



EU INDUSTRY WEEK 2021

#EUIndustryWeek

CHEAPER THAN ELECTRIFICATION

*How **solar heat** will replace oil and gas in the **EU industrial sector***

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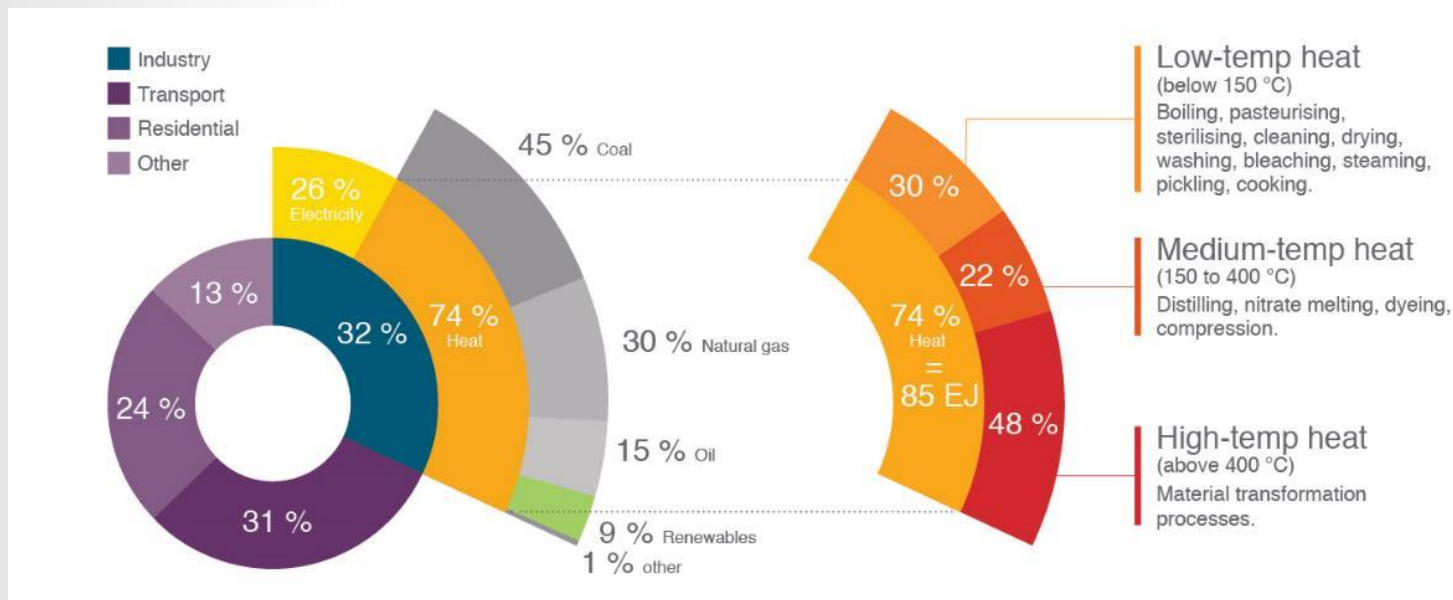
SOLAR PROCESS HEAT AND IT'S ROLE IN A FUTURE RENEWABLE ENERGY SUPPLY

CHRISTOPH BRUNNER

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Share in industrial energy demand

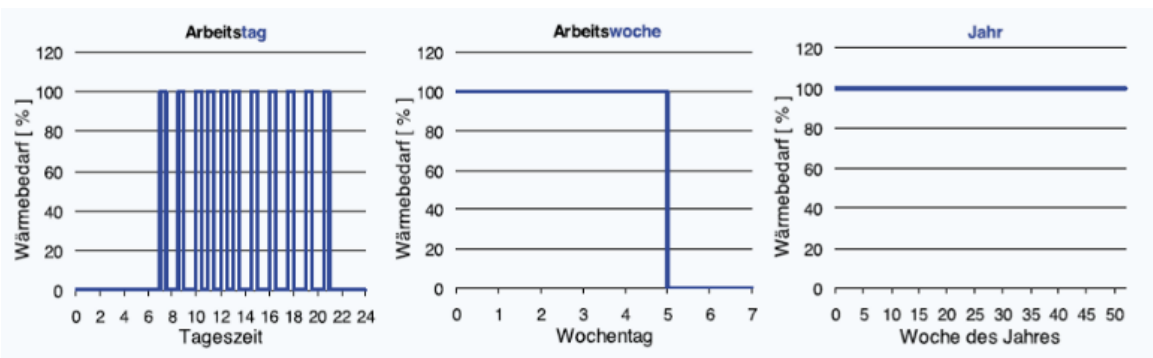


74% of final energy demand in industry is allocated to thermal energy!



