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Building temperature and electricity integration

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Meyer Burger Group & Energy Systems

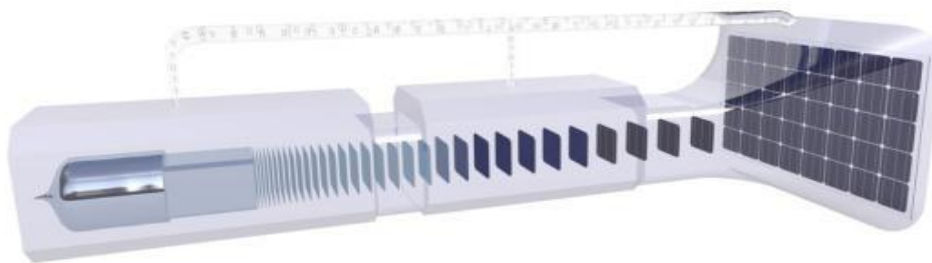
Passionate about PV



«We will shape the future energy mix by combining leading technology with the infinite power of the sun .»

«We will further develop the photovoltaic, semiconductor and other high-end niche markets using both new and existing technologies.»

From ingot to solar module to complete energy system



End applications of PV

e.g. UmweltArena, Spreitenbach, CH, 750 kWp



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e.g. PV on historical protected buildings



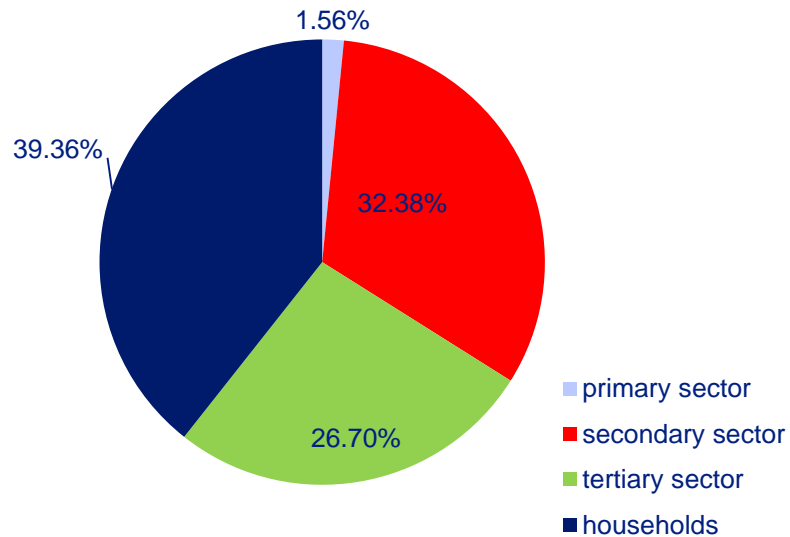


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Storage of thermal energy to reduce electricity need (Seasonal shift of energy)

