

Global View on District Energy

2nd International Conference on District Energy in Chile

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ABOUT IDEA



Formed in 1909: 111th year

501 (c) 6 industry association

2400+ members – 27 nations

56% end-user systems, majority in North America

Major urban utilities, public & private colleges & universities, healthcare, pharma, airports, industry, etc.

www.districtenergy.org

The Energy Challenge for Cities

In 1810, 210 years ago, one (1) city on the planet had population over 1 million – London. Total global population - 1 billion.

In 1910, 100 years later, there were three (3) cities w/population over 1 million. Total global population- 2 billion

Today, in 2020, there are 512 cities with a population over 1 million; 35 “mega-cities” with over 30 million.

Total global population is 7.8 billion; 8 billion expected by 2023.

The Energy Challenge for Cities

As of 2014, about 3.9 billion people live in urban areas; 54% of world's 7.4 billion population

By 2030, urban area population expected to be 4.9 billion

With urbanization and population growth, expected to surpass 6.0 billion by 2050

The Energy Challenge for Cities

Cities account for over 70 percent of global energy use and nearly 50 percent of greenhouse gas emissions worldwide.

In several cities, heating and cooling of buildings can account for over 50% of local energy consumption.

In developing countries (UAE), air conditioning accounts for over 70% of total electricity use.

CITIES SEEKING RESILIENCY & SUSTAINABILITY







U.S. 2017 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 15 billion-dollar weather and climate disasters that have impacted the United States January through September of 2017, a record pace.

Estimated value of total losses in 2017 - \$330 Billion; Insurers Paid Out \$135 Billion



