

Lily Riahi
Advisor on Sustainable Cities
Division of Technology, Industry and Economics, UNEP



DISTRICT ENERGY IN CITIES

A GLOBAL INITIATIVE TO UNLOCK THE POTENTIAL OF ENERGY EFFICIENCY AND RENEWABLE ENERGY





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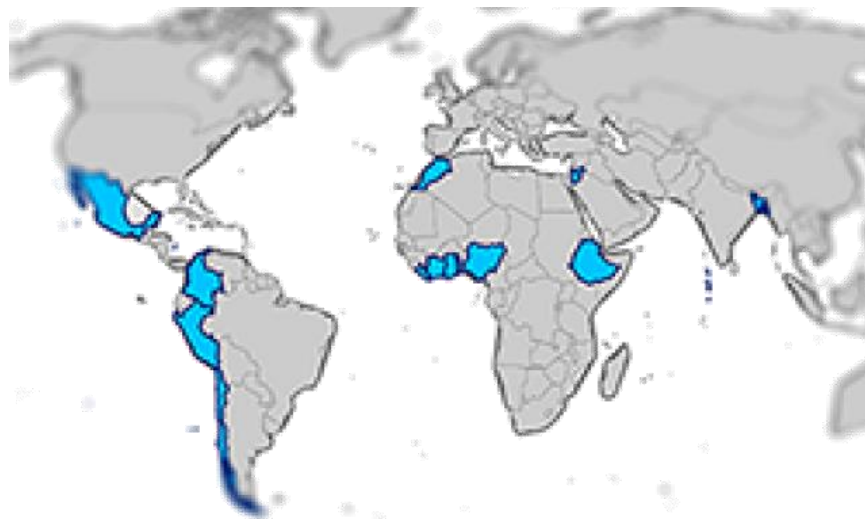
2nd International Conference on Smart Energy Systems and
4th Generation District Heating, Aalborg, 27-28 September 2016



Low-GWP Alternatives in Commercial Refrigeration: Propane, CO₂ and HFO Case Studies



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2nd International Conference on Smart Energy Systems and
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Country club





GLOBAL ENERGY EFFICIENCY
ACCELERATOR PLATFORM



Building Efficiency
Accelerator



en.lighten



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DENMARK

Where was district energy?



4DH

4th Generation District Heating
Technologies and Systems

HEAT ROADMAP
EUROPE 2050

STUDY FOR THE EU27

by

Aalborg University
David Connolly
Brian Vad Mathiesen
Poul Alberg Østergaard



strategy&
Energy & Business Consulting

*Unlocking the
potential of
district cooling*

The need for GCC
governments to take
action

theguardian

District heating: a hot idea whose time has come

Look for wasted urban heat and you see it everywhere. Cities worldwide are finally starting to address this with collective methods to stay toasty



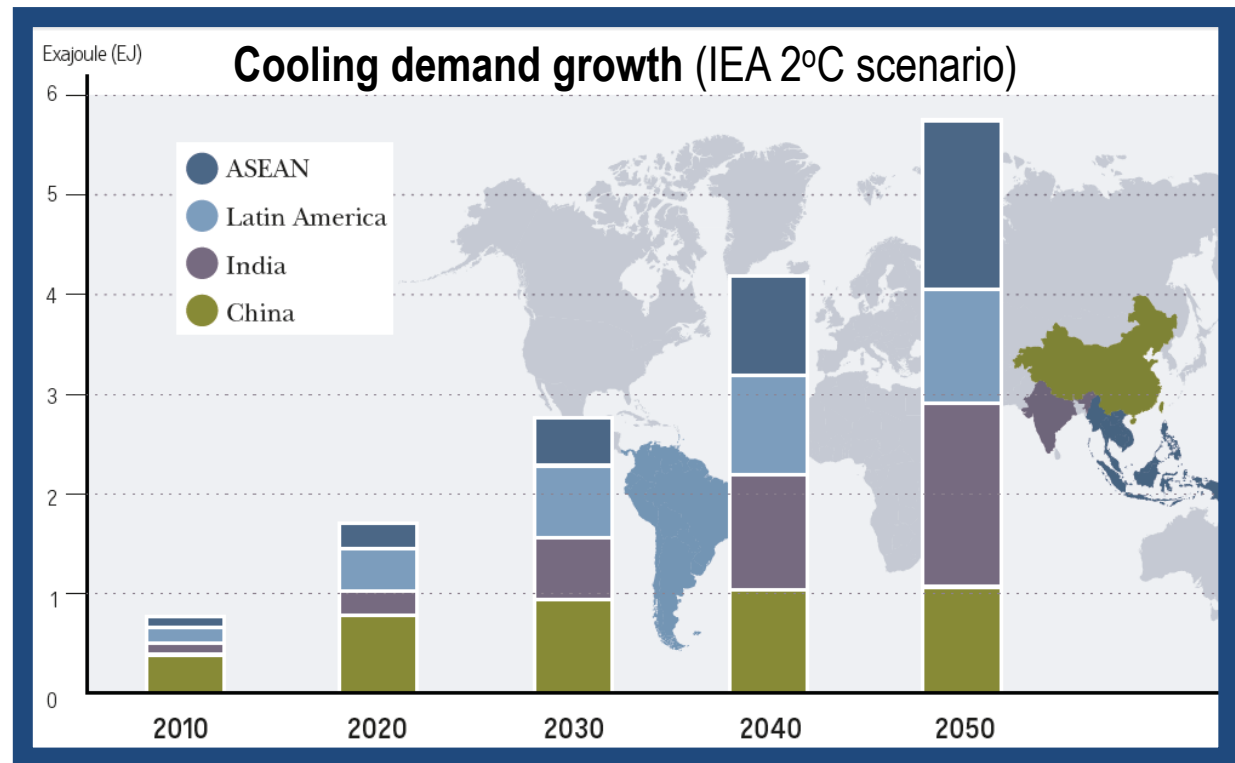
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Making the case: Why is district energy important?

Heating, hot water and cooling account for **60% of the global energy consumption** in buildings, largely met by fossil fuels

Connects waste heat and large scale renewables that **cannot be used** on an individual building level

Achieves **30-50% reductions** in primary energy consumption for heating and cooling

