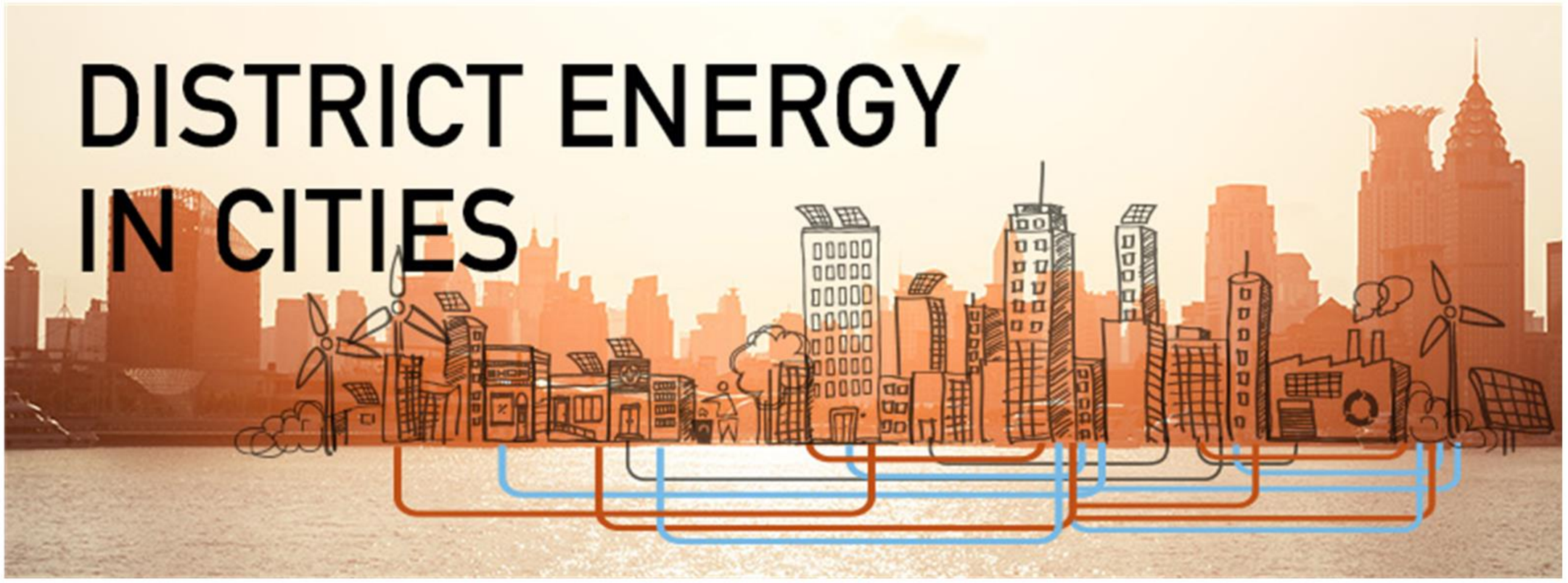


A Global Initiative to Unlock the Potential of Efficiency and Renewable Energy

Ms. Lily Riahi, Advisor on Sustainable Energy in Cities

United Nations Environment Programme I Energy, Climate, and Technology Branch 15 rue de Milan, 75009 Paris I

Tel: + 33 1 44 37 42 92 I **email:** lily.riahi@unep.org

UNEP

SUSTAINABLE ENERGY FOR ALL

COPENHAGEN CENTRE ON ENERGY EFFICIENCY
SE4ALL EE HUB

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

UN HABITAT
FOR A BETTER URBAN FUTURE

EUROHEAT & POWER

I·C·L·E·I
Local Governments for Sustainability

Danfoss

The Initiative “Sustainable Energy For All”

- **Launch:** September 2011 by UN Secretary-General Ban Ki-moon
- **Vision:** make sustainable energy for all a reality by 2030
- **Mobilize action** from all sectors of society in support of three interlinked objectives

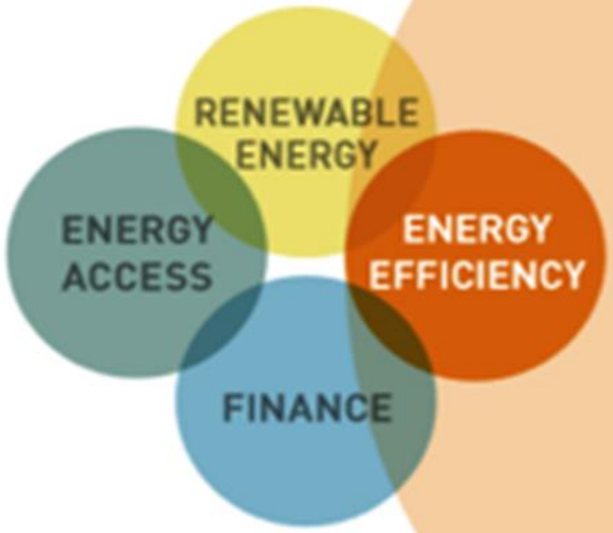
The 2030 Goals:

1. Ensure universal access to modern energy services.
2. **Double the global rate of improvement in energy efficiency.**
3. Double the share of renewable energy in the global energy mix.