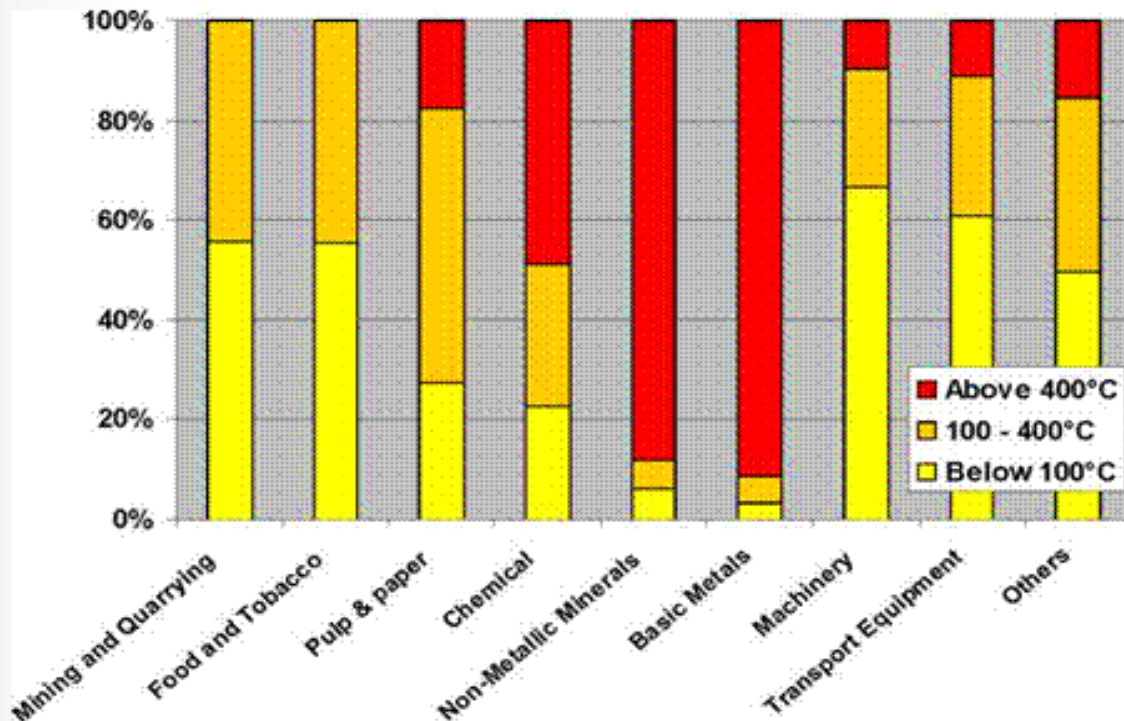
What are the challenges for a renewable energy supply in industry?

- A hybrid system with different renewable energy sources (solar thermal, H₂, biomass, biogas, geothermal, heat pump, district heating, excess heat,...)
- Energy supply under exergetic consideration – demand temperature is crucial
- Matching of volatile solar resource with load profiles (e.g. for batch processes or night time supply of continuous processes)
- Energy management system including integration of waste heat recovery



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Renewable potential in different sectors

