



CONFERENCIA INTERNACIONAL ENERGÍA DISTRITAL LAC 2025



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District Energy: Scalable Solutions for Sustainable Urban Growth



About IDEA



- **Founded in 1909** with headquarters near Boston, MA, USA
- A nonprofit industry association representing **over 3,000 members from 28 countries.**
- Advancing best practices/advocating for community-scale thermal energy systems for **over 115 years.**
- Members include: District energy systems in cities, communities, campuses, clusters, and airports, as well as equipment, technology, and service providers.





Urbanization is accelerating.

1900

Global population: **1.6 billion**
Urban population: **220 million**
Cities over 1 million: **12**

2025

Global population: **8.2 billion**
Urban population: **4.6 billion**
Cities over 1 million: **548**

2030 (Projected)

Global population: **~8.5 billion**
Urban population: **~5 billion**
Cities over 1 million: **~706**

2050 (Projected)

Global population: **~9.7 billion**
Urban population: **~6.6 billion**
Cities over 1 million: **~865**



Concentrated energy use in cities strains resources.

Urban areas account for more than **70% of global energy consumption** and nearly **50% of greenhouse gas emissions**.

In many cities, heating and cooling account for **50% of primary energy use**, placing enormous strain on electric grids and aging infrastructure.

Cooling in cities is critical to **offset urban heat islands** and is becoming critical for **public health and safety**.



