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Heat Road Map Europe 2050
Pre-study 2012

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Existing Studies

- Energy Road Map 2050 (EU commission)
- Road Map 2050 (McKinsey et al.)
- The energy report – 100% renewable energy by 2050 (WWF)
- Energy Technology Perspectives 2010 (IEA)
- World Energy Outlook (IEA)
- Deciding the Future – Energy Policy Scenarios to 2050

Consensus/general: "Combined heat & power (CHP) and district heating (DH) are important"

... but fail to quantify to which extent these options can be used in the future energy system...

The European Commission in the Energy Roadmap communication:
“An analysis of more ambitious energy efficiency measures and cost-optimal policy is required. Energy efficiency has to follow its economic potential. This includes questions on to what extent urban and spatial planning can contribute to saving energy in the medium and long term; how to find the cost-optimal policy choice between insulating buildings to use less heating and cooling and systematically using the waste heat of electricity generation in combined heat and power plants.”
GIS based information

Urban areas (Heating Demands)
Power and Heat Generation
Waste Management
Industrial waste heat potential
Geothermal heat
Solar Thermal
Energi System Analyse Model

www.EnergyPLAN.eu
Europe  IEA 2010 and EU CPI scenario 2050

CPI = Current Policy Initiatives

IEA Statistics 2009

EU Energy Roadmap 2050

Reference (12% DH) (IEA 2010 and EU CPI 2050)

Versus

Reference plus 30% and 50% DH (and CHP etc.)
Showing DH benefits in 2 steps

**Step 1: (Energy Efficiency)**
- Increasing DH to 30% then 50%
- Increasing CHP
- Using Oil/Natural gas in CC-CHP

**Step 2: (Utilise waste and RE sources)**
- Industrial waste heat
- Waste incineration
- Geothermal heat
- Large-scale Solar Thermal
Year 2010
Step 1: Energy Efficiency

EU 27 Primary Energy Supply & CO2 for Heating Buildings in 2010 at Different DH Penetrations

- IEA 2010
- HRE 30%
- HRE 50%

- Existing CHP & DH
- Additional CHP & DH
- Other renewable
- Biomass
- Natural gas
- Oil
- Coal
- Nuclear
- CO2 Emissions
**EU 27 Primary Energy Supply & CO2 for Heating Buildings in 2010 at Different DH Penetrations**

- **Present 12% DH**
- **HRE 30% RE**
- **HRE 50% RE**

- **Existing CHP & DH**
- **Additional CHP & DH**
- **Other renewable**
- **Biomass**
- **Natural gas**
- **Oil**
- **Coal**
- **Nuclear**
- **CO2-emissions**

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**IEA Statistics**
Total European Energy Supply

EU27 Primary Energy Supply & CO2 in 2010 at Different DH Penetrations - High RE

- 7% reduction in Primary Energy Supply
- 13% reduction in fossil fuels
- 17% reduction in CO2-emissions

IEA Statistics
EU Energy Roadmap 2050

CPI reference
EU27 Primary Energy Supply & CO2 for 2010 to 2050
EU CPI vs HRE RE

HRE 2050 compared to EU CPI 2050:
- 5% reduction in Primary Energy Supply
- 10% reduction in fossil fuels
- 13% reduction in CO2-emissions
Cost and Jobs:

- Saved fuel costs annual approx. 30 Billion EUR in 2050
- In total cost are reduced by 14 Billion EUR in 2050
- Additional investments of a total of 500 billion EUR
- Additional jobs from to 2013 to 2050: 8-9 million man-year in total
  Approx. 220,000 jobs.
Conclusion: 50% DH and CHP

• Decrease primary energy supply and especially fossil fuels and CO2 emissions

• Decrease annual costs of energy in Europe by approx. 10 Billion in 2050

• Create additional 220,000 jobs in the period 2013-2050

• Further integration of RES
Conclusion: Methodology

• In continuation of this pre-study to make a tighter connection between the energy modelling part and the mapping part

• Advocate full energy balance matrixes in future projections concerning the future European energy system such as *Energy Roadmap 2050*

• Further optimise the DH-scenarios (replace electric heating, expand CHP and HP, further the integration of wind and PV etc.)
HEAT ROADMAP
EUROPE 2050

FIRST PRE-STUDY FOR THE EU27

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EUROHEAT & POWER

AALBORG UNIVERSITY
What and who are 4DH?

- Strategic Research Centre financed by the Danish Research Council and the partners
- Universities and Industry including manufactories, consultants and DH companies
- International partners
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