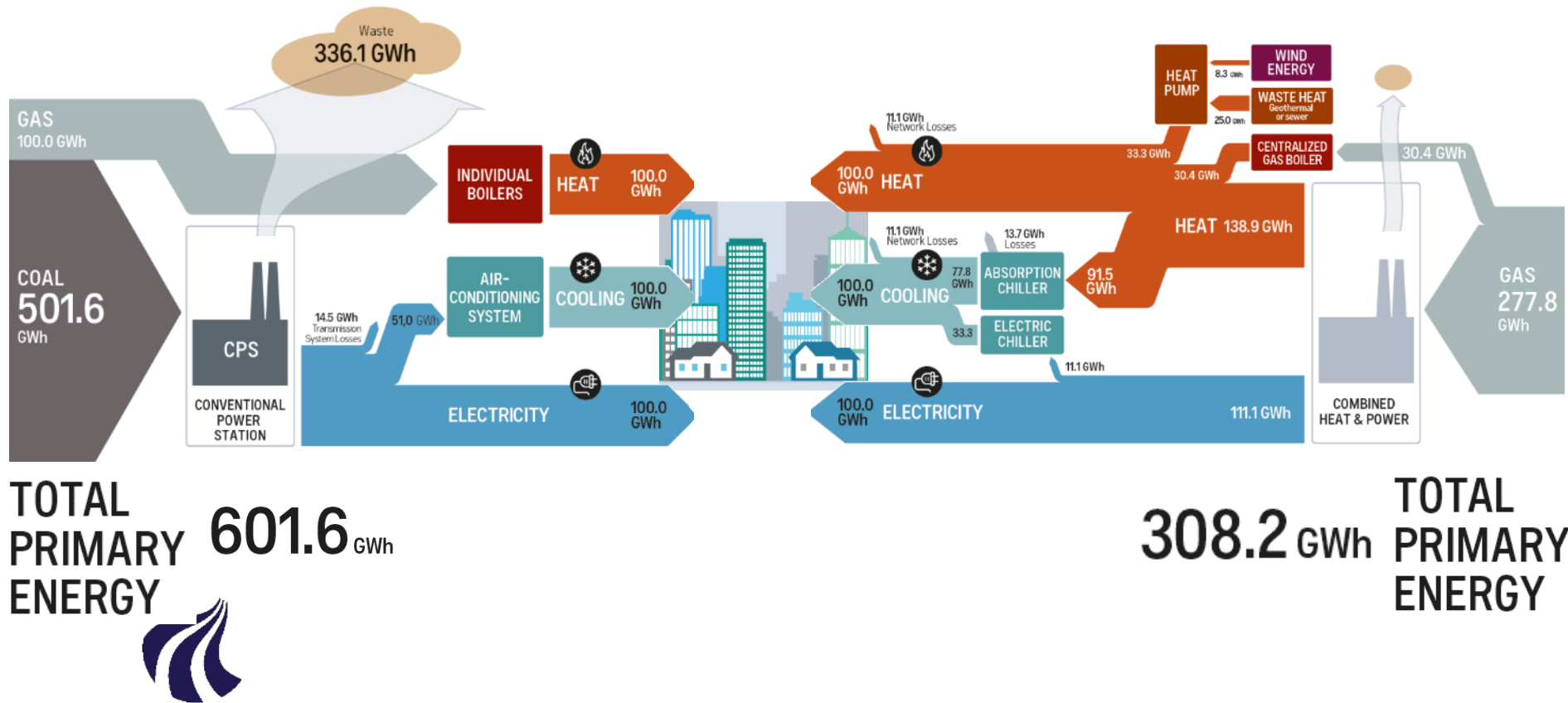


Making the case: Energy efficiency

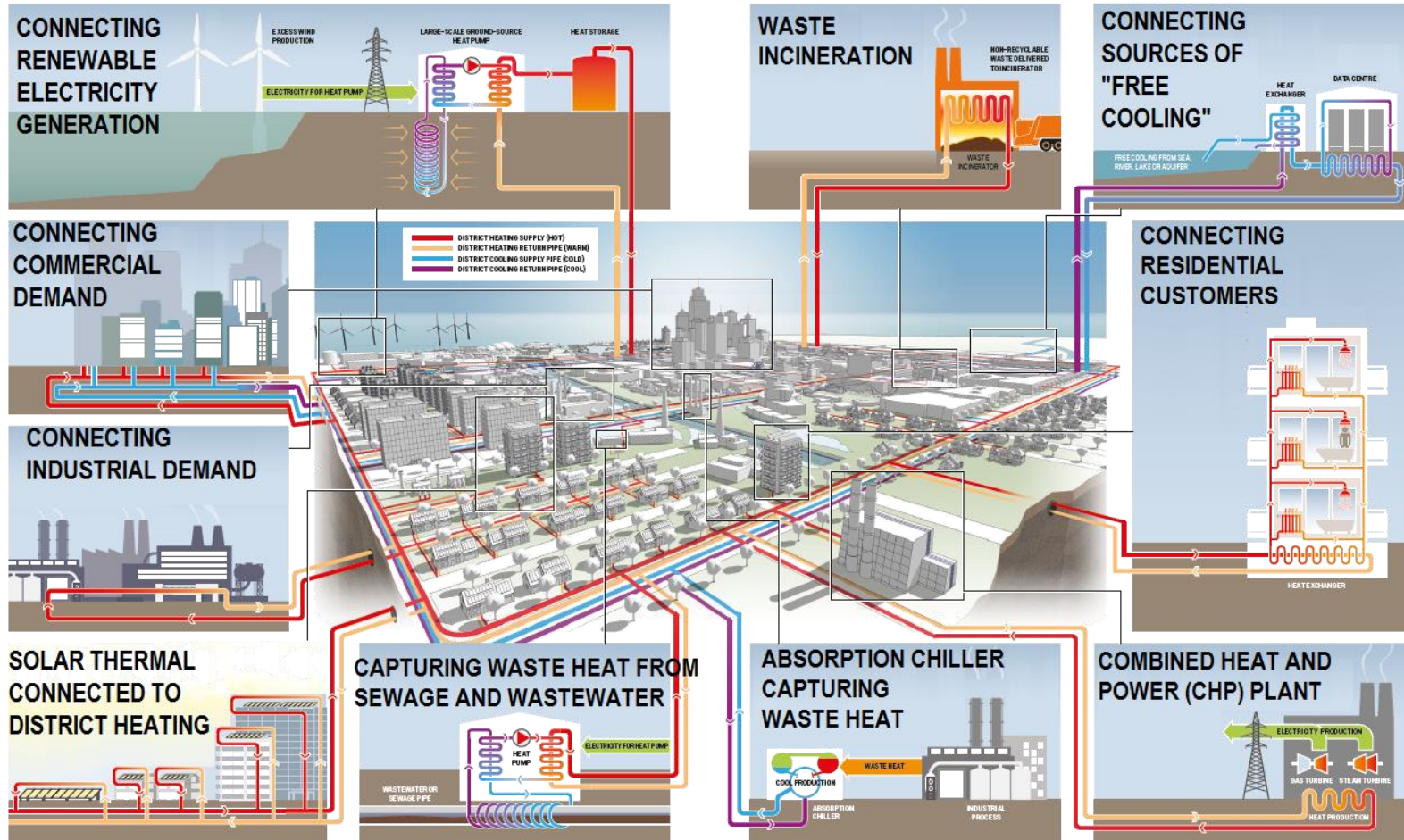


BUSINESS AS USUAL

MODERN DISTRICT ENERGY SYSTEM



Making the case: Integrates Renewables



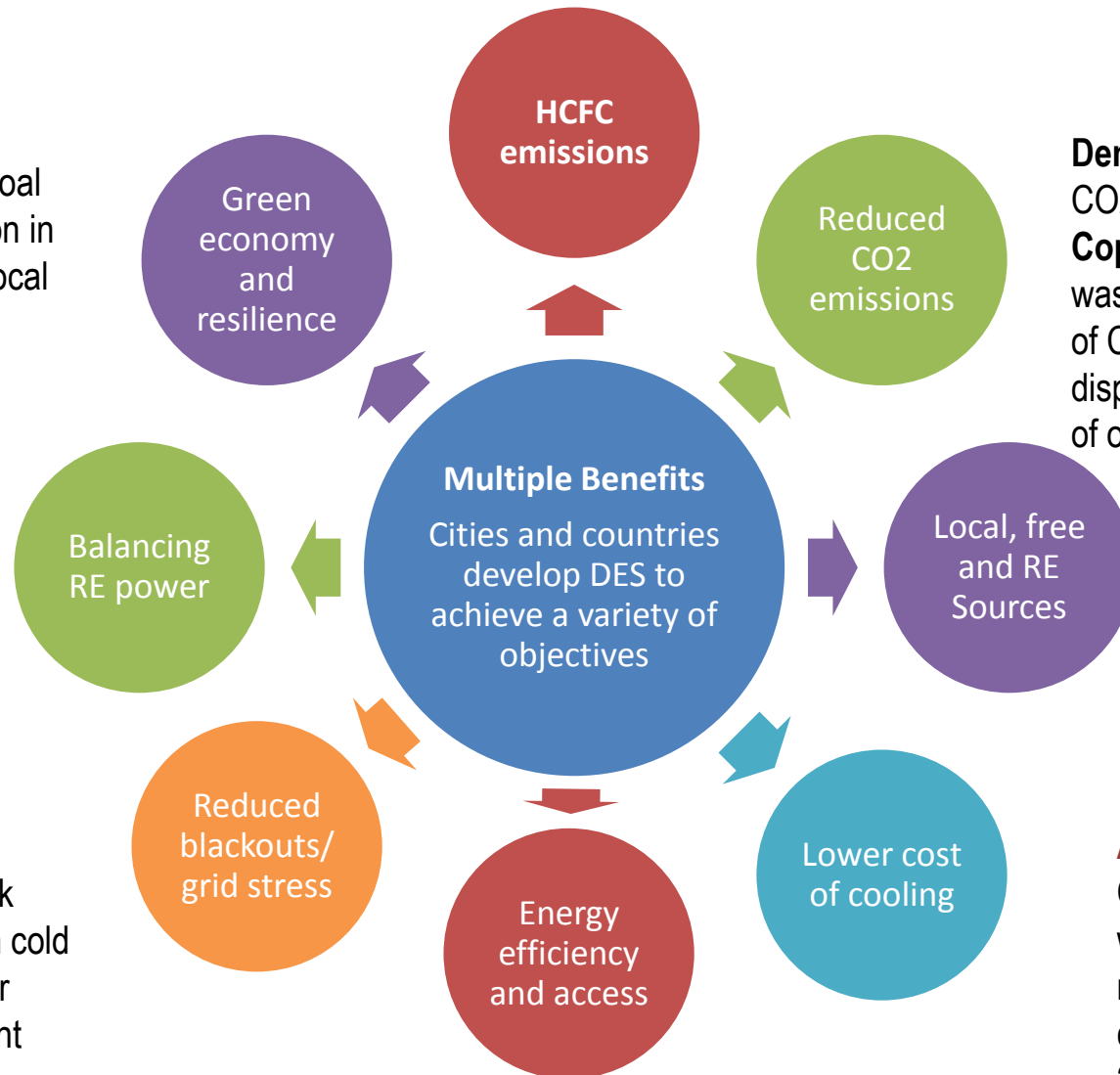
Making the case: Multiple benefits



St. Paul, USA

Reduce 275,000t of coal annually US\$12 million in energy dollars kept local

Denmark 20% reduction in CO₂ since 1990. In **Copenhagen**, recycling waste heat leads to 655,000t of CO₂ reductions while also displacing 1.4 million barrels of oil annually.



Anshan, China

