

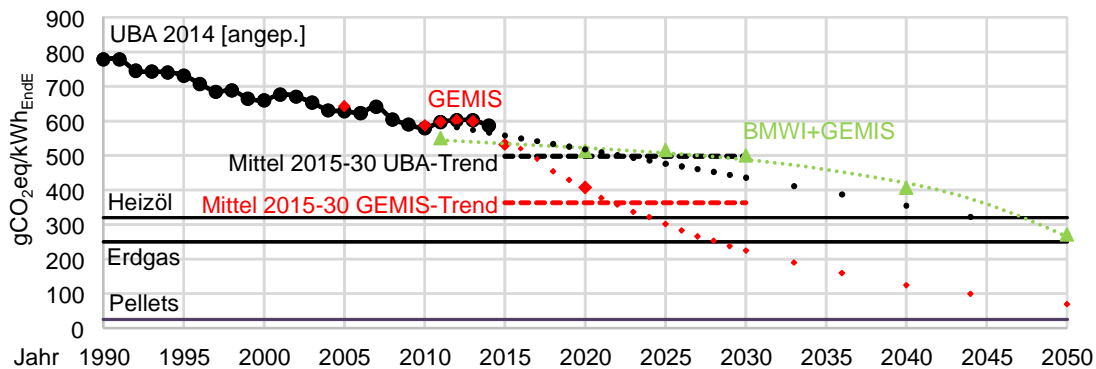
**PER, Part 4: Is electricity (still) a "bad" thing?**

Coal-fired power plants are regarded as climate-killers, and high-risk nuclear power is the spectre of entire generations. Therefore, it is not surprising that electricity was considered questionable for a long time. And for many, it still is. However, with the transition to sustainable energy, the situation will change and has already changed in countries like Germany, where the first steps towards a sustainable energy supply have already been taken. There nuclear and coal-fired power stations are gradually being superseded by wind turbines, photovoltaic systems and other sustainable power plants. The PER model, according to which the total energy demand of Passive House buildings is determined, works on the premise of a full transition to this future energy scenario. Electricity is thus clean and favourable compared to other energy sources.

But is electricity today really so clean that it can be used with a good conscience for heating as well? Or is it still "bad" in terms of climate protection? One indicator for clarifying this is the Global Warming Potential (GWP). This indicates how much CO<sub>2</sub>eq is emitted per kWh of final energy. What is certain is that the GWP of electricity has already decreased quite significantly, because power stations have become more efficient and the share of renewable electricity is steadily rising. A further reduction can be expected in the future (illustration below). With the use of a heat pump (COP 2), today the GWP of an electrical heating system is already much lower than that of an oil-fired heating system, and with a really good heat pump (COP 3) this is even better than gas heating.

To substantiate this statement, in [Krick 2016] different heat supply systems in a single-family Passive House were studied with reference to their GWP. The findings show that electricity today is a climate-friendly energy source.

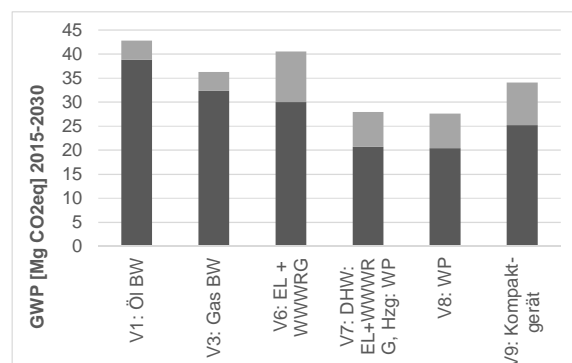
The most climate-damaging variant is an oil-fired



boiler (V1), followed by a direct electrical system with heat recovery from hot water. A gas boiler is slightly better (V3). The solutions with a heat pump performed best, with the compact heat pump unit scoring just slightly better than the gas boiler. Of particular interest is V7 with heating via a small brine-water heat pump without a storage tank, which acts on the activated concrete ceilings. Here the hot water is generated by a controlled electric flow-type heater with heat recovery from hot water. There are no storage and distribution heat losses, so this variant is on par with the heat pump solution; but its implementation is considerably less expensive.

**Conclusion:**

In conjunction with heat pumps and other efficiency strategies, electrically supported systems achieve the best results already today. Together with the energy transition, energy efficient buildings create scope for new cost-effective supply systems.



GWP of the variants (selection) in tons CO<sub>2</sub>eq for the time period 2015-2030 (corresponding with the useful life of a supply system that is installed today) for hot water, space heating, domestic electricity and auxiliary electricity. Dark bars: optimistic scenario for the GWP of electricity, light-coloured bars: pessimistic



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scenario for the GWP of electricity. The statements apply for Germany and regions with similar climate protection objectives.

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Further information can be found on [www.passipedia.org](http://www.passipedia.org) and in:

Krick 2016: Krick, Benjamin: Is electricity (still) a bad thing? In: Feist, Wolfgang: Conference Proceedings of the 20<sup>th</sup> International Passive House Conference 2016 in Darmstadt (to be published in April 2016)