**Climate-related
events and costs
are increasing.**

2000–2004: **\$237.2 billion**

2005–2009: **\$328.0 billion**

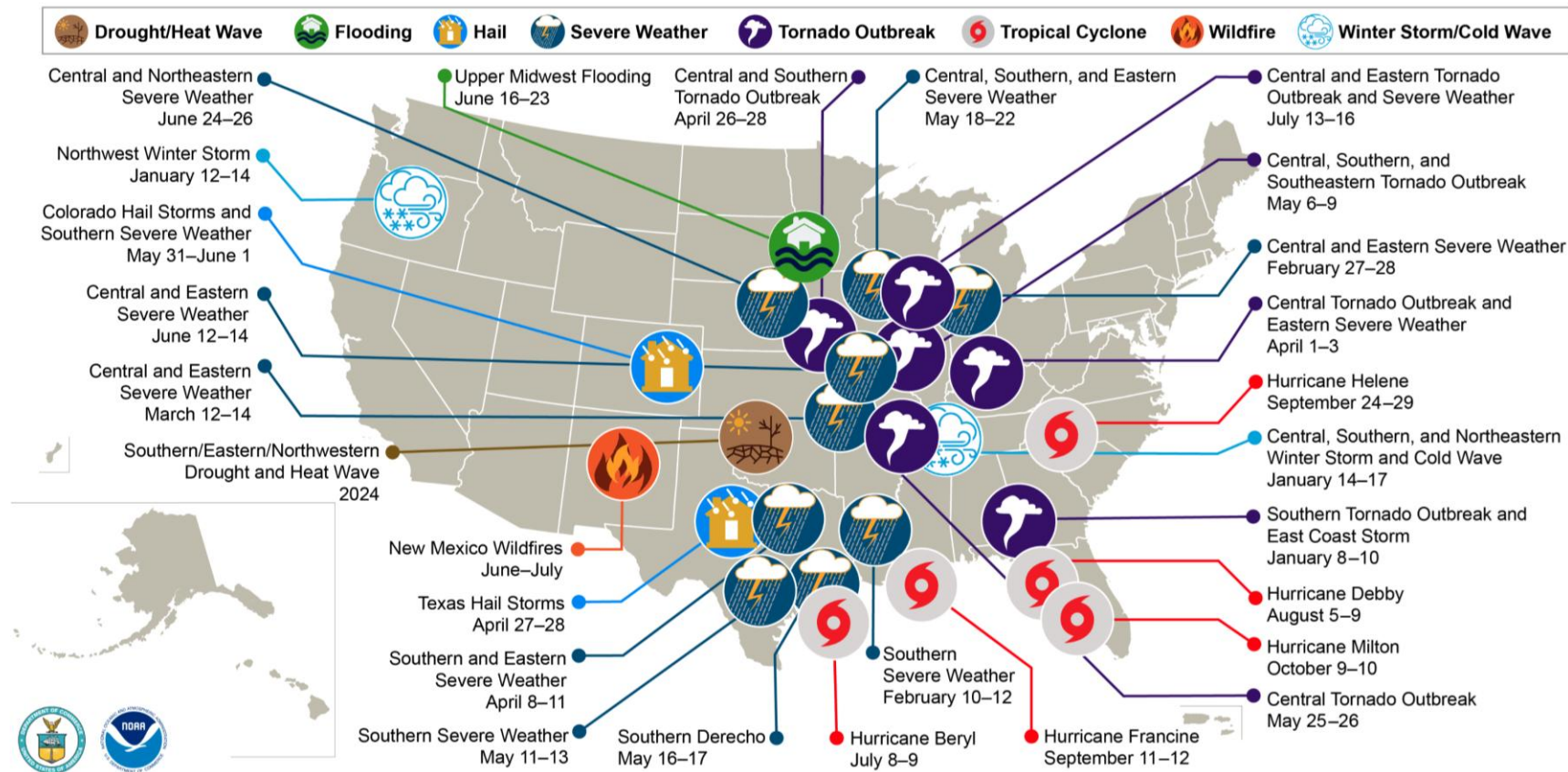
2010–2014: **\$416.0 billion**

2015–2019: **\$510.3 billion**

2020–2024: **\$746.7 billion**

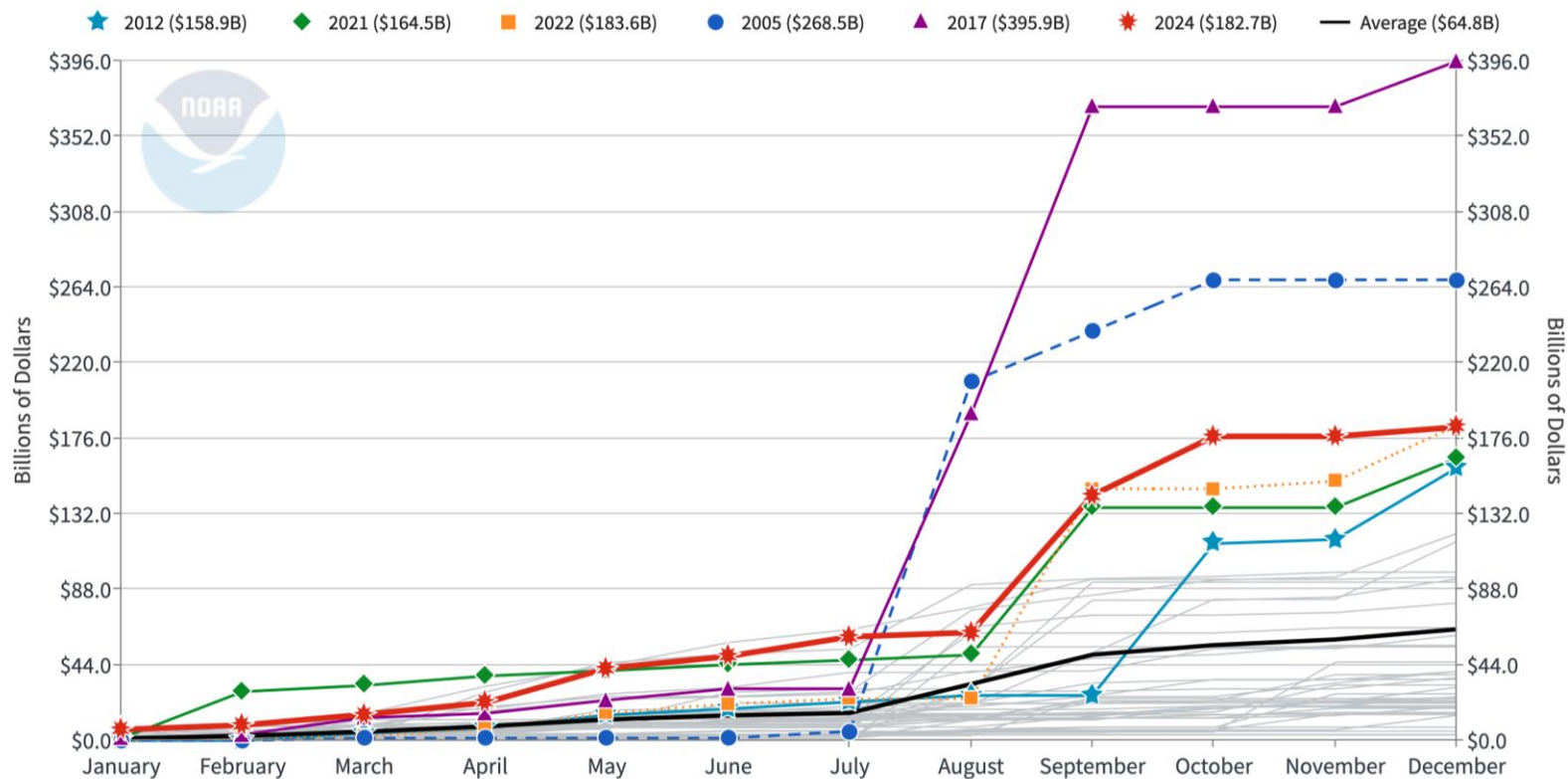
5-year annual average:
\$149.3 billion per year

