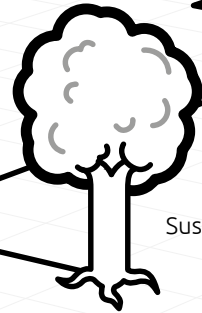
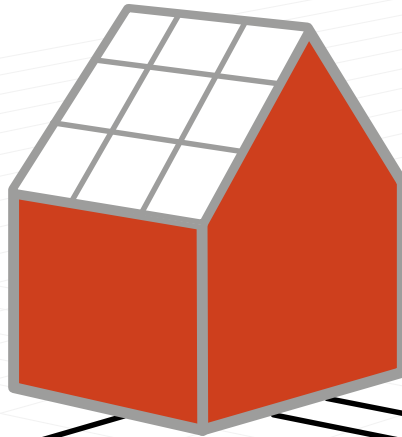
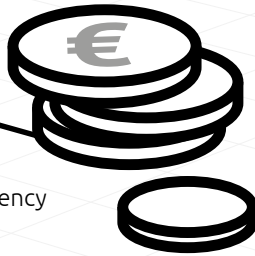


Independence



Sustainability



Efficiency



Electricity and heat from sunlight – lower costs, gain independence

MAKING CLEVER USE OF THE SUN

“PHOTOVOLTAICS IS A **POWERFUL** TECHNOLOGY WHICH CAN NO LONGER BE DISREGARDED FROM THE ELECTRICITY MIX. WE HAVE ONLY JUST **BEGUN** TO UTILIZE ITS POTENTIAL.”

Who is Advanced Energy?

Advanced Energy – advancement in photovoltaics

High-tech solutions for energy are the central focus at Advanced Energy. Advanced Energy is already one of the world’s leading companies for PV inverters. Since the beginning of 2013 REFUsol has been a part of Advanced Energy and thus part of a company which wins over its customers with experience, ability, service and outstanding technology.

The Advanced Energy inverter product range covers all possible PV system sizes: private rooftop systems, commercial PV systems and solar power plants. The spectrum extends from single-phase string inverters with an output of 1.8 kW to large turnkey platform solutions with an output of 2 MW. Thanks to the UltraEta topology, AE inverters reach peak degrees of efficiency of over 98 %. They thereby ensure the

highest yields and a quick return on investment. The inverter product range is rounded out by a wide assortment of accessories. This includes sensors, safety modules, fuse and power regulation modules, auxiliary fans and much more.

We are not limited to delivering electricity from PV systems to mains grids, production systems or households. We are also capable of finding solutions to efficiently utilize PV electricity. Pioneering technologies like the PV Heater, which supports hot water preparation in homes, are the result. That is what we call progress.

