Potential of Solar Process Heat

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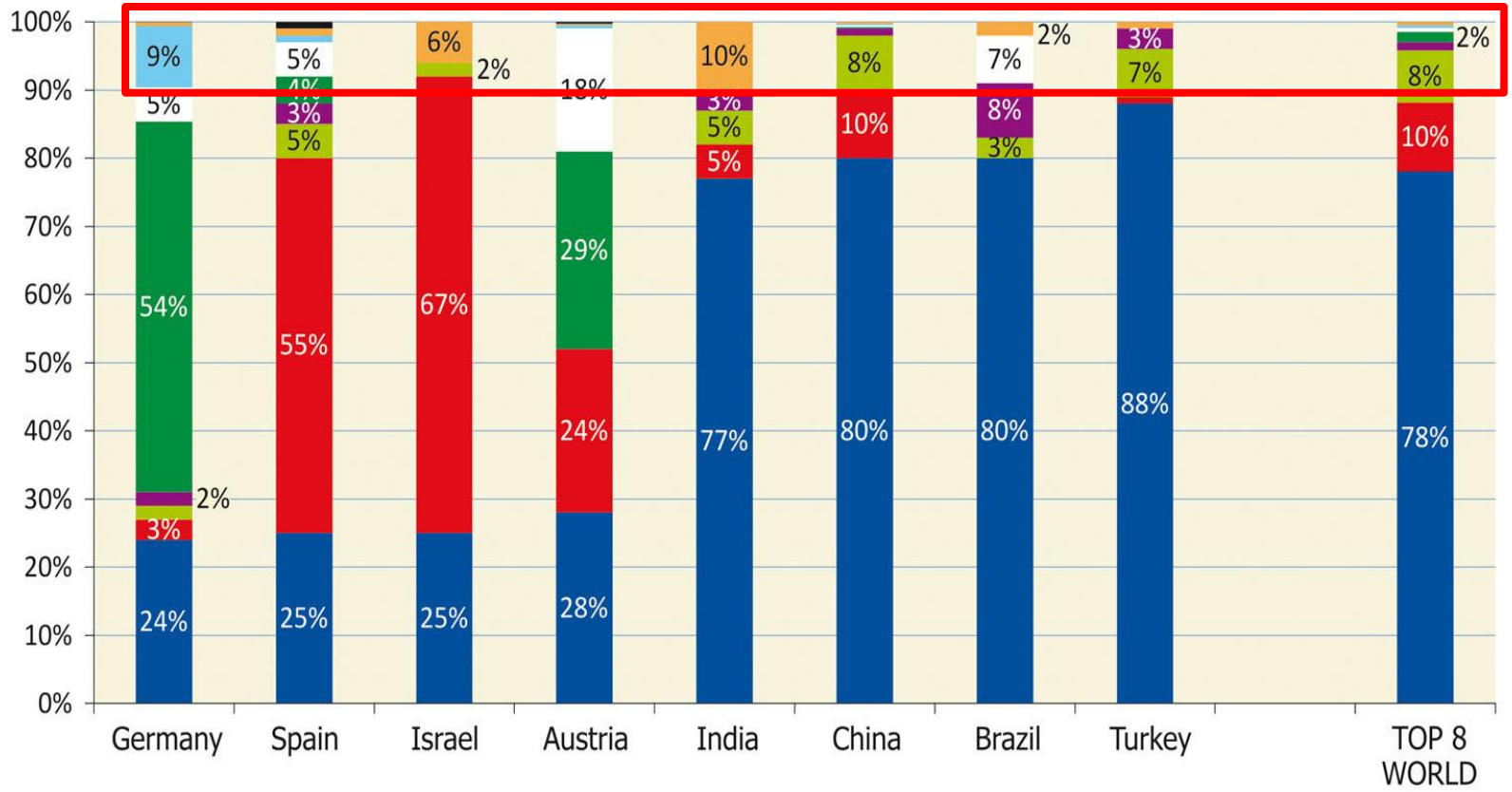
Distribution of different applications

