The German "Energiewende" and its implications for District Heating and Cooling and Combined Heat and Power

DBDH Meeting of Members

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AGFW: A brief introduction

The current market situation

The German „Energiewende“

Implications for DHC and CHP
Who we are

» **AGFW** is an independent and impartial association promoting energy efficiency, (district) heating, cooling and CHP at national and international levels

» **AGFW** unifies approximately 500 (regional und municipal) district energy suppliers and industrial operators of the sector in Germany and Europe

» **AGFW** represents over 95 % of the heat load connected to German district heating systems – the largest scale in Western Europe

» **AGFW** has over 40 years of experience in this field
Who we are

Example

Why technical guidelines – our Target:

Technical self-administration of the sector as the foundation of lobbying activities
AGFW: A brief introduction

The current market situation

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Implications for DHC and CHP
The current market situation

Facts and figures – DH and CHP in Germany

- The district heating connected load in Germany is approximately 57 000 MW$_{th}$
- 13% CHP share in electricity production
- The district heating customers are: 46% private homes, 36% public buildings, commercial and trade sector and 18% industry
- The total length of the district heating grid in Germany is approximately 100 000 km
- Over 84% of District Heating is generated in high efficient CHP plants
The current market situation

District Heating market share (occupied accommodations)

Approximately 13% of the occupied accommodations are heated with District Heating, that equals around 4.8 million accommodations.

36.1 million accommodations according to their heating solution

- District Heating: 13.2%
- Central Heating: 7.2%
- Floor Heating: 8.6%
- Individual Boilers: 71.0%

Source: Statistisches Bundesamt
District Heating market share in terms of accommodation type

- District Heating predominantly in multi-family houses (accommodations for more than two families)

18.8 million accommodations in multi-family houses according to their heating solution

- 23% District Heating
- 6% Central, floor Heating
- 71% Individual Boilers

17.3 million accommodations in single or two family houses according to their heating solution

- 9% District Heating
- 2% Central, floor Heating
- 89% Individual Boilers

Source: Statistisches Bundesamt
The current market situation

Energy consumption for heating and warm water supply

- District Heating supplied buildings have, on average, the lowest energy consumption (PE/m²) and CO₂ emissions.

Demand for heating and warm water preparation, period 2006-2010, database > 6 million accommodations (double counting possible).
The current market situation

Net electricity supply in public and industrial supply, 2011

» CHP has the highest potential for growth in the public electricity supply

» In order to meet the targets on CHP electricity DHC are essential

Source: Statistisches Bundesamt
AGFW: A brief introduction

The current market situation

The German „Energiewende“

Implications for DHC and CHP
Brief chronology of the „Energiewende“

➤ April 2002: Laws for the implementation of the consensus on nuclear energy between the former government (Social Democrats and Greens) and the energy companies operating nuclear installations come into force

➤ No new commercial nuclear installations, average standard run-time 32 years, 2.62 million GWh production from January 2000 (flexible allocation, phase-out was foreseen for around 2021)

➤ September 2010: Government decides the energy conception 2050

➤ Especially: Prolongation of the run-time of nuclear power installations combined with a tax on nuclear fuel

➤ January 2011: Laws for the implementation of the energy conception come into force

➤ March 2011: Following the catastrophe in Fukushima, Japan, a moratorium is imposed on nuclear installations to check their security

➤ September 2011: Government decides a new energy conception

➤ Especially: Accelerated phase-out of nuclear installations until 2022
### Targets of the „Energiewende“ (2011)

<table>
<thead>
<tr>
<th>Category</th>
<th>Today</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut in greenhouse gas emissions (against 1990)</td>
<td>-27 %</td>
<td>-40 %</td>
<td>-55 %</td>
<td>-70 %</td>
<td>-80 %</td>
</tr>
<tr>
<td>Proportion of renewable energy in gross final energy consumption</td>
<td>10 %</td>
<td>18 %</td>
<td>30 %</td>
<td>45 %</td>
<td>60 %</td>
</tr>
<tr>
<td>Share of renewables in electricity consumption</td>
<td>16 %</td>
<td>35 %</td>
<td>50 %</td>
<td>65 %</td>
<td>80 %</td>
</tr>
<tr>
<td>Cut in primary energy consumption (against 2008)</td>
<td>-6 %</td>
<td>-20 %</td>
<td></td>
<td>-50 %</td>
<td></td>
</tr>
<tr>
<td>Cut in electricity consumption (against 2008)</td>
<td>-7 %</td>
<td>-10 %</td>
<td></td>
<td>-25 %</td>
<td></td>
</tr>
<tr>
<td>Cut in energy consumption in transport sector (against 2008)</td>
<td>-10 %</td>
<td></td>
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<td>-40 %</td>
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» AGFW: A brief introduction

