
IntegraTE-XL: PVT-Ready Heat Pumps: Definition and Market Overview



Speaker:

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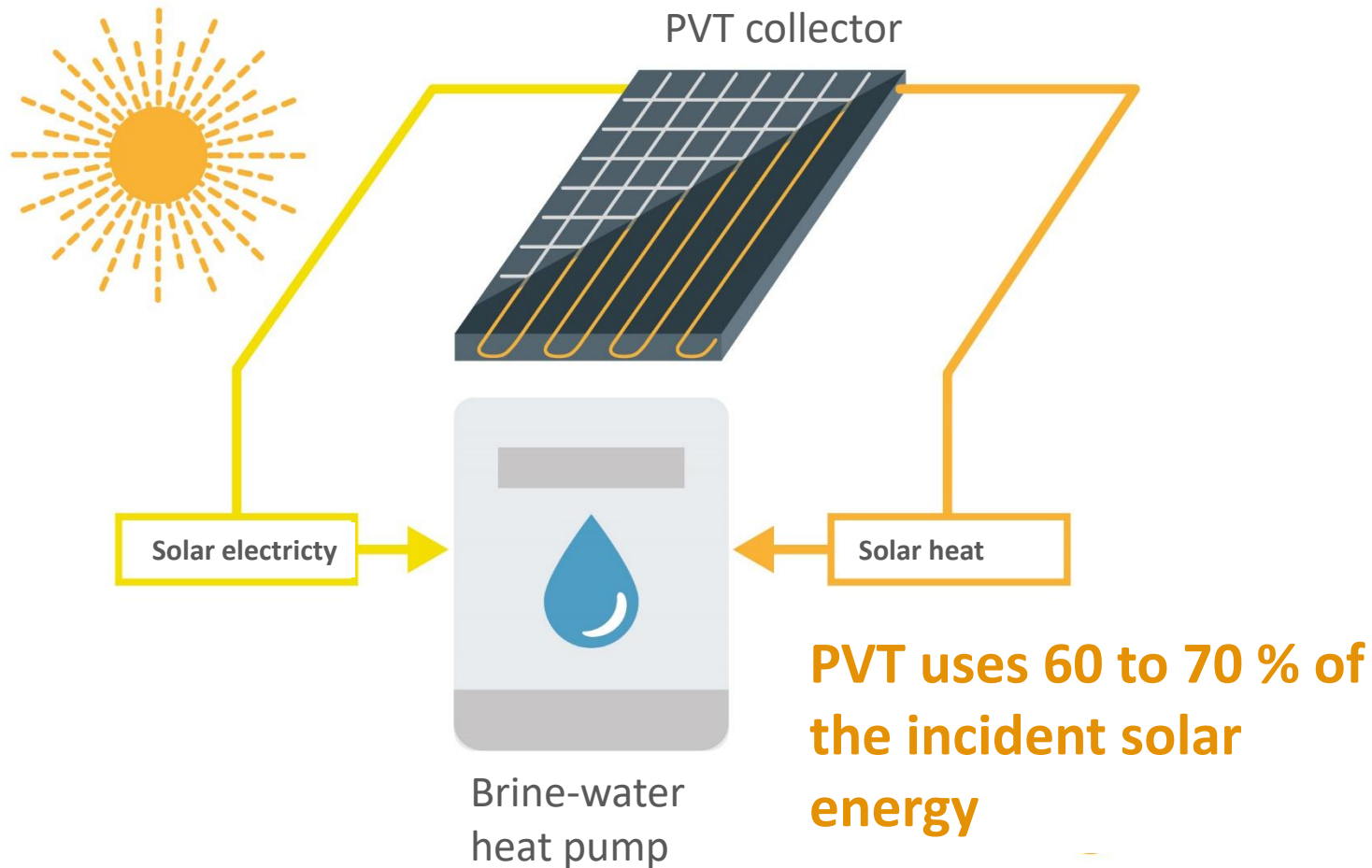
Gefördert durch:



Bundesministerium
für Wirtschaft
und Energie

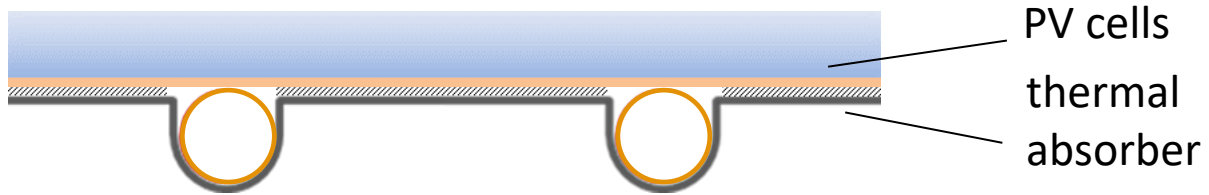
aufgrund eines Beschlusses
des Deutschen Bundestages