of the newly installed capacity for the 8 leading countries worldwide in 2010



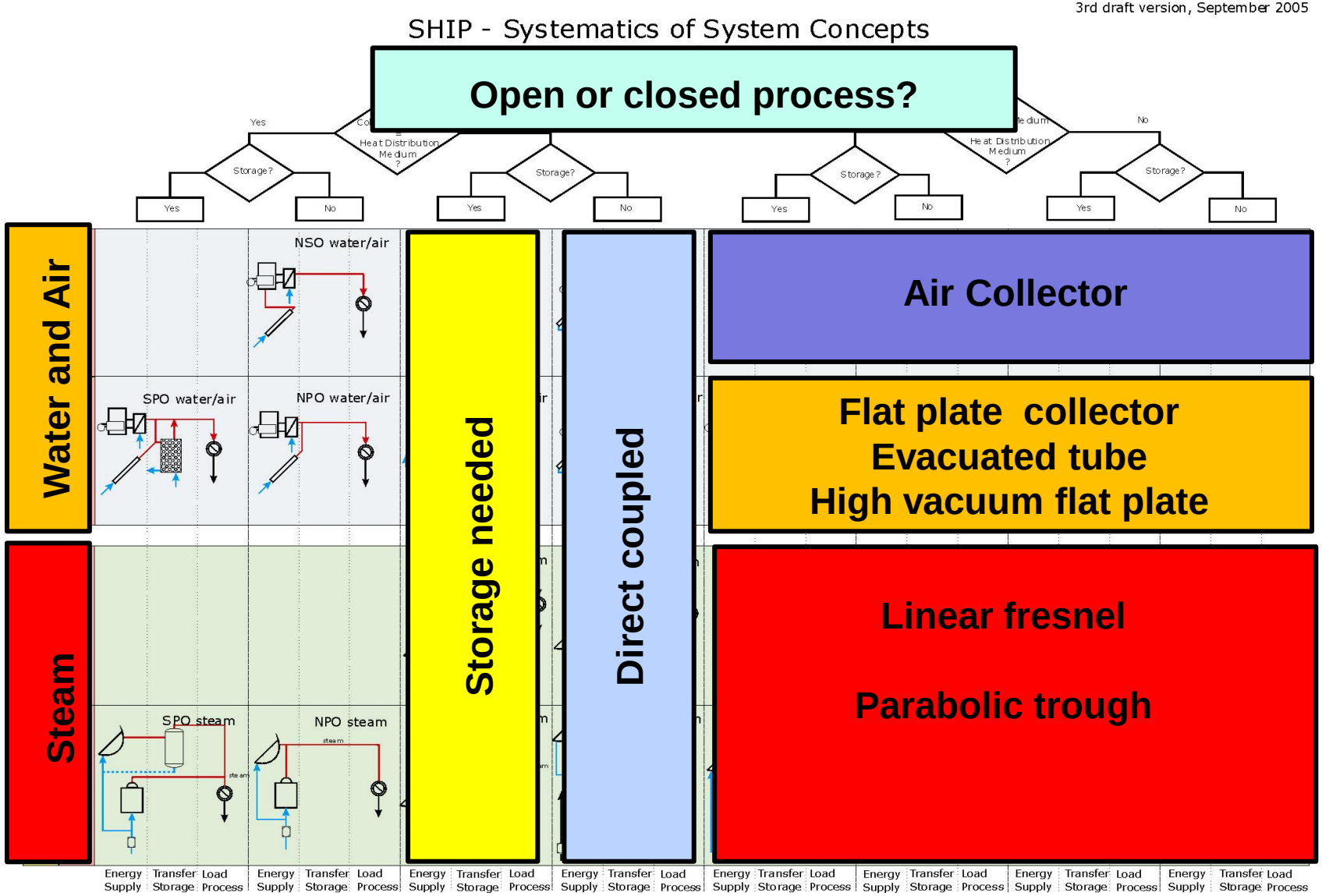
Processes and Temperature Levels

Industrial Sector	Process	Temperature Level [°C]
Food and Beverages	Drying Washing Pasteurizing Boiling Sterilizing Heat Treatment	30 - 90 40 – 80 80 – 110 95 – 105 140 – 150 40 – 60
Textile Industry	Washing Bleaching Dyeing	40 –80 60 – 100 100 – 160
Chemical Industry	Boiling Distilling Various chem. Processes	95 – 105 110 – 300 120 - 180
All Sectors	Pre-heating of Boiler Feed-water Heating of Factory Buildings	30 – 100 30 – 80

