



# Everybody has the power, but where is the heat?

There is lots of talk about power shortages and how we can produce even more power through solar or wind. It is true, nothing works without power. However, the current crisis in eastern Europe shows that we cannot only focus on power shortages. There is another source of energy, that might actually be a way bigger risk if we can't find a sustainable solution, and that is heat.





which can reach high temperatures, especially in summer. This leads to an overheating of the solar cells, lowering their performance and decreasing their life span.

The hero. modules have a patented water-cooling system, which absorbs the heat, thus cooling the solar cells, increasing the performance, and expanding the life span of the cells, as well as making the thermal energy usable. The hero. system can be integrated in different thermal systems and the thermal energy can be used in various ways, always depending on the needs of the homeowner.

#### Store the heat in the summer for use in the winter

Most thermal energy will be produced in the summer, when the sun is strongest. This thermal energy can be used in various ways, which can all be divided into two categories: immediate usage and long-term usage.

The immediate usage of the thermal energy can, for example, be to heat the water boiler or to heat a pool. However, the need for thermal energy in the summer is minimal compared to the winter. And that's why long-term usage is even more interesting.

Depending on what the customer's infrastructure and what their needs are, the produced thermal energy can be stored in various long-term options. The ice storage or the earth probe are already applied and very popular technologies. In combination with a heat pump and earth probe, for example, the thermal energy in the summer can be used to heat the soil around the earth probe. The spare heat, that is not being used immediately, is conducted into the ground. The heat is stored there over a longer period so that the heat pump can then use this heat via the earth probe in the colder months of the year. Homeowners can save a lot of electricity for the heat pump.

#### Combine hero. with hydrogen

In addition to the aforementioned thermal storage solutions, hydrogen can be used for both electricity and heat. It has to be said that hydrogen is a pure electricity storage and that one of the above-mentioned storage solutions would be needed in order to store thermal energy produced by the hero. modules. But the world's first year-round electricity storage system, picea, developed by the German company Home Power Solutions (HPS), might just solve your heat problems anyway, by making the process heat usable. Currently, the picea system is only available in Germany. However, HPS is expanding.

In the summer, the hydrogen system converts the electrical energy, delivered from the hero. modules, into electricity. During the day, the sun charges the integrated battery so that there is enough solar power available in the evening. As soon

By mainly focusing on producing renewable electrical energy, heat energy is almost completely left out. While we are building huge wind parks and installing PV solar panels, the main heat source is still fossil fuels such as oil and gas. In numbers, more than 80% of heat production is not renewable.

On top of that, we are dependent on supplies from other countries, which, in a crisis like we are in right now, is a big threat. So, there must be a way for renewable, decentralized heat production, which will reduce CO<sub>2</sub> emissions and dependency on other countries. Luckily, there are already solutions out there that can be used immediately; solutions like hero. modules.

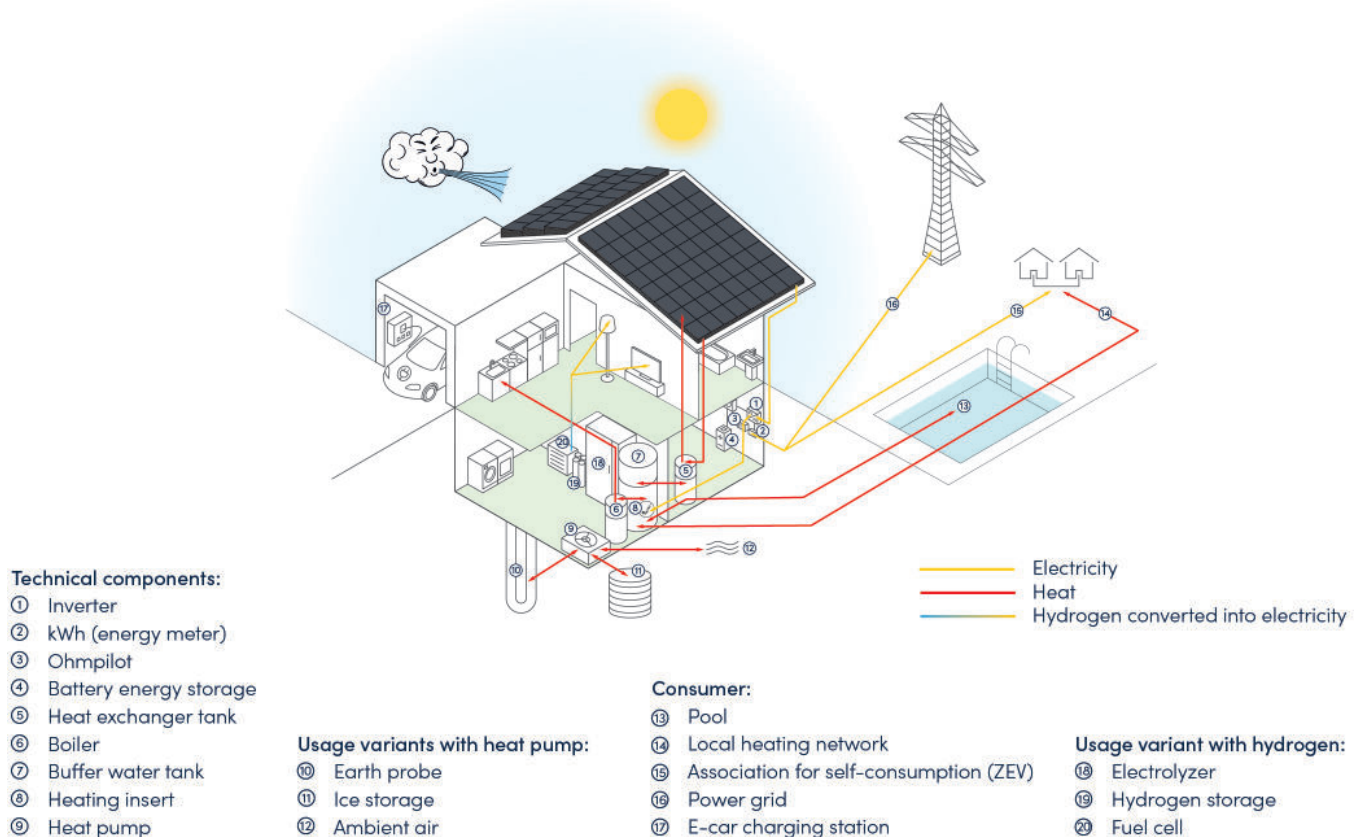
#### Electrical and thermal energy in one compact module

Compact hero. modules produce renewable electrical and thermal energy and can easily

cover the energy needs of a single-family home. They can be combined with any other hero. module and are suitable for installation on all surfaces, including pitched roofs, flat roofs, and facades.

In terms of electrical energy, hero. modules can produce up to 20% more than standard PV panels, thanks to the patented cooling unit. The hero.wind modules can produce even more energy thanks to their wind generators, which transform wind energy into electrical energy and thus produce energy 24/7.

However, it's the production of thermal energy that really makes the hero. modules stand out, and the technology is as simple as it is genius. The solar cells produce electrical energy through sunlight. However, sunlight also produces thermal energy. This process is a big problem for standard solar panels,



Hero. solutions combined with different usage and storage systems

as the battery is fully charged, the electrolyser produces hydrogen from the surplus electricity and stores it. The procedure is quite easy.

The electrical energy is used to power the electrolyser, which splits  $H_2O$  into  $H_2$  and  $O_2$ , splitting water into hydrogen and oxygen. The oxygen will be released and the  $H_2$  will be stored in the  $H_2$  storage.

On cloudy days and in the evenings, the hydrogen system supplies the building with electricity from the integrated, now charged, battery. The battery acts as a short-term storage. However, to compensate for the lack of solar yield in the winter, the hydrogen system now uses the stored hydrogen, which was produced in the summer. The hydrogen acts as seasonal storage.

To convert the hydrogen back into usable energy, the process is reversed and electricity is made from hydrogen again. This storage is completely emission-free. The electricity stored in the fuel cell is used to compensate for the reduced solar radiation and this way, the building continues to be supplied with up to 100% self-generated and  $CO_2$ -free electricity even during the winter.

To further increase the efficiency of the system, the waste heat from the energy conversion is also used. In this way, an all-season electricity storage device such as picea, achieves a total efficiency of up to 90%.

### The solution for electricity and heat

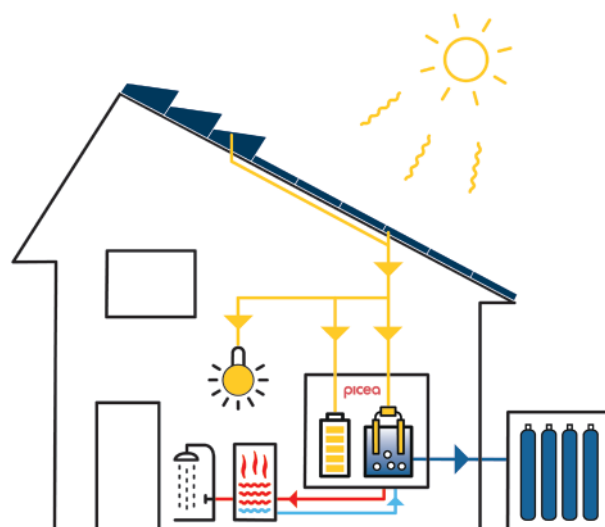
When compared to standard storage systems, hydrogen offers a variety of benefits. Firstly, in intelligently designed systems such as picea, and similar to the hero modules, the process heat can also be used in addition to the electricity, which significantly improves the overall efficiency of the system, up to 90% with picea.

The thermal heat generated by the hydrogen system can be used in the same ways as the

thermal energy produced by hero. either immediately, or then stored in a thermal storage solution.

On the other hand, a hydrogen storage enables applications for which conventional battery systems are not really an option, in particular the medium and long-term storage of surpluses from the production of renewable energies.

This means that the  $H_2$  storage could be charged in the summer and then converted



Picea system. Source: Home Power Solutions



back to energy in the winter, meaning that both electricity and heat are available when they are needed most. And this is completely CO<sub>2</sub> free.

#### Dual is the way to go

We need both electricity and heat. The innovative hero. modules produce both in a compact module, on any surface. Hero.wind even produces energy 24/7. But why should the hero. be combined with a hydrogen storage? The hero. modules deliver clean, renewable electrical energy, which is needed to start the electrolysis.

Furthermore, thanks to the higher energy production of the hero. modules when compared to standard solar panels, a higher degree of energy independence can be achieved, even with a smaller hydrogen storage, thus making the whole system more affordable and more profitable. Also, the thermal energy of both, the hero modules and picea, can be used in various ways, further decreasing the electricity usage, and increasing the energy independence.

A renewable energy independence might just become reality.

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