U.S. 2024 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 27 separate billion-dollar weather and climate disasters that impacted the United States in 2024.

1980–2024 United States Billion-Dollar Disaster Year-to-Date Event Count (CPI-Adjusted)



Updated: January 10, 2025

Event statistics are added according to the date on which they ended. Powered by ZingChart

Why District Energy?

District energy is purpose-built for dense, urban environments by aggregating heating & cooling demand, reducing peaks, and integrating cleaner energy—delivering efficient, low-carbon energy services at scale. **It's the resilient infrastructure that smarter cities demand.**

- **Customer Scale Enables Smarter Systems:** Aggregating the heating/cooling needs of dozens of customer buildings creates economies of scale to enable investment in fuel flexibility and local resources.
- **Energy That Works Harder:** Thermal systems boost efficiency, reduce costs, and cut emissions.
- **Sourcing That Adapts in Real-Time:** Use, make, or buy energy based on cost or carbon intensity.
- **Peak Shaving Delivers Cost Savings:** Reduce total energy consumption and avoid costly fuel and demand spikes.
- **Built-In Resilience:** Industrial-grade equipment supports critical loads, enables islanding, and withstands extreme events.
- **Integration-Ready Infrastructure:** Seamlessly connects to storage, renewables, and power generation.

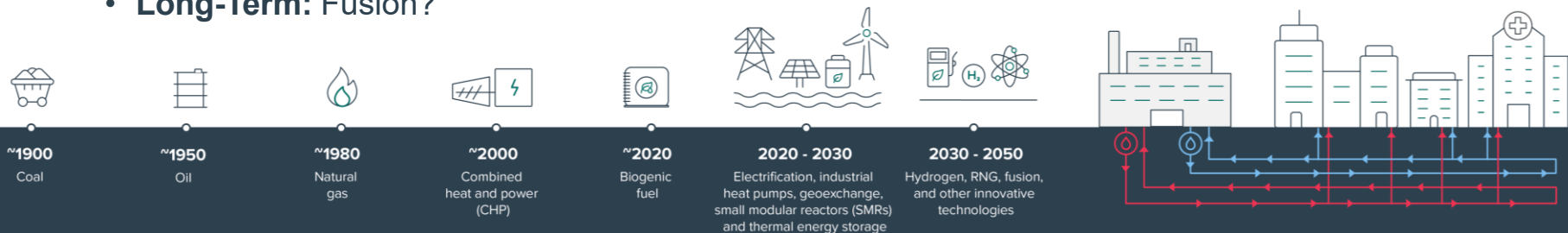


Designed to Evolve and Adapt: A Century of Cleaner Fuel Switching and Technology Innovation