PARADIGM

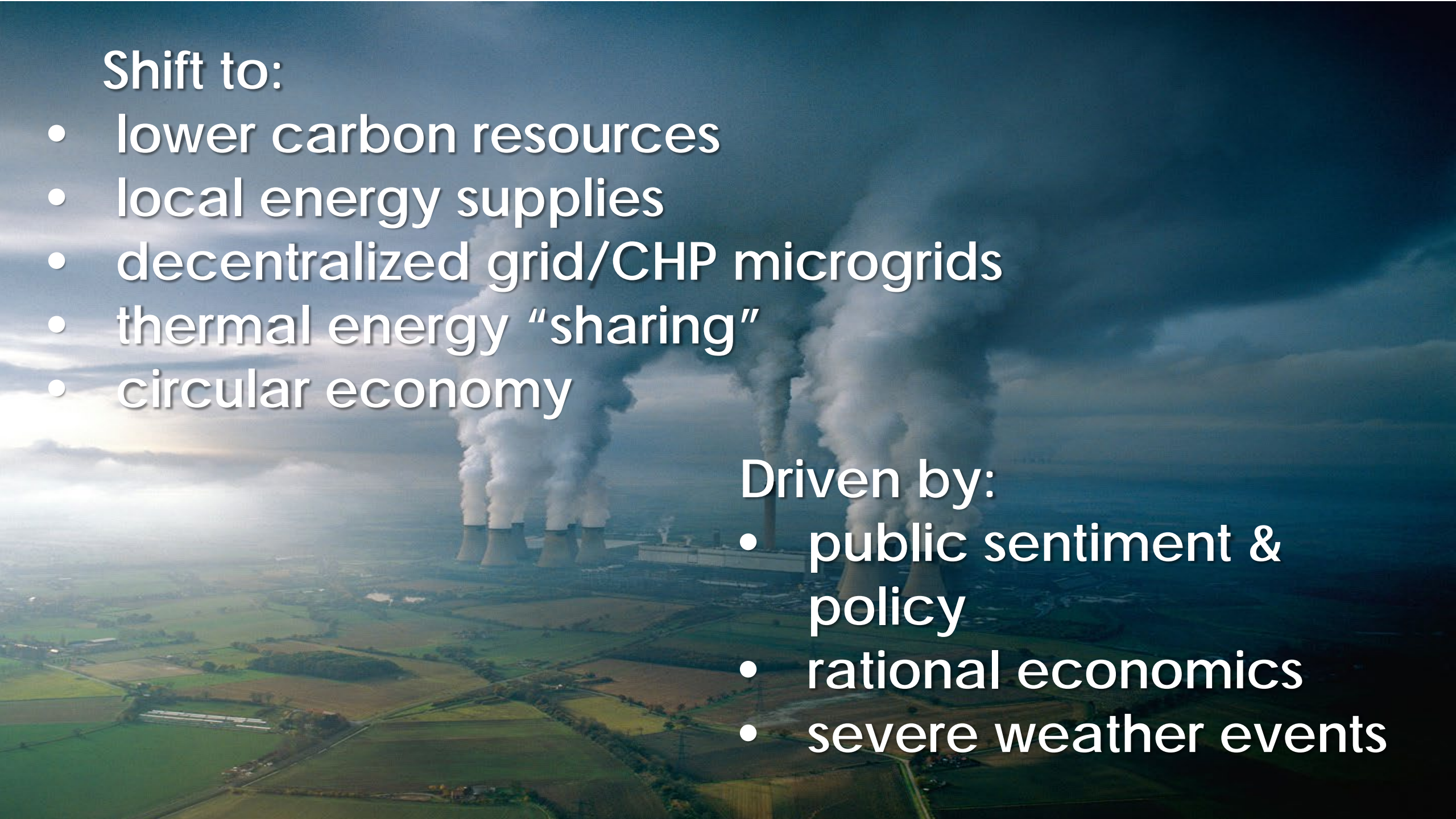
SHIFT

Shift to:

- lower carbon resources
- local energy supplies
- decentralized grid/CHP microgrids
- thermal energy “sharing”
- circular economy

Driven by:

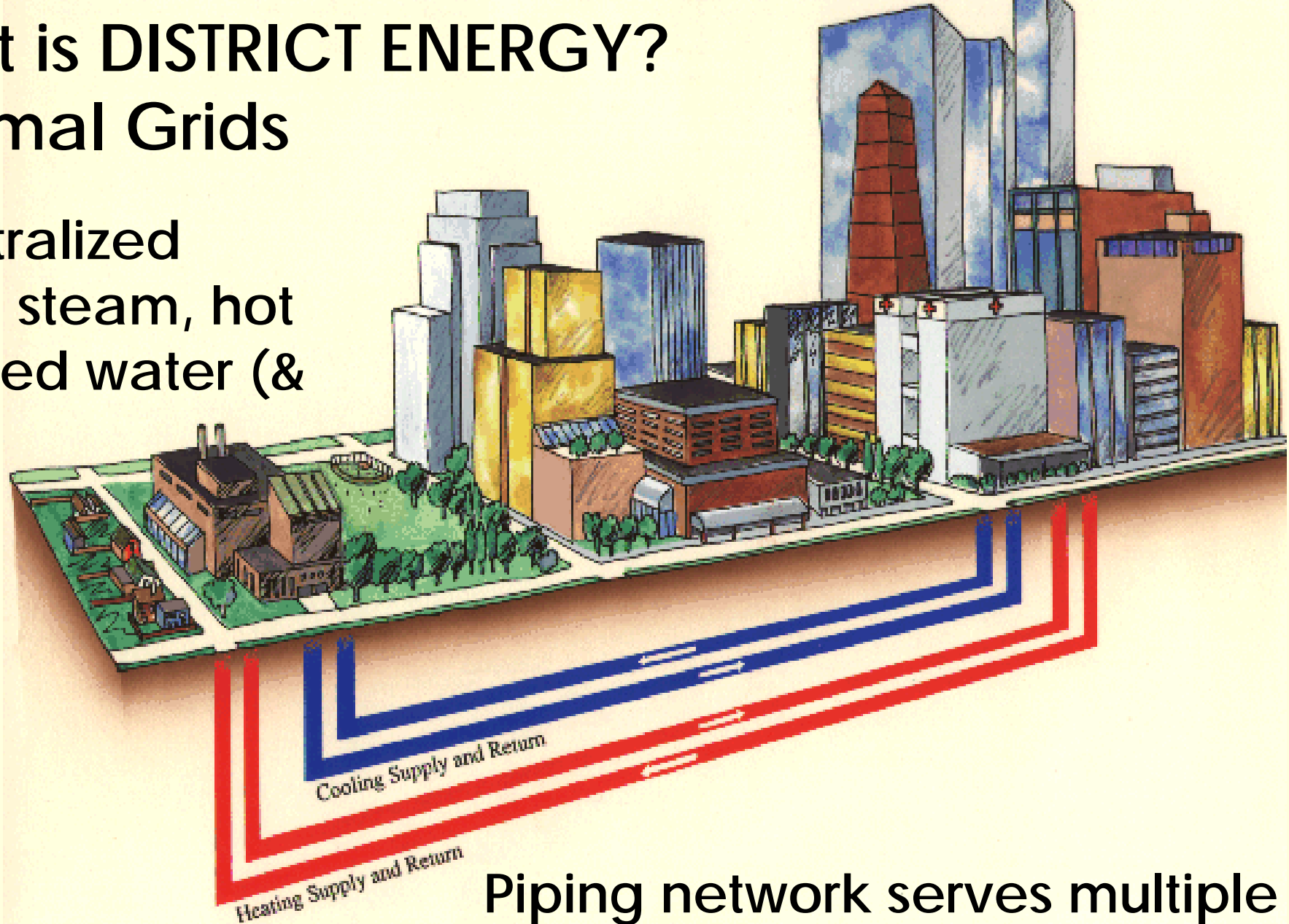
- public sentiment & policy
- rational economics
- severe weather events



What is DISTRICT ENERGY?