Buildings account for 40% of the CO2 emissions

CO2 Emissions in Switzerland 2011



Source: <http://www.pxweb.bfs.admin.ch>



Large installed thermal generation capacity in houses



Over 40GWth of installed oil and gas burners in Switzerland

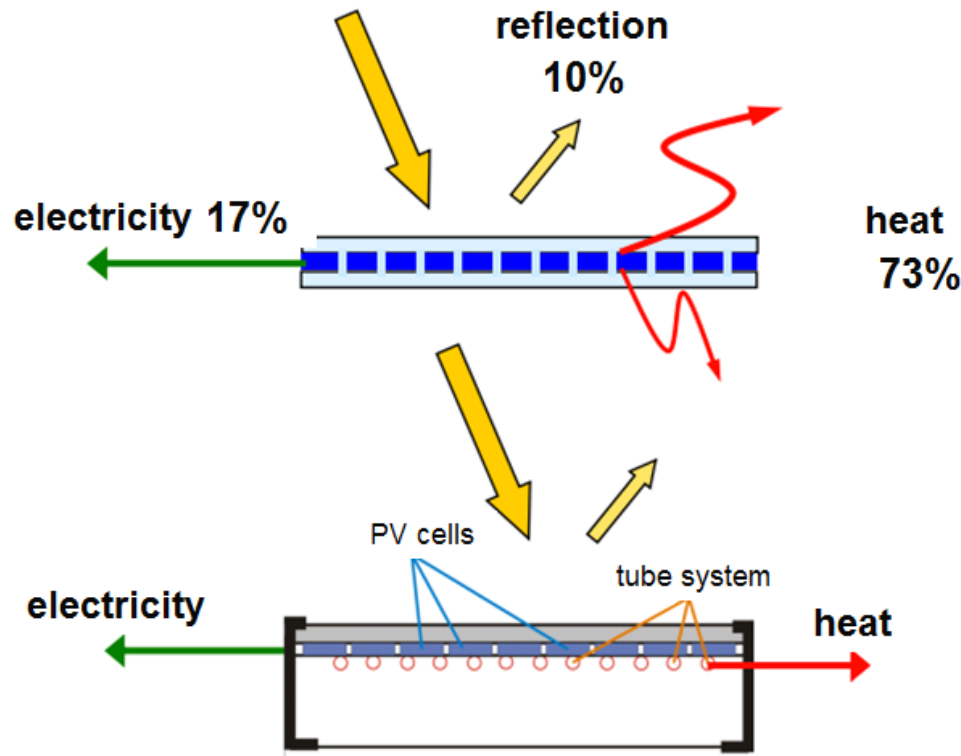
Geothermal probes and heat pumps are seen as a solution

But if it is cold, air/water heat pumps have a bad efficiency. This results in lot of electricity need on the coldest day

With todays heat pump systems we would need an additional of 8-10GW electrical power the coldest day of the year.

We can not change decarbonize our energy source by using air/water heat pumps we need another heat source

Basic idea of Hybrid collector



- With higher cell temperature reduction of electrical efficiency
 - Typical module working temperature is 65°C instead of standard measurement of 25°C:
 - minus 17%
 - 270 W → 224 W
- With hybrid collector the heat can be discharged in a controlled way and the cells can be cooled down
- Low temperature can be used

