

Solar electricity for heating

The longtime mantra that solar hot water (SHW) collectors are the means for solar heating is not valid anymore. Times have changed and now, in many cases, PV makes much more sense – in combination with heat pumps.

Yes, heat pumps – a technology that wasn't valued at all in green circles in the past because it was used in combination with nuclear and coal power for heating purposes, thus offering a way of creating further demand for these energy sources. Putting this aside, the efficiencies of this technology were often so bad that you could just as efficiently use the electricity directly for heating.

Over the last few years, however, heat pumps have improved quite a bit. While you were usually lucky to find a product that could produce 3 kWh of heat from 1 kWh of electricity only a few years ago, there are models available today that have a coefficient of performance (COP) of 5 – in other words, you can produce five times the heat energy from a single unit of electricity. The efficiency increase has mainly been reached through one innovation – variable capacity control. An inverter adapts the speed of the compressor so that the heat pump only delivers the exact amount of power that is actually needed.

This latest generation of heat pumps makes the technology a perfect fit for PV. Especially with today's low PV power generation cost. At levels of less than 20¢ in Central European climates and 15¢ or below in sunny countries, »solar fuel costs« come out to just 3¢ to 4¢ for a kilowatt-hour of heat if a COP 5 heat pump is used. It's hard to imagine that unsubsidized oil or natural gas can compete with this – even in shale gas regions. In many regions, there will be also hardly an argument left to use SHW collectors. In Central Europe, for example, 1 m² of SHW systems can generate maybe 500 kWh of heat power per year. Compare this to a typical PV module covering the same amount of roof space – it will provide about 160 kWh of electricity, which a top heat pump will turn into around 800 kWh of heat power.

High-quality heat pumps are expensive – that's true. But in general the difference in fuel cost will make it affordable. And the user will not need to watch natural gas prices or get upset about rising oil prices – simply because he will no longer have to bother with refilling the fuel tank. Moreover, unlike with SHW collectors, there is no backup heating system needed for winter days. If there is insufficient solar power, the electricity used to power the heat pump can be taken from the grid – in several regions a customer can even purchase green power.

In the PV world you usually think in kilowatt-hours of electricity, of which a household typically needs nearly 4,000 per year in Germany and about 7,000 in California (the average in the US is much higher). But when thinking about water



and space heating, in many countries demand quickly goes through the roof – even in not-so-cold regions you are easily talking about 10, 20 or 30,000 kWh. That's a load that really makes it worth using a rooftop PV system on a residential or commercial property.

But it is not just about the share of solar electricity needed for self-consumption, a topic that is increasingly being discussed in countries where formerly lucrative feed-in tariffs have declined or disappeared altogether. Self-consumption of just electricity might result in smaller PV system than in the past, with some free roof space going unused. It is rather about using as much solar electricity as possible for a wide variety of purposes. It's about developing a holistic PV-powered energy system for a home or business that can do everything from powering the computer and washing machine to heating the water to fueling the electric car.

As PV continues its cost reduction, many new business opportunities arise for solar companies. For PV installers – some of which have been hit hard in markets that have cut solar incentives – this development is a chance to become an integral part of the new energy world. Just installing a PV system was yesterday, the future is about energy management – from in-house storage solutions and electric vehicle charging stations to the integration of a heat pump. For module companies, this offers new potential partnerships for doing business. Already today, the first big heat pump producers offer their own OEM-made PV module lines. To put it simple, in the future, electricity will be used for producing all sorts of power – and that means even for heating increasingly based on PV.

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