HEAT and ELECTRICITY from one SOLAR ELEMENT



- Alternative heat source for brine/water heat pumps
- PVT collectors make highly efficient use of solar radiation and can also absorb ambient heat
- Also suitable for retrofitting existing PV systems

Uncovered PVT collectors – heat source for heat pump



Photos: 2Power / Pa-ID, Greenonetec und Dualsun

Industry Partners at IntegraT-XL



			PVT heat pump system suppliers	Heat pump manufacturers	PVT manufacturers	Design services	Heat contracting
	Abora Solar	www.abora-solar.com			✓	✓	
	Consolar GmbH	www.consolar.de			✓	✓	
	DualSun	www.dualsun.com			✓	✓	
	GREENoneTEC Solarindustrie	www.greenonetec-pvt.com			✓		
	InnoContract GmbH	www.inno-contract.de				✓	✓
	Muhr und Bender KG	www.mubea.com	✓				
	nD-System GmbH	www.nD-System.de			✓	✓	
	PA-ID Process GmbH	www.2power.de	✓		✓	✓	
	Pflugfelder Planen und Bauen GmbH & Co. KG	www.pflugfelder.de/				✓	
	PVT-Strom und Wärme GmbH	www.sonnenstrom365.de	✓		✓	✓	
	QVANTUM Energietechnik GmbH	www.qvantum.com		✓			
	ratiotherm GmbH & Co. KG	www.ratiotherm.de	✓	✓			
	Rud. Otto Meyer (ROM) Technik	www.rom-technik.de	✓			✓	
	sinnogy GmbH	www.sinnogy.de				✓	
	Solab GmbH	www.solab-solar.com			✓		
	Solvis GmbH	www.solvis.de		✓			
	Technische Bauteile Eberle GmbH	www.alukol.de	✓		✓		
	Triple Solar GmbH	www.triplesolar.de	✓	✓	✓		
	TWL-Technologie GmbH	www.prisma-pvt.com			✓	✓	

Gefördert durch:



aufgrund eines Beschlusses des Deutschen Bundestages

Duration: 1 December 2024 to 30 November 2028

Market overview: PVT-ready heat pumps



PVT collectors place particular demand on the heat pumps

- Significant fluctuations in the temperature of the brine from the solar circuit
 - During the summer months, up to 70 °C depending on the design of the PVT collector
 - On cold winter nights, the brine can come off the roof at temperatures as low as -15 °C.
- Brine/water heat pumps are designed for geothermal heat sources whose temperature varies very little:
 - Ground baskets: -5 °C bis +25 °C
 - Boreholes: 0 C° bis +25 °C



The permitted wider range of the heat source inlet temperature for the heat pump is the key criterion for PVT-ready heat pumps

Market survey of the relevant heat pump manufacturers



- 18 heat pump suppliers, 11 of whom were based in Germany and 7 in neighbouring countries, were sent a multi-page questionnaire. Nine companies that supply PVT-optimised heat pumps completed the questionnaire.