Connecting 2000MW of waste heat- a 1.2m ton reduction in coal consumption/year and 2m ton of CO₂/yr

Dubai, UAE shifts peak electricity demand with cold storage lowering power transmission investment

Barriers to Unlock the Potential of district Energy



Lack of awareness
and misperceptions

Local and
institutional capacity
for coordinating DES
development.

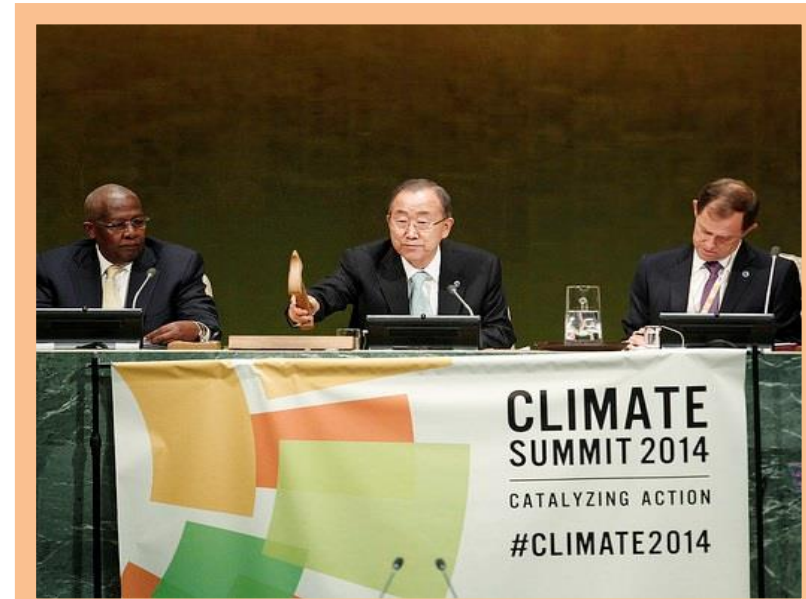
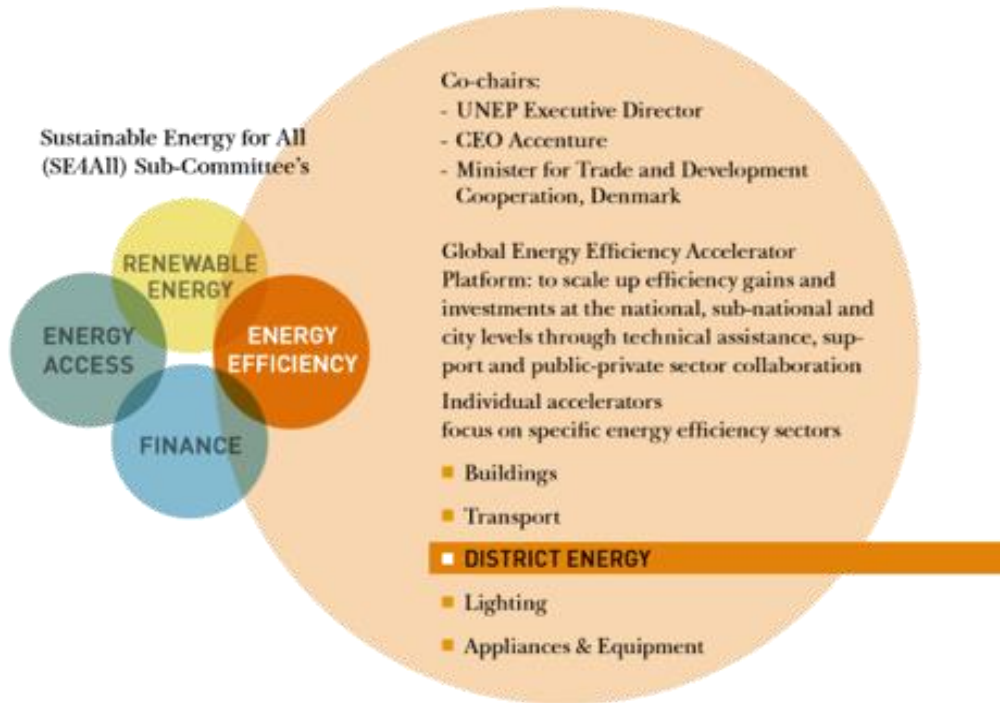
Lack of holistic
planning policies
that integrate energy
and DES.

Regulatory
environment

Commercial viability
of DES unproven in
some markets.