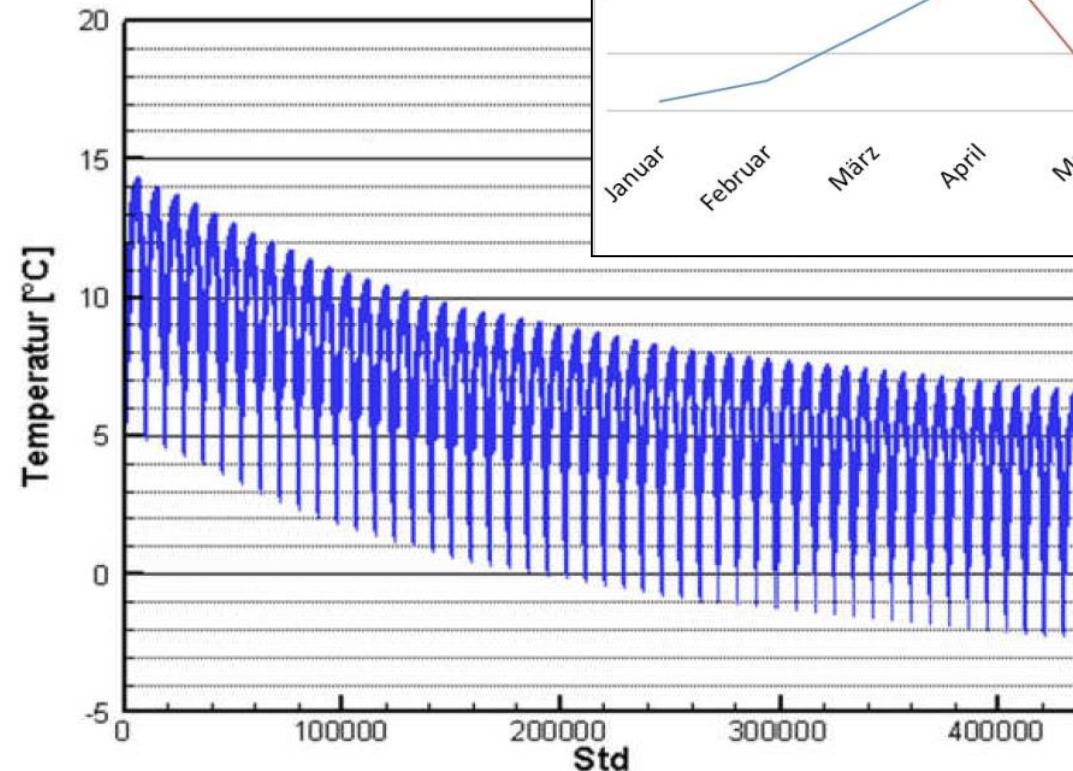
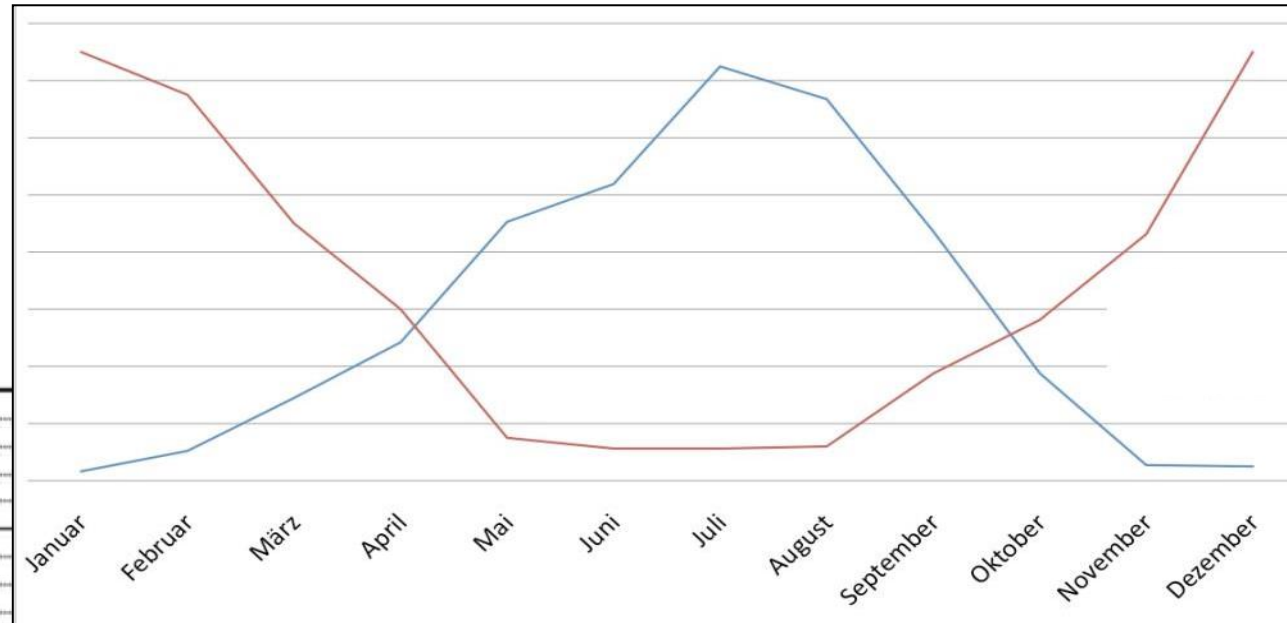
Main issues



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General problem with thermal collectors:

- bad coincidence of need and gain:



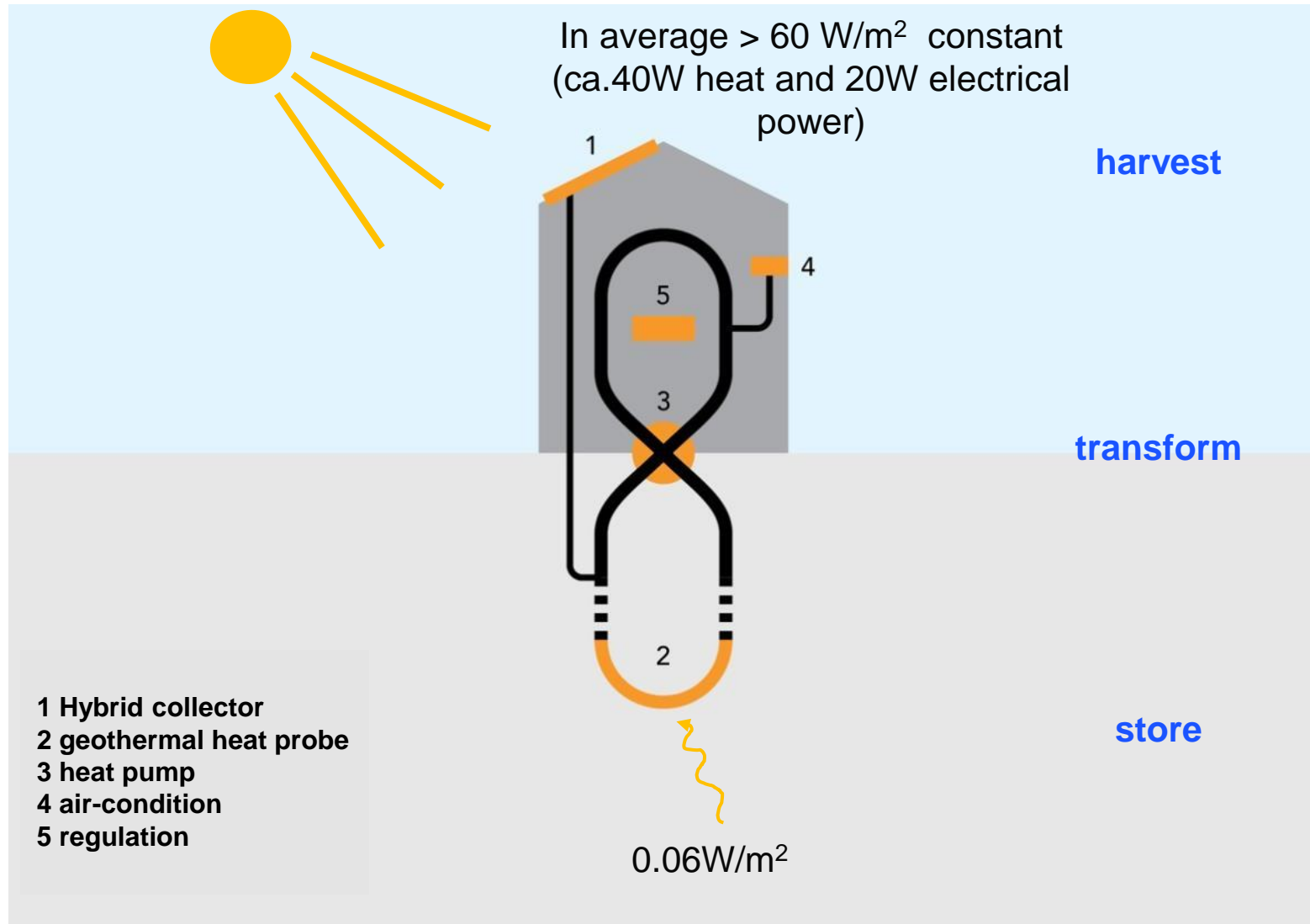
On the other hand:
Problems with geothermal heat probes:

- Soil cools down over several seasons \Rightarrow lower efficiency of heat pump

overall solution electrical power/heat supply in buildings



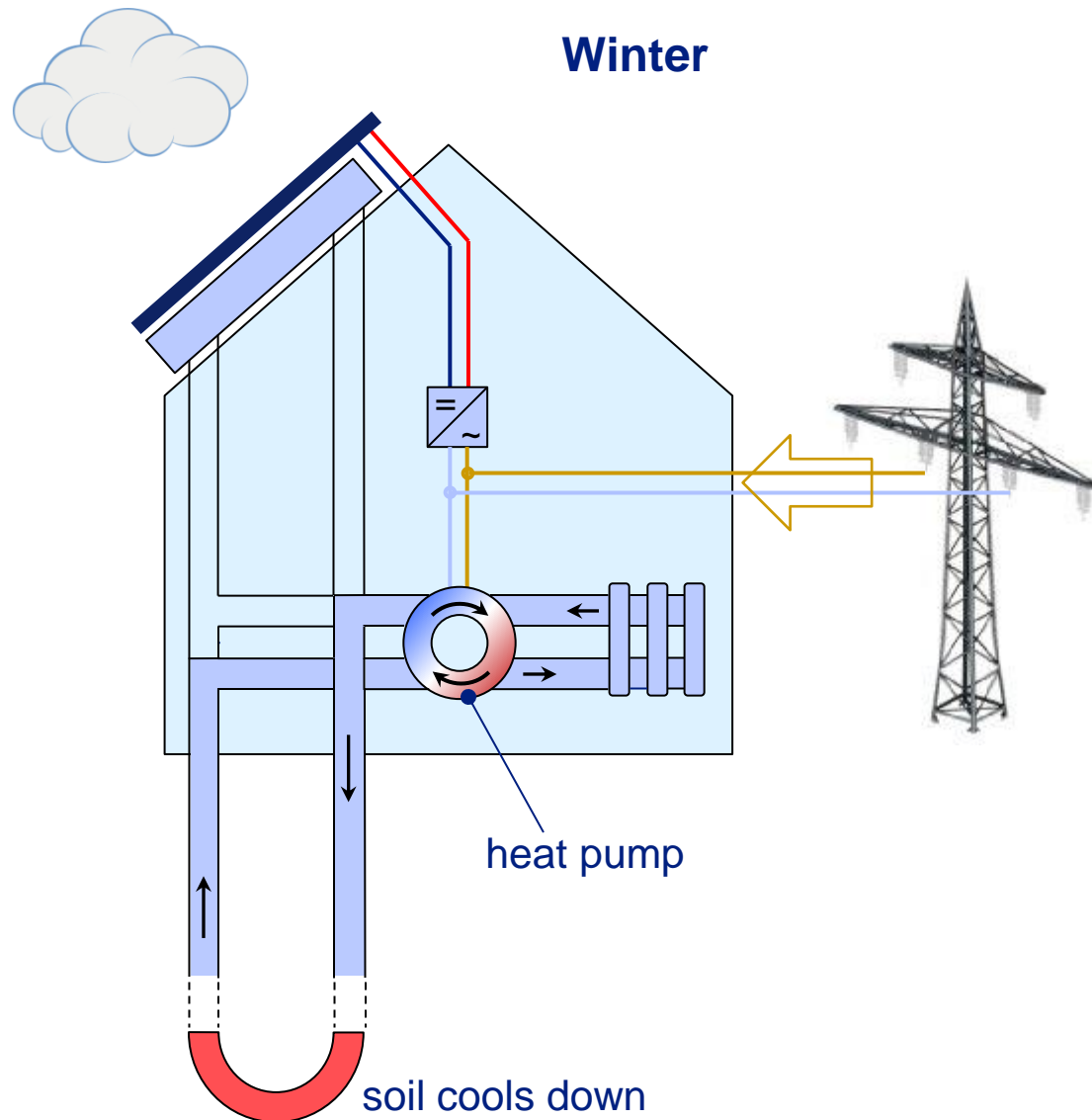
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Hybrid System