- For more than 100 years, district energy systems have evolved—shifting to cleaner fuels and pioneering technologies to lower emissions—maximizing flexibility, resilience, and ROI over time.
- These systems are built to “**plug and play**” emerging solutions without full system overhauls.
 - **Today:** Industrial heat pumps, thermal storage, electric boilers, energy from waste, geo-exchange
 - **Mid-Term:** Small Modular Reactors (SMRs)
 - **Long-Term:** Fusion?

Strategic advice

Act now to meet today's decarbonization goals by planning thermal infrastructure with a 50–100-year horizon.



District Energy: A Flexible Platform for Technology Integration

Built for integration, district energy systems create economies of scale—making it feasible to deploy advanced, low-carbon technologies as policies shift, markets mature, and innovation accelerates.

“A Quiver of technologies,” not a single arrow.

Diverse Technology Pathways

CHP & Microgrids:

Con Edison, MIT, & Harvard University use CHP to reduce emissions and increase resilience.

Industrial Surplus

Heat: Dunkirk, France, recovers heat from steel production, cutting costs, retaining jobs, and decarbonizing industry.

Energy From Waste:

Copenhagen's Copenhill facility turns trash into heat for buildings.

Biomass: Widely deployed in Sweden and Finland to sustainably heat cities and rural districts. Prince Edward Island biomass

Lake & Ocean Water Cooling:

Enwave Toronto & Cornell University use deep lake water to cut electricity use for cooling by up to 90%.

Energy Recovery - Stanford University

heat recovery chillers and heat pumps, energy recovery.

Geo-Exchange at Scale Princeton University

seasonal heat storage during cooling; heat extraction in winter.

