Comparison of different solar energy technologies

	Solar panel	Hybrid panel (non-insulated)	Hybrid panel (fully insulated)	Solar thermal collector
Energy factor compared to a solar panel	1:1	4–8 times higher	2–3 times higher	2–3 times higher
Energy output from the panel/collector per m²/year at 1,000 kWh solar irradiation according to solar keymark certifications	**Electricity:** 220 kWh **Thermal energy:** 0 kWh	**Electricity:** 240 kWh **Thermal energy:** 1,560 kWh (including yield from the air), optionally distributed between heating and hot water in combination with a liquid/water heat pump.	**Electricity:** 200 kWh **Thermal energy:** 400 kWh, primarily hot water.	**Electricity:** 0 kWh **Thermal energy:** 600 kWh, primarily hot water.
Energy sources	Sun	Sun and air	Sun	Sun
Common working temperatures in the glycol circuit	Not applicable	-20°C to +30°C	+20°C to +80°C	+20°C to +90°C
Maximum temperature on a warm summer day in the nordic region	60–65°C	60–65°C during stagnation (no circulation in the solar circuit). No risk of boiling. If circulation is absent, the hybrid panel functions as a standard solar panel.	130°C during stagnation (no circulation in the solar circuit). Risk of boiling if the accumulator tank is full.	200°C during stagnation (no circulation in the solar circuit). Risk of boiling if the accumulator tank is full.
Need for accumulator tank	No	No	Yes	Yes
Need for piping for glycol circuit between roof and technical room	No	Yes, standard materials such as PEX, AluPex, and PEH-PN100	Yes, stainless steel or copper pipes.	Yes, stainless steel or copper pipes.
Cooling of solar cells	No	Yes, the solar cells are cooled via a heat exchanger connected to the cold liquid from the boreholes, increasing the solar cells' electricity production and lifespan.	No, insulation increases the temperature of the solar cells, reducing electricity production and lifespan. Stagnation can lead to significantly reduced lifespan for the solar cells.	Not applicable, as solar collectors do not have solar cells.