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GERMANY: BUILDING A GEOTHERMAL FUTURE

The use of geothermal energy has already reached a decent state. Last year 17,000 shallow geothermal systems have been installed. The sum up to 333,000 times in Germany and provide heat with a total capacity of 3,900 Megawatt. After some difficult years with a decline in selling numbers, the adjustments of the energy saving regulations (EnEV) and the market incentive programme (MAP) have produced a rising interest in shallow geothermal systems.

33 deep geothermal systems were built during the last 32 years in Germany. 30 of them are providing heat with a total capacity of 281 MW_{th}. 9 power plants are producing electricity and sum up to ca. 38 MW_{el}. Three regions are known for reservoirs of thermal water: molasses basin (south-east Germany), the Upper Rhine Rift (south-west Germany) and the Northern German Basin.

A lot of experience with shallow and deep geothermal systems was gathered in Germany in the last decades and enabled technological improvements, e.g. in seismic exploration or thermally enhanced backfilling materials. They have laid a solid foundation for a prosperous future of geothermal energy in Germany.

Very important for the present and future expansion of the use of geothermal energy are federal incentive programmes and energy laws. The following article will give an overview.

The use of geothermal energy is supported by the Renewable Energy Heat Act (EEWärmeG), which introduces the obligation to use renewable energy. It also establishes the market incentive programme (MAP), which gives money to the building owners and developers of big-scale geothermal sites. The incentive programmes for energy efficiency (APEE) has been introduced in January 2016. It is ought to boost the speed of heating modernisation by additional grants. The energy saving regulations (EnEV) requires energy efficiency of buildings – adding heating to the result/balance. The electricity production from geothermal energy is fostered by the Renewable Energy Act (EEG) by a levy system.