GLOBAL ENERGY EFFICIENCY ACCELERATOR PLATFORM

Sustainable Energy For All Initiative

Sustainable Energy for All (SE4All) Sub-Committee's



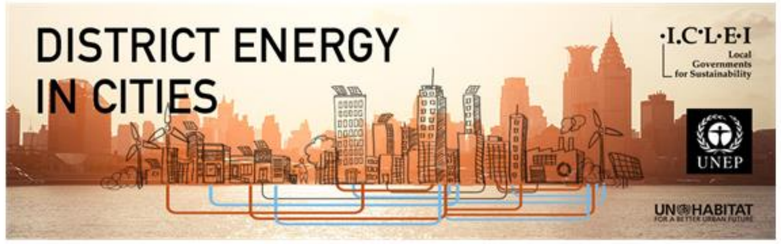
Co-chairs:
- **UNEP Executive Director**
- **CEO Accenture**
- **Minister for Trade and Development Cooperation, Denmark**

Global Energy Efficiency Accelerator Platform: to scale up efficiency gains and investments at the national, sub-national and city levels through technical assistance, support and public-private sector collaboration

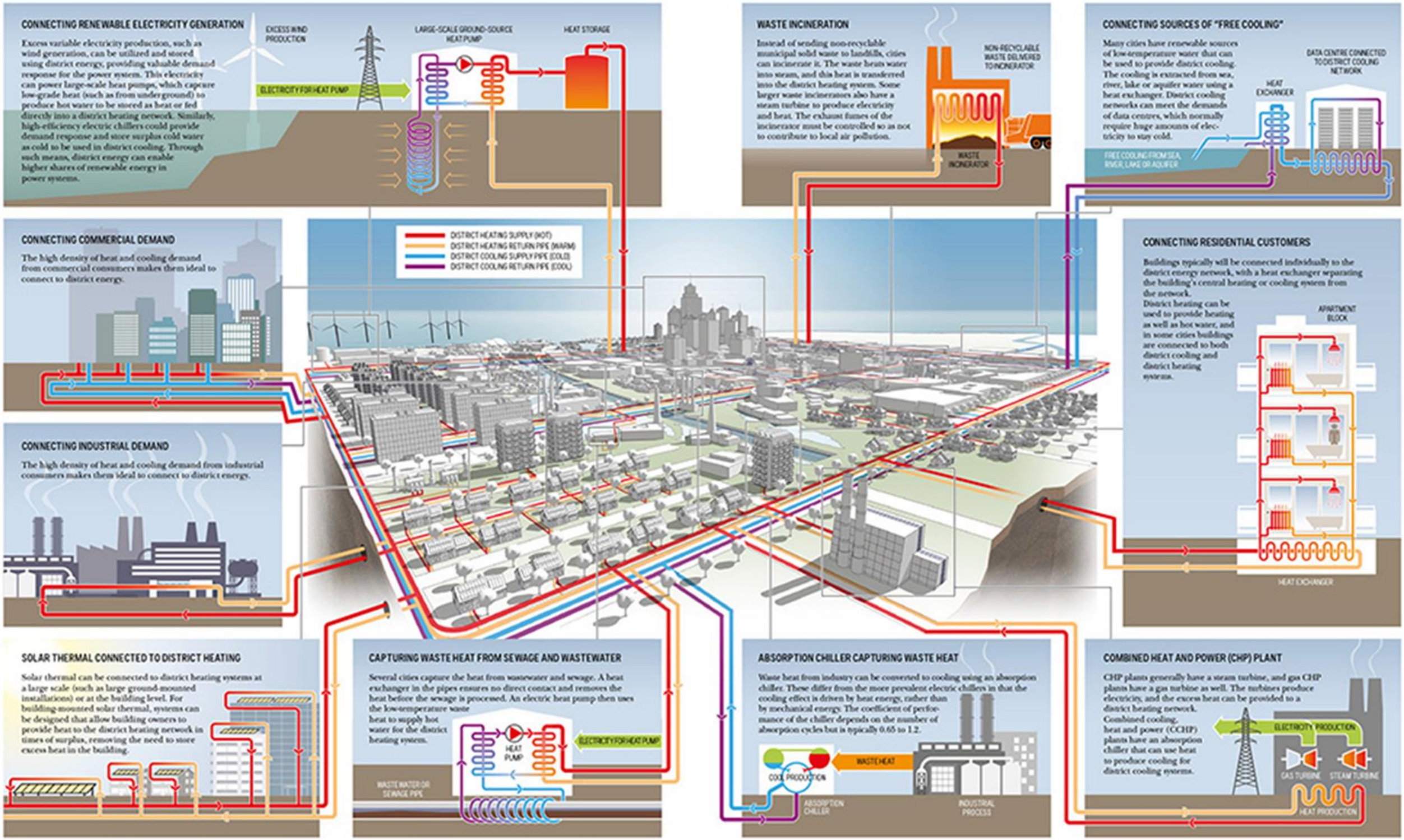
Individual accelerators focus on specific energy efficiency sectors

- **Buildings**
- **Transport**
- **DISTRICT ENERGY**
- **Lighting**
- **Appliances & Equipment**

GLOBAL ENERGY EFFICIENCY ACCELERATOR PLATFORM



What is District Energy?