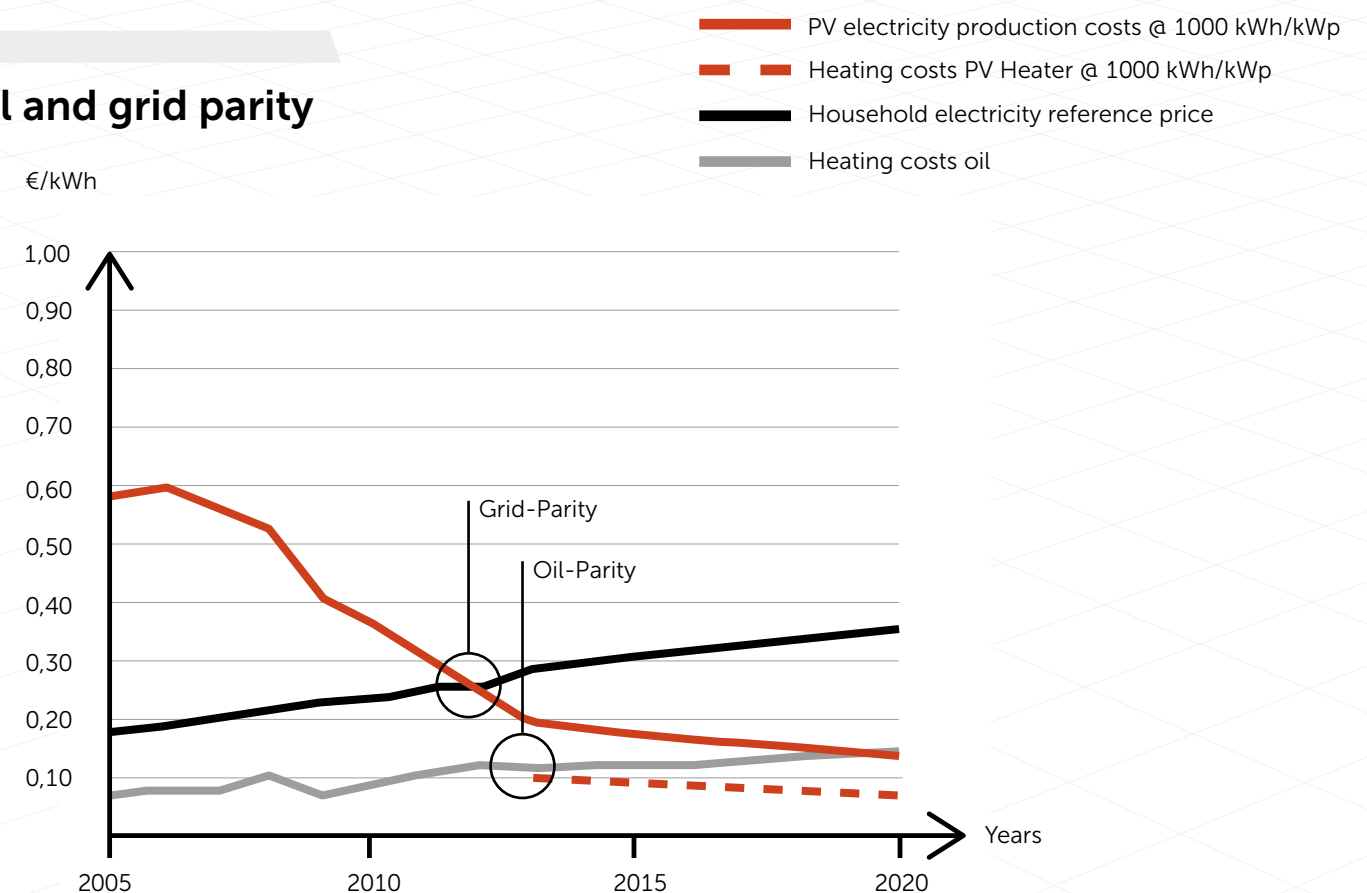
Why photovoltaics pays off

Photovoltaics and photovoltaic thermal – affordable electricity, affordable heat

Change is taking place within photovoltaics. New legal regulations, considerably reduced module prices and increasing costs in the energy market are good reasons to reconsider photovoltaics. Photovoltaics is no longer considered a revenue model, rather an effective way to achieve greater independence. The price of PV electricity was already competitive with conventionally generated electricity in 2012. Experts refer to this situation as grid parity.

In the meantime, PV electricity can also compete with major fossil energy carriers: oil and gas. Borrowing from the term grid parity, this can be referred to as oil parity. Since the price of oil is a world market price, oil parity is not a national or European phenomenon. PV electricity generated from an operator’s own system takes on more of a global dimension. Based on the service life of a PV system of around 25 years, the price of oil will more likely increase than decrease. This means: In addition to pure PV electricity production, you can already efficiently generate and store hot water thanks to our PV Heater. In the future, photovoltaics can enable great savings potential worldwide, particularly with this type of heating support – which comes completely independent of monetary incentive systems and feed-in reimbursements.