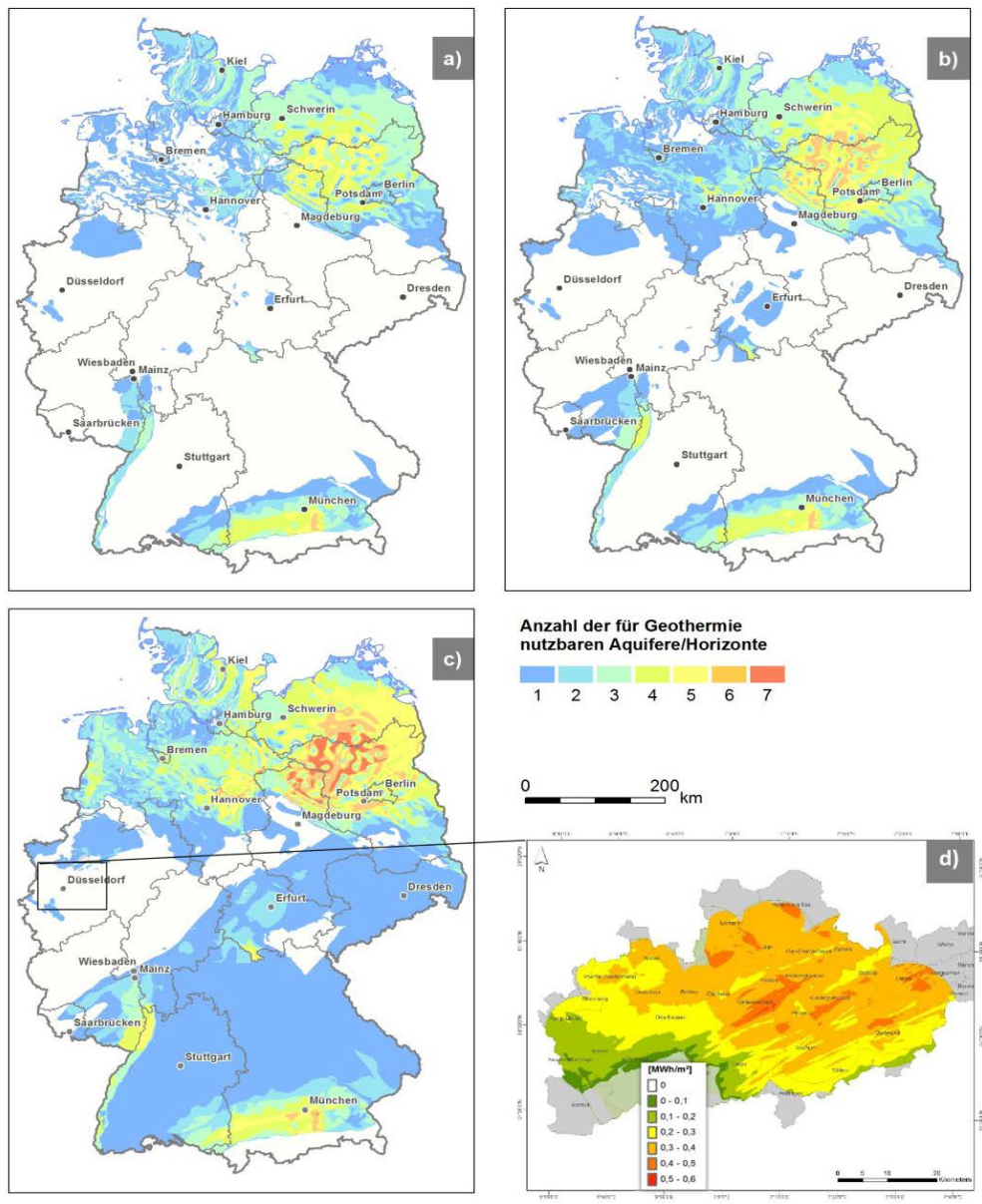


Fig. 1. The figure shows a how many different aquifers/horizons can be used in the different depths: a) known horizons of hydrothermal potential, b) known and supposed horizons of hydrothermal potential, c) total horizons of hydrothermal and petrothermal potential (SCHULZ et al., 2013), d) geothermal potential of Devonian compact limestone (Bracke et al. 2016; source: LIAG / GZB)

RENEWABLE ENERGY HEAT ACT (EEWÄRMEG)

With the Renewable Energy Heat Act (EEWärmeG), the German government aims to expand the use of renewable energy in the heating and cooling sector.

Until 2020, the share in the final energy consumption shall be raised up to 14 percent. Therefore, binding regulatory law and financing incentives (MAP; see below) are combined.

The use of renewable energy is mainly regulated by the Renewable Energy Heat Act (EEWärmeG). It is mandatory for new buildings and public domain buildings that are fundamentally renovated. As a general rule, geothermal heatings have to contribute to at least 50 percent to the heat supply. Furthermore, the seasonal performance factor of installed heat pumps should be at least 3.8 (for space heating plus hot water) or 4.0 (only space heating). Furthermore the heat pumps either have to be certified by or fulfil the requirements of “EU Ecolabel“, „Blauer Engel“ (engl.: “Blue Angel”) or „EHPA Quality Label“. There are several other options to fulfil like a connection to the district heating, but especially in the private sector the duties are met by local heatings.

MARKET INCENTIVE PROGRAMME (MAP)

The Renewable Energy Heat Act (EEWärmeG) offers financial support within the market by means of the federal incentive programme (MAP). Per year, a maximum of 500 million Euro are granted. Smaller shallow geothermal plants (up to 100 kilowatt heat capacity) receive direct investment grants through the Federal Office of Economic Affairs and Export Control (BAFA). The main prerequisite for this is an annual performance factor of heat pumps of min. 3.8 (already existing homes) 4.0 (non-residential buildings) and 4.5 (new buildings).

Existing buildings receive 100 Euro per kilowatt heat pump capacity as a basic subsidy; but at least 4,000 € (other geothermal systems) or 4,500 € for probe systems. Exceedingly efficient heat plants with an annual performance factor of at least 4.5 can apply for a promotion of innovation. The basic amount is thereby increased by 50%. Additional bonuses for basic promotion and promotion of innovation are available for heatings that are smart grid ready, the combination with other renewable energies and high building efficiency. New buildings benefit from promotion of innovation (annual performance factor of min 4.5). The user receives 100 € per kilowatt and at least 4,000 € respectively 4,500 €.

The “Renewable Energies (Premium)” programme (No. 271/281) of the Kreditanstalt für Wiederaufbau (KfW) provides subsidized loans and repayment bonuses for shallow geothermal systems with a heat pump capacity of more than 100 kilowatt. The application is possible via any house bank. Entitled to apply are private individuals, companies and municipalities, if the installed heat pump can fulfil a seasonal of at least 3.8. The interests depend on the amount of the loan, current status (July 2016): 1.0%. Per plant, the following repayment bonuses are possible: 80 € per kilowatt, but at least 10,000 € and not more than 50,000 €.