The Global District Energy in Cities Initiative

A Global Multi-Stakeholder Partnership to support national and municipal governments in their efforts to develop, retrofit or scale up low-carbon,modern district energy systems

Identify key factors to city success in scaling up efficiency and renewables

DES emerges as a best-practice intervention

Technical research and stakeholder consultations

Multi-stakeholder partnership developed

Launch of *Global District Energy in Cities Initiative*

The Global District Energy in Cities Initiative: Scope of Activities

Leveraging the Partnership and Pool of Expertise to Provide

5 International Organizations

6 Industry Associations

8 Private Sector Companies

2 Networks

22 Municipal Governments

Technical Assistance
new local and national **policy** actions and innovative **finance** tools

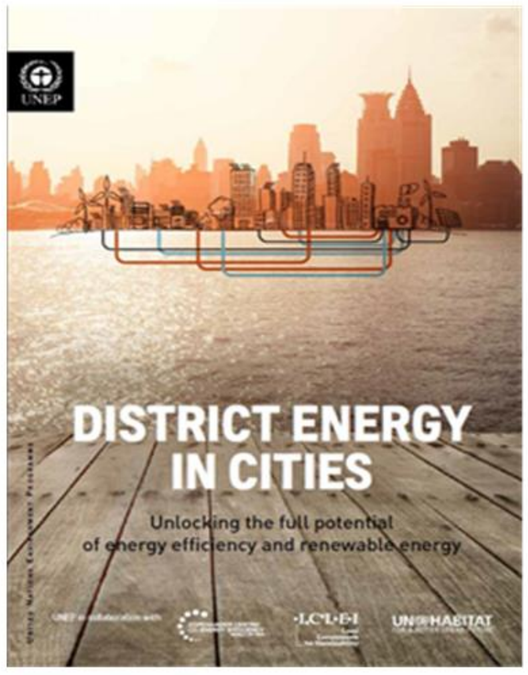
Demonstrations activities - to develop a replicable district energy policy-investment roadmap – for different regions and applications

Successful market transformation

Awareness including local assessments on benefits and feasibility

Capacity Building
Knowledge Transfer
Tailored Training Tools, Best Practice Guidelines

Launch of District Energy in Cities Publication: An Address from Achim Steiner



"In launching this report we want to draw the attention of the world's decision makers, mayors and leaders at the community level to the importance of district energy systems."

- Achim Steiner, UN Environment Programme Executive Director. Launch of the District Energy in Cities Report - Paris, 25 February 2015

Key Findings: Multiple Benefits and Policy Objectives

Energy Efficiency and Access

Local and Renewable Sources

Meet Tomorrow's Energy Needs
by
Leapfrogging to Modern District Energy Systems Today!

