URB Energy

WP 4 Energy Supply

WORKSHOP 3

INNOVATIVE TECHNOLOGIES IN HEATING SUPPLY SYSTEMS

Background information from Germany & Berlin

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RES heat supply policy in Germany[1]

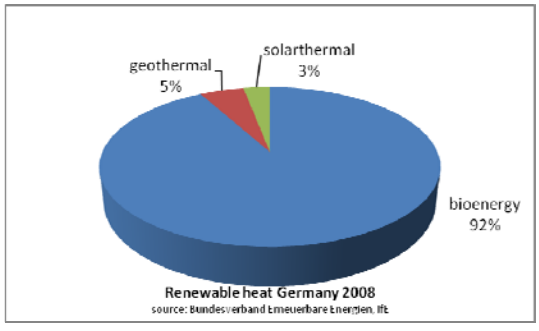
Heat Act (EEWärmeG): Increase share of RES from 6% (2006) to 14% (2020) All owners of new buildings must cover part of their heat demand from renewable energy sources. Share is specified according to which energy source is used:

- solar radiation, at least 15 percent
- biogas, at least 30 percent
- all others, at least 50 percent.
  (Act can be extended to existing buildings on Länder level)[2]

Heat from RES in Germany:

Heat Act (EEWärmeG): Increase share of RES from 6% (2006) to **14%** (2020)

Renewable heat in Germany 2008



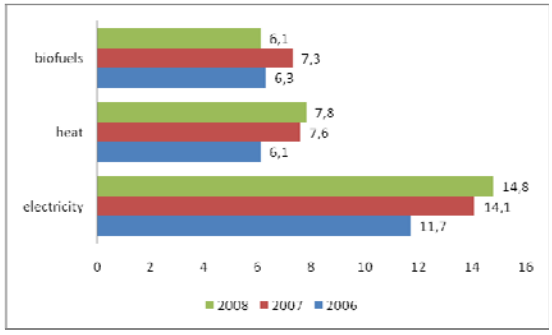


Fig. share of RES in Germany's energy mix (source: BEE)

No German figures for share of RES in DH found (Berlin: around 6.5%)

Scenario heat supply Germany until 2050

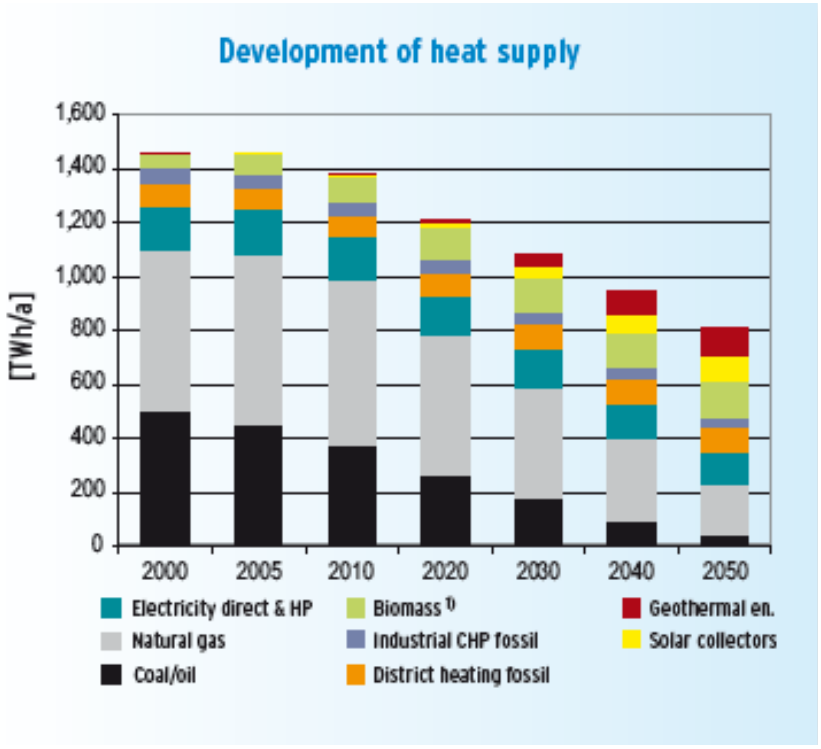
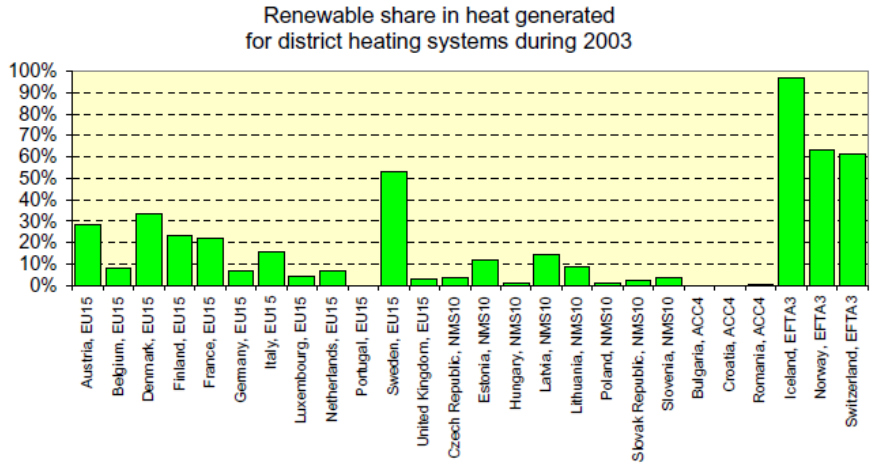


