



SMART DISTRICT HEATING FROM FINLAND

The Coldest Country in Europe

The Best Country of District Heating

5.6.2013 Conference: biomass for district heating systems,

Belgrad, Serbia

Internationalization Programme of Finnish DH Cluster

Background of Finnish Supply Potential:

- Finland: the coldest country in Europe
- Optimal DH & CHP system: low tariffs, high quality and availability
- World best experience in usage of renewable fuels
- Industrial and municipal co-operation is well-established
- Good examples in district cooling already
- Reliable reputation and high-quality products



Internationalization Programme of Finnish DH Cluster:

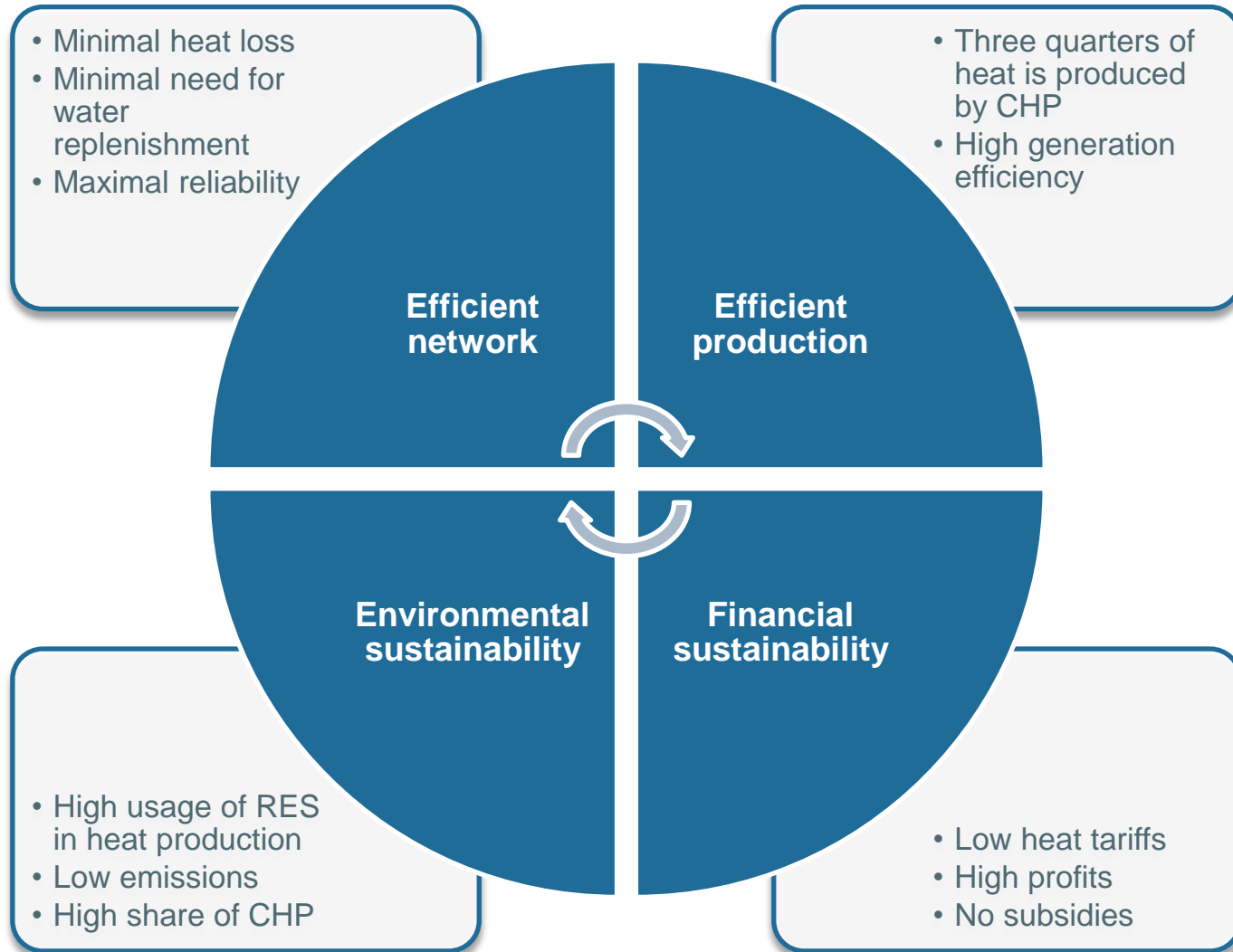
- Finnish Ministry of Employment and Economy has decided to finance internationalization programme of Finnish DH cluster through Finpro
- Fourteen Finnish companies are participating in the programme