Lack of data on
heating and cooling
consumption

Launch at the Climate Summit



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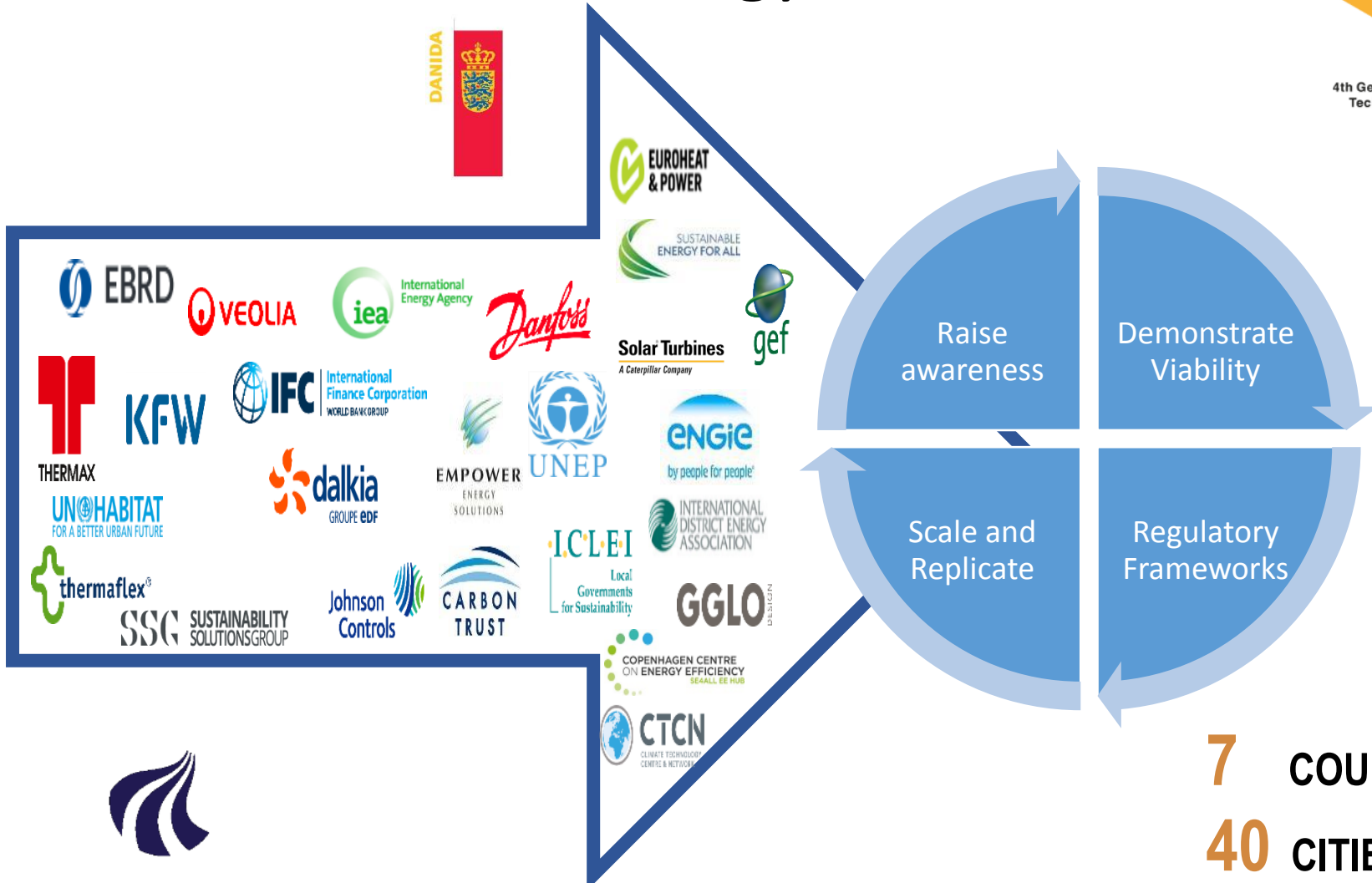
SUSTAINABLE
ENERGY FOR ALL



**GLOBAL ENERGY EFFICIENCY
ACCELERATOR PLATFORM**

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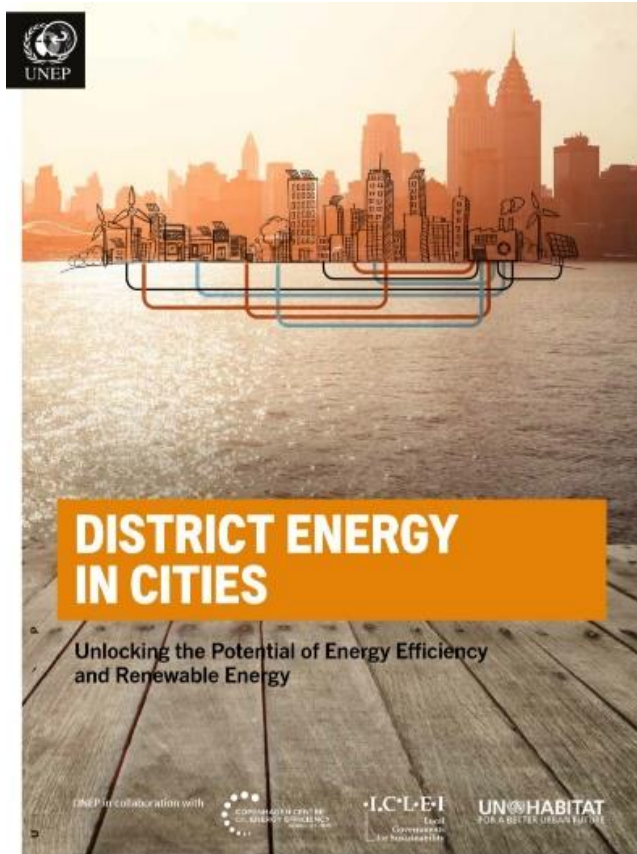
A Global Partnership on District Energy



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7 COUNTRIES
40 CITIES
36 PARTNERS

Launch of a Technical Guide



*“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.**”*



International Agenda

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21•CMP11



The District Energy Accelerator
Accelerating Transition to Low-Carbon, Climate Resilient Energy Systems



(Compilation Text as of 06 June 2016) Habitat III Zero Draft Outcome Document

122. We recognize that even for cities that do not directly control power generation, they may control local infrastructure and codes that can drive sustainable energy in end-use sectors, such as buildings, industry, transport, waste, or sanitation. We note the effectiveness of net metering standards, portfolio standards, and public procurement policies on energy, among other instruments, to support deployment. Smart grid and district energy systems should also be prioritized to improve synergies between renewable energy and energy efficiency.