Fig. Scenario heat supply Germany until 2050
Source: BMU, Nitsch, Leitstudie 2007

Renewable share in heat generated for district heating during 2003



Source: IE Energy balances, Euroheat

Good practice example 1:

Solar district heating
(source: excerpt from IEE-Euroheat, WP4)

In some European district heating systems, large central solar heating plants supply heat to the systems. The 8 largest solar plants are listed in Table 5. They are all located in Germany, Denmark and Sweden and generate together about 70 TJ of heat each year.
The IEA Energy Balances contain for 2003 a total heat supply of 3616 TJ of heat generated from Solar/Wind/Others for the target area. However, a closer look in the extended balances reveals that almost all of this heat supply comes from unknown fuels in Denmark, Lithuania, and Slovak republic. Albania and Denmark are the only countries in the world that report supply of solar heat into district heating systems. Hence, the total solar heat supply to district heating systems cannot be found in the IEA Energy Balances.

The 2003 volume for Denmark was 51 TJ in the IEA Energy Balances. From Swedish sources, 7 central solar heating plants are known and they generate about 30 TJ per year. The two German plants in Table 5 generate about 12 TJ/year. Together, these three countries have a total annual solar heat supply of almost 100 TJ, corresponding to 0,004% of all heat generated in the target area in 2003.

The future possibility is that

• Solar heat can be transferred in district heating systems to customers having high willingness to pay for solar heat. An ambition can be to increase the annual heat generation from 0,1 PJ to 2 PJ at the current heat sales.

View of the Marstal solar collector area in Denmark
Photo: Leo Holm, Marstal Fjernvarme.

Overview dolar district heating

Location	In operation since	Owner	Country	Collector area, m2	Capacity, MWth
Marstal	1996	Marstal Fjernvarme	Denmark	18 300	12,8
Kungälv	2000	Kungälv Energi AB	Sweden	10 000	7,0
Nykvarn	1984	Telge Energi AB	Sweden	7 500	5,3
Falkenberg	1989	Falkenberg Energi AB	Sweden	5 500	3,9
Neckarsulm	1997	Stadtwerke Neckarsulm	Germany	5 263	3,7
Ærøskøping	1998	Ærøskøping Fjernvarme	Denmark	4 090	2,9
Friedrichshafen	1996	Techn. Werke Friedrichsh.	Germany	4 050	2,8
Rise	2001	Rise Fjernvarme	Denmark	3 575	2,5
Total				**58 278**	**41**

Good practice example 2:
Carbon neutral heat supply in Märkisches Viertel, Berlin

Apart from a 50% reduction of energy demand through energy efficient refurbishment of 13,000 flats of large building blocks in Berlin, modernisation of heat supply is envisaged as well. Currently, a district heating plant uses gas to supply the quarter with heat. Plans foresee to convert the plant into a heat and power plant using biomass instead of gas which will save an equivalent of 20,000t CO_2.

In the electricity supply the housing association GESOBAU has changed its supply contract to green electricity for power which is shared by all dwellers (corridors, cellars) and by GESAOBAU which has led to CO_2 savings of 2,700t per year.