Applications to date

Space heating of industrial buildings **35 – 60°C**	 
Low- and medium temperature heat for industrial processes **30 – 150°C**	 
Water treatment **(e.g. Sea water desalination)** **80 – 110°C**	 
Refrigeration and cooling **60 – 120°C**	 

Generic Solar Heat Integration Concepts



Efficiency first

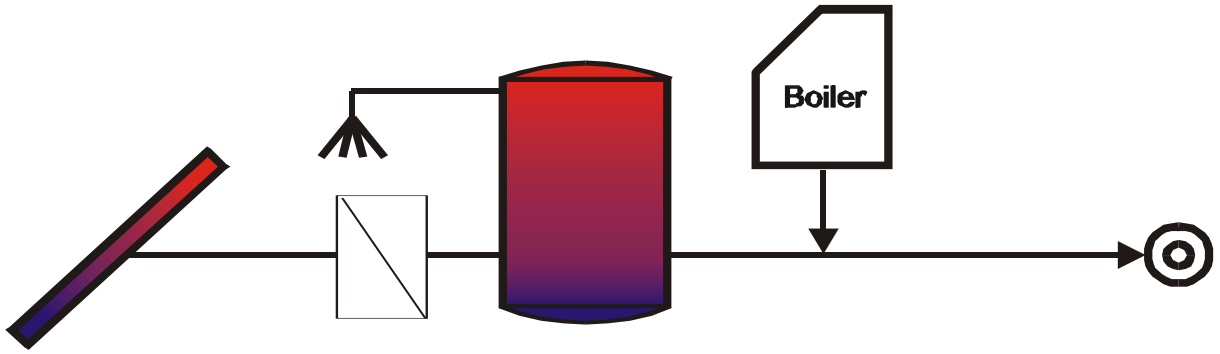
1st step

2nd step: Solar Thermal Energy

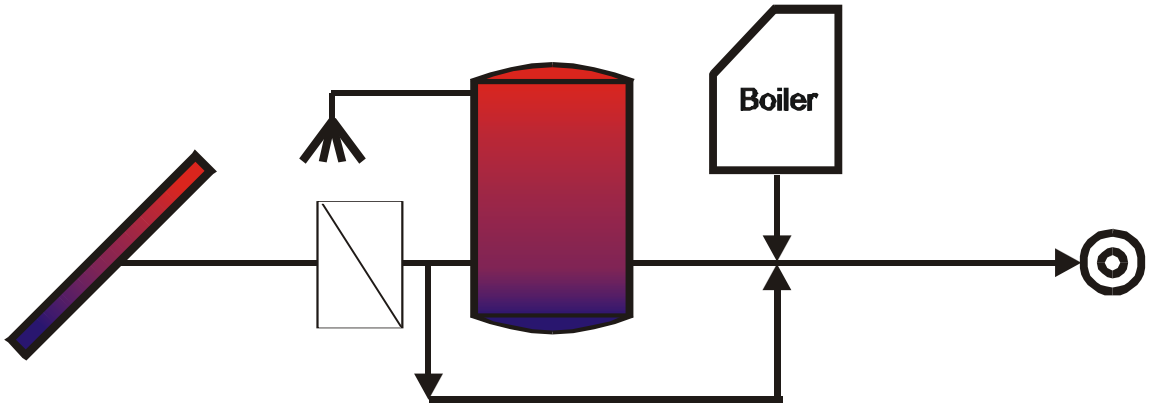
Space Heating of Factory Buildings

System concepts

