sector coupling extends district energy well beyond hot-climate markets.

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Enabling Conditions: What Makes District Cooling Scale

The technology exists. The cases are proven. What separates markets that scale from those that stall is policy, finance, and planning.

Policy & Regulatory Frameworks

- Embed district cooling in national cooling action plans and demand-side management strategies
- Mandate or incentivize connections in high-density new developments
- Send clear, long-term policy signals that unlock private capital.

Finance & Development Capital

- Concessional finance from IFC and World Bank to catalyze first-mover markets
- Anchor load contracts (government buildings, airports) de-risk early-stage systems
- Long-term revenue certainty through regulatory frameworks matched to infrastructure timescales

Urban & Infrastructure Planning

- Integrate district cooling into master planning for new developments and urban regeneration
- Reserve corridor rights-of-way for thermal piping alongside power and transit
- Coordinate cooling strategies with grid planning to optimize peak demand management

From Proven Cases to Global Scale

District cooling delivers the trifecta cities need: **climate progress, grid resilience, and energy affordability.**

Today's panel will explore:

- Operating experience and industry outlook
- Policy and finance enabling conditions
- Pathways for replication in new markets

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

CoolTalks

The UNEP Cool Coalition webinar series

MODERATOR

Leading the conversation

Meghan Riesterer

Second Vice Chair, Executive Committee

Board of Directors

International District Energy Association

Cool Talks

The UNEP Cool Coalition webinar series

PANEL DISCUSSION

Industry Outlook and Enabling Conditions

Ahmad Bin Shafar

Chief Executive Officer

Empower

Oddgeir Gudmundsson

Director, Projects

Danfoss

Sudheer Perla

Senior Advisor, District Cooling

UNEP Cool Coalition

Alexander Sharabaroff

Senior Energy Specialist

World Bank

UNEP COOL COALITION WEBINAR · APRIL 2026

Cool Coalition
a UNEP-convened initiative

District Cooling in India

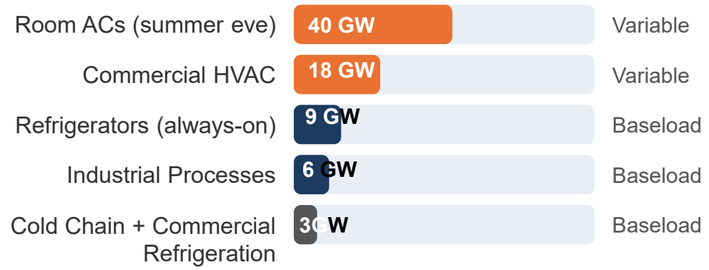
Industry Outlook & Enabling Conditions

Setting the Context: Cooling's Role in India's Energy Mix

256 GW

India's record peak power demand · April 2026

~75 GW (30%) of this peak is going towards Cooling



Over 70% of India's Cooling is currently powered by Coal

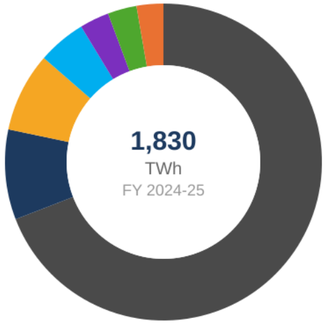
Time of Day	Coal %	Solar/RE
Evening ACs (6–10 PM)	78–85%	0%
Office HVAC (11AM–2PM)	50–60%	25–35%
Baseload 24/7	71–74%	5–8%

DCS+TES shifts load from coal-peak evening to solar midday.

~130 GW

Projected by 2030 — ACs doubling from 60M to 120M+ units

Total installed capacity: 475 GW · End FY 2024–25

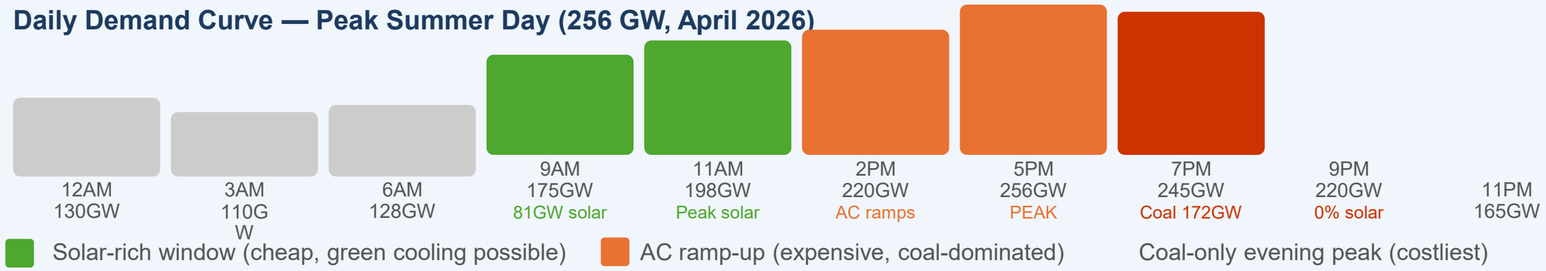


Source	TWh	Share
Coal	1,265	69%
Hydro	168	9%
Solar	148	8%
Wind	90	5%
Nuclear	55	3%
Gas	50	3%
Others	54	3%