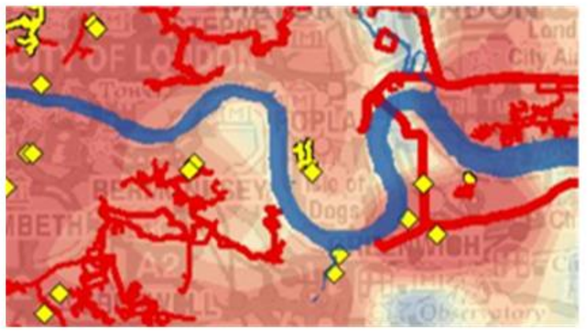
GHG Mitigation Improved Air Quality

Green Economy Resilience

Key Findings: The importance of local governments

Strategy and Targets

Integrated energy planning and mapping



Local governments

$ € £ ¥

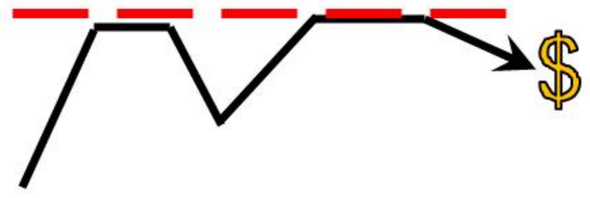
Facilitating Finance

Consumers and Providers

Key Findings: The importance of national governments

Levelling the playing field

Tariff regulation



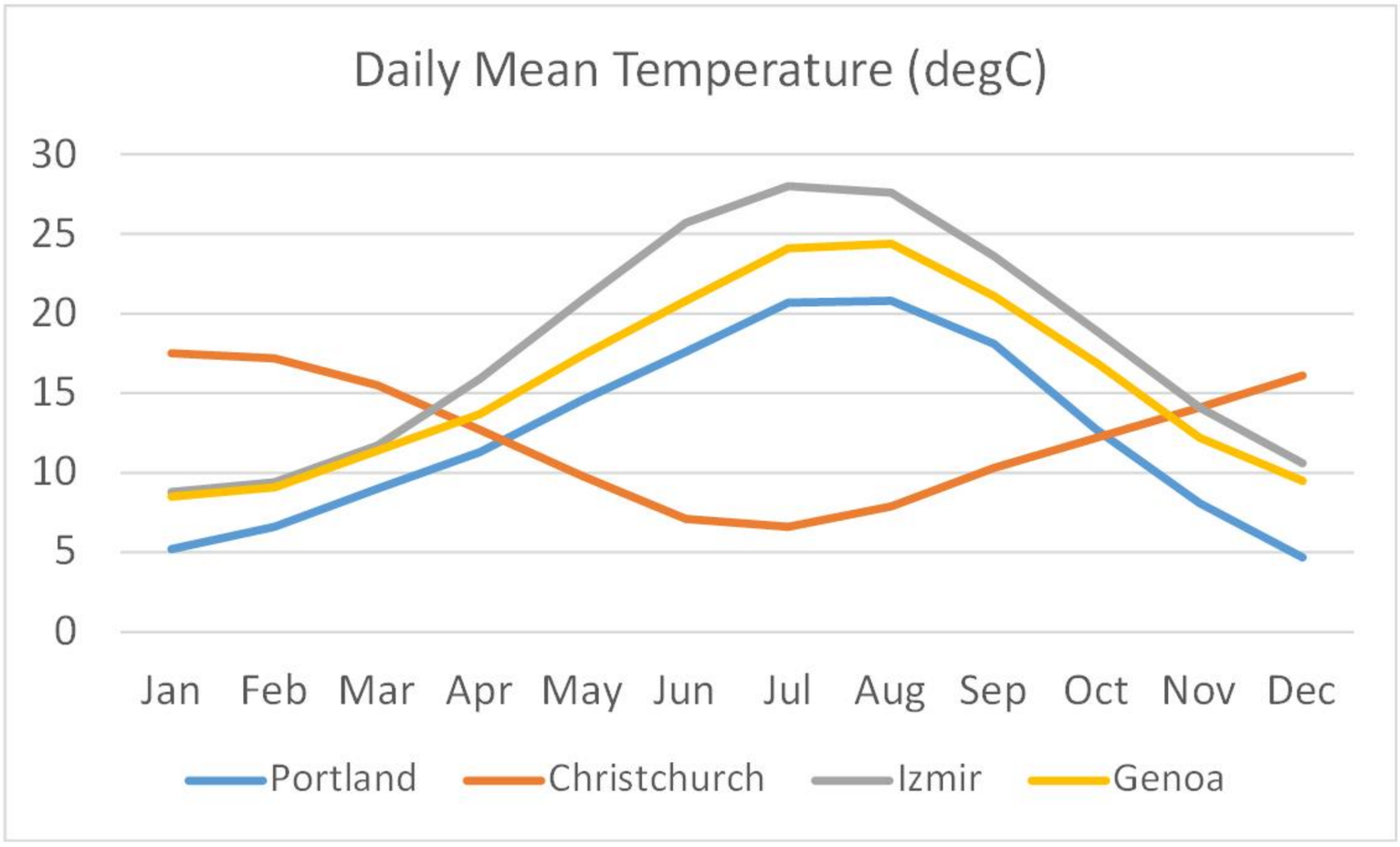
National governments

Devolving authority to local governments

Labels and standards

District heating not just for countries with very cold winters.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Christchurch	17.5	17.2	15.5	12.7	9.8	7.1	6.6	7.9	10.3	12.2	14.1	16.1
Portland	5.2	6.6	9	11.3	14.6	17.6	20.7	20.8	18.1	12.7	8.1	4.7
Izmir	8.8	9.4	11.7	15.9	20.9	25.7	28	27.6	23.6	18.9	14.1	10.6
Genoa	8.5	9.1	11.4	13.7	17.4	20.8	24.1	24.4	21.1	16.9	12.2	9.5



- Portland (USA), Izmir (Turkey) and Genoa (Italy) all have very similar winter temperatures to Christchurch.

Portland, Oregon focusing on developing DHC in large new developments.

Already has several nodal heat and cool networks. 10% of energy needs from district energy by 2030.