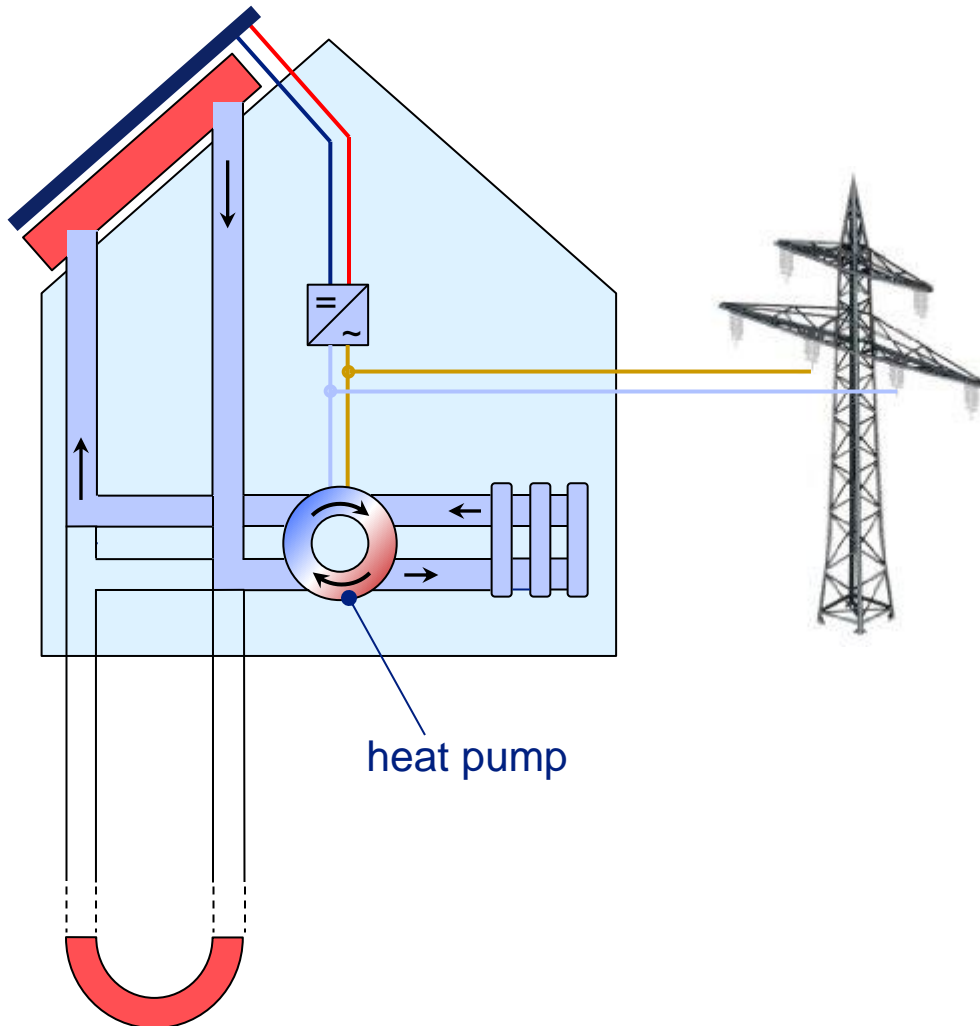
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