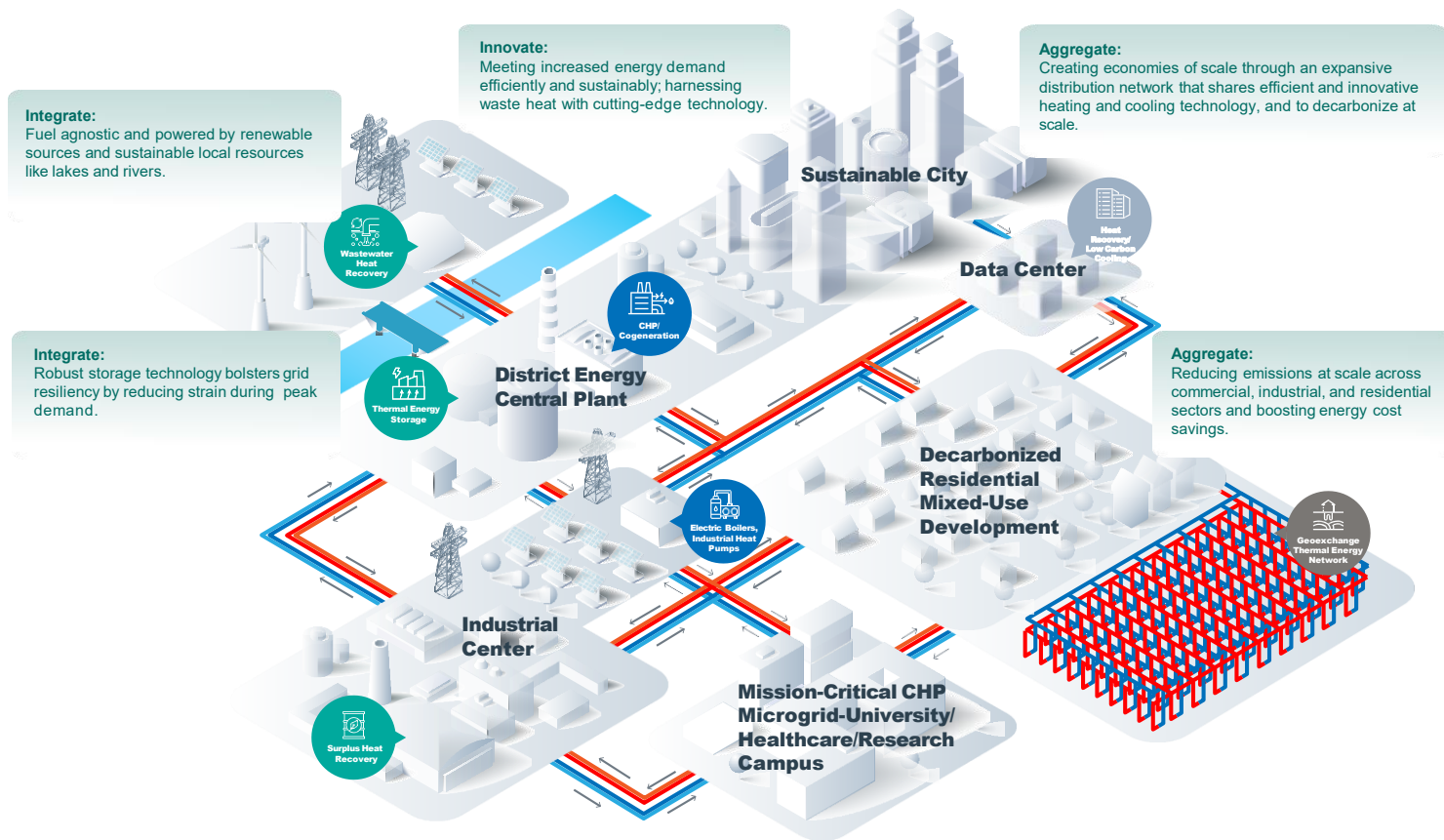
Data center Heat Export: Amazon's Seattle campus captures and reuses heat from IT infrastructure. UVA will recover data center heat.

SMRs (Small Modular Reactors):

Helsinki is building next-generation SMRs to provide clean, resilient heat for urban districts.

District Energy Networks (DENs): Aggregate, Integrate, Innovate

A Blueprint for Efficient, Resilient and Sustainable Cities, Communities and Campuses



600

District Energy systems are operating in US cities, on college and university campuses, and at healthcare facilities, military bases, airports, and corporate headquarters, including Meta, Apple, and Google.

District energy networks distribute **steam, hot water, or chilled water through underground piping systems** to multiple connected buildings, creating economies of scale to enable investment in **lower-carbon solutions**.

The scale creates opportunities to integrate a range of technologies to optimize **energy efficiency**, **leverage local resources**, **strengthen the regional grid**, and **enhance economic resilience**.



Manhattan: Clean Steam in the Heart of NYC

System: Con Edison Steam System

Start Date: 1882; modernizing in 20th century

Scale: Largest in U.S.; serves 1,500+ buildings

Key Points:

- Originated to replace thousands of coal furnaces in dense buildings, improve urban air, and reduce the risk of fires.
- Dramatically cut chimney soot and urban air pollution.
- Today provides space heating, domestic hot water, cooling, humidification, and sterilization in a dense, vertical energy-intensive market.
- Combined heat & power (CHP) recovers surplus heat to produce least carbon-intensive energy.
- Critical asset to accelerate electrification of steam supply, reduce compliance costs and mitigate disruption.

Boston and Cambridge: Electrifying a Historic Network

System: Vicinity Energy District Energy System

Start Date: 1948, Ongoing electrification and modernization

Scale: Downtown Boston and Cambridge

Key Points:

- CHP provides reliable steam distribution while enabling clean energy integration.
- A 42 MW electric boiler enables a shift to renewable power during favorable grid conditions.
- Planned integration of industrial heat pumps using the Charles River as a source and thermal storage to manage peaks.
- System upgrades enable compliance with BERDO (Boston) and BEUDO (Cambridge) carbon mandates.
- A Stepwise approach allows the city to reduce emissions without disrupting critical services.