Programme Objectives:

- To cluster Finnish offering of DH, CHP and renewable fuels
- To promote the Finnish expertise and know-how in CEE, CIS countries and China
- To establish strategic co-operation between the Finnish and local companies as well as high-level authorities

Finnish District Heating know-how is unique!

WOULD YOU LIKE TO HAVE THE **WORLD BEST** DHC SYSTEM?



WOULD YOU LIKE TO HAVE A DHC SYSTEM WITH EXCELLENT KEY PERFORMANCE INDICATORS?

Key Performance Indicators	Finland (200 companies on average)	Transition Economies
Network heat losses of production	6-9%	15-40%
Make-up water replenishment need per year	1	10-50
Reliability	99,98%	99% or lower
CHP share of DH production	76%	30-60%
DH generation efficiency	93%	60-90%
RES share of DH production	38%	0-10%
Staff productivity (GWh / employee)	20	1-4
Profitability % of turnover	10-20%	Low or negative

Highly **efficient** and **reliable** Finnish DHC Networks



- DH is available for customers 99,98% of the time (**breaks are less than 2 hours per year**, including planned breaks)
- Frequency of network damages is 0,1 damages/km, compared to 1-2 damage/km in transition economies
- Due to preventive maintenance practices, **damages are minimized** and if occurs, repaired immediately
- The efficiency of the DH networks is on average over 91%, in some cities reaching even 94%
- Network **water replenishment rate is only once a year** compared with 10-50 times in transition economies;
- Finnish DH pipelines are designed to last minimum 50 years and **expected to operate 100 years or even longer.**

Finnish DH systems are characterized by **reliability** and **ease of use**. Heat supply breaks are rare and the DH network requires **minimal maintenance**.

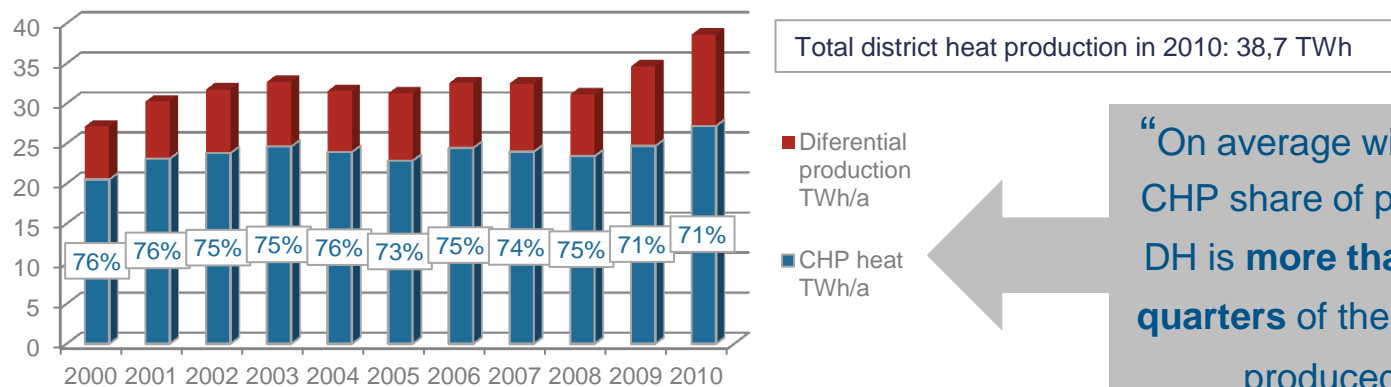
Finland: The World Leader in CHP / DH



CHP in District Heating is the Best Choice:

- Combined Heat and Power (CHP) is the **most efficient way** to produce heat and power from any fuel.
- CHP is largely used in both industry and district heating.
- In Finland, more than 70% of all district heating is generated by CHP whereas in many cities the share is more than 90%.
- In 2010, 20% of all electricity produced in Finland was based on CHP.
- Customers benefit from **low heat prices** in Finland.
- The reason to low prices lies on the optimized structure and size of the Finnish DH systems.
- Large scale use of CHP provides synergy benefits to DH as well.
- DH at low prices is competitive to any other heating modes.

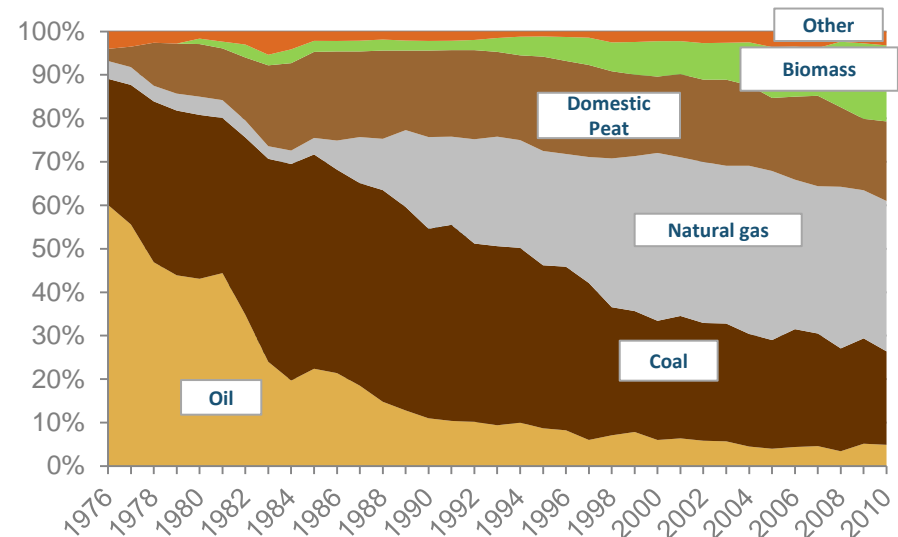
Finnish District Heat production and the share of Cogenerated Heat



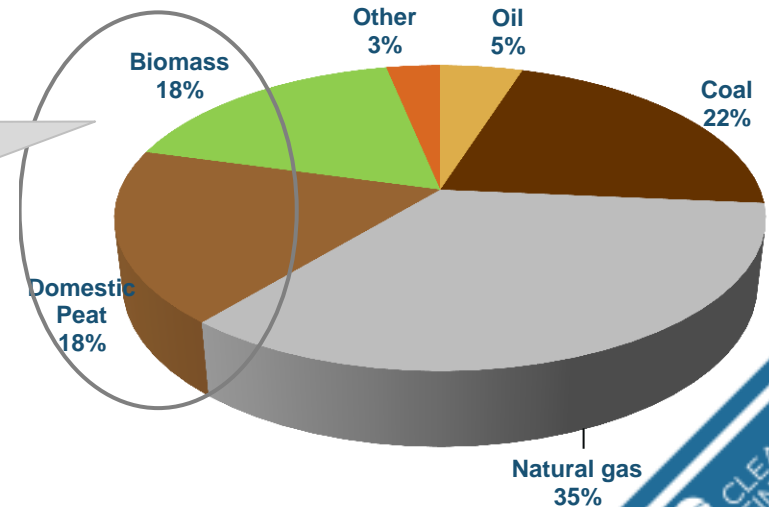
“On average winter, the CHP share of produced DH is **more than three quarters** of the total DH produced.”