Despite 48% non-fossil installed capacity, coal provides 69% of actual generation · FY'25 · Source: CEA

INDIA'S DAILY ELECTRICITY DEMAND PROFILE — WHERE COOLING SITS

Daily Demand Curve — Peak Summer Day (256 GW, April 2026)



Duck Curve: The Grid Crisis

Solar peaks 81 GW at 11AM; demand peaks at 5PM. Coal must ramp 120 to 172 GW in 6 hrs. Each GW of AC requires 1.5–2 GW of coal backing.

DCS + TES: The Solution

TES is 5–8x cheaper than BESS. Every 10 TR of DCS shifts ~15 kW off coal peak.

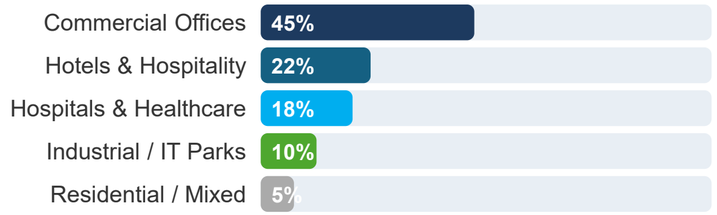
District Cooling in India: The Untold Story

Cool Coalition
a UNEP-convened initiative

322K TR

operational DCS capacity · 73+ projects measured by BEE guidelines

INSTALLED CAPACITY BY SECTOR



ANCHOR CASE STUDIES

DLF Cyber City, Gurugram- Now De-commissioned
45,000 TR | 28M sq ft Grade-A offices | 35% energy savings vs split ACs | ₹250 Cr | BEE 4★

GIFT City, Gandhinagar — Merchant Utility
25,000 TR operational | First independent cooling utility in India | GIFT ICT (GIL) as licensed DC operator | Serves financial district

Infosys Campus Network
~50,000+ TR captive DCS across 22+ campuses | LEED Platinum | Centrifugal chillers + TSE condenser water

Amaravati, Andhra Pradesh
First **government-mandated PPP DCS** | ~20,000 TR planned for capital city core zone

NET-ZERO BUILDINGS: INDIA'S INVISIBLE DCS STORY

India: World Leader in LEED Platinum

- Most Net-Zero and LEED Platinum projects globally — Majority use **captive campus DCS technologies**
- Centrifugal chillers (0.45–0.65 kW/TR) + TSE condenser water & pre-insulated piping across 2-10 buildings in campus
- Radiant cooling, DOAS & secondary side interventions to reduce sensible and latent loads

TECHNOLOGY STACK: INDIA VS. GCC

Top performing buildings in India are already designed 2x more efficiently than buildings connected to District Cooling in the GCC countries

Floor area per RT of installed chiller capacity:

700–1,000
sq ft per RT · India
>2x more efficient than GCC

VS.

250–300
sq ft per RT · UAE/GCC
Standard design benchmark

THE MISSING PIECE: FROM CAPTIVE TO COMMERCIAL UTILITY

Not Technology — A Business Model Problem

- All 73+ projects are **captive campus models**: owner builds & operates for own buildings only
- Missing: **Merchant Cooling Utility:** an independent operator selling chilled water across multiple buildings (Singapore, UAE, Scandinavia)
- GIFT City is the only operational merchant model;

The Scale-Up Opportunity

- **15x gap:** 322K TR installed vs. >4.8M TR technical potential by 2030
- **ToD arbitrage:** TES commercially self-sustaining
- **Grid dividend:** 10% DCS penetration avoids up to $9bn T&D capex
- Unlocking requires a **merchant utility regulatory framework** — the single missing enabler

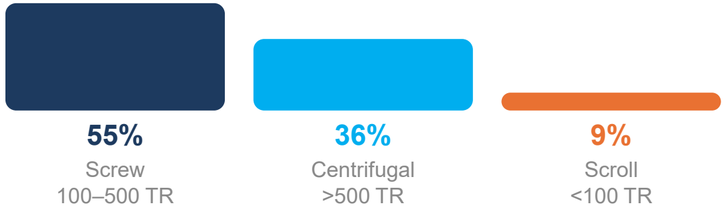
Market Opportunity: India's Local Manufacturing Ecosystem