Thermal Grids

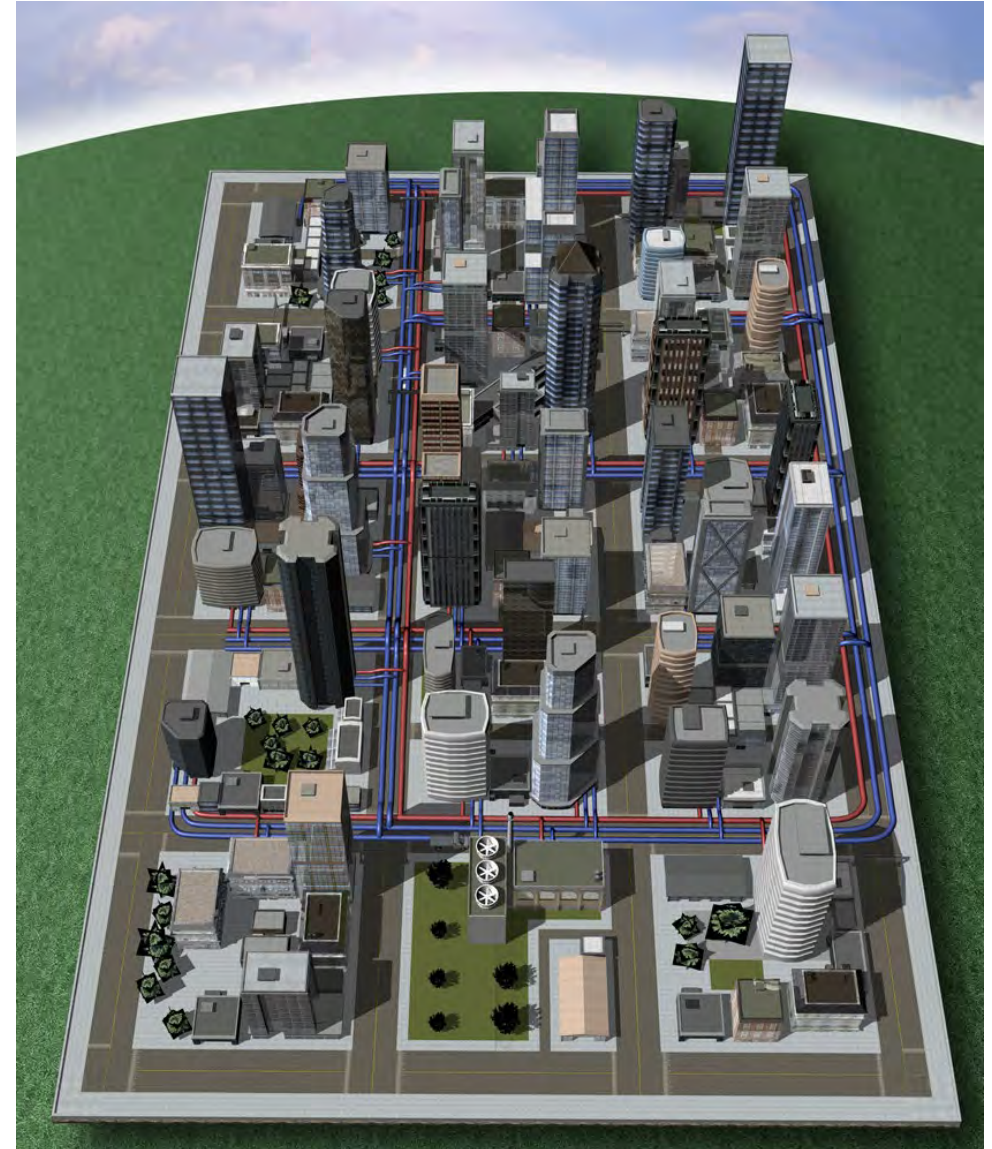
Local, centralized
production steam, hot
water, chilled water (&
power)