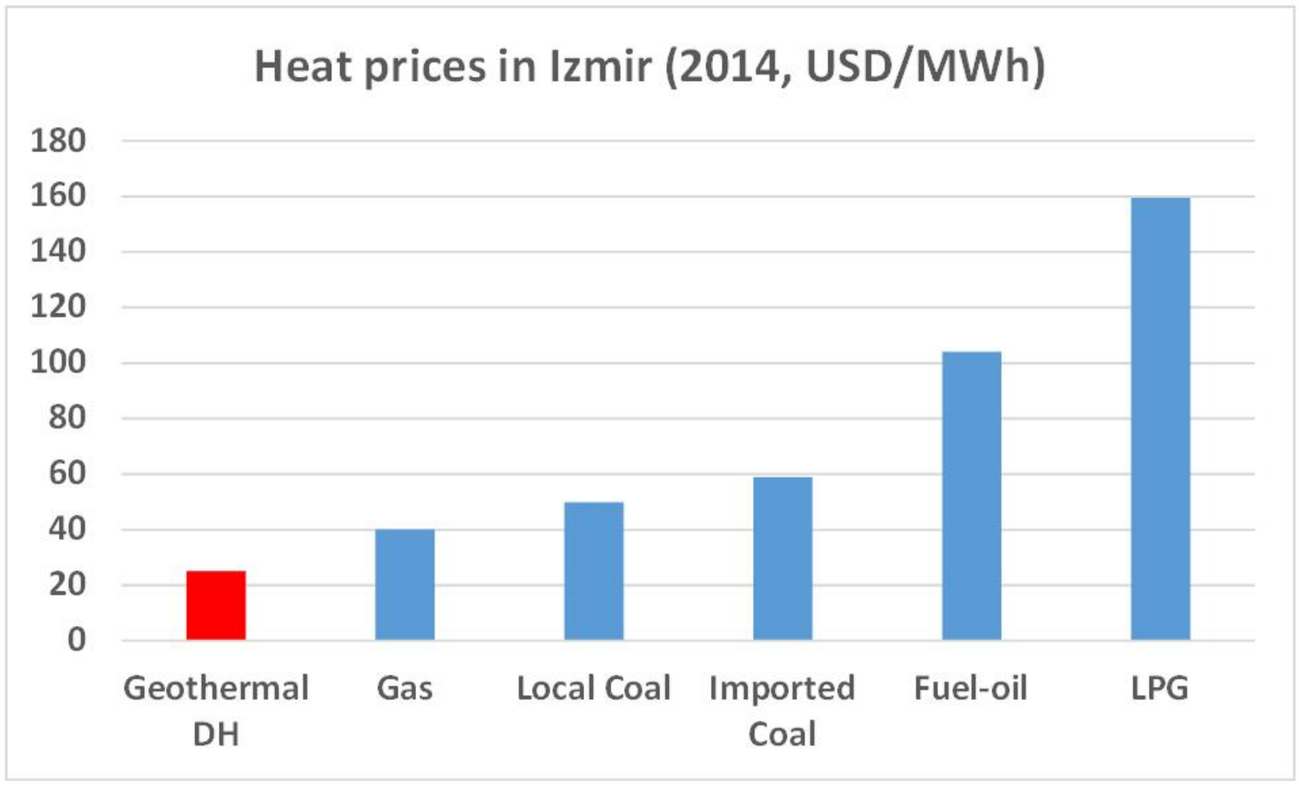
Rose Quarter — Convention Center

- 380-acre urban redevelopment area.
- Annual Space Heating: 30.5 GWh
- Annual Space Cooling: 21.5 GWh
- Peak heating demand: 12.5 MW
- Peak cooling demand: 16.5 MW
- Good land use mix for district energy: including retail (~20%), office (~40%), residential (~10%) and hotel (~30%) uses.
- Catalysed by the urban redevelopment of this area.
- District energy will be expanded to other nodes in the future.

Izmir, Turkey has developed large scale district heating system based on geothermal

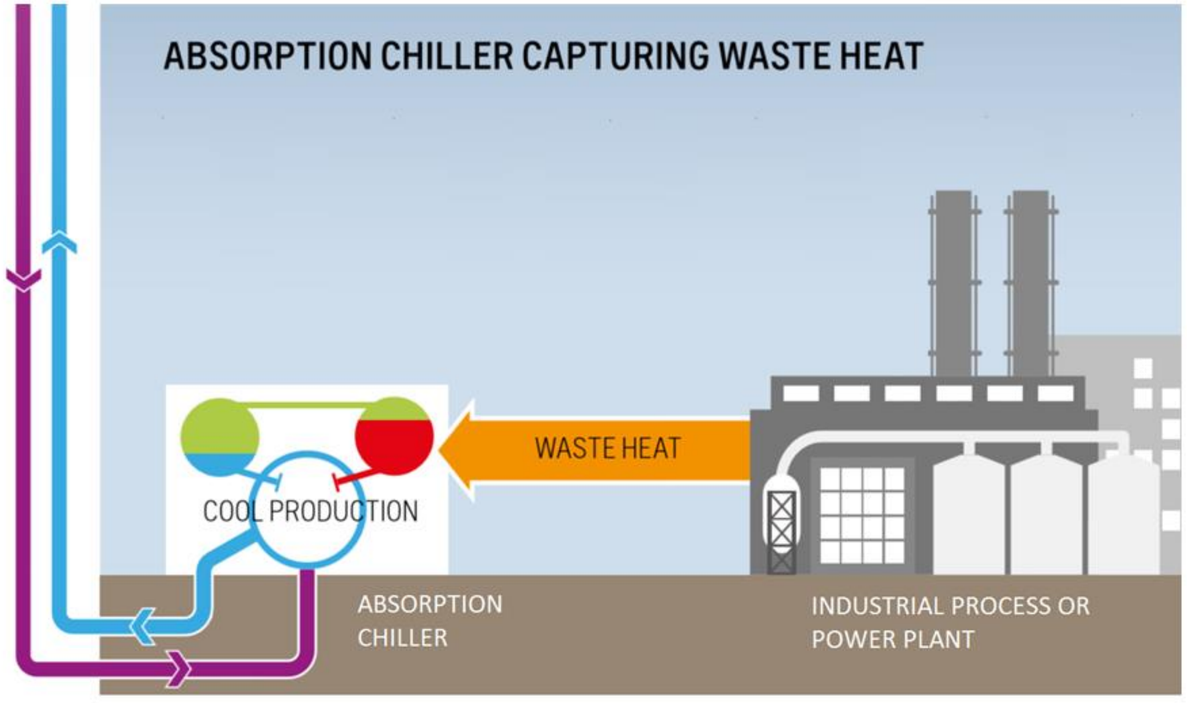
Izmir Geotermal Company (IJT)