Vancouver: Private Capital for Public Good

System: Creative Energy (formerly Central Heat) & other citywide networks

Start Date: 1968

Scale: Downtown core and expanding neighborhoods

Key Points:

- Created to combat severe air pollution caused by hundreds of coal and oil-fired boilers.
- Early private investment catalyzed Vancouver's clean energy transition.
- System now incorporates biofuels, sewer heat recovery, geo-exchange, and energy-from-waste technologies.
- District energy is a cornerstone of Vancouver's "Greenest City" and Zero Emissions Building Plan.
- Strong example of how policy, infrastructure, and private capital can unlock local economic value and climate impact.

Beijing: A Transformation Before the World Stage

System: Beijing District Heating Group and municipal upgrades

Start Date: Modern overhaul began in the 1990s; major push before the 2008 Olympics

Scale: Serves over 250 million m² of floor area

Key Points:

- Historically reliant on small coal boilers, a major source of smog and particulate matter.
- Olympic investment led to the replacement of 44,000+ boilers with centralized systems.
- Massive improvement in air quality is visible within months.
- District energy is now core to Beijing's long-term energy plan.
- Ongoing shift to renewables, heat pumps, and larger clean-energy plants.





Helsinki's Energy Transition: Smart, Scalable, Nuclear-Ready

System: Citywide district heating and cooling network led by Helen Ltd.

Start Date: 1953, added CHP 1960; district cooling 1998; active decarbonization/ expansion underway

Scale: Serving residential, commercial, and industrial sectors with rapidly growing demand

Key Points:

- Combined heat and power provides a resilient, efficient base.
- Harnessing surplus heat from industry and urban systems.
- Capturing low-grade heat from data centers to serve citywide networks.
- Rapid growth in housing fuels system scale and reach.
- Steady Energy is pursuing small modular reactors (SMRs) for heat-only applications—showcasing bold, low-carbon innovation.

Paris Powers Ahead: Cooling the Olympics and Beyond

System: Paris District Cooling Network

Start Date: 1967; major expansion underway through 2030

Scale: Doubling network size to over 500 MW of cooling capacity by 2030

Key Points:

- ENGIE is delivering low-carbon cooling to 2024 Olympic Village, designed to serve the city long after the games.
- Utilizes Seine River water to reduce electricity use and enhance system efficiency.
- Preserves iconic Parisian architecture by eliminating rooftop mechanicals and freeing up valuable real estate.
- Combines energy-from-waste, renewable electricity, and geo-exchange to decarbonize cooling.



Dubai: Scaling District Cooling

System: Empower (Emirates Central Cooling Systems Corporation)

Start Date: 2003

Scale: World's largest district cooling provider; over 1.64 million refrigeration tons (RT) of capacity

Key Points:

- Strategic government and private investment over 20 years.
- Avoided reliance on inefficient, standalone cooling units across Dubai's dense urban developments.
- Reduces electricity demand and water use by up to 50% compared to conventional AC systems.
- Delivers consistent cooling in a region with extreme temperatures and year-round demand.
- Key contributor to the UAE's national energy strategy and net-zero carbon goals.



Small Cities, Big Impact: District Energy at Community Scale



Burlington, Vermont

A city powered by 100% renewable electricity is planning to create a biomass-fueled district heating network to further decarbonize building heat.