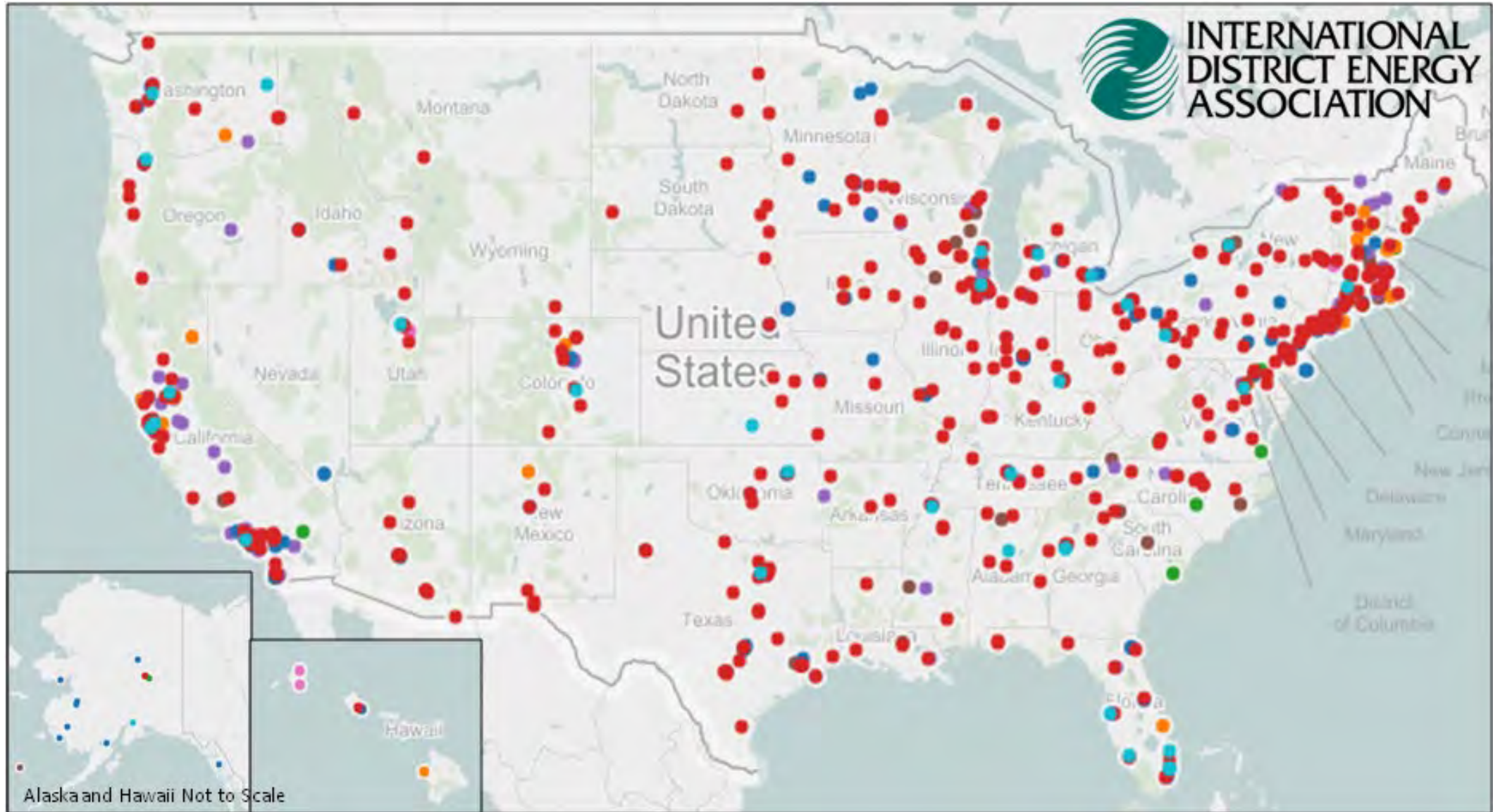
Piping network serves multiple
buildings “aggregated thermal loads”

District Energy – Community Scale Energy Solution

- Underground network of pipes “combines” heating and cooling requirements of multiple buildings
- Aggregated thermal loads creates scale to apply technologies not feasible on single-building basis
- Creates a “market” for valuable thermal energy
- Fuel flexibility & distributed generation improves energy security, strengthens local economy, enhances resiliency