- 3.3 million square metres connected, 4,400 buildings
- Heat demand approximately 46kWh/msq/year
- Uses 100% Geothermal through 20 geothermal wells with power of 160MW
- Geothermal has a 67% load factor
- System prevents 68,000tCO2 emissions (compared with natural gas)
- Out of heating season, hot water is still provided.
- The city is now looking to produce power from the geothermal resource outside of the heating season.
- Very low heat prices.



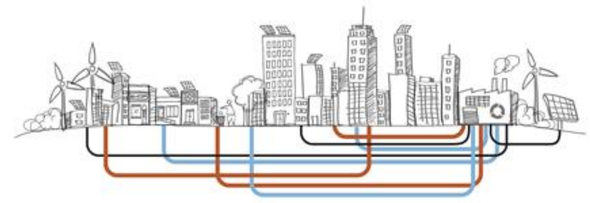
Absorption chillers allow district heating assets to be used in summer

- Absorption chillers drive demand for heat in summer increasing the load factor of heat production assets, lowering costs for heat and cool.
- If air conditioning raises electricity prices CCHP can produce cool when electricity price is higher improving revenues and helping meet electricity demand.
- Absorption chillers can also directly connect to the district heating network. Velenje, Slovenia has a DH connected absorption chiller that is 70% cheaper than normal cooling and allows it to use waste heat from power plant.
- Anchor loads such as data centres and swimming pools also ensure year-round district heat/cool demand.