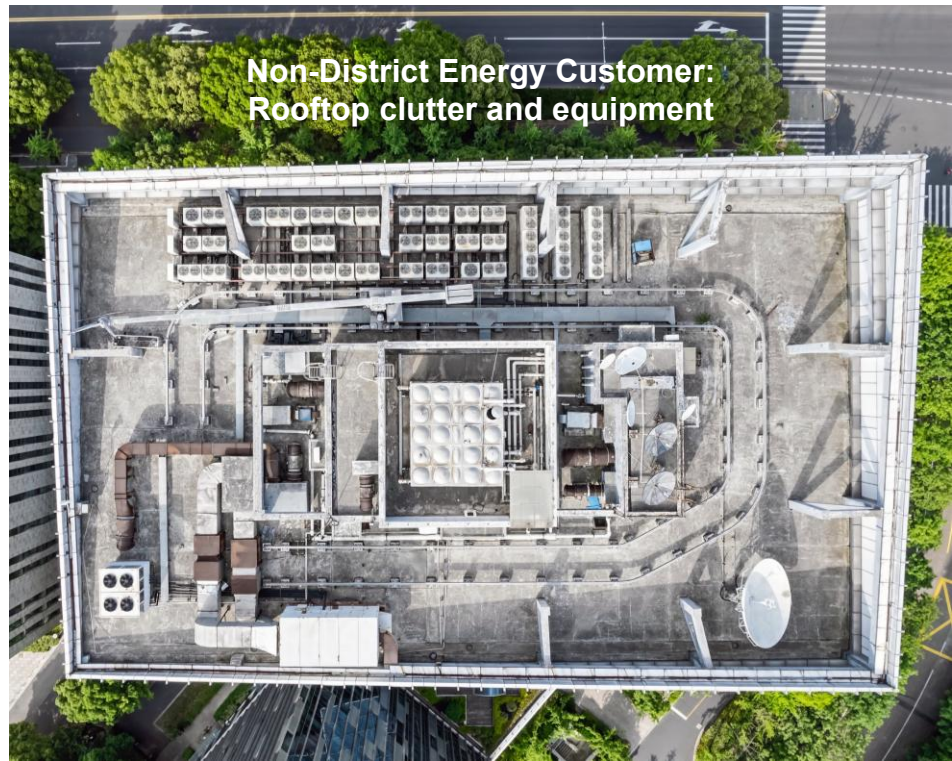
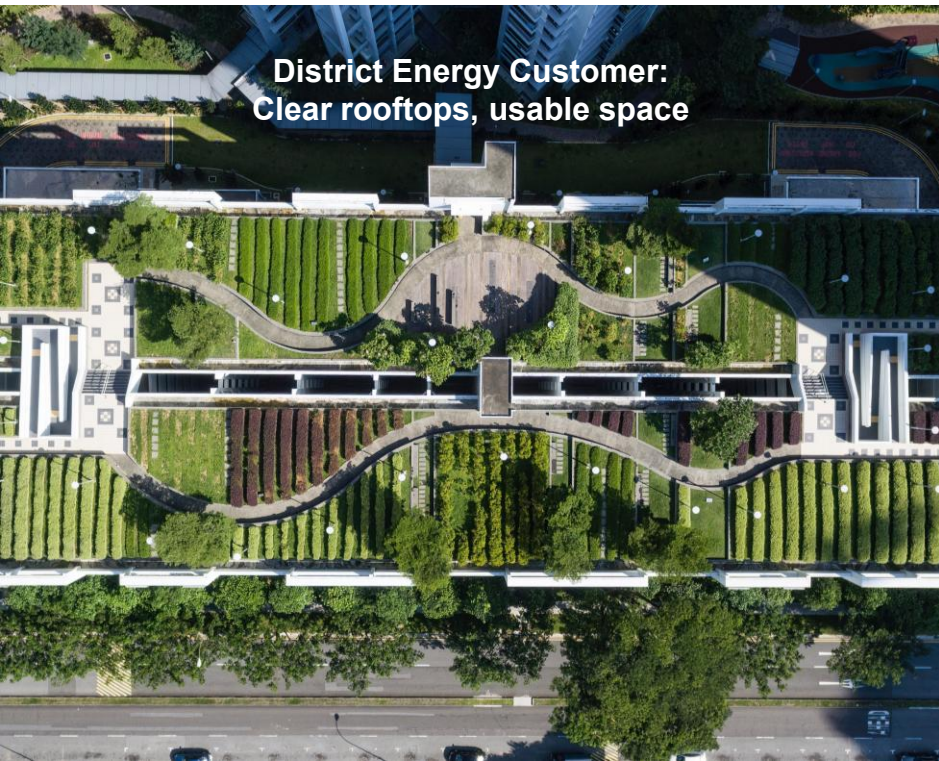


Surrey, British Columbia

The city is expanding its district heating network powered by waste heat recovery, supporting population growth and climate goals.