US District Energy Systems 2019

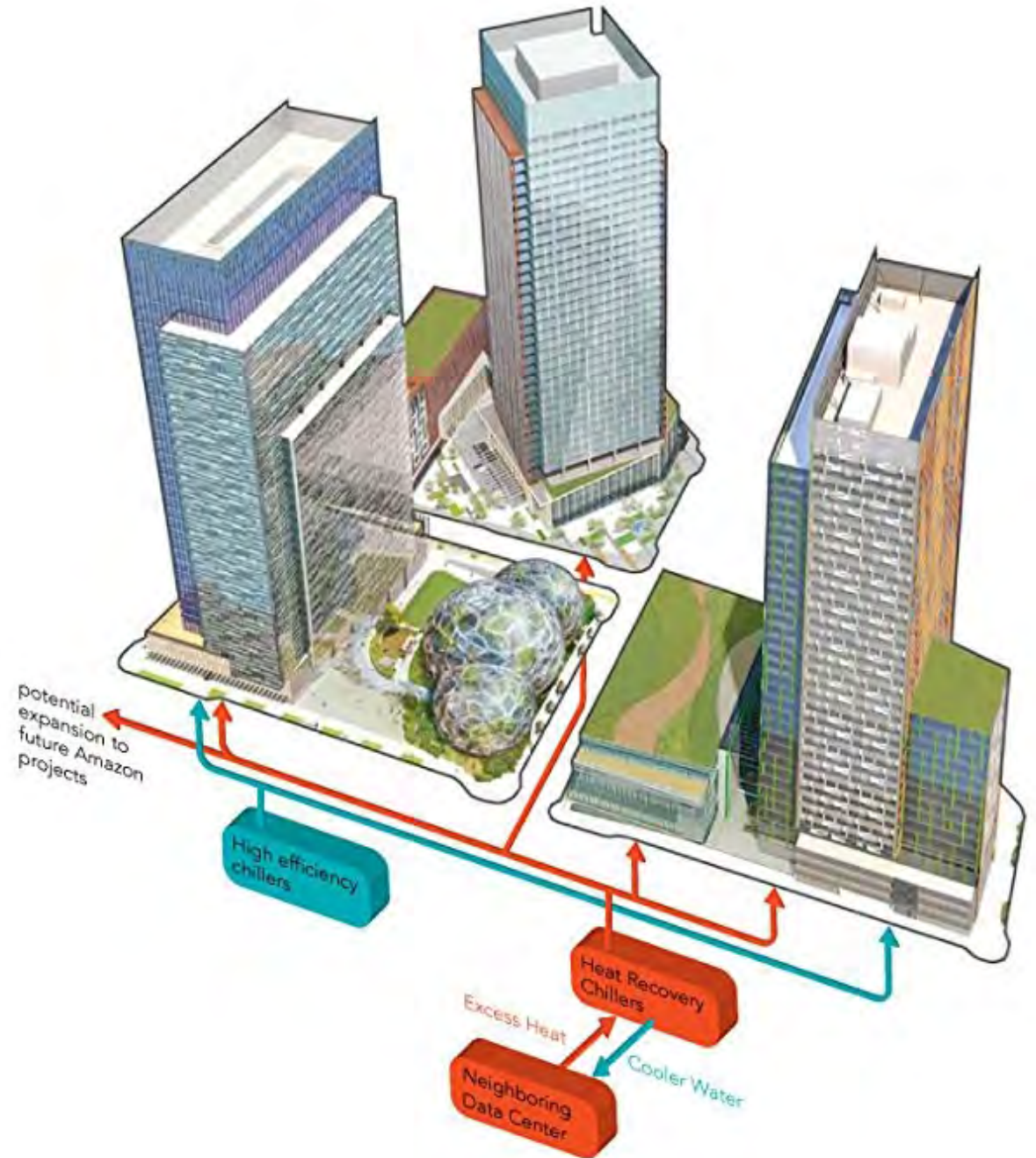




Amazon's Seattle Campus

Heats 4 million sq ft of office space using waste heat from a neighboring data center