INDIA CHILLER MARKET — SIZE & SEGMENTATION

~$740M

Annual chiller market (2025) · ~9M TR installed base

By Compressor Type



55%
Screw
100–500 TR

36%
Centrifugal
>500 TR

9%
Scroll
<100 TR

Water-cooled: 53.6% of market — backbone for DCS & large commercial · DC segment CAGR: **12.4%** · New installations: **~1.1M TR/yr**

KEY INDUSTRY PLAYERS

Domestic Manufacturing Base in India

Carrier
Centrifugal & screw chillers; Gurugram & Hyderabad plants

Daikin
Chillers & VRV; Rajasthan

Trane (Ingersoll Rand)
Large centrifugal; Pune manufacturing & service hub

Blue Star / Voltas
Leading Indian OEMs; I

Danfoss / Alfa Laval
Drives, valves & heat exchangers; Chennai & Pune plants

Grundfos / KSB
Pumps & motors; Pune & Bengaluru; core DCS equipment

CHILLER MARKET GROWTH TRAJECTORY

MAKE IN INDIA & R&D INNOVATION ECOSYSTEM

Localisation Trajectory: 40% → 65–75% by 2035

- Heat exchangers, cooling towers, pumps, piping —domestic already
- Pre-insulated pipes & energy transfer stations (ETS): currently imported. Can be fully localized in 3 years
- Centrifugal compressors & refrigerants: remaining import gap

Live R&D & Manufacturing Investments

Daikin — Compressor Manufacturing (Neemrana)
First OEM to localise compressor manufacturing in India; reduces import dependence & cuts DCS plant costs.

IIT-M & IIT-B — TES Materials R&D
PCM slurries & ice-on-coil storage optimised for tropical climates; targeting 50% cost reduction vs. imports.

Thermax — Absorption Chillers
Indigenous absorption chiller design for waste heat & solar integration; PLI-eligible; reduces import reliance.

Export: Voltas, L&T, AECOM India already supplying DCS EPC to Middle East

The Role of DCS: Market Transformation & Climate Impact

Cool Coalition
a UNEP-convened initiative

~4.8M TR

Potential DCS market by 2035 if 12.5% of existing chiller base adopts a merchant DCS model

9x+

growth vs. 322K TR installed today — without any regulatory frameworks

$7.2 B

incremental DCS investment at $1,500/TR plant cost

Merchant DCS can be a natural evolution for the chiller market. Every large chiller project in an urban cluster is a latent DCS project awaiting the right regulatory framework.

ELECTRICITY DISTRIBUTION, CLIMATE & SOCIETAL IMPACT

Electricity Grid & Distribution

- **6–8 GW peak reduction** with 12% DCS penetration → Upto $ 9B T&D capex avoided
- TES shifts cooling load from coal-heavy evening to solar midday (offering a 50% DISCOM cost reduction)
- Deferred distribution network upgrades in commercial zones — direct relief for state DISCOMs
- Reduces substation loading & peak feeder congestion in urban commercial districts

Climate Impact

- Refrigerant re-fill market in India at $800 M from 32,000 T of HFC refrigerant leaks
- DCS = fewer HFC refrigerant leak points vs. millions of individual AC units
- Similarly, cumulative emission reduction by 2035 (TES solar shift + higher COP) can >60 $MtCO_2$
- Urban Heat Island (UHI) mitigation: centralised heat rejection towers vs. distributed AC outdoor units across rooftops
- Water circular economy: TSE as condenser water closes the sewage-to-cooling loop

Societal Impact

- Thermal comfort equity: lower OpEx model makes cooling accessible to all classes of society
- District Cooling contributes to 8 SDGs- from saving lives during heat waves to creating skilled employment and building more sustainable cities
- Reliable 24/7 cooling for hospitals, pharma plants & data centres — critical infrastructure resilience

6–8 GW
Peak demand avoided

60 $MtCO_2$
By 2035

8
SDGs

Policy Landscape: Implemented Initiatives & What's Next

✓ IMPLEMENTED — CENTRAL GOV'T

MoEFCC · 2019
India Cooling Action Plan (ICAP)
First national cooling roadmap; recognizes role of DCS for commercial & urban zones; sets medium term targets

BEE · 2019
DCS Performance Guidelines
India's first DCS guidelines to increase awareness and support project development

MoEFCC · 2021
Techno Economic Feasibility Study
National DCS potential mapping across cities; forms investment-decision basis for state govts & developers.

UNDER CONSIDERATION — CENTRAL

AHEAD ($750M, World Bank): EE upgrades incl. DCS feasibility studies in commercial districts; under implementation

BEE-UNEP DCS Hub: National knowledge & coordination platform; connecting developers, financiers & policymakers; launched 2025

✓ IMPLEMENTED — STATE GOVTs

Maharashtra — MERC Concessional Tariff
MERC concessional electricity tariff for licensed DCS utilities; reduces OpEx & improves project viability.