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.

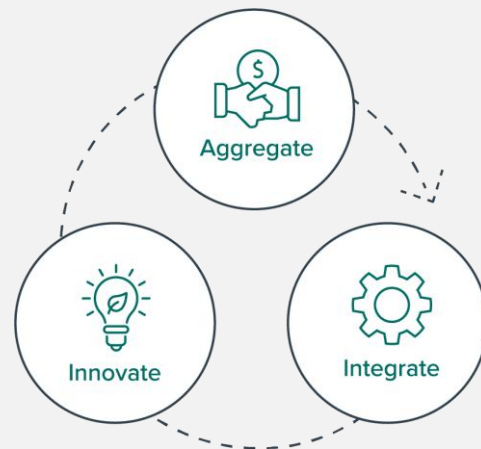


“If You Can’t Solve a Problem, Make It Bigger”

- **Plan for Scale:** Like President Eisenhower’s highways, today’s infrastructure must prioritize scale, resilience, and resource use.
 - **Aggregate:** Start with anchor loads to scale across campuses, districts, and cities.
 - **Integrate:** Link data centers, waste heat, digital twins, and thermal sharing for greater efficiency.
 - **Innovate:** Use advanced tools like digital twins to streamline operations and unlock new energy sources.
- **The Pace Is Quickening:** Urban growth and rising demand require systems that adapt in real-time.

From Linear to Circular

Energy systems must be flexible, iterative, and built to evolve—not fixed in place.



Developing a District Energy System: A Strategic, Iterative Journey

- **Continuous Optimization:** Efficiency, economics, and the environment forms a dynamic loop. District systems allow for scaling up or down over time based on local goals and growth.
- **Flexible Ownership Models:** Public, private, hybrid, or institutional, district energy can be delivered through a variety of proven structures to meet local needs.
- **Global Expertise:** Proven policy frameworks, planning tools, and real-world case studies help cities and stakeholders reduce risk and build with confidence.
- **Built-In Optionality:** Infrastructure that supports choice, adapting to the pace of innovation and shifting market or regulatory conditions.

Timing is everything.

Early action builds long-term value and climate resilience.

“The best time to plant a tree was 50 years ago. The second-best time is today.”



Gaining Momentum: Insights from North America and Around the World

- **Global acceleration underway:** From Canada to Chile, Denmark to Dubai, cities are scaling district energy to meet climate, resilience, and energy sustainability goals.
- **North American resurgence:** Campuses, cities, and utilities are modernizing legacy systems and building new networks with electrification, waste heat, and storage at the core.
- **Danish model of transformation:** Over the decades, Denmark integrated low-carbon fuels into thermal networks, dramatically reducing emissions while improving efficiency and reliability.

The key is to start.

District energy systems evolve—early adopters like Denmark started with fossil fuels and steadily transitioned to renewables.



You're Invited!

IDEA welcomes you to two capital cities next year—Washington D.C. and Ottawa, ON.

For more information, visit districtenergy.org.

CampusEnergy2026

Advancing Thermal Networks

FEB. 17 – 20, 2026 | WASHINGTON, DC



DISTRICT ENERGY

IDEA2026

Connecting Networks

June 23 – 26, 2026 | Ottawa, ON, Canada



IEA DHC



*“Never doubt that a small group of thoughtful,
committed citizens can change the world.
Indeed, it's the only thing that ever has.”*

— Margaret Mead

Thank You

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