Oil and grid parity



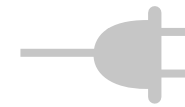
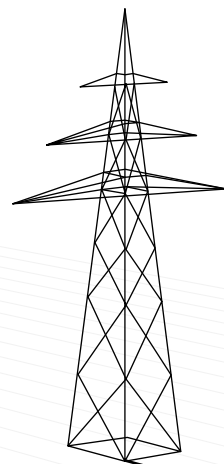
Photovoltaics

– technology using a basic principle of nature

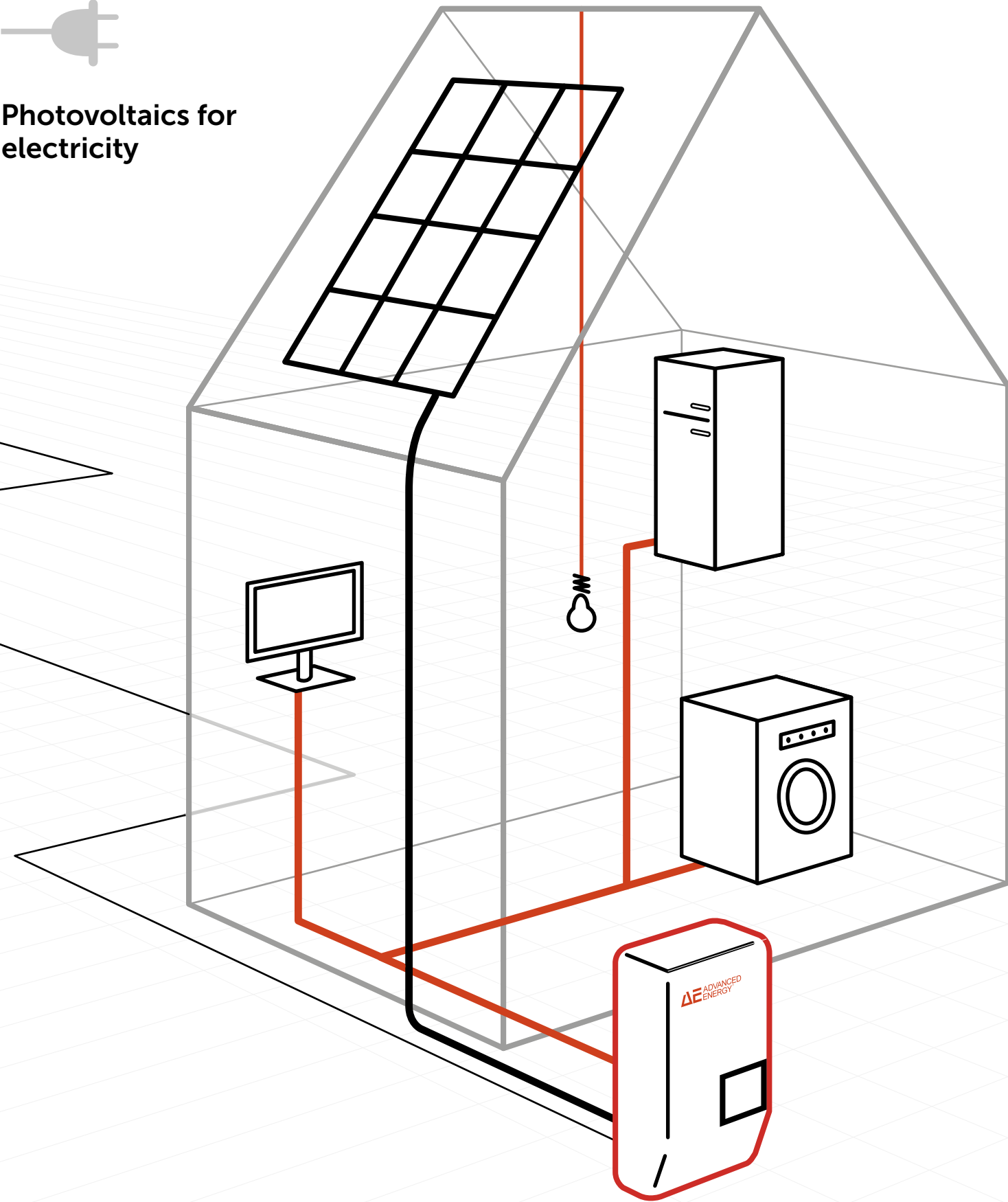
For more than 3 billion years organisms have been using sunlight to create energy. Yet only in recent decades has mankind been able to generate electricity from sunlight. The technology has made major advancements during that time. An essential component of a photovoltaic system is the inverter. It converts direct current from the photovoltaic modules into alternating current. And it adapts to the solar radiation so that the PV system achieves a high degree of efficiency in any weather conditions. We have been working with this technology since the beginning of modern photovoltaics.