Andhra Pradesh — Amaravati PPP DCS
India's **first govt-mandated PPP DCS**; ~20,000 TR for Amaravati capital zone; under implementation.

Telangana — Pharma City PPP DCS
PPP DCS **awarded** at Hyderabad Pharma City; first industrial-use DCS on PPP basis in India.

Gujarat — GIFT City Merchant Utility
25,000 TR **operational**; GIL as licensed independent cooling utility for IFSC. *India's only active merchant DCS.*

UNDER CONSIDERATION — STATE

Chennai: Inclusion of DCS under the City's new masterplan under development

Mumbai: Several active projects under consideration

⚠ CRITICAL POLICY LEVERS YET TO BE ACTIVATED

1. **Merchant Cooling Utility Licensing:** No framework to sell chilled water across property boundaries. Needs Electricity Act amendment or standalone DCS Act (cf. Singapore 2001).
2. **ToD Tariff and Concession Tariffs:** Needs CERC national mandate.
3. **Public Utility Status & TSE Off-take Structures**
4. **ECBC 2.0 DCS Zone Mandate:** Mandatory DCS connection for buildings >10,000 sq m in designated zones — de-risks merchant investment via guaranteed offtake.

POLICY GAP VS. OPPORTUNITY

What Exists
ICAP ✓ BEE Guidelines ✓ Techno-Economic Study ✓ MERC tariff ✓ State PPP pilots ✓

What's Missing
Utility licence ☐ ToD national ☐ TSE rights ☐ ECBC mandate ☐

The Unlock: India has demand (256 GW peak), financing (AHEAD in progress), and technical standards (BEE). The single remaining bottleneck is the *commercial & regulatory framework* for Merchant Cooling Utilities.

Way Forward: The District Cooling Roadmap for India (2025–2035)

Cool Coalition
a UNEP-convened initiative

PHASE 1
Foundation & Pilots
2025–2027

★ **BEE-UNEP DCS Hub — Foundational Platform**
National knowledge, coordination & project development hub (launched 2026). Six pillars of work:

- Govt. Coordination & Policy
- Project Development Support
- Knowledge Products & Repository
- Market Research & State Plans
- Stakeholder Engagement
- Capacity Building & Training

2 **State Feasibility Studies**
6-state studies (TN, MH, AP, TG, Delhi, GJ) to identify and develop anchor projects through PPP concession frameworks

3 **Merchant Utility Regulatory Framework**
Draft licensing model; pilot in GIFT City & Hyderabad with private operators

4 **Data Centre Anchor Tenant Scheme**
3–5 hyperscale DCs as anchors for merchant DCS in Mumbai, Chennai or Hyderabad

Key Enabler
Foundation: DCS Hub + Project Development+ Merchant utility license

PHASE 2
Scale-Up & Manufacturing
2027–2030

1 **5 Anchor Merchant DCS Projects operational**
GIFT City (25K TR), Hyderabad (50K TR), Mumbai (40K TR), Chennai Knowledge City (60K TR), Amaravati (30K TR)

2 **Activate ToD Tariff — National**
CERC mandate; DCS+TES self-sustaining without subsidy

3 **Make in India & ECBC Mandate**
PLI for compressors & ETS; 65% local content; ECBC 2.0 DCS zone mandate (>10,000 sqm)

4 **Green Finance Mobilisation**
IFC, HUDCO green bonds; AHEAD de-risk first 30% of project cost

Key Enabler
Finance + Tariff: ToD rollout + AHEAD/BHAVYA + IFC green bonds + PLI

PHASE 3
System Transformation
2030–2035

1 **4.81M TR DCS Installed**
322K TR (2024) → 4.81M TR (2035): 15x; $7.2B+ market

2 **Upto 8 GW Peak Reduction**
12% DCS penetration avoids 6–8 GW grid capacity; $9 B T&D capex saved

3 **Full Solar-Cooling Integration**
80%+ of cooling on solar hours; >60 $MtCO_2$ cumulative reduction by 2035

4 **India as Regional DCS Export Hub**
Indian DCS systems & EPC firms supplying South Asia, SE Asia & Africa

Key Enabler
Technology: TES at scale + Solar integration + Indigenous manufacturing

UNEP Cool Coalition invites all stakeholders — policymakers, financiers, developers, technology providers — to join the DC Hub and co-create India's district cooling transformation. **Together, we can make district cooling India's most impactful climate solution by 2030.**

Cool Talks

The UNEP Cool Coalition webinar series

Thank you

RECORDING & MATERIALS

Recording, presentations and summary article will be available shortly.

NEXT COOL TALK • 16 MAY

Taxonomies for Financing Efficient Consumer Appliances