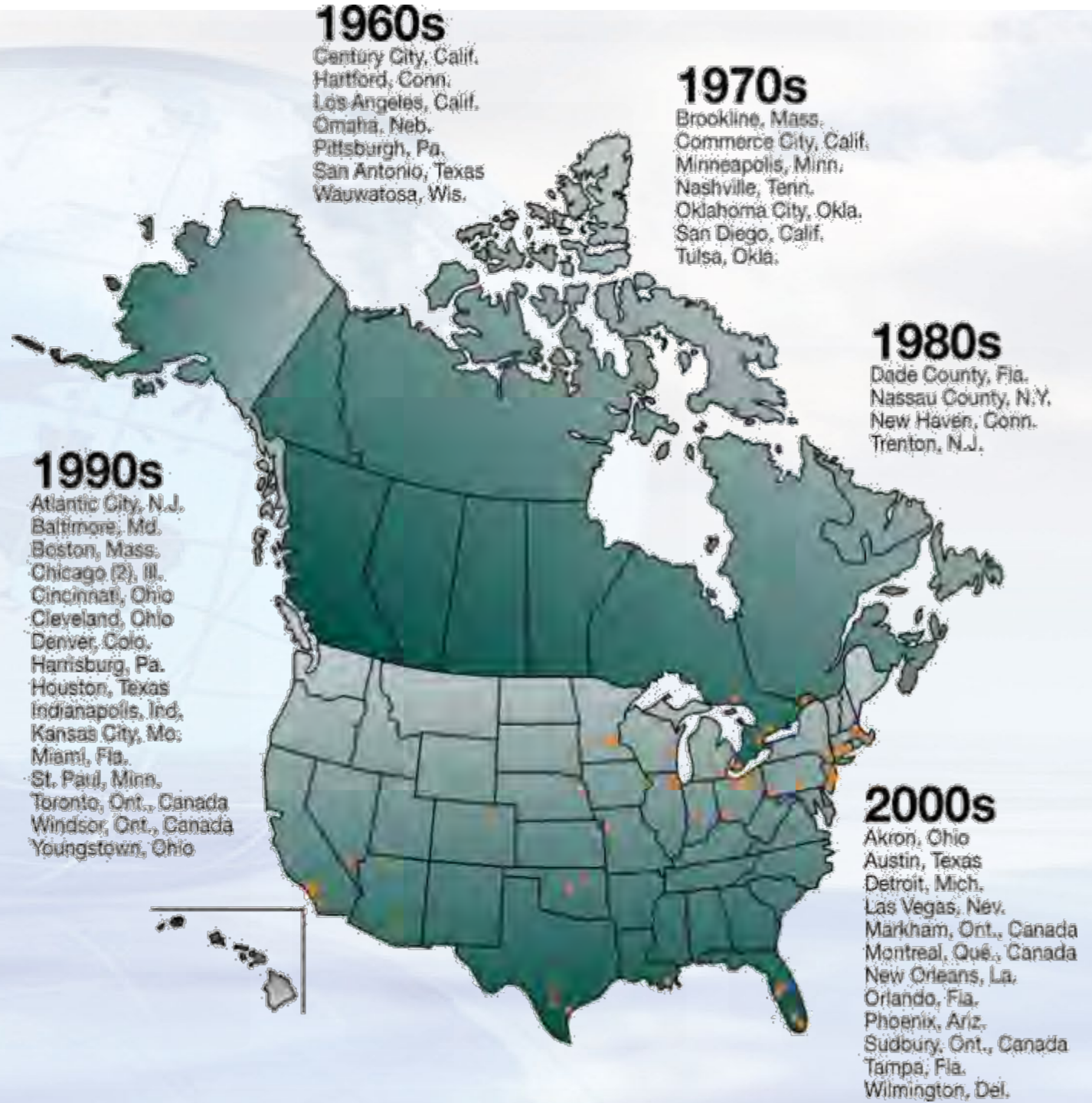
"4x more efficient than traditional heating methods"