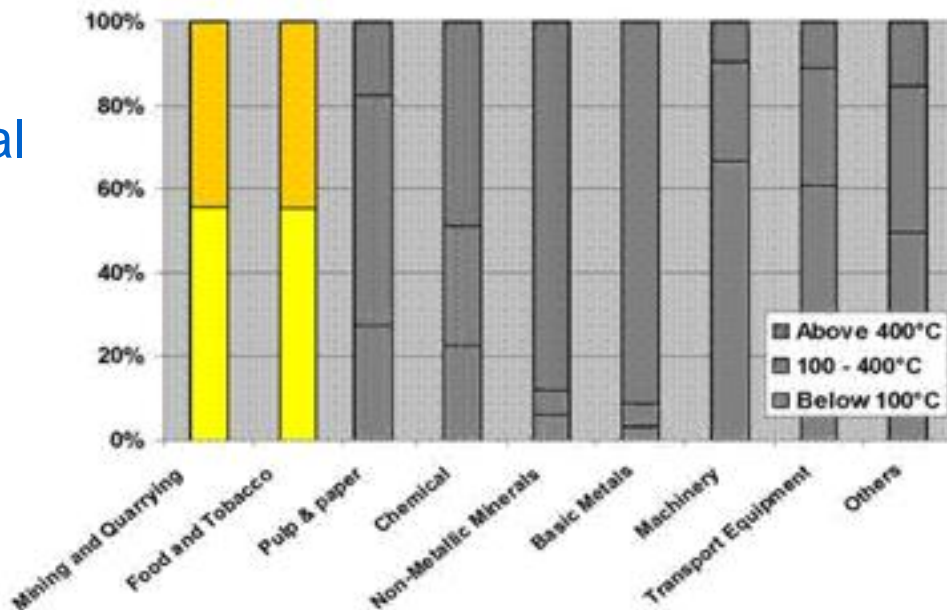


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Renewable potential in different sectors

Potential for:

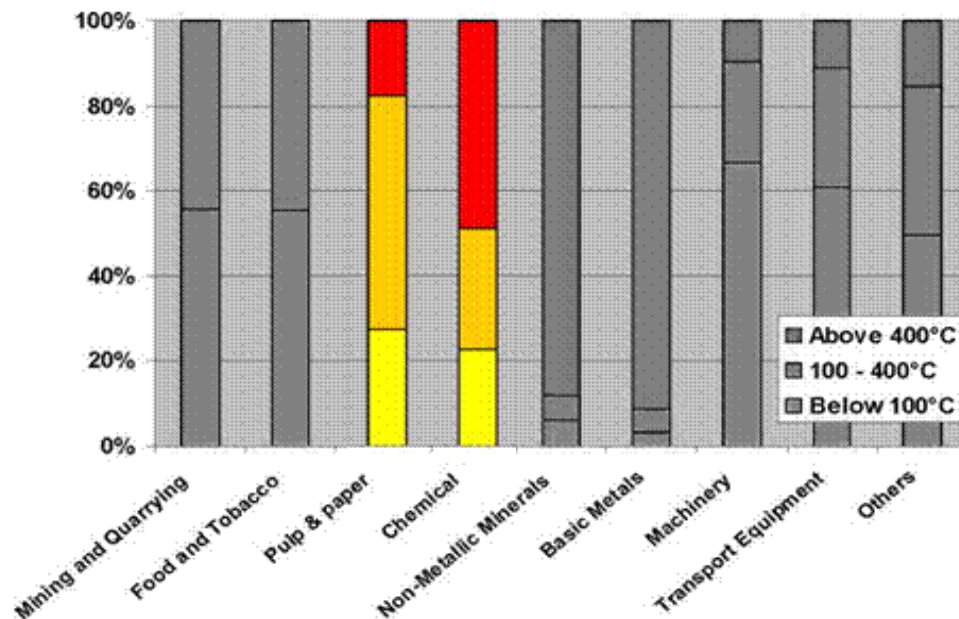
- Heat pumps, Geothermal
- Solar thermal energy
- Biomass, Biogas
- District heating
- Excess heat



Renewable potential in different sectors

Potential for:

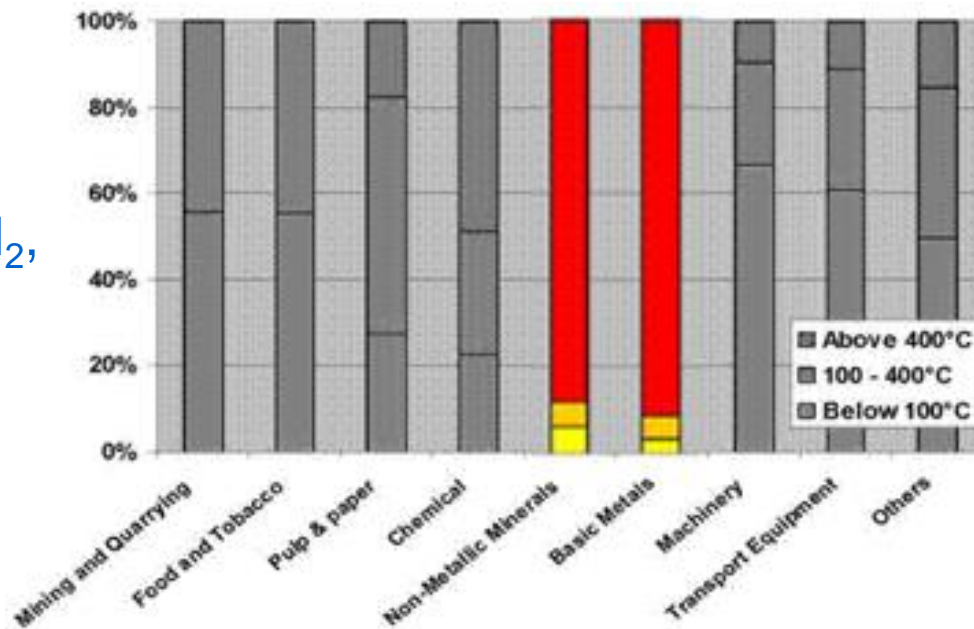
- Heat pumps
- Solar thermal energy
- Biomass, Biogas
- New energy vectors like H_2 , NH_3
- Electricity



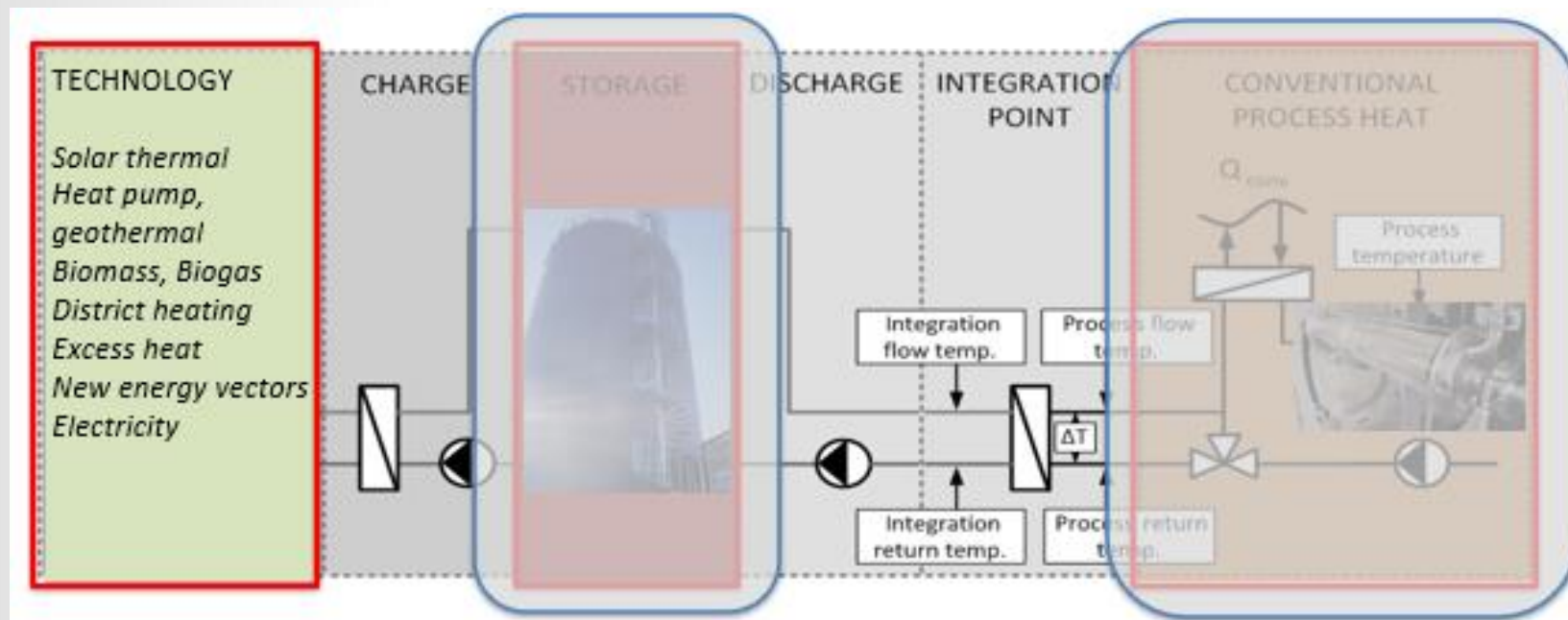
Renewable potential in different sectors