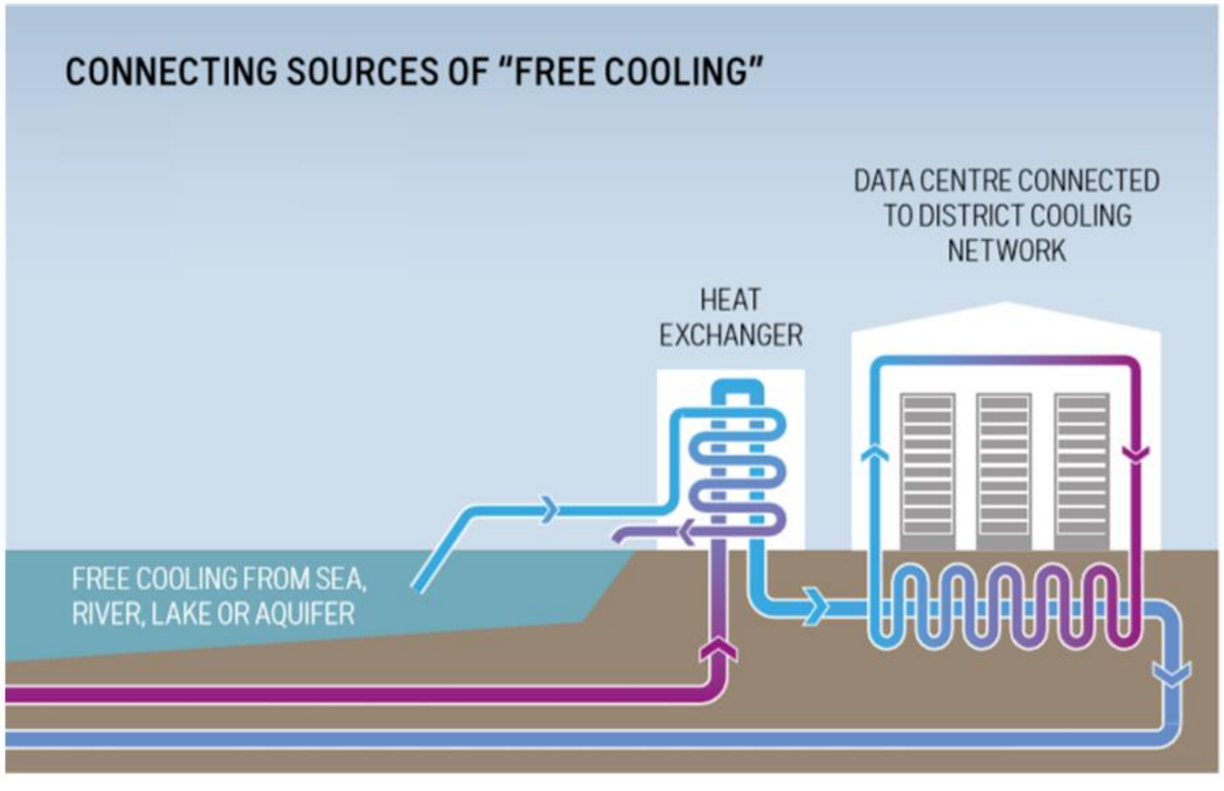
London's Olympic Legacy

- As part of Olympic development London created a district heating and cooling network designed to be a node within a future city-wide network.
- Designed to be expanded to 200 MW of heat (up from 100 MW today) and 64 MW of cooling (up from 18 MW today).
- 40 year concession to Cofely to finance, design, build and operate
- 16km heat network; 2km cool network
- Includes CCHP, biomass boilers and electric chillers.
- Heat and cool storage to maximise CCHP use.
- DH and DC networks in total are 30% more efficient than conventional heating and cooling systems



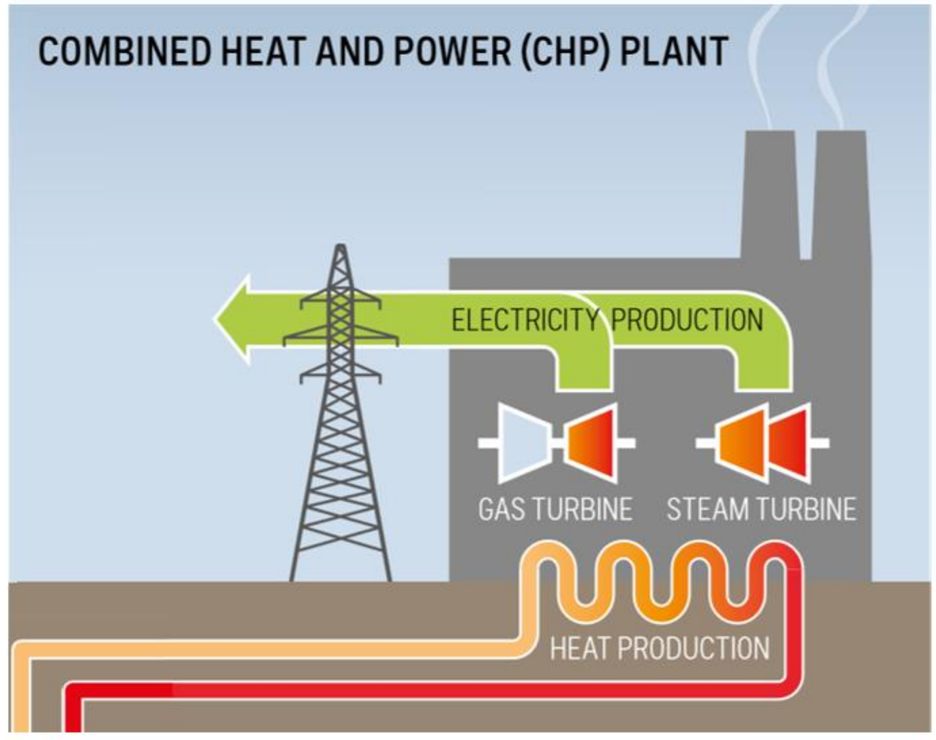
District energy is the only way to use large scale renewable heat and cool sources