The quarter Märkisches Viertel will be refurbished to Germany's largest low energy quarter
Photo: GESOBAU

Good practice example 3:

Europe's largest low energy house, Berlin-Lichtenberg

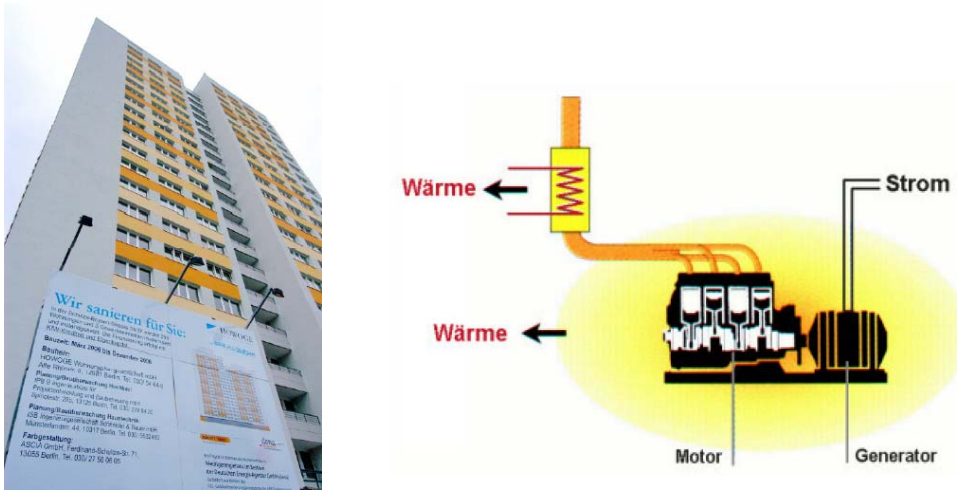
Replacement of a district heating transfer station and construction of a new Block Heat and Power Plant (using CHP) in residential building of HOWOGE housing association at Schulze-Boysen-Str. 35-38, Berlin-Lichtenberg

Renovation of district heating transfer station

The district heating transfer station in the basement of one of Germany's largest low energy house has been renovated using best available control technology. The flow temperature was reduced from 110°C to 70/55°C. New radiators were installed in the flats which were newly sized.

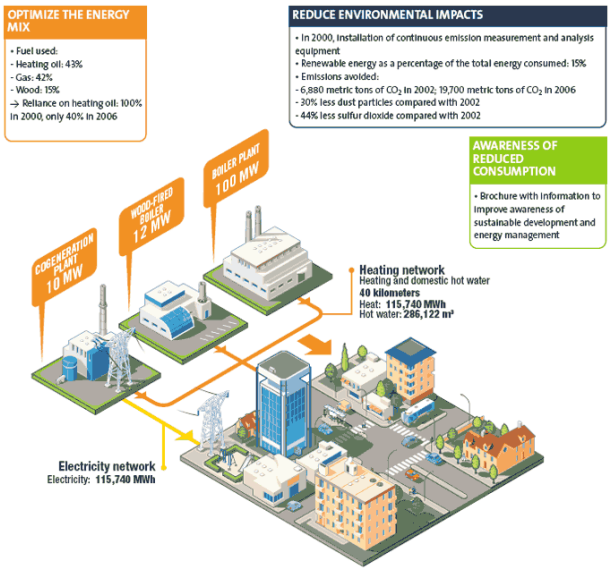
New Block Heat and Power Plant

A new block heat and power plant was installed in the basement and integrated in the heat supply circle. Electricity produced from CHP is used to light public spaces in the house and the ventilation system. Waste heat from the block heat and power plant is also used for hot water supply.



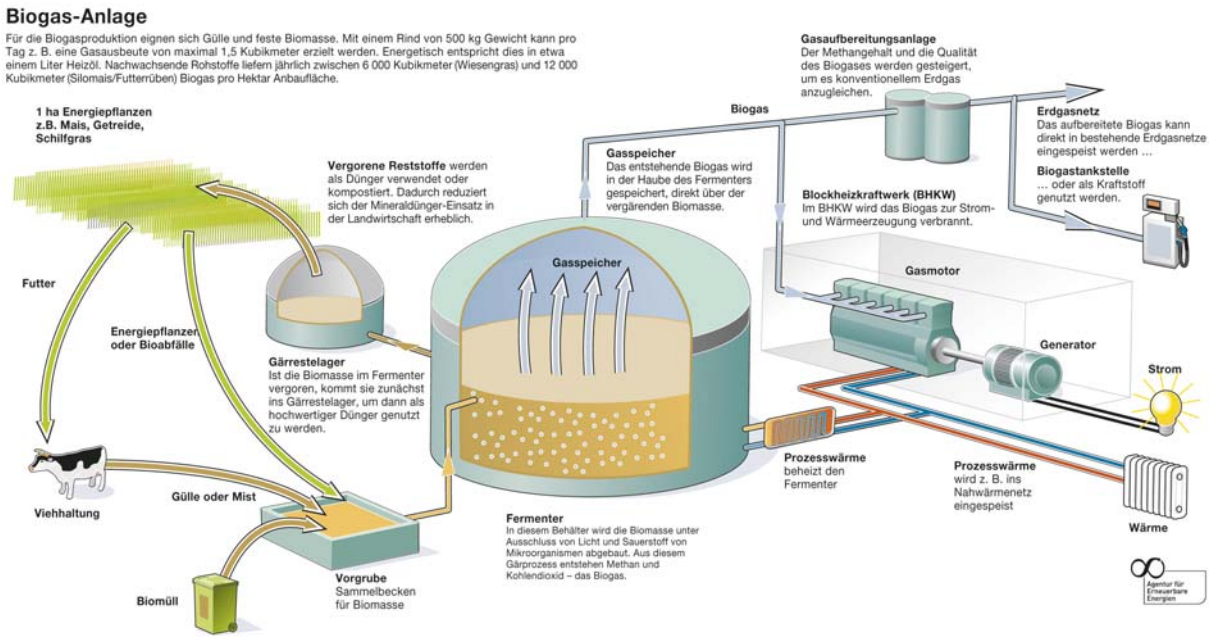
Low-energy residential building and scheme of block heat and power plant at Schulze-Boysen Str., Berlin
(source: HOWOGE)