Leading Expertise in Usage of RES

- Finnish companies have decades of experience and strong position in exporting bio energy technology
- 36% of DH production is based on biomass and domestic peat
- 31% of electricity production is based on RES.
- DH in Finland has its roots in the CHP of the wood processing industry
- The increase of biomass use is even higher in CHP than in separate heat production
- The national target is to have DH and CHP free from fossil fuels by 2050



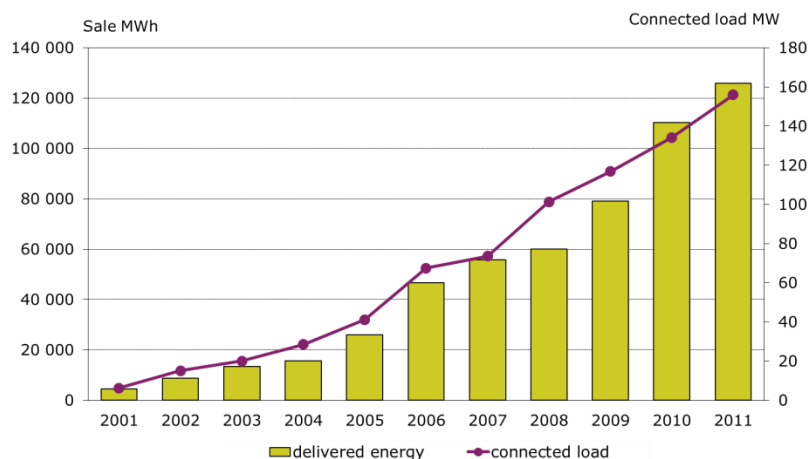
“ The price of district heating has increased moderately compared to rising prices of oil and gas, because alternative fuels - such as coal, domestic peat, waste wood, municipal and industrial waste - have been used instead. “



Finland: among the Leading Countries on District Cooling in Europe



- In Helsinki, despite of the cold climate, a high demand for cooling prevails.
- In 2008, Helsinki had the third largest and most rapidly growing cooling system in Europe. (90 MW).
- The growth is based on customers' own willingness to connect district cooling in the free market.
- Sea water, conventional heat pumps and absorption chillers, covering 1/3 each, are used as sources for cooling.
- More than 80 % of the district cooling production is based on resources that otherwise would be wasted.
- The share of renewable sources amounts to 60%.



District Cooling Key Figures in Finland, 2011

- Total DC sales: 120 MWh
- DC trench length for transport and distribution network (one way): 76 km
- Available DC storage: 38.6 MW
- Cities offering DC: Helsinki, Turku, Heinola, Lahti
- Tampere is planning to offer DC
- DC is competitive in densely built areas where high demand for cooling exists.

Integration of district heating and cooling provides synergy in CHP operation and in overall energy efficiency.

Finnish DHC: The **Benchmark** worldwide!



Finnish DHC in 2012

Heat sales (incl. taxes)	2,250 mill €
Sold heat energy	33.6 TWh
Average price of DH (incl. taxes and domestic hot water)	67 €/MWh
Inhabitants in DH apartments	2.7 mill
Market share of district heat	47%
Sold district cooling energy	124 GWh

*The International Energy Agency (IEA 2009) has stated that **Finland is the 'model for the world' in CHP and DHC** with high efficiency and environmental performance.*

Finnish DHC business and expertise is provided by:

- Both private and public DH companies that independently operate in the non-regulated market, which drives them for high operational efficiency and financial sustainability
- Investments made based on the long-term least cost solution
- Several world-class energy consulting companies
- Full range of equipment manufacturers both for energy production and distribution
- Several universities, research institutes and energy companies who invest in R&D activities for CHP and DHC.