ratiotherm
Smart Energy Systems

triple solar 

HEIM AG
Heizsysteme

 **heliopac**



M-TEC
ENERGY FOR FUTURE

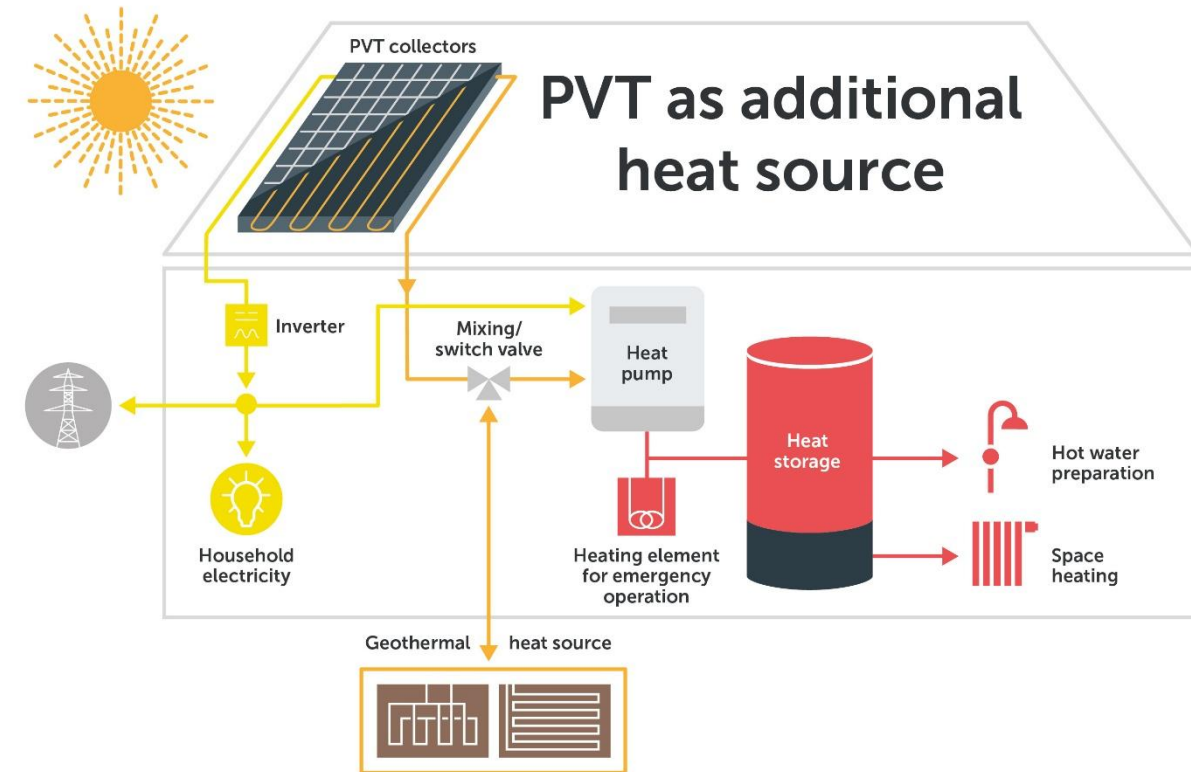
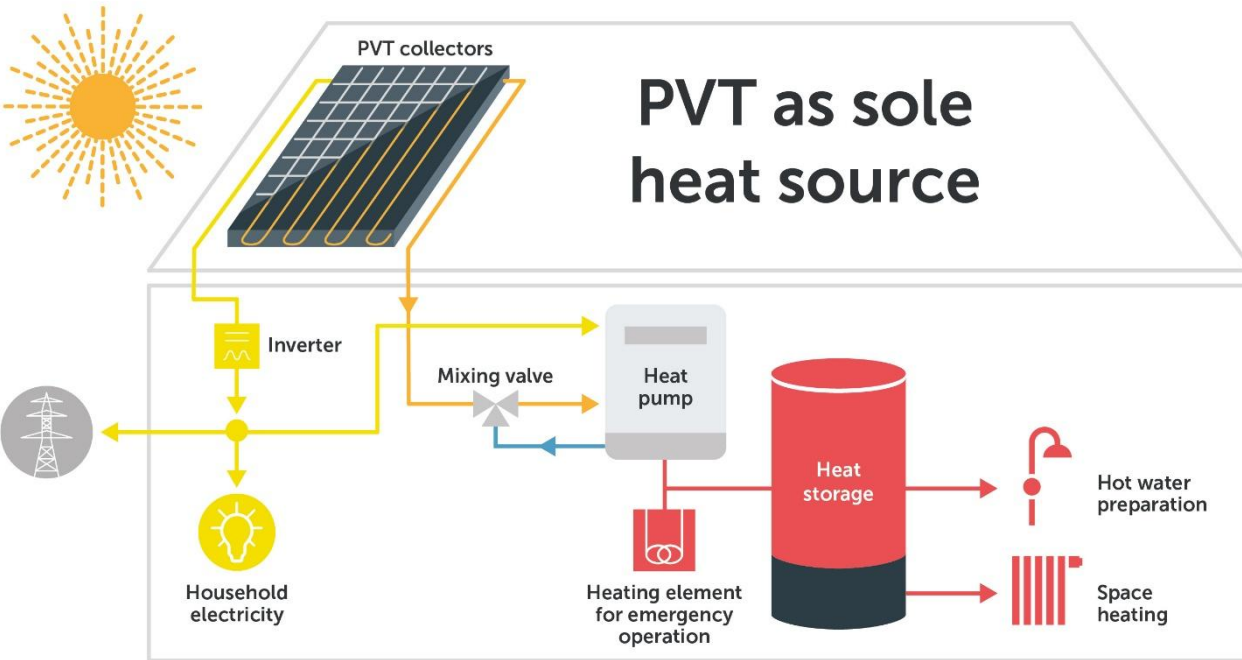
 **enrgi** GmbH