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET



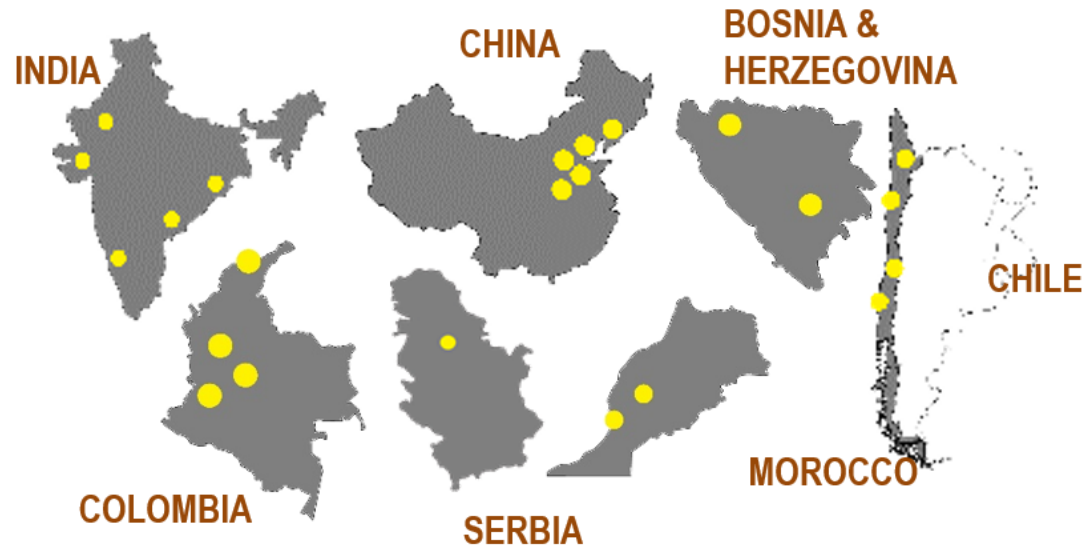
WORLD BANK GROUP



IRENA
International Renewable Energy Agency



Inspires Country Interest



Major ministries in 7 countries engaged to adopt and replicate best practice

Other countries being engaged: Malaysia, Mexico, Albania, Pakistan, Mongolia, Panama.