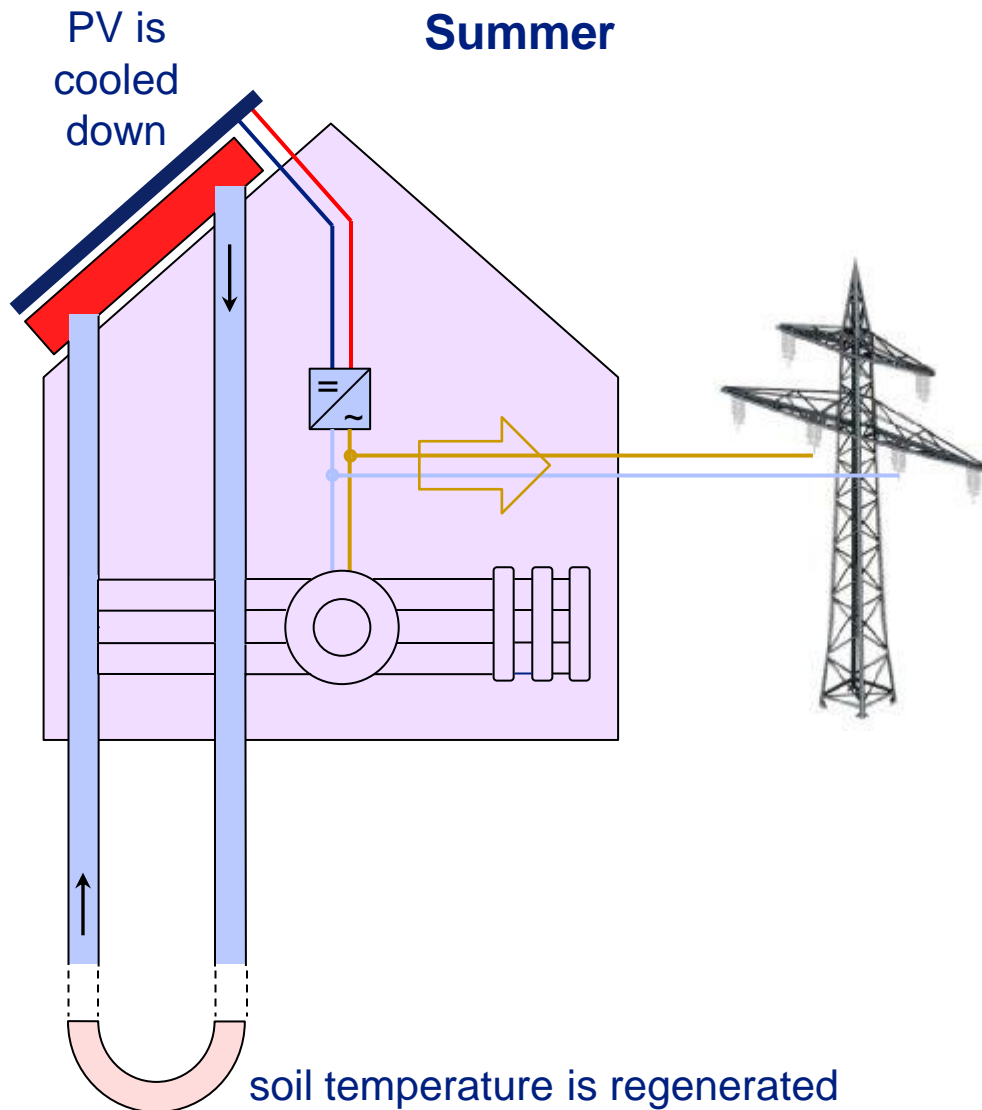