PVT-ready label for heat pumps

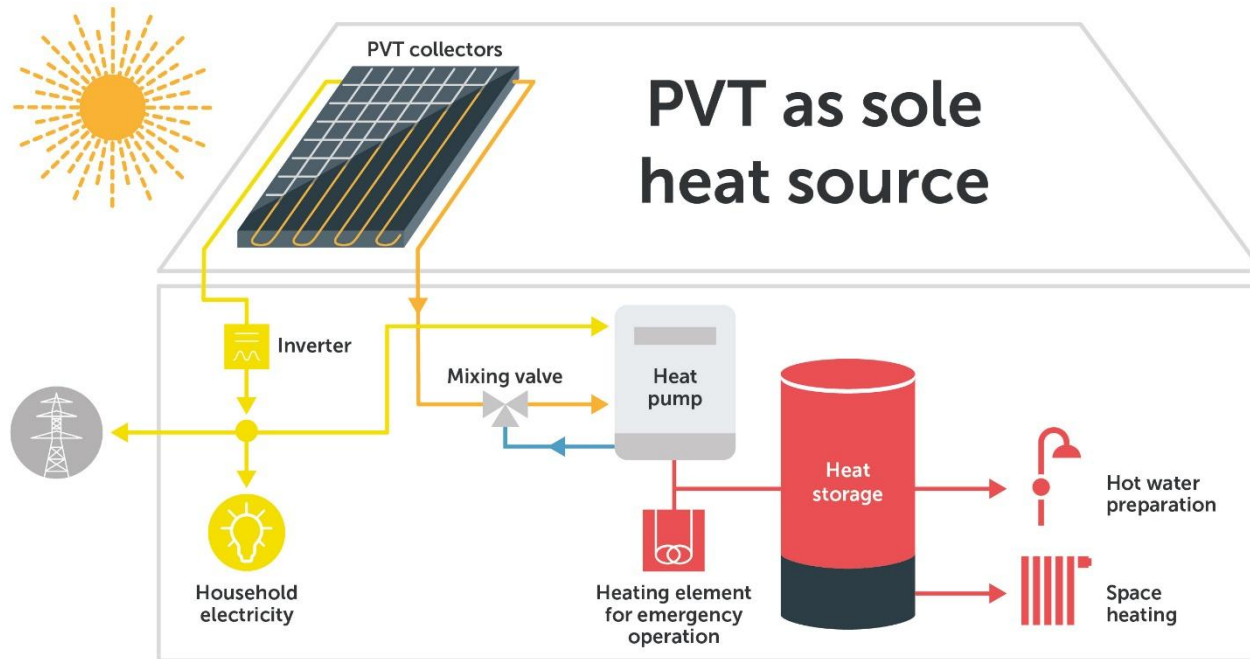


- ✓ The definition of PVT-Ready was jointly discussed and agreed upon by the three research partners in the IntegraTE-XL project.
- ✓ The basic principle underlying the PVT-Ready definition is that the heat pump's control system should be optimally tailored to the specific characteristics of PVT collectors, in order to avoid 'makeshift solutions' involving numerous interfaces.

PVT-ready label for two system variants



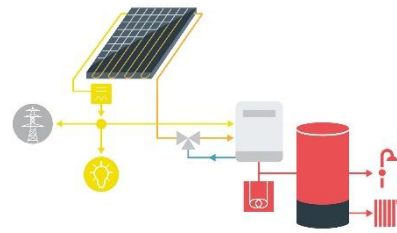
Definition of PVT-ready heat pumps



- ✓ The approved minimum source temperature for the heat pump must be $-15\text{ }^{\circ}\text{C}$.*
- ✓ The manufacturer must specify the maximum thermal output for the lowest source temperature of $-15\text{ }^{\circ}\text{C}$.
- ✓ The maximum permitted upper source temperature for the heat pump must be maintained by means of a mixing valve or a special design of the refrigeration circuit.
- ✓ It must be possible for the heat pump to control the mixing valve.