Building Interest in Eastern Europe

Tallinn Workshop

Private Sector Participation in District Heating



IFC

International
Finance Corporation
WORLD BANK GROUP



Country interest and sign-up

- Serbia
- Bosnia & Herzegovina
- Croatia
- Kosovo
- Mongolia



Banja Luka: Inefficient network



Water losses, oil, inefficient piping
= Energy Efficiency: 56-65%

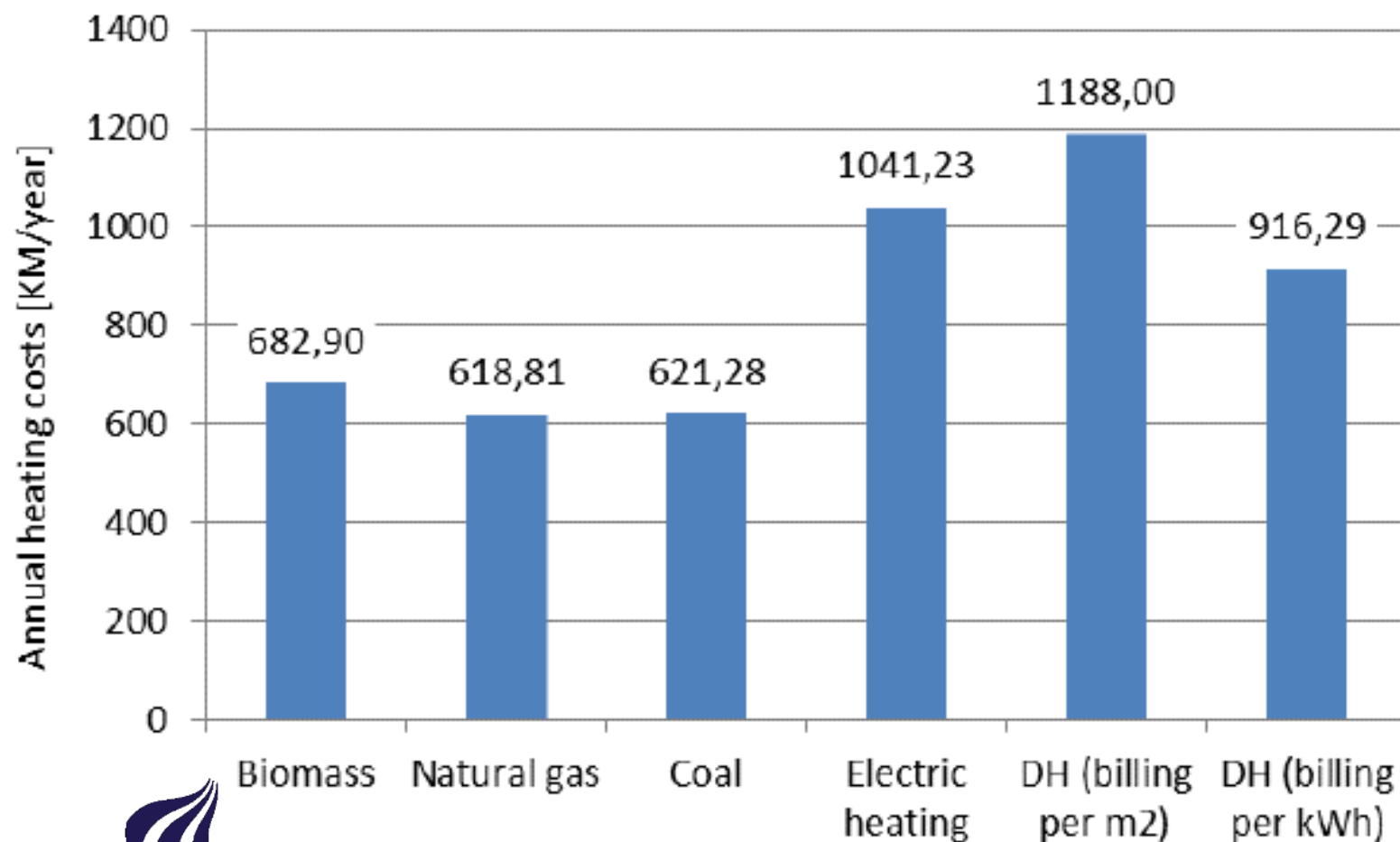


Banja Luka: High DH Prices

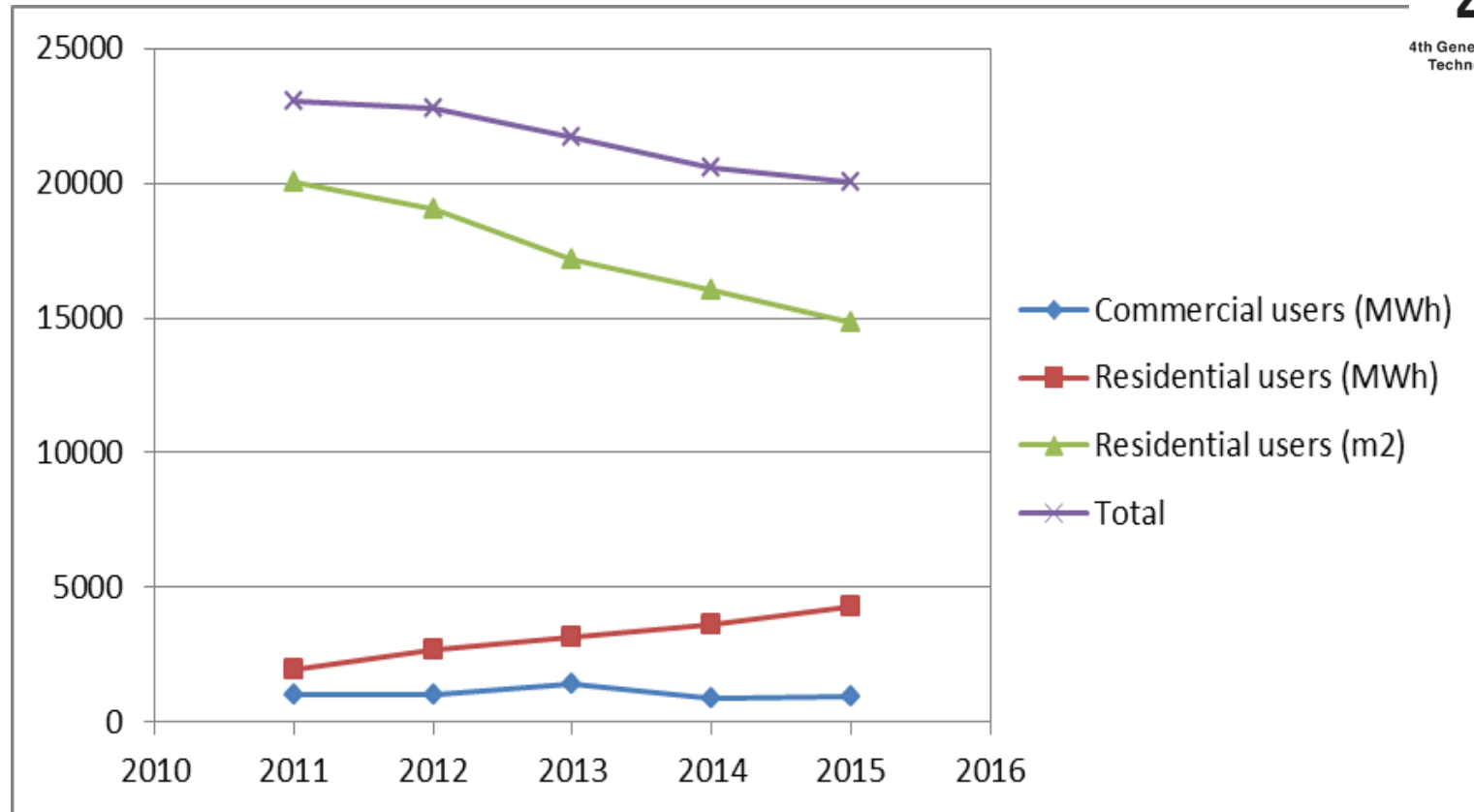


4DH

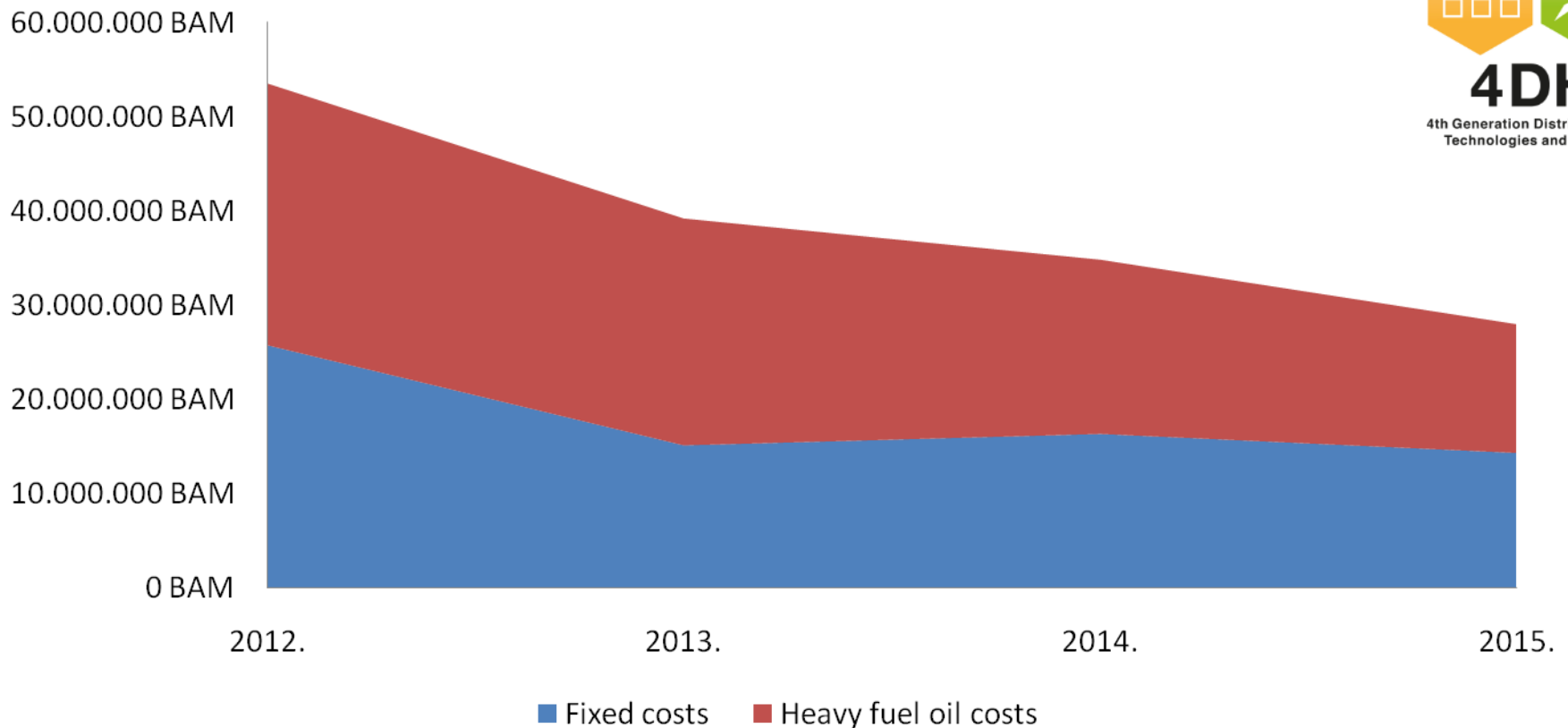
4th Generation District Heating
Technologies and Systems



Banja Luka: Customer Disconnections



Banja Luka: Financial Losses



Losses (2012): ~\$16 million

Losses (2015): ~\$2.5 million



Banja Luka: Technical Assistance



Support for intervention established – Mayor, DH company, National Government, Development Banks

City-wide assessment

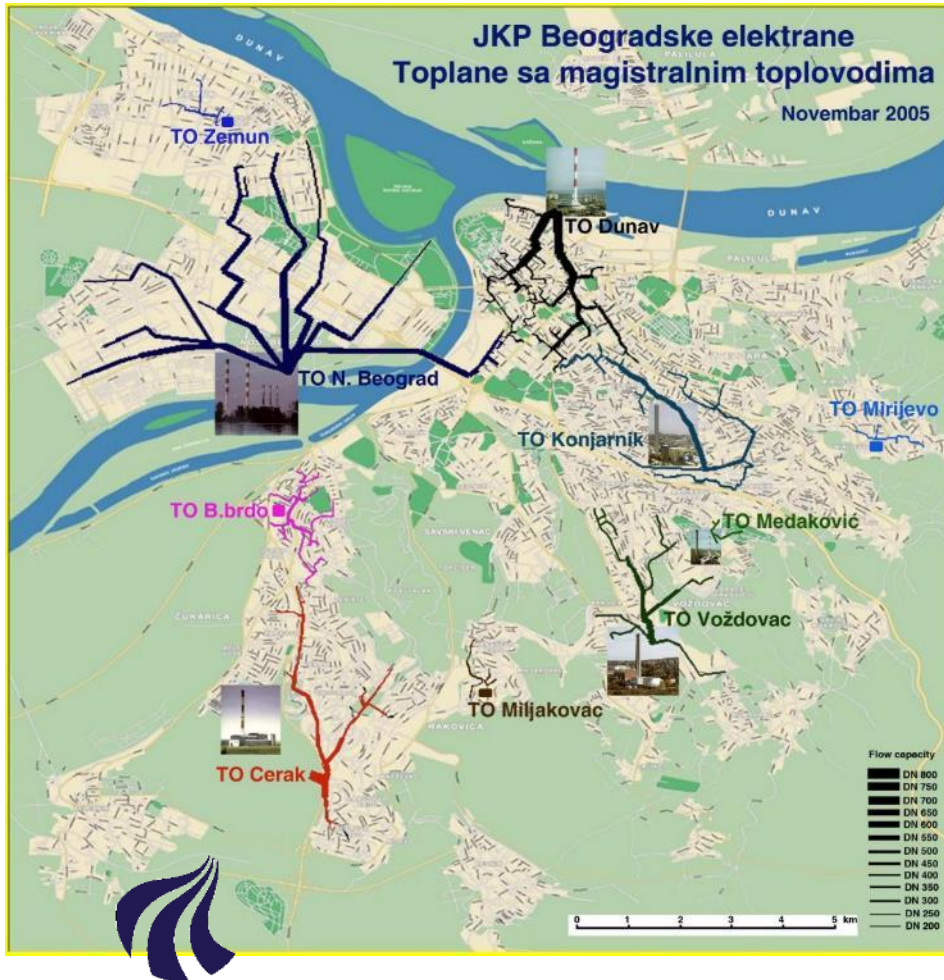
Priority investment program ~\$30 million