» The current market situation

» The German „Energiewende“

» Implications for DHC and CHP
Framework of the „Energiewende“ (DHC and CHP related)

» Accelerated development of electricity from renewable energy sources (RES) tailored to suit market demand

» Strong contribution of accumulators and flexible conventional electricity production for the integration of fluctuating/volatile electricity from RES, especially wind

» In order to guarantee affordable electricity prices the development of RES has to be cost-efficient

» Continued CHP support beyond 2016

» Development of CHP support in the context of a new CHP act

» Improvement of energy efficiency standards for buildings

» Roadmap for improving energy efficiency in the building stock
Implications for DHC and CHP

The new CHP act following the „Energiewende“

- Target: Increasing the share of CHP electricity in Germany to 25%; NEW: 2020 as a time frame for reaching the target
- Obligation of grid operators to connect CHP plants and give priority to buying CHP electricity
- Grid operators pay a fixed premium for CHP electricity on top of the market price for a limited time; NEW: Increased premium (+ 0,3 EUR Cent / kWh), additional premium for CHP plants that take part in the EU Emissions Trading System, ETS (+ 0,3 EUR Cent / kWh)
- Support for DH grids based on CHP as heat sinks within this support system; NEW: Increased support (30% of the construction costs), extending support to DC grids
- NEW: Support for thermal storage (heating and/or cooling) used in conjunction with CHP plants for the integration of RES electricity in the energy system
- Costs for the support are shared among all electricity consumers (currently 0.002 – 0.05 ct/kWh)
- Compatible/in line with European law
- No burden on the national budget
- No state aid
New support categories for CHP installations

» Small installations, installed capacity ≤ 2 MW<sub>el</sub>
  » ≤ 50 kW<sub>el</sub> 5.11 Cent/kWh / 10 years
  » > 50 kW<sub>el</sub> 2.1 Cent/kWh / 30 000h

» New high efficient installations > 2 MW<sub>el</sub>
  » > 2 MW<sub>el</sub> 1.5 Cent/kWh for 30.000 h
  » Additional 0.3 EUR Cent/kWh
  » Additional compensation of 0.3 EUR Cent/kWh for ETS

» Modernized or replaced installations > 2 MW<sub>el</sub>
  » Modernization rate > 50 % 1.5 Cent/kWh/30 000h
  » Modernization rate > 25 % 1.5 Cent/kWh/15 000 h

» Retrofitted installations > 2 MW<sub>el</sub>
  » Retrofitting rate > 50 % 1.5 Cent/kWh/30 000h
  » Retrofitting rate > 25 % 1.5 Cent/kWh/15 000h
  » Retrofitting rate > 10 % 1.5 Cent/kWh/10 000h
### Implications for DHC and CHP

#### Installations necessary to reach the 25 % CHP target

- The number of small installations necessary to reach the target are too high to be achieved under realistic conditions (currently there are around 20000 small installations eligible for support).
- Larger scale installations are necessary to reach the target.

#### Conclusion:

Without DH, the 25 % CHP target is impossible to reach.
Implications for DHC and CHP

DH production including storage and power2heat

» Low proportion of wind and/or pv
Implications for DHC and CHP

DH production including storage and power2heat

» Medium proportion of wind and/or pv
Implications for DHC and CHP

DH production including storage and power2heat

» High proportion of wind and/or pv
Barriers for accelerated development of DHC and CHP

» Discussions on a mandatory TPA regime, especially labored on the European level
  » DH is local and there is no European “copper plate” for heat
  » TPA in DH leads to higher prices for the customer
  » TPA in DH leads to higher CO₂ emissions
  » TPA in DH leads to less efficiency

» The ETS, which favours on-site installations due to size limitations
  » Unlike in Denmark there is no high CO₂ tax on fuels to incentivize efficiency in heat supply

» These assumptions are backed by the results of the sector inquiry “District Heating” by the “Bundeskartellamt”
  » The price for DH in Germany in general is appropriate
  » The ETS 2013 will have a negative impact on DH
  » TPA in DH is not recommended and leads to higher prices
  » TPA (transmission) in DH only if technically viable
  » No mandatory unbundling and regulation of DH due to high systemic costs and no sizeable benefit
Barriers for accelerated development of DHC and CHP

» Market situation for CHP installations is deteriorating
» The base load is slowly deteriorating
» Installations reach lower full load hours
» Higher flexibility (at higher costs) is necessary

Base load disappears (residual load 2030 in GW)

CHP installations are pushed out of the market

Profit margin drops, costs rise

AGFW | Energy efficiency association for heating, cooling and CHP
my best choice
district heating ...
because it´s clean and helps,
to save CO₂ for a better environment.
Mange tak!
Thank you for your kind attention!

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www.smart-heat-grid.de