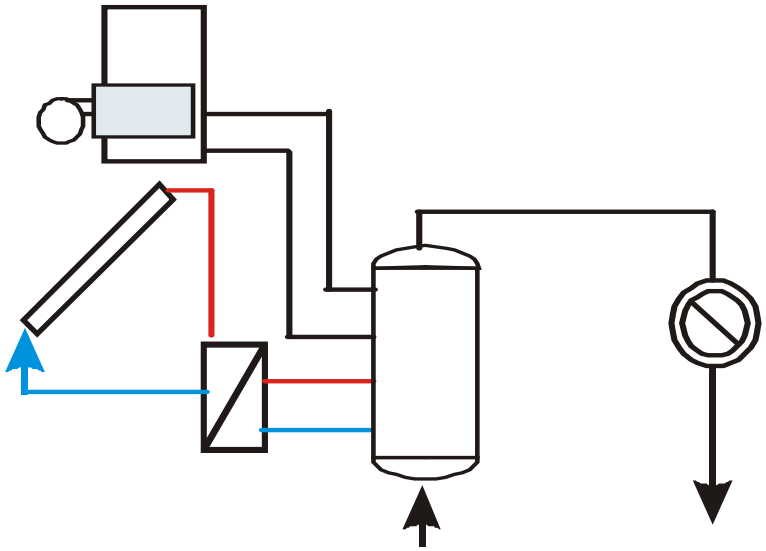
- Via buffer storage



- Via buffer storage and/or direct via heat exchanger



Open Process - Water



Main Applications

cleaning of:

- bottles
- textile
- cars

Temperature range for the processes: 40 - 90°C

Heat carrier: water

Recommended Collector Types:

- **flat-plate collector**

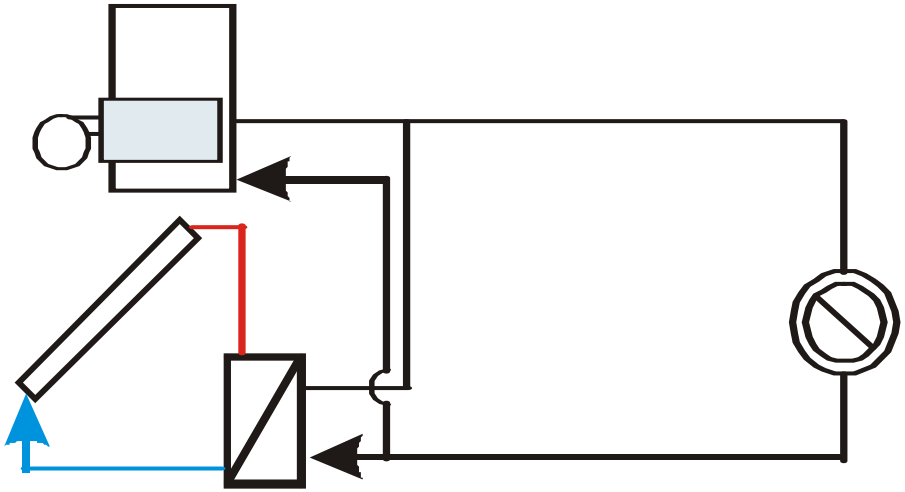
Built Examples

Built Examples

Solar car wash plant, Köflach, Austria

Installed capacity: 30 kW_{th} (43 m^2 flat plate collector)