* This applies to the climatic conditions in Germany/Austria.

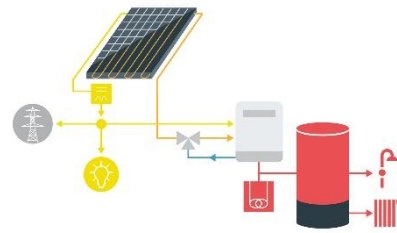
PVT as sole heat source



All the heat pumps listed are modulating!

	ait-deutschland (D)	enrgi (D)	Heim Heizsysteme (CH)	M-TEC (A)	Nibe (D)	Ratiotherm (D)	Ratiotherm (D)	Triple Solar (D)	Triple Solar (D)	Waterkotte (D)
Product name of heat pump	alpha innotec - WZSV 63H(K)1/3M	Eco Geo Pro 2-10	SWM pro 2-13	BHPA412	S1156 / S1256	WP Max-LoQ F27	WP Max-LoQ pF10	PVT-Wärmepumpe 5.0	PVT-Wärmepumpe 10s	5029 Ai
Date of market launch	June 2025	January 2021	July 2022	April 2025	May 2024	May 2021	February 2025	July 2025	July 2025	2010
Thermal output at B0W35	6 kW	10.2 kW	11.9 kW	10.7 kW	18 kW	27 kW	9.5 kW	5 kW	10.6 kW	21.6 kW
Approved temperature range of heat source	-13 to +30 °C	-25 to +35 °C	-20 to +22 °C	-15 to +40 °C	-9 to +30 °C	-15 to +55 °C short-term until +70 °C	-15 bis +55 °C short-term until +70 °C	-20 to +70 °C	-20 to +25 °C	-15 to +20 °C
Maximum thermal output at B-15W55	3.45 kW at B-13/W55	7 kW	7 kW	6.5 kW (extrapolated)	n/a	13.8 kW	4.5 kW	3.6 kW (extrapolated)	5.5 kW (extrapolated)	n/a
Can the heat pump control system control a mixing valve?	No	no	yes	yes	yes	not required	not required	not required	yes	no
PVT ready	---	---			---					---

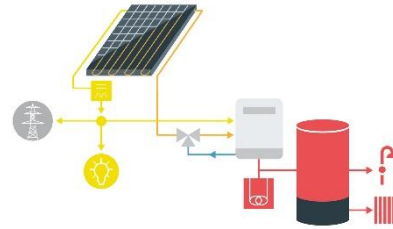
PVT as sole heat source



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PVT ready	---	---			---					---

PVT as sole heat source



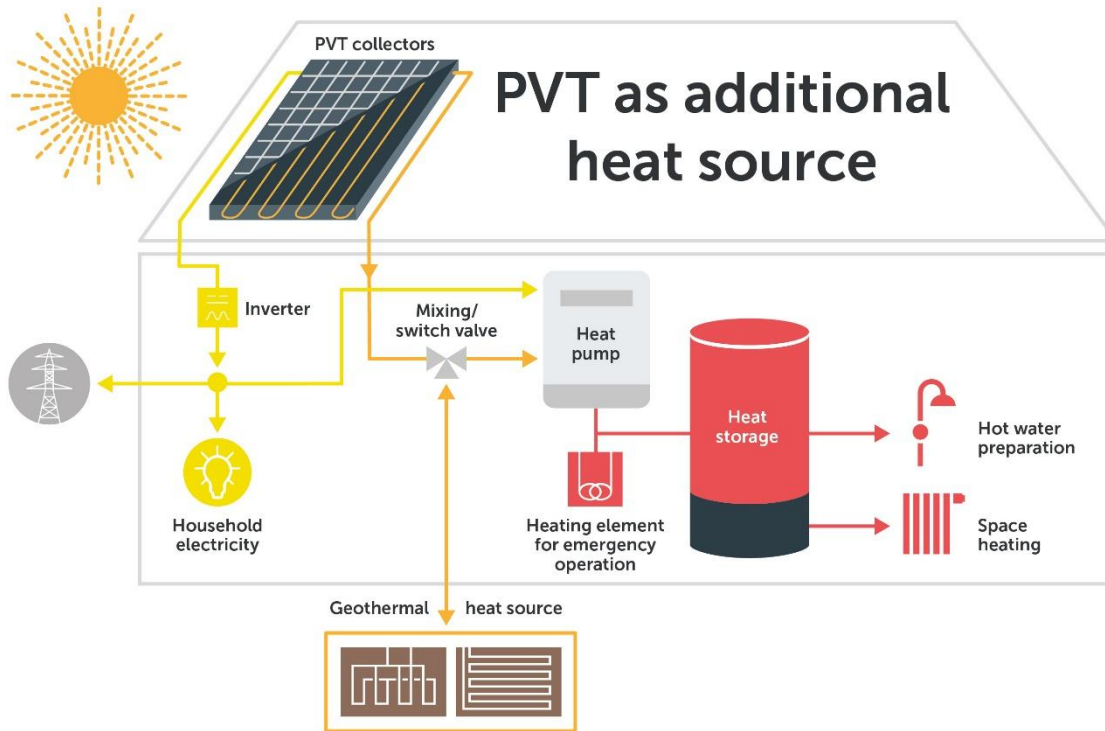
No mixing valve required: To ensure the heat source's inlet temperature does not exceed the upper limit, two manufacturers use a special design for the refrigeration circuit:

- ✓ WP Max-LoQ F27 / WP Max-LoQ pF10: In Ratiotherm systems, an internal intermediate circuit located directly upstream of the evaporator acts as a mixing valve.
- ✓ The PVT heat pump 5.0 from Triple Solar features an electronically controlled expansion valve and a dynamic superheat controller, which ensures that the refrigerant circuit can be flowed through for cooling at minimum compressor speed until the refrigerant has cooled to 50 °C.



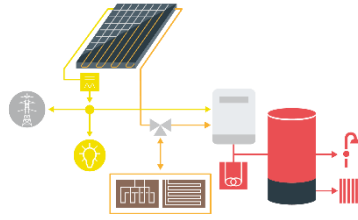
Photos:
Ratiotherm,
Triple Solar

Definition of PVT-ready heat pumps



- ✓ It must be possible to connect multiple heat sources to the heat pump.
- ✓ The heat pump's control system must be able to select the heat source with the higher temperature whilst remaining within the heat pump's permitted source temperature range.
- ✓ Control the pump in the PVT system for regenerating a geothermal heat source is seen as an optional feature of a heat pump

PVT as additional heat source



	ait-deutschland (D)	enrgi (D)	Heim Heizsysteme (CH)	Heliopac (F)	M-TEC (A)	Nibe (D)	Ratiotherm (D)	Ratiotherm (D)	Triple Solar (D)	Triple Solar (D)	Waterkotte (D)
Product name of the heat pump	alpha innotec - WZSV 63H(K)1/3M	Eco Geo Pro 2-10	SWM pro 2-13	Solerpac	BHPA412	S1156 / S1256	WP Max-LoQ F27	WP Max-LoQ pF10	PVT-Wärmepumpe 5.0	PVT-Wärmepumpe 10s	5029 Ai
Thermische Leistung bei B0W35	6 kW	10,2 kW	11,9 kW	12 kW bei B10W45	10,7 kW	18 kW	27 kW	9,5 kW	5 kW	10,6 kW	21,6 kW
Is the heat pump designed for connection of multiple heat sources?	no	yes	no	yes	yes	no	no	no	no	yes	yes
Can the heat pump control system control the pump in the PVT collector circuit as a second heat source?	no	yes	no, function possible via external PVT controller	no, function possible via heliopac-system+ package solution	yes	no	no, function possible via optional control unit installed in heat pump	no, function possible via optional control unit installed in heat pump	no	yes	no, function possible via external controller
PVT ready	--		--	--		--	--	--	--		--

Summary of the survey of heat pump manufacturers



- Many heat pump manufacturers have accepted and understood that PVT collectors place specific demands on the heat pump.
- Some heat pump suppliers already meet the newly developed PVT-ready definition set by the IntegraTE-XL Consortium, particularly when PVT collectors are used as the sole heat source.
- However, when PVT collectors are used as an additional heat source, many heat pump manufacturers rely on external controllers for source management, which does not meet the PVT-ready criteria (keyword: makeshift solution).
- The 'big' names among heat pump manufacturers, such as Viessmann, Bosch Buderus, Stiebel Eltron and Vaillant, did not take part in the survey. These companies monitor the PVT market, but so far view it more as a niche market with low volumes and do not yet offer suitable products for it.

Thanks for your attention!

Contact:

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Further information: www.pvt-energie.de

PVT-info videos in Englisch: [Film 1](#) and [Film 2](#)