Potential for:

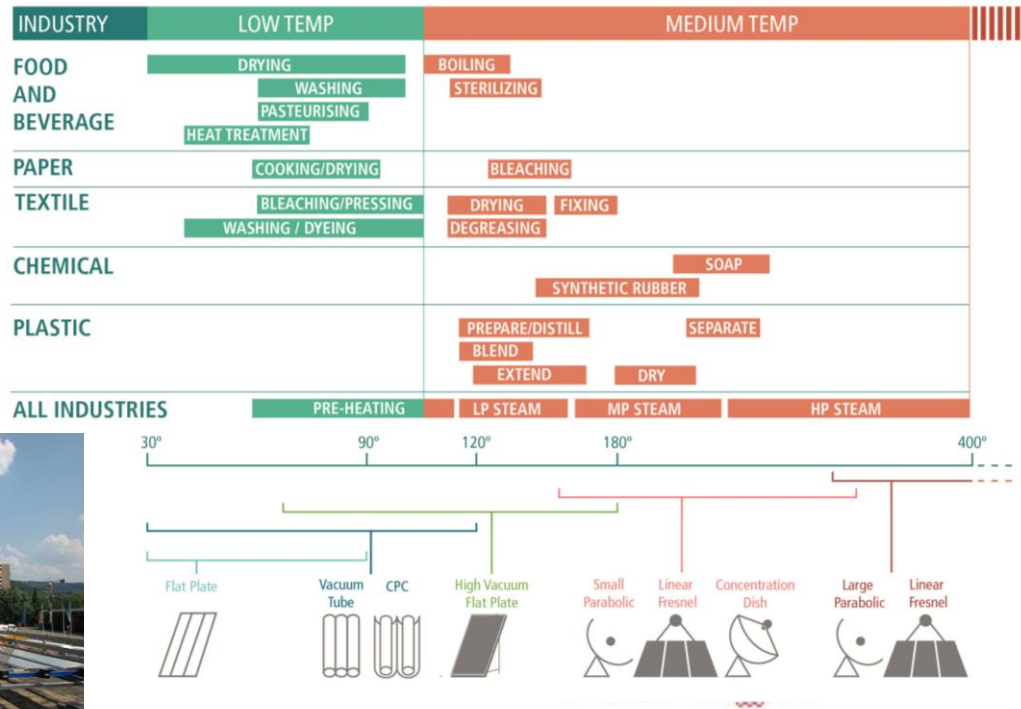
- Biomass, Biogas
- New energy vectors like H_2 , NH_3
- Electricity



System integration of hybrid systems



Solar thermal collectors



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SHIP Database on existing plants

- 294 realized plants by 2020
- Selection by country, application, solar company, collector technology, year of installation, industry,...

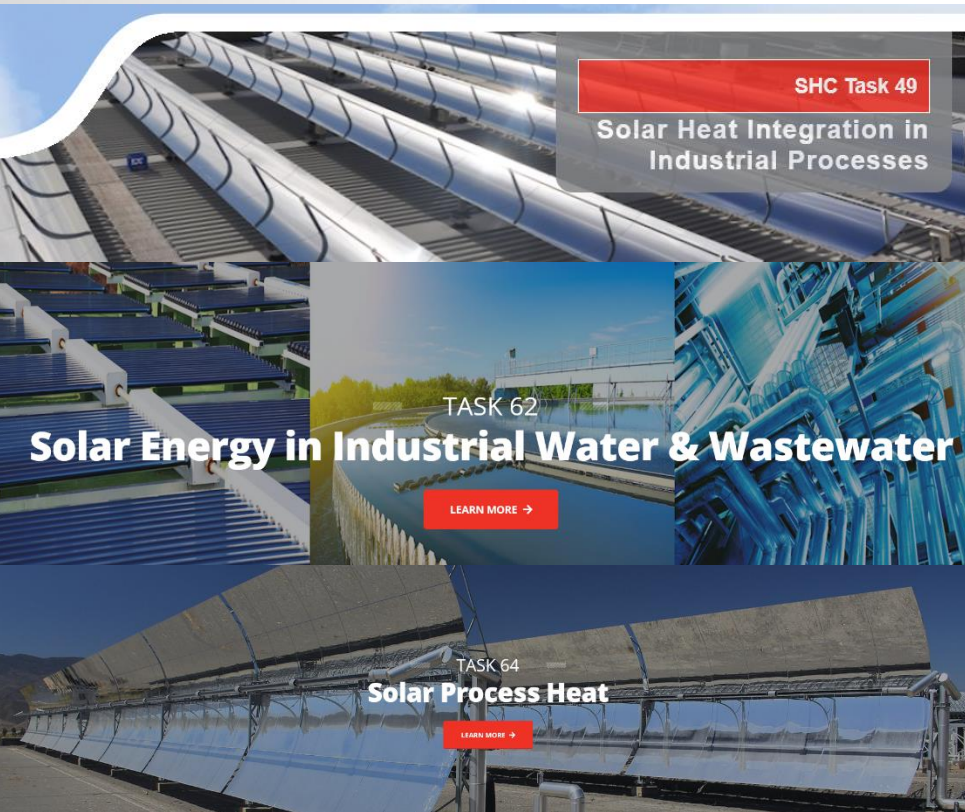
www.ship-plants.info



GENERAL INFORMATION		General
Name	Montesano - Canary Islands	<input type="checkbox"/>
Country installed	Spain	<input type="checkbox"/> Solar
Address	La Esperanza	<input type="checkbox"/> Process
Industry sector, NACE code	C10 - Manufacture of food products	<input type="checkbox"/> Eco
Solar thermal system owner / operator	Montesano	<input type="checkbox"/> Lessons
Solar thermal engineering company		<input type="checkbox"/> Source
Process integration engineering company		
Year of operation start	2008	

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International Energy Agency Solar Heating and Cooling - SHC

- Solar Heat Integration in Industrial Processes:

<https://task49.iea-shc.org/>

- Solar Energy in Industrial Water & Wastewater

<https://task62.iea-shc.org/>

- Solar Process Heat

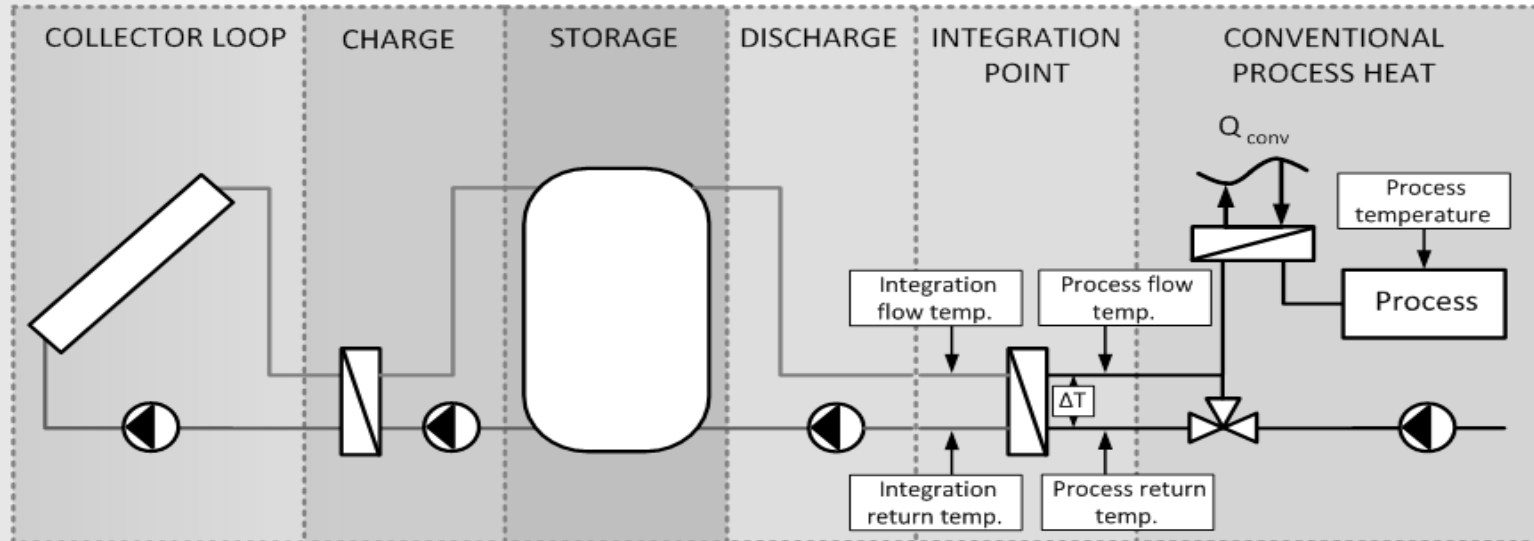
<https://task64.iea-shc.org/>



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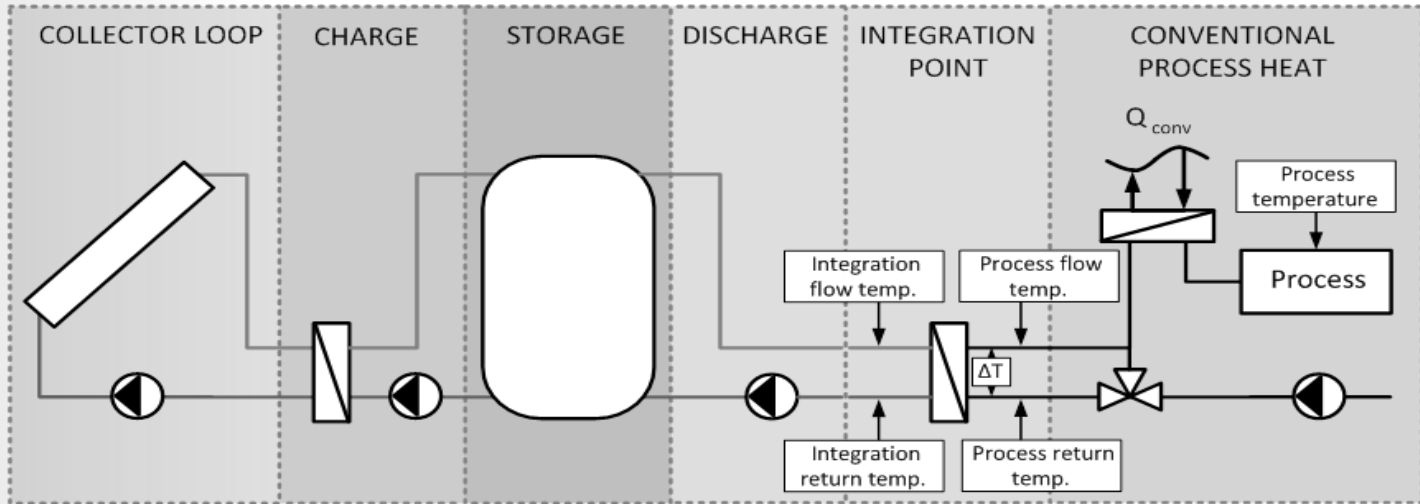


R&D needs for storage technology



- High temperature storage technologies (up to 1000°C)
- Increased energy storage densities in thermal solids and fluids
- Adaptable storage cycles (daily, weekly, monthly or seasonal)
- New materials for phase-change, sorption and chemical storage

R&D needs for process technology



- higher process and resource efficiency in processing and increased energy efficiency (e.g. thermal driven separation technologies)
- constant and lower energy demand (e.g. by batch-to-continuous approach) smoothening the heat demand profile
- higher heat transfer coefficients to realize energy supply with minimized heat transfer areas



Industries' future renewable energy supply

- Energy efficiency first
- Willingness for changes in the process technology
- Hybrid renewable energy supply (digitalization, exergy, new storage technology)
- Renewable energy depending on specifications of location (biogas, biogas waste water, biogas from waste, connection with energy network, solar, heat pump...) and process temperature demand
- For solar thermal: Important factors are the solar irradiation (shading), space availability and production times





Thank you!

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