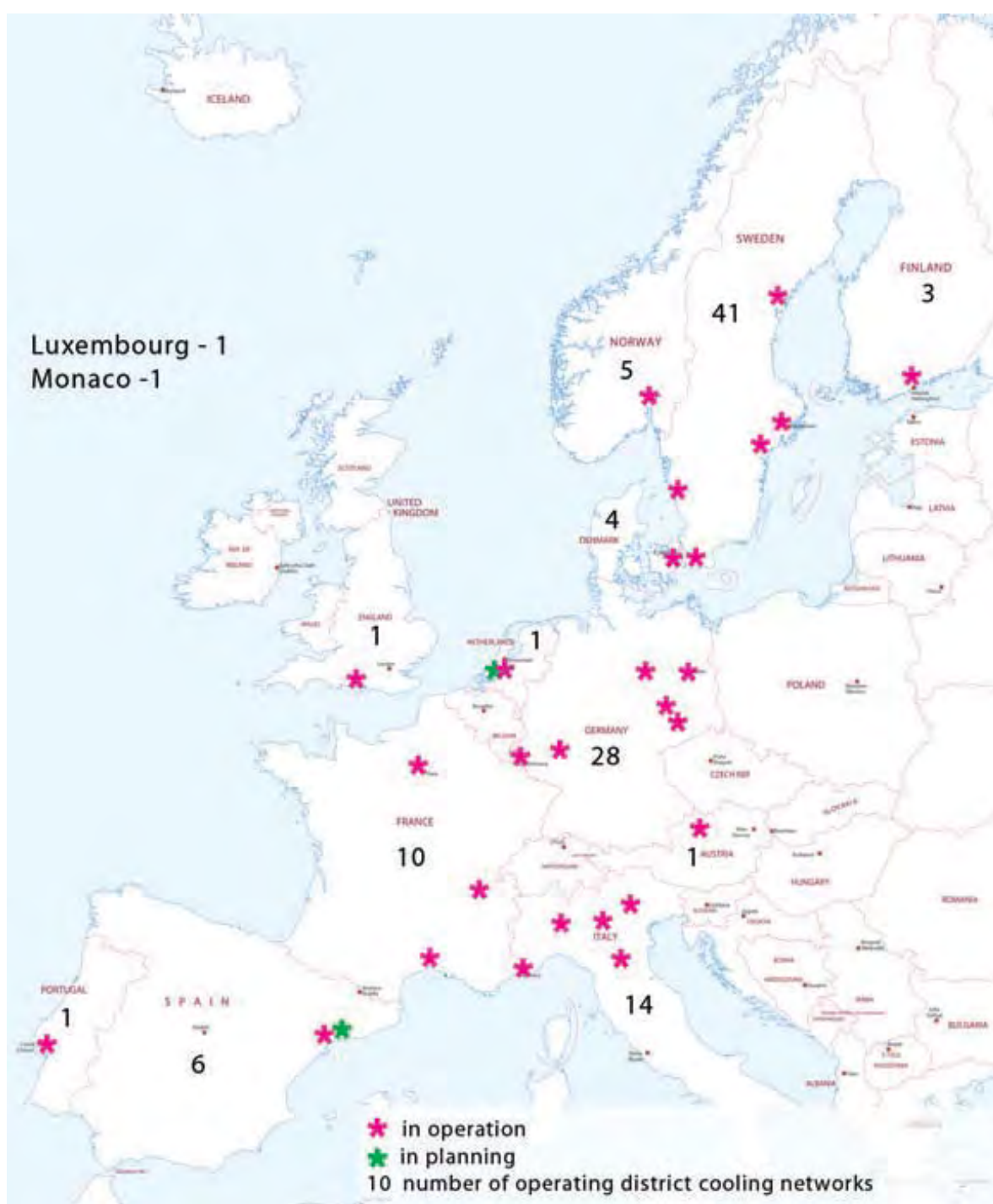
Local Community Benefits

- Increase energy efficiency
- Improve energy security & resiliency
- Tap local energy supplies - improve trade balance, drive economic multiplier
- Recover surplus thermal energy = circular economy
- Assets in local tax base, generate municipal income
- Cut GHG emissions & address climate mitigation

Commercial District Cooling Systems in North America



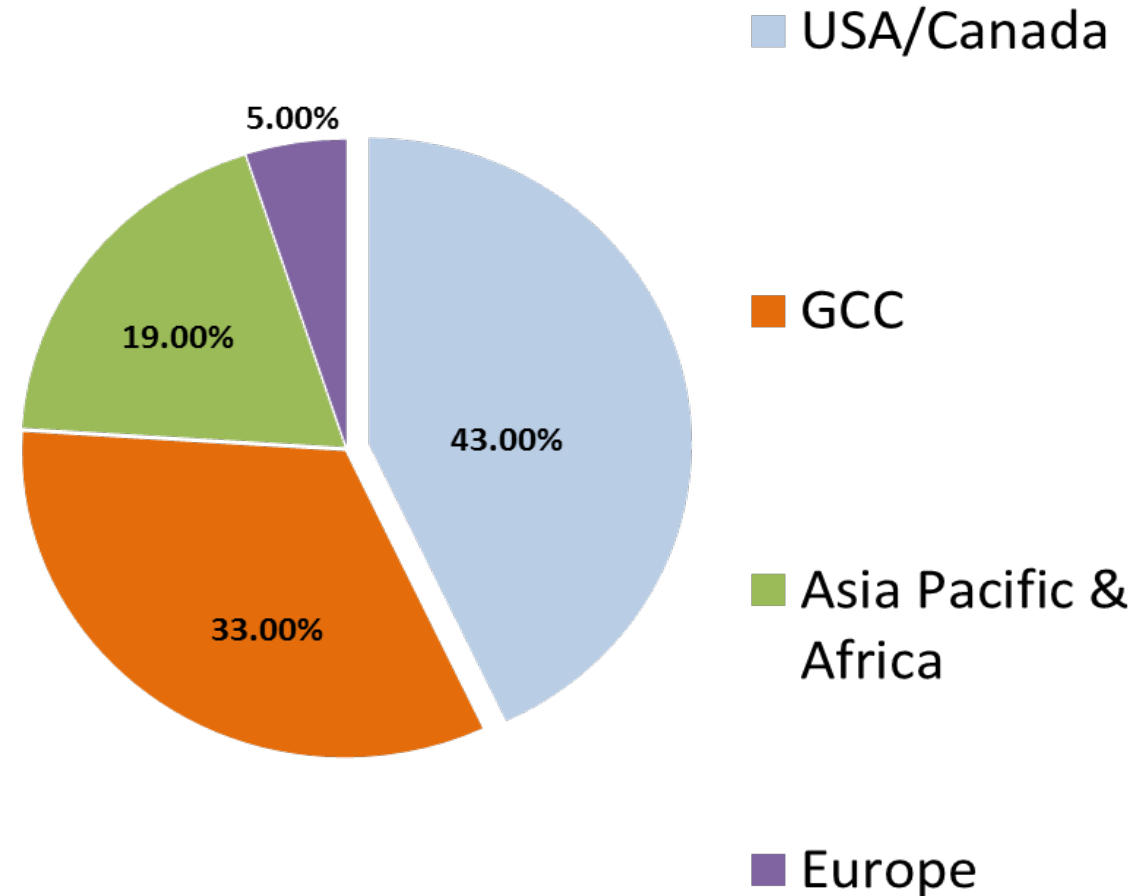
District Cooling in Europe



Source: Ecoheatcool Work Package 2

Global District Cooling Market

Region	District Cooling (RT)
USA/Canada	5,418,000
GCC	4,158,000
Asia Pacific & Africa	2,394,000
Europe	630,000
Total	12,600,000