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Winter





Realized system building at campus of the Swiss fed. Inst. of technology



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Source: Chair of Building Systems / Prof. Hansjürg Leibundgut
Institute of Technology in Architecture / Faculty of Architecture / ETH Zurich

Suurstoffi – Rotkreuz (Switzerland) low temperature- heating grid



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- 600 kWp electrical power
- 2000 kW thermal power
- Start of construction march 2014
- Biggest system using PVT for harvesting and geothermal probes

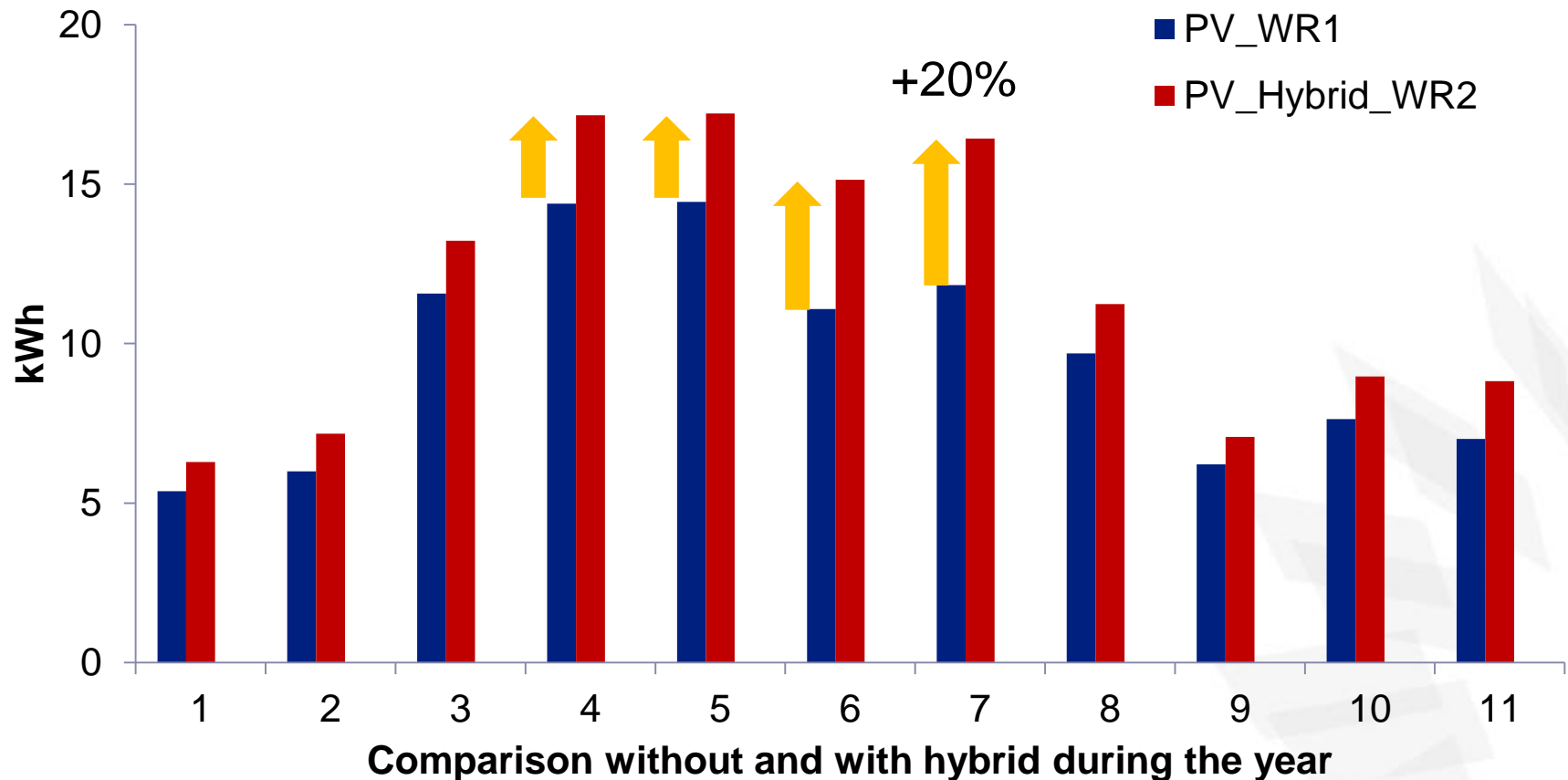


More electricity, more heat or cooling capability



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- Data from measurement:
 - Annual average of +10% more electricity
 - In summertime (June 2013): + 20% more electricity



Take aways



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- CO2 emission mitigation is needed to preserve the world
- Buildings are globally a major CO2 source
- We need to realize low CO2 buildings
- Combination of technologies can lead to new solutions
- These solutions can help to integrate variable energy sources. In this case by using heat in a storage system for reducing the energy needed to produce heat.

Thank you for your attention!