- **New biomass boilers (24MW)**
- **Reconstruction of oil boiler**
- **Network rehabilitation**
- **Switching metering**

**Attracted new loans and refinancing from banks
~ 42 million euros**



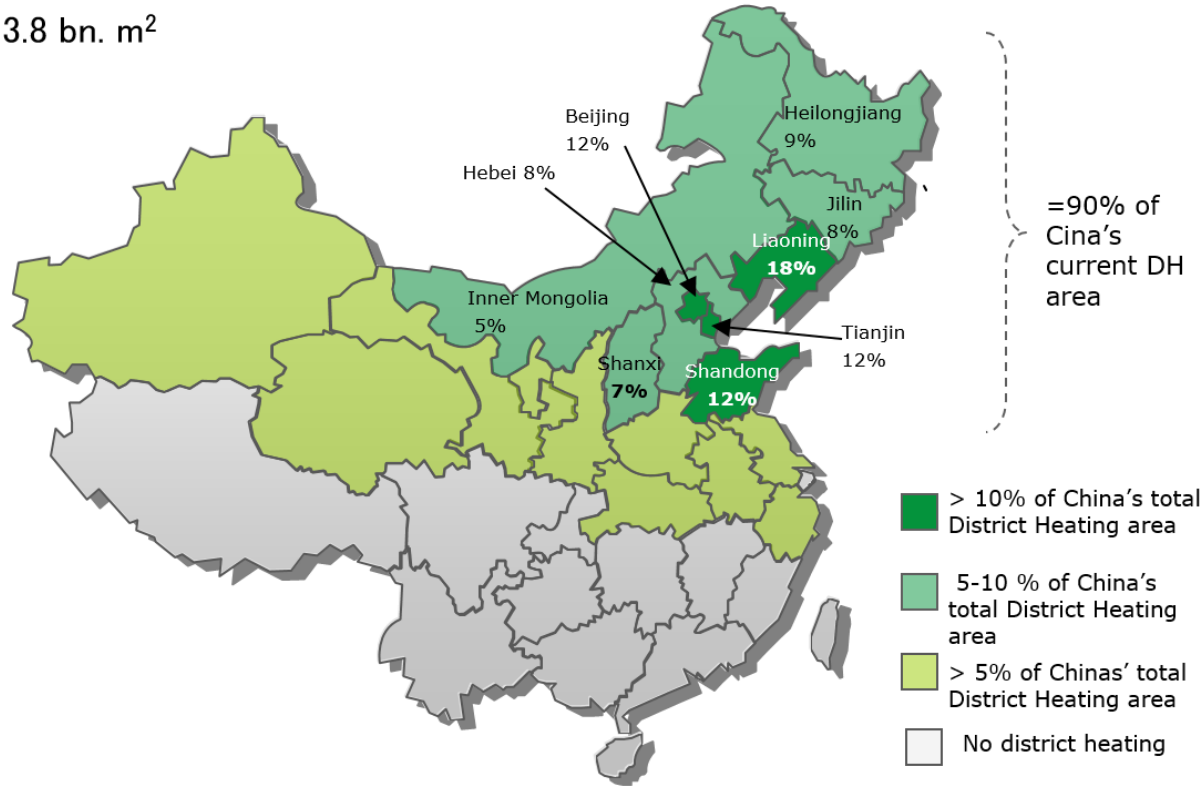
Support to Belgrade



- Uses more than 50% of the country's natural gas supply that is being imported
- City wants support to switch heat sources, improve management, increase connections and assess new business model options
- Belgrade will benefit from capacity building, assessments, demonstration project and strategy development DH system

China: Huge potential for DH modernisation

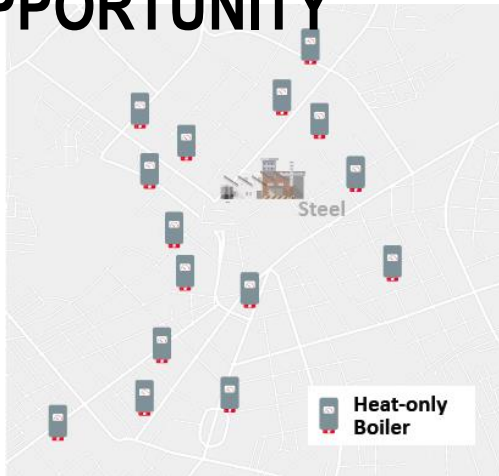
Σ 3.8 bn. m²



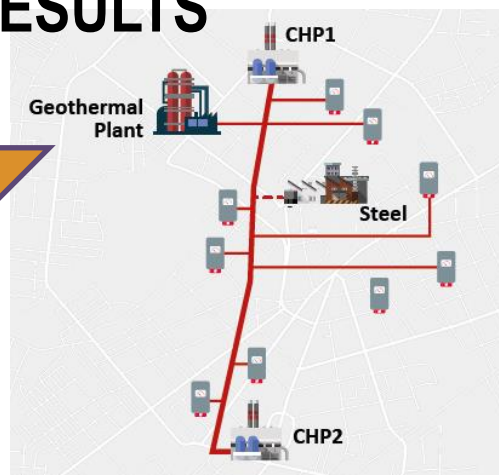
- Fastest growing market worldwide - 3 fold growth
- Half of all major cities have DH ½ residential and commercial buildings
- Industrial waste heat close to cities
- 3.2% of national energy consumption (2010)
- Boilers and CHPs in near equal amounts, largest CHP capacity in the world
- Local air pollution due to high use of coal