Scheme of urban energy planning



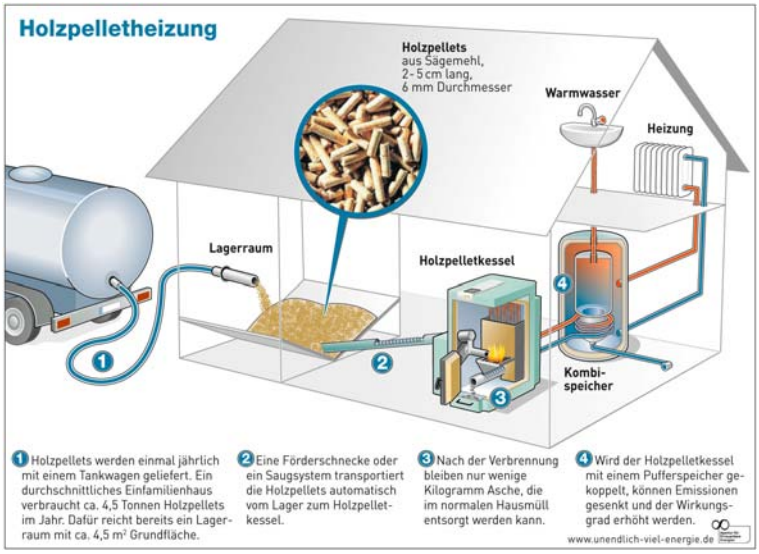
Source: Veolia[3]

Scheme of biogas plant



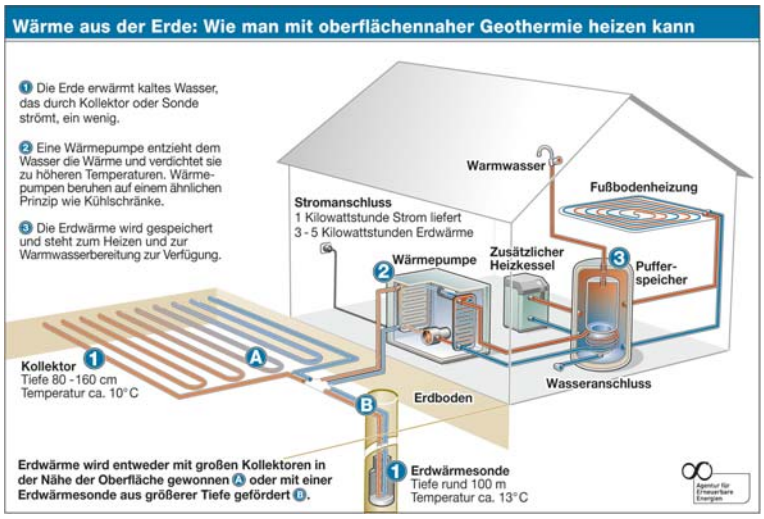
Source: Agentur für Erneuerbare Energien

Scheme of wood pellet heatinig



Source: Agentur für Erneuerbare Energien

Scheme of geothermal heating



Source: Agentur für Erneuerbare Energien

Sources:

[1] http://www.bmwi.de/BMWi/Redaktion/PDF/E/eckpunkt-fuer-ein-integriertes-energie-und-klimaprogramm,property=pdf,bereich=bmwi,sprache=de,rwb=true.pdf

[2] http://www.bmu.de/files/pdfs/allgemein/application/pdf/broschuere_waermegesetz_bf.pdf

[3] http://www.sustainable-development.veolia.com/en/repository/2038,schema-heating-network.gif