Necessity of a Storage Tank



Main Applications

- Galvanic industry
- Food industry

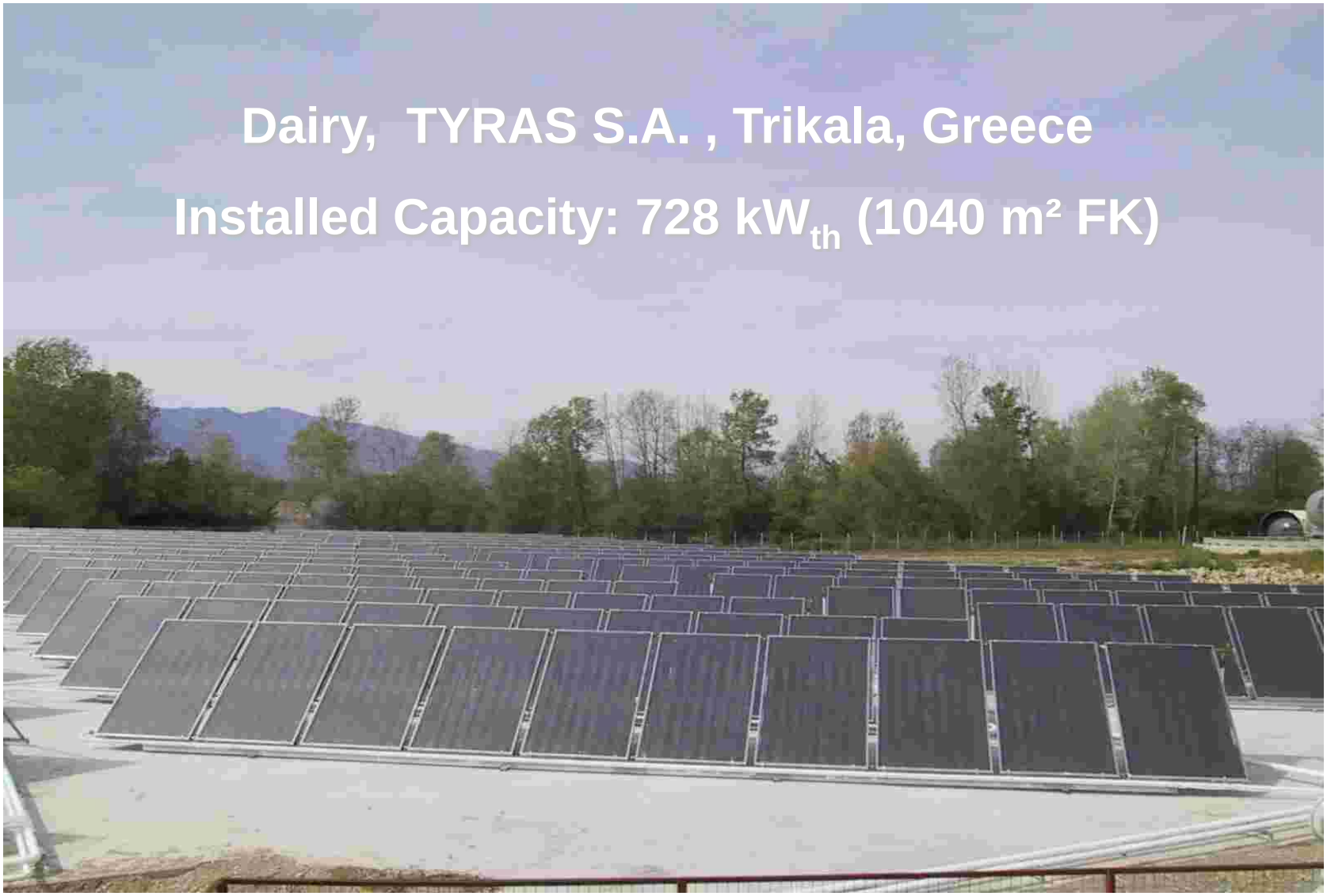
Temperature range for the processes : 30 - 90°C

Heat carrier: Water

Recommended Collector Types: FP, ETC, CPC

Demonstration Plant – Galvanic Industry

Dairies


Dairy, TYRAS S.A. , Trikala, Greece
Installed Capacity: 728 kW$_{th}$ (1040 m² FK)