China: from Opportunities to Results

OPPORTUNITY



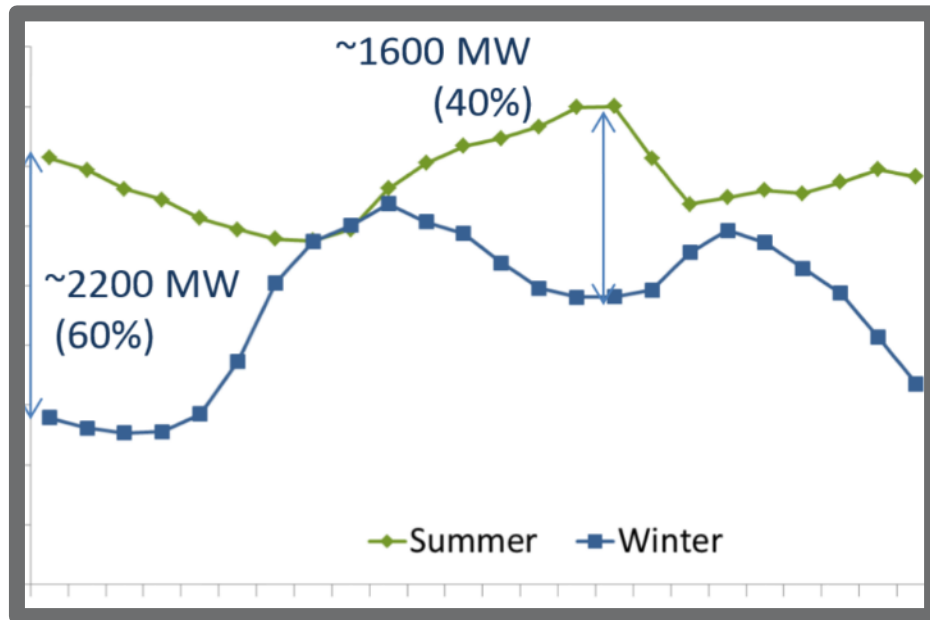
RESULTS



- Select 1-2 focal cities
- City-wide techno-economic assessment
- Mapping waste heat sources
- Waste heat and integrated energy planning
- City-wide development plan for district heating
- Business model support and pricing
- Capacity building
- Results replicated to 3-10 participating cities

India: Huge potential for district cooling

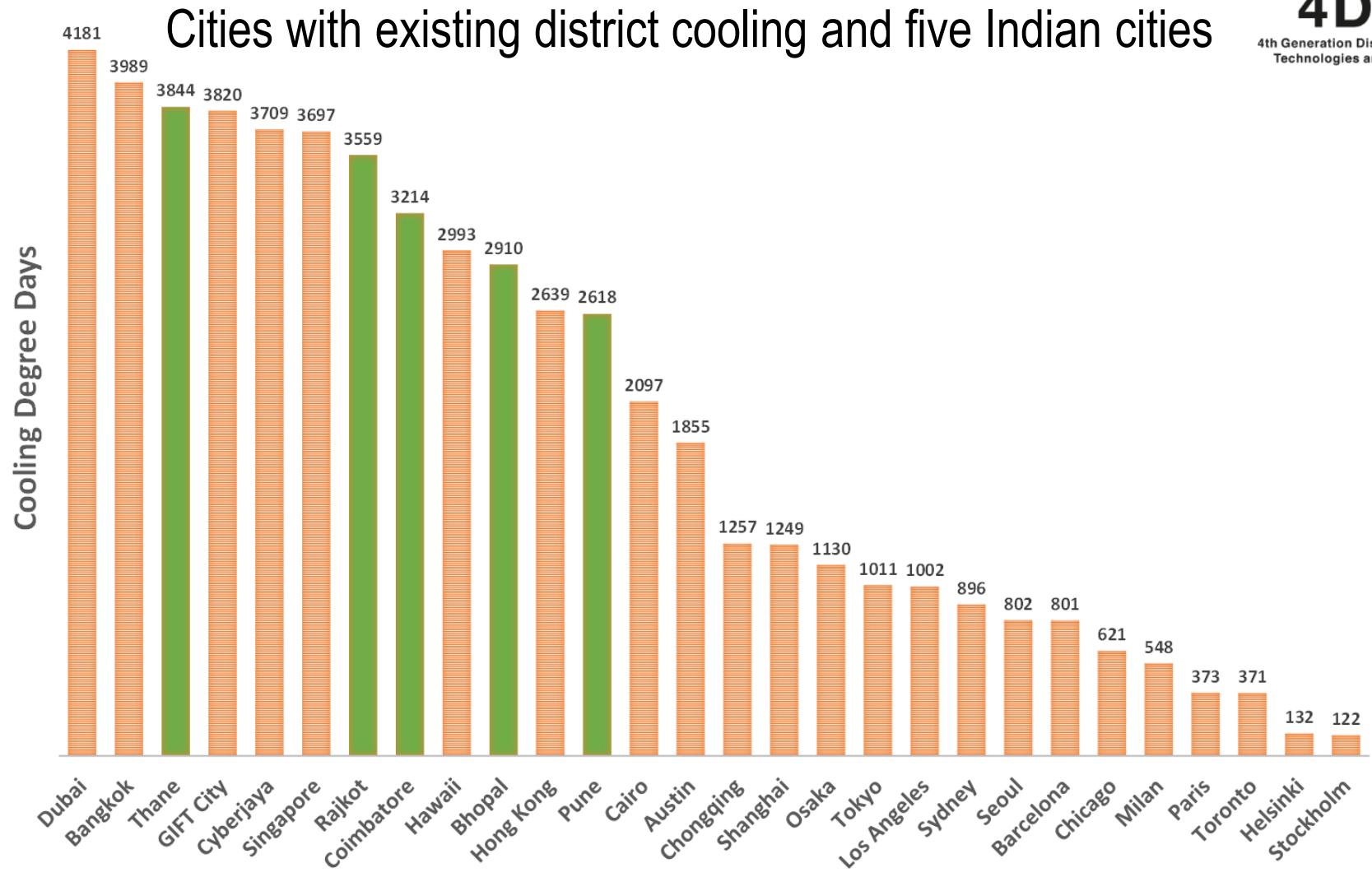
Delhi Summer and Winter Electricity Demand Profile



- India to require 83GW of additional power capacity from 2016 to 2022
- Commercial demand for electricity to increase 50% from 2016 to 2022
- In many cities such as Delhi, cooling already contributes 40% -60% of peak electricity demand
-
- Cooling demand in India is projected by the IEA to grow 18 times by 2050



India: Huge potential for district cooling



*Average of 2014 and 2015 cooling degree days for locations in selected cities using 18 degrees Celsius as reference temperature.

Chile District Energy Potential



- Improve air quality in high polluted areas of central and southern Chile by up to 90%.
- Substitute individual wood-stoves by district heating networks.
- Chile imports 60% of its primary energy. District energy would help reduce energy consumption and gain energy independence.
- Connect large scale renewables to buildings (e.g. geothermal, solar thermal).

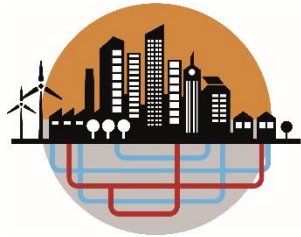
Activities in Chile 2016

- Preparatory phase
- National Steering Committee
- Consultation with Project Partners to identify areas of interest
- National roadmap for the development of district heating
- Call for city expression of interest
- National workshop to select cities and define next steps for the national roadmap (Sept 2016)

Coyhaique, Chile



Collaboration possibilities



**DISTRICT ENERGY
IN CITIES
INITIATIVE**



Addressing this huge potential through sharing expertise:

- Review policy, regulatory and technical guidance
- Provide capacity building to city planners, engineers and technicians
- Provide support to development or adaption of modelling tools
- Direct advice to cities and countries
- University exchange programmes
- Incorporation of developing country case studies into research programmes and PhDs



For more information on the Global District Energy in Cities Initiative and to become a partner, please visit the website or contact:

- Ms. **Lily Riahi**, Advisor on Sustainable Energy in Cities, Energy, Climate, and Technology Branch, UNEP
lily.riahi@unep.org