URB Energy

WP 4 Energy Supply

WORKSHOP 1

ENERGY EFFICIENCY OF HEATING SUPPLY SYSTEMS

Background information from Germany & Berlin

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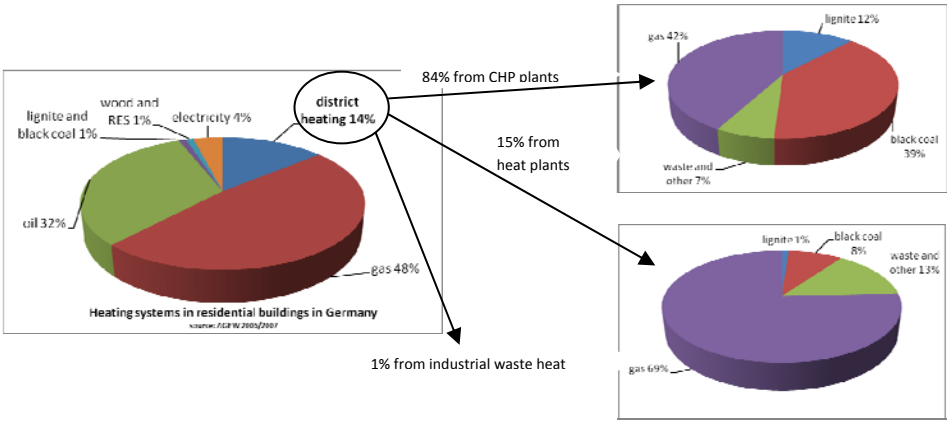
Baltic Sea Region Programme 2007-2013

BACKGROUND FIGURES GERMANY:

Heating systems:



BACKGROUND FIGURES BERLIN:

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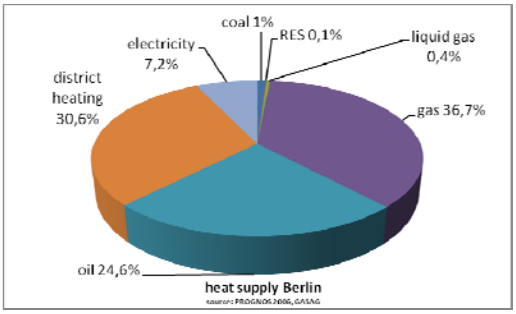

Heat supply policy in Germany[1]

1. **Energy saving Act 2009** (EnEV 2009): decommissioning of night storage heaters[2]

2. **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)

3. Amendment to the **Heating Costs Ordinance** (HeizkostenV) which increases consumption share in allocation system (fix and consumption share)

4. Amendment to the **CHP act (KWKG)**

- double electricity production from CHP to 25% by 2020
- funding of high efficiency CHP plants
- feed-in tariff for electricity (12,5-14,5 ct/kWh), new: same tariff for self suppy

Heat supply policy in Berlin

1. Energy Programme Berlin 2006-2010

- preference of existing gas and district heating supply (compete with each other)
- individual solutions through solar thermal solutions with local heat grids
- in favour of CHP extension and new combined heat and cold power CHCP technologies (good example: Potsdamer Platz)
- plant optimisation (conversion into gas and steam plants)
- cooperation with local gas provider GASAG with fixed CO_2 reduction goals
- solar refurbishment campaign (Solare Sanierung) for housing associations
- use of biomass residues (parks, cemeteries etc.) in heat power plants
- avoidance of wood pellet heating due to emission of particulate matter (10x higher than oil heating)
- Solar Framework Plan: priority for district heating or gas+solar thermal

2. Draft of new climate protection law (2009)[3]

- extension of RES duty for heat supply in existing buildings (>50 sqm)
- district heating only from CHP plants
- ordinance for heat supply plans
- compulsory use for defined heat supply in urban land-use plans

ALFA project – exemplary investment costs /costs per m²

Measure	**costs**	costs /m²	Energy saving potential th=thermal, el=electricity
New transfer station (DE:HA-Station) for district heating	**12.200 €**	2,59 €/m²	…
Hydraulic calibration of the heating system	15.750 €	3,35 €/m²	th:up to 5%
Hydraulic calibration of hot water generation	3.100 €	0,66 €/m²	th:up to 5%
Insulation of heating pipes	5.880 €	1,25 €/m²	th:up to 5%
Insulation of riser pipes	**8.860 €**	1,88 €/m²	th:up to 4%
Insulation of circulation pipes	**1.890 €**	0,40 €/m²	…
Total	**47.680 €**	10,14 €/m²	

→ Energy purchase costs: 33.493 €

→ Energy saving per year: **~25%,** i.e. 8.373 €,

→ Return On Investment (ROI): **4 years**

Comparison of power plants that produce 250 GWh/a electricity & 1000 GWh/a heat
(Source: institute for energy engineering, TU Berlin)

	Separate production	CHP (Coal)	CHP (Gas)
	Steam Power Plant (only electricity production)	**Steam Power Plant (using district heating)**	**Block heat and power plant (local heating grid)**
Combustible	42%	30%	40%
Electric yield		55%	45%
Heat yield		10%	45%
Heat GWh/a		413 GWh/a	267 GWh/a
Combustible consumption GWh/a	596	833	625
CO_2 emissions t/a	203.863	285.000	126.000
	Low temperature boiler (Gas)	**Low temperature boiler (Gas)**	**Low temperature boiler (Gas)**
Combustible consumption GWh/a	1.075	588	733
CO_2 emissions t/a	420.637	412.355	284.855
Combustibles saved		12%	15%
CO_2 saved		2%	32%

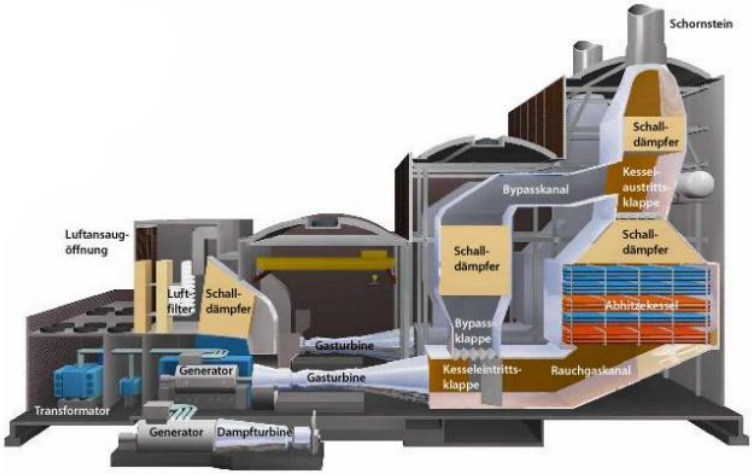

fig. Section Gas and Steam Heat Power Plant Berlin-Mitte (photo: Vattenfall)
55% efficiency factor since part of steam is not used for electricity production but for district heating. This offers the advantage of better energy saving as energy from combustible can be used to 89%[4]

Smart metering in heat supply systems:

Example: Adapterm heat supply regulation

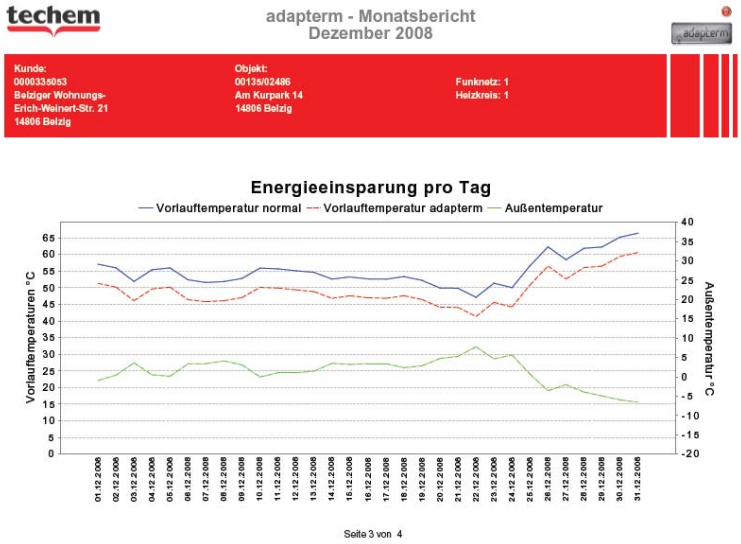

Fig. blue: normal flow temperature, red: flow temperature adapter, green: outside temperature (source: Techem, BEWOG)

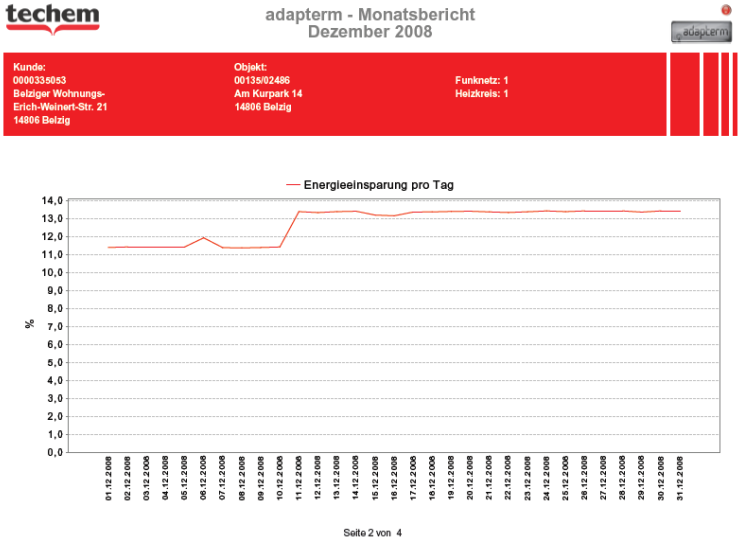

Fig. energy saving per day in % (source: Techem, BEWOG)

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

[3] http://www.berliner-klimaschutzgesetz.de/wp-content/uploads/klimaschutzgesetz.pdf

[4] http://www.ri-ing-gmbh.de/gud-kraftwerk.html