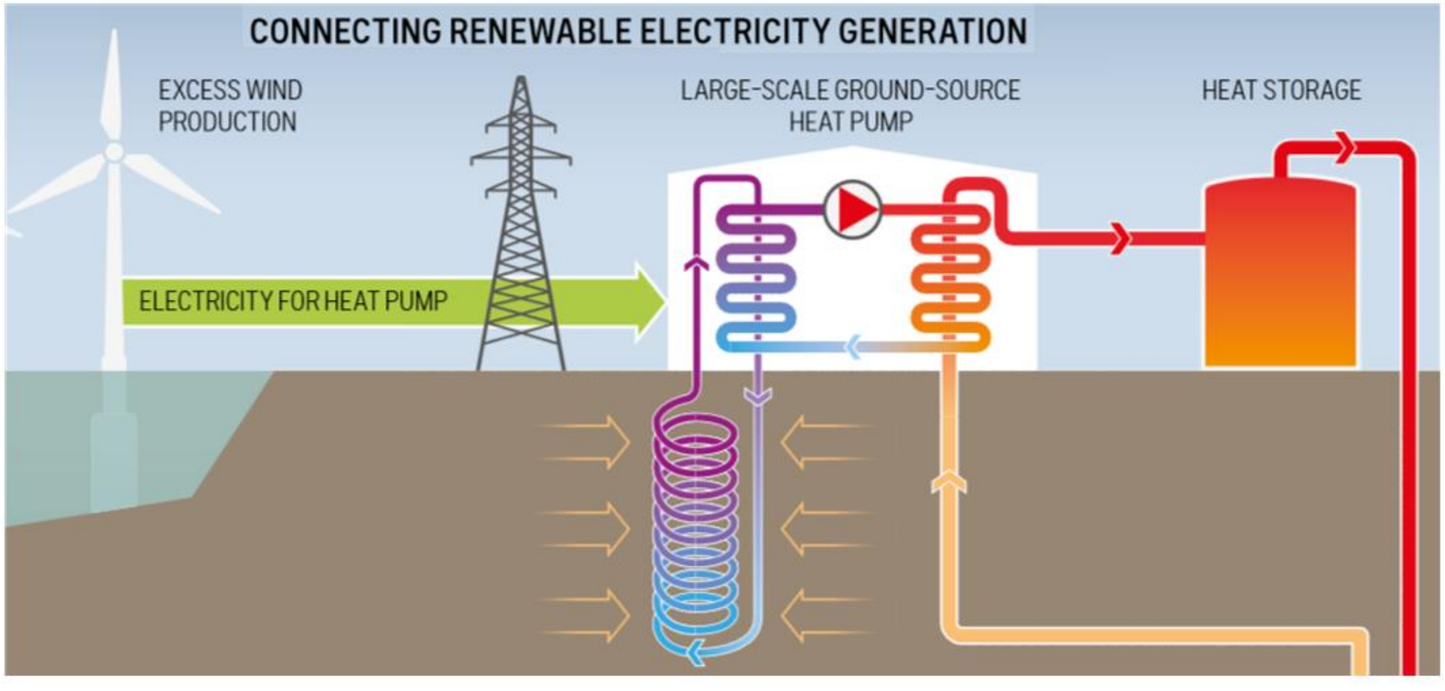
- District cooling and heating networks enable the connection of renewable heat or cool that cannot otherwise be used on an individual building level for example:
  - waste heat from industry, power plants, waste incinerators, metro systems or data centres;
  - geothermal;
  - large scale biomass;
  - large scale heat pumps;
  - free cool from rivers, lakes, seas and aquifers;
  - large scale solar thermal; and
  - sewage and wastewater heat.
- By connecting heat or cool storage district energy networks can maximise the use of these renewable resources



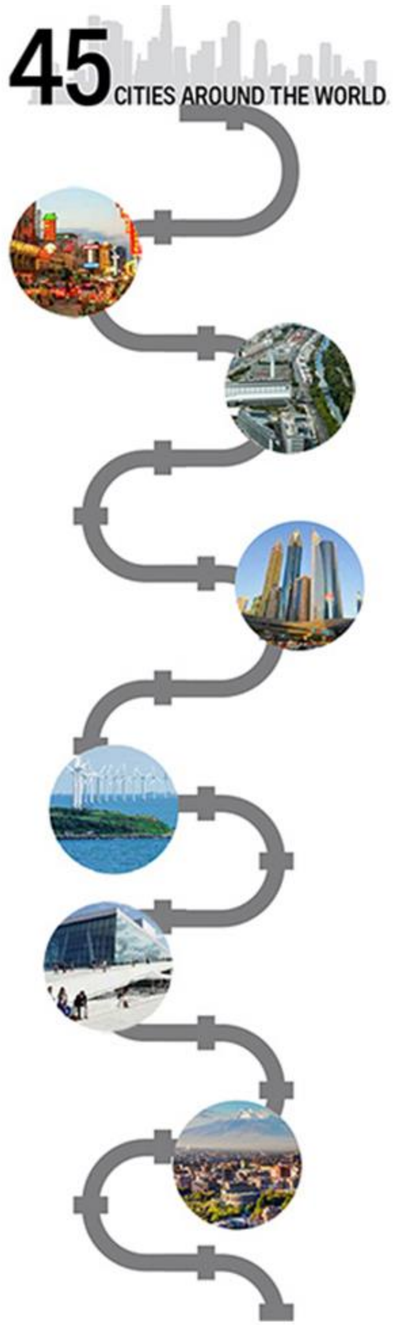
District energy provides important electricity balancing services enabling higher shares of renewable electricity

- The combination of CHP or CCHP and heat/cool storage can allow district energy networks to balance renewables such as wind and PV on the electricity network.
- This is how Denmark is reaching such high shares of wind and Germany such high levels of solar PV.





District Energy in Cities Publication: Decision Tree and Training Tool -kit



Why?

Why choose district energy?

When?

When to develop district energy?

What?

What initial steps should cities take?

How?

How to accelerate district energy?