Photovoltaics for the home

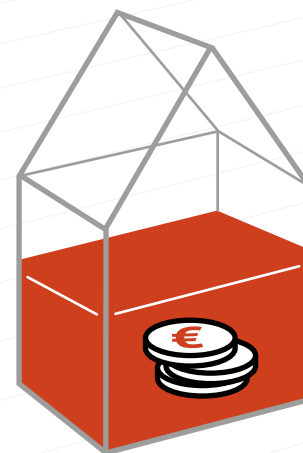
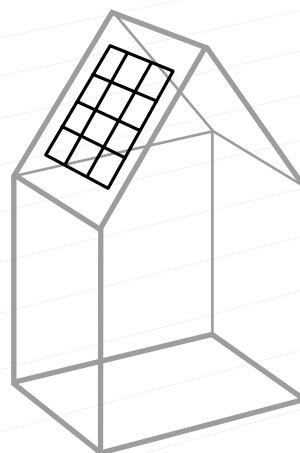
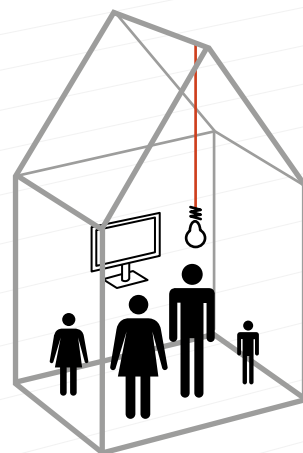
Reduce energy costs, gain independence from the energy market, contribute to sustainability – the motives behind PV systems in private homes have changed. What has not changed is the excellent quality of AE inverters. The AE 1TL 1.8 kW–4.2 kW single-phase inverters were developed for rooftop systems on carports and single- and multi-family homes. Their high efficiency, durable design and simple installation provided the best conditions for high yields for a long time. See for yourself: You can create a personalized efficiency calculation with our AE Design planning software. Rely on technologies that support your goals.