Geothermal probe projects receive in addition 4 € per meter for the first 400 meters, below this point 6 € per meter. The programme also provides subsidies for heat networks.

For deep geothermal systems there is as well a subsidy programme by KfW: “Renewable Energies (Premium) – Deep Geothermal” programme (No. 272/282). It provides low-interest loans for deep geothermal systems for the production of heat or combined usage of heat and power; but not for singular power production. The interest is fixed for 10 years. At the moment it is 1%. Part of the programme is the funding of construction (up to 2 Mio. €), drilling costs (up to 4 boreholes with 2,5 Mio. € each) and unplanned, additional costs (up to 4 boreholes with 1.25 Mio. € each). The incentive for combined power generation and direct use is lower. Small companies get more.

INCENTIVE PROGRAMMES FOR ENERGY EFFICIENCY (APEE)

In early 2016, the incentive programmes for energy efficiency (APEE) introduced an additional addition of 20% to the market incentive programme (MAP) incentives. The only condition is that a pre-existing heating system based on fossil fuels has been replaced by a modern near-surface geothermal plant. In addition, the funding application has to be granted and the entire heating system has to be optimized (lump sum: 600 €). The funding is available both for BAFA (until 100 kW) and near-surface geothermal plants as part of the German Reconstruction Loan Corporation (KfW) (from 100 kW). The latter also receive a 20% plus on the drilling costs grants. The incentive programmes for energy efficiency (APEE) expires in late 2018.

ENERGY SAVING REGULATION (ENEV)

The Energy Saving Regulation (EnEV) aims at reducing the heating demand to reach a climate-neutral building stock. Especially when new buildings are constructed, but also when existing buildings are renovated in certain manners, the requirements of EnEV have to be fulfilled. EnEV is prescribing maximum values for the heating demand, primary energy demand per year and transmission heat loss. Apart of the building cover the heating system plays an important role in the fulfilment. The requirements are tightened periodically.

The last amendment has passed in 2013. First adjustments became effective in May 2014. They stated that heatings that are older than 30 years had to be renewed by modern heating systems by 2015. New heaters have to be CE-certified since then. On January 1st 2016, the primary energy requirements of buildings as well as the minimum quality of building envelope increased again.

For existing buildings, the limits stated in the energy saving regulations (EnEV) are not as strict. Decisive factor in fulfilling it is the primary energy consumption. With raising restriction of the limits, the renewable heating technology plays an even more important role,

because renewable energy, such as geothermal heating, uses little, if any primary energy – taking into account the upstream chains.

RENEWABLE ENERGY ACT (EEG)

Geothermal electricity production is funded by the Renewable Energy Act (EEG). Operators of renewable power plants get a fixed feed-in tariff guaranteed for 20 years. It is financed by a levy. At the moment geothermal power plants can get 25.2 Cents. It is guaranteed by law until 2020. Afterwards (from 2021 on) the compensation will be reduced by 5% per year, the shortly renewed law states.

GERMAN GEOTHERMAL CONGRESS

These and many more information on the geothermal market in Germany are provided by the German Geothermal Congress. It is taking place from 29th November to 1st December. Further information is presented on: www.geothermie.de/aktuelles/der-geothermiekongress-2016/information-in-english.html

OFFICIAL DOCUMENTS (GERMAN):

- Renewable Energy Heat Act (EEWärmeG):
www.bmwi.de/DE/Service/gesetze,did=588536.html
- Market incentive programme (MAP)
www.bmwi.de/DE/Themen/Energie/Energiewende-im-Gebaeudebereich/marktanreizprogramm-map.html
- Energy Saving Regulation (EnEV):
www.bbsr-energieeinsparung.de/EnEVPortal/EN/EnEV/enev_node.html
- Incentive programme for energy efficiency (APEE):
www.bmwi.de/DE/Themen/Energie/Energiewende-im-Gebaeudebereich/anreizprogramm-energieeffizienz.html
- Renewable Energy Act (EEG)
www.bmwi.de/BMWi/Redaktion/PDF/G/gesetzentwurf-ausschreibungen-erneuerbare-energien-aenderungen-eeg-2016,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf

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