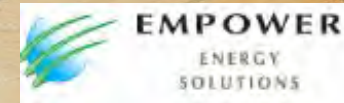


Source: DC Market Global Trends & Forecast to 2019,
Market & Market

MARKET LEADER – U.A.E.



DUBAI



ABU DHABI





Dubai, UAE



Abu Dhabi, UAE

Buildings Sector

Hotel/Casino



Healthcare/
Pharma



Commercial/
Data Center



Residential



Malls



Arena/Event



Government



Transportation Sector – Mass Transit



Dubai Metro: 69,000 RT
75 Km, 47 stations



7 Qatar Rail stations

District Cooling Advantages in Warm Climates

- Conserves fresh water
 - Central plant scale allows use of grey water for condensers – treated sewage effluent (TSE) – (Dubai code)
- Reduces use and demand for electricity – Air conditioning consumes 70% in region
 - Efficiency gains of 50% to 100% over traditional cooling
 - Central plan optimization, monitoring, maintenance
 - Chilled water storage shifts peak demand
- Cooling is life safety, not luxury

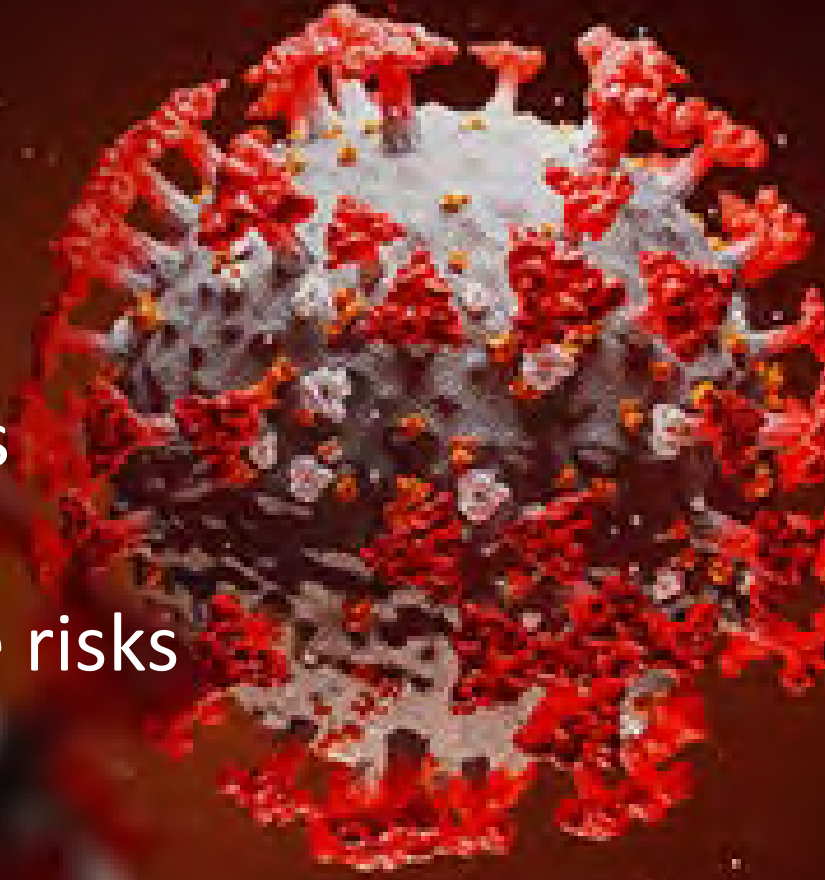
Benefits for Consumers

- Improved energy efficiency - 50% reduction in peak power demand
- Lower lifecycle and capital costs
- Easier building operation & maintenance
- Architectural design flexibility; less noise/vibration; roof lines free
- Scale allows industrial-grade equipment not feasible in buildings
- Enhanced reliability and resiliency



Lessons from COVID-19

- Occupancy and energy use dropped 40-70%
 - District energy simplified building operations
 - Unoccupied buildings & stagnant water pose risks
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- Plans to modify densities; uses; schedules
 - Plans to double outside air could increase heating & cooling loads



Gracias.

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