Solar Heat for Copper Mining in Cyprus - 0.5MWth

Solar Leaching Field Pilot Implemented in 3 months

Mining Sector – Copper Mines in Cyprus and Chile

Biggest System Worldwide, Saudi Arabia

36.000 m² / 25 MW_{th}

Sources: Millennium Energy Industries and AEE INTEC

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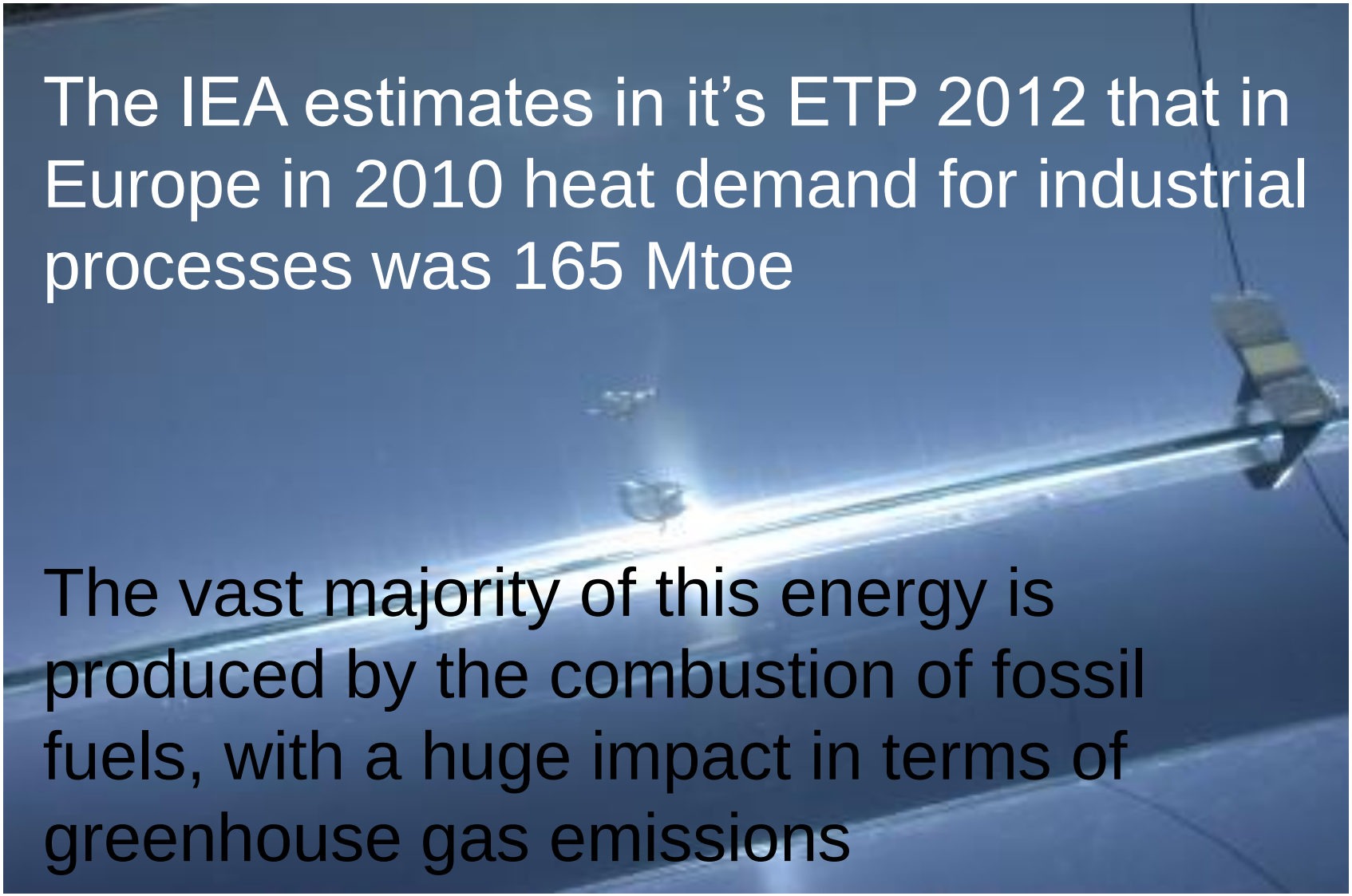
Industrial Scale Solar Thermal is available

Potential of Solar Heat in Industry

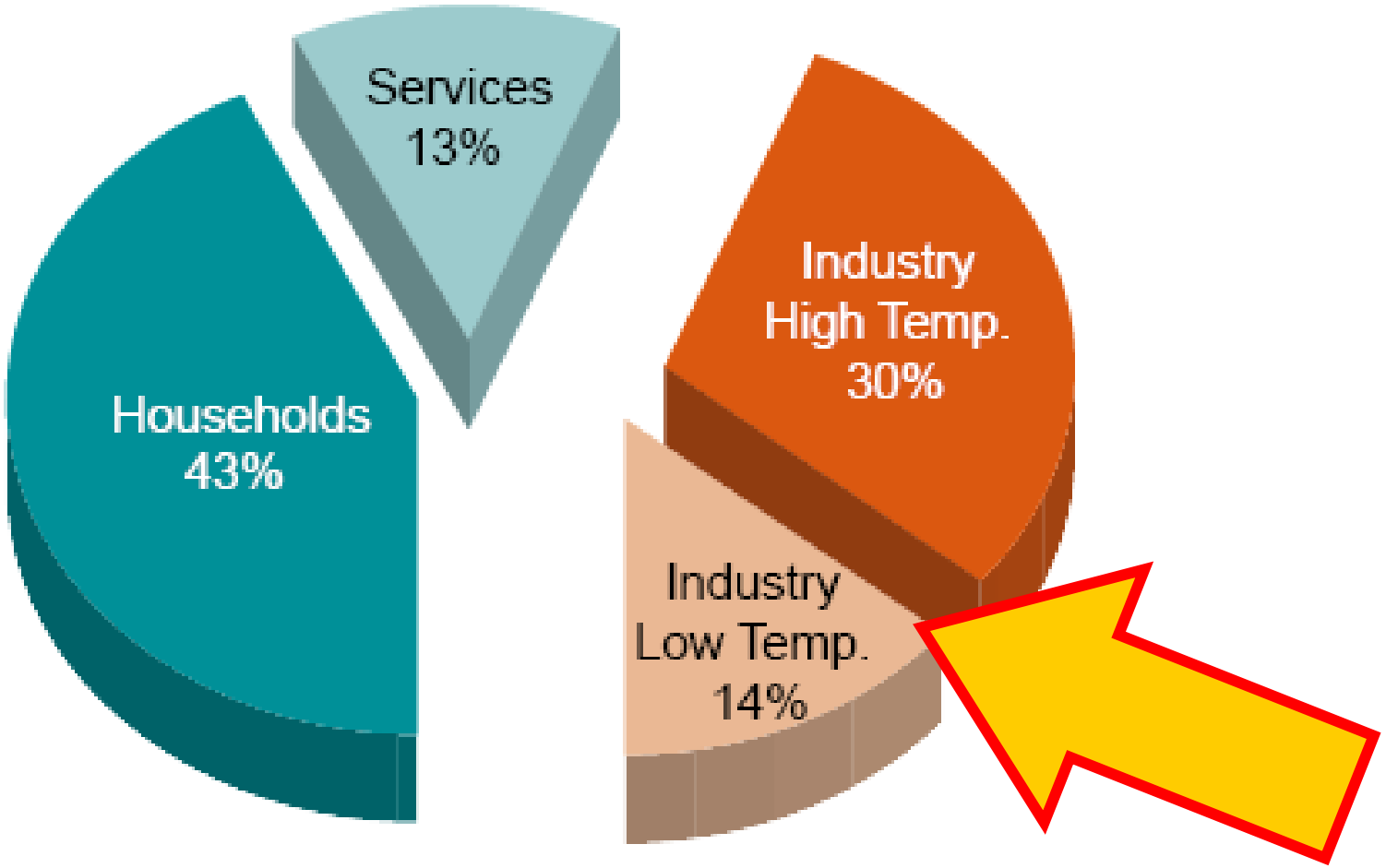
Status of Solar Heat for Industrial Applications



The IEA estimates in it's ETP 2012 that in Europe in 2010 heat demand for industrial processes was 165 Mtoe

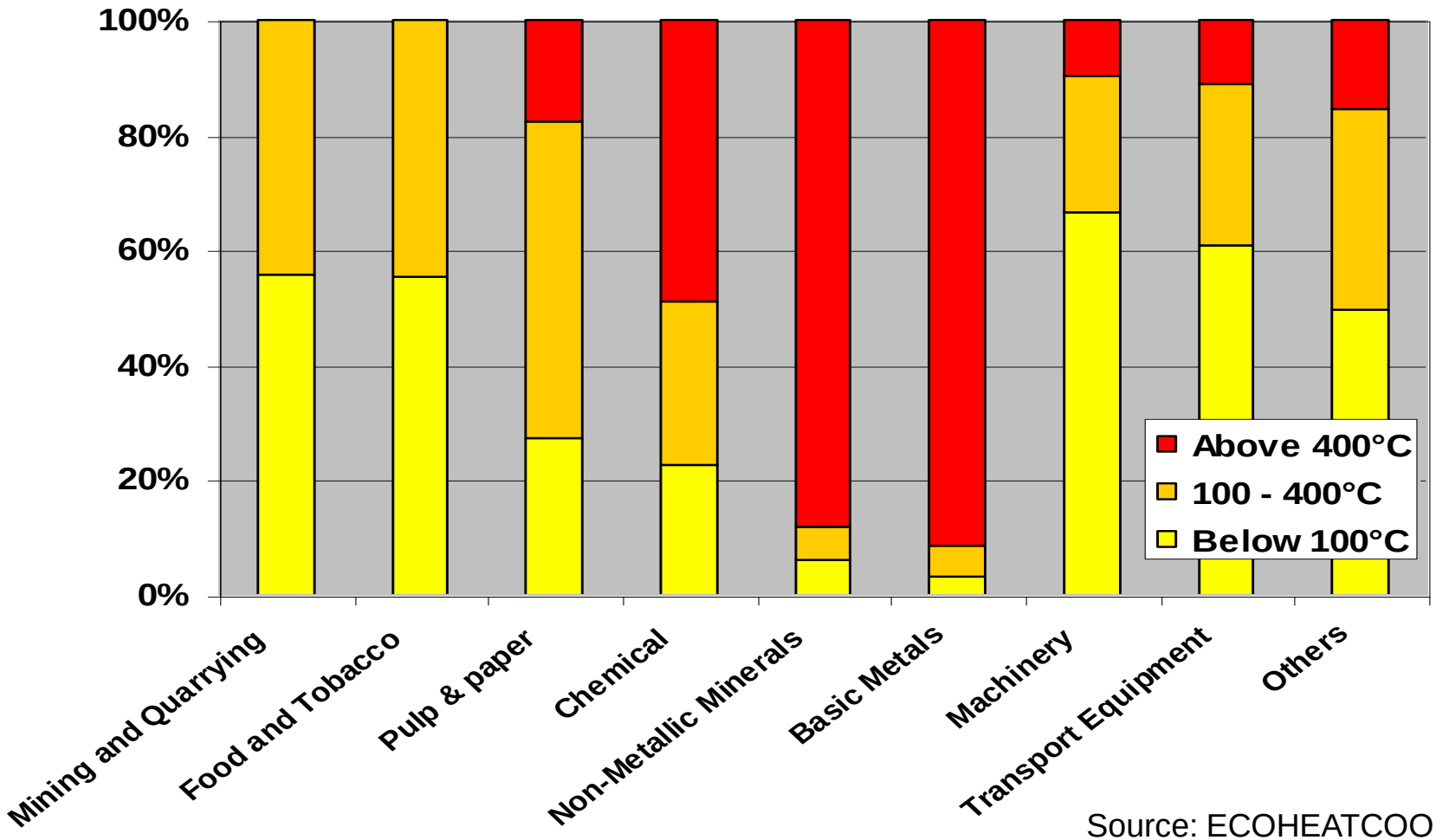
The vast majority of this energy is produced by the combustion of fossil fuels, with a huge impact in terms of greenhouse gas emissions

Heat Demand by Sector – EU 27