Photovoltaics for electricity



Save on electricity costs



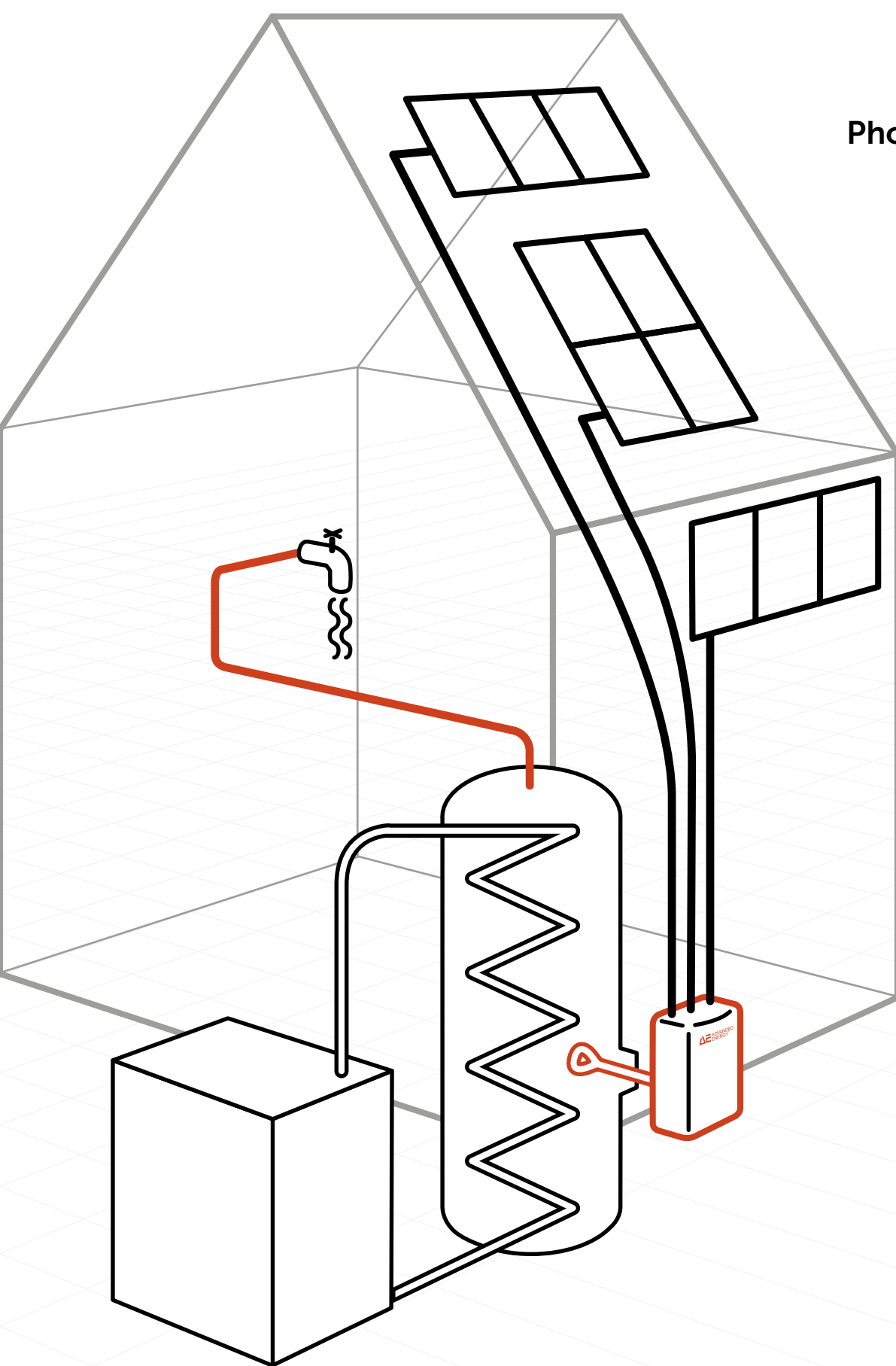
Design parameters:

3 kWp PV = 20 m² roof surface,
56 % internal consumption,
44 % feed into the grid
(1320 kWh)

4-person household
4000 kWh / year
Electricity requirement

3 kWp PV system
3000 kWh / year
PV electricity

42 % purchased electricity savings
1680 kWh internal
consumption / year



Photovoltaics for direct hot water heating

Photovoltaics thermal

PV electricity stored directly in hot water

The AE PV Heater has turned the traditional approach to photovoltaics upside down. Until recently it was less efficient to generate heat with electricity; the PV Heater has now shown the opposite to be true. This new system from Advanced Energy utilizes the direct current of a photovoltaic system to directly heat water in the boiler of a heating system by means of a DC heating element. The degree of efficiency is nearly 100 %, because conversion by an inverter is omitted. Since the PV Heater is only operated separately from the mains grid, feed-in requirements do not apply.

The energy costs of the PV Heater are less than those of fossil fuel carriers. Depending on the layout and alignment of the PV system, and depending on the management of the heating system, you can cover up to 72 % of annual energy requirements for hot water preparation with the PV Heater.

You can also save on installation and operation: Since the PV Heater is operated with a direct current of less than 50 volts, operators are permitted to wire the system themselves.

AE PV Heater

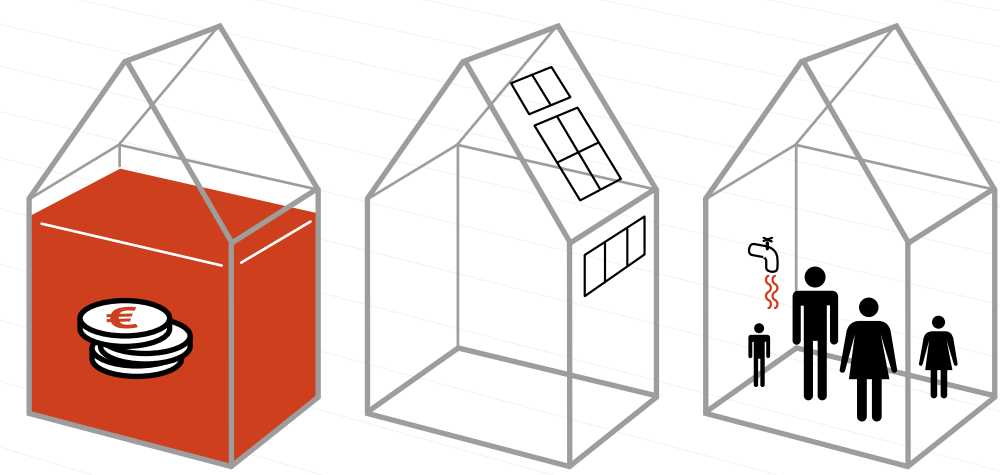
Efficiency even with small units

The PV Heater is efficient. With just eight photovoltaic modules, which cover a surface of 13 square meters, 2000 kWh of regenerative electricity are created. With a solar coverage of 68 % of the annual hot water requirement, savings of around 340 liters of oil per year can be achieved.

The PV Heater has priority. The system only reverts to oil, gas or wood pellets when the heat output is not sufficient. Therefore the burner is operated less frequently and preparation losses are reduced considerably.

The PV Heater is suitable for retrofitting. Only an additional 1.5 inch DIN flange on the boiler is required. Therefore your existing heating system can be easily modernized and become more environmentally-friendly. The alignment of the house's roof, on the other hand, is not a factor. The photovoltaic modules can be arranged with east/west alignment.

And the PV Heater is competitive. The alternative heating system consists of only a few components and the installation expenditure is low. As a result, the PV Heater also stands up to a critical comparison with other heating systems in terms of price.




Save on fossil energy

68 % purchased oil savings
340 liters of heating oil saved / year

2 kWp PV system
2000 kWh / year PV electricity

4-person household
240 liters / day Hot water requirement

Design parameters:
2 kWp PV = 13 m² surface,
94 % internal consumption,
0 % feed into the grid



„WE ARE ACCUSTOMED TO BUILDING AND CONNECTING PV SYSTEMS QUICKLY. THIS HAS BEEN PROVEN IN PRACTICE WITH THE INSTALLATION OF THE PV HEATER. THE PV HEATER ALSO HAS AESTHETIC APPEAL. WITH THE PV HEATER YOU WILL HAVE ONLY ONE SYSTEM ON YOUR ROOFTOP:

A HARMONIOUS PHOTOVOLTAIC SURFACE.”

(S. BUCHER, PLANNER)

„WE CHOSE THE PV HEATER SYSTEM BECAUSE IT IS SIMPLY **MORE EFFICIENT** THAN PHOTO-THERMAL EQUIPMENT.”

(A. LEIBFARTH, INSTALLER)

„THE SYSTEM’S **SIMPLE INSTALLATION** AND **SHORT ASSEMBLY TIME** APPEALED TO US.”

(H. KUHN, INSTALLER)

advanced-energy.com

REFUsoI GmbH
an Advanced Energy company
Uracher Strasse 91
72555 Metzingen
Germany
Tel. +49 7123 969-0
Fax. +49 7123 969-165
info@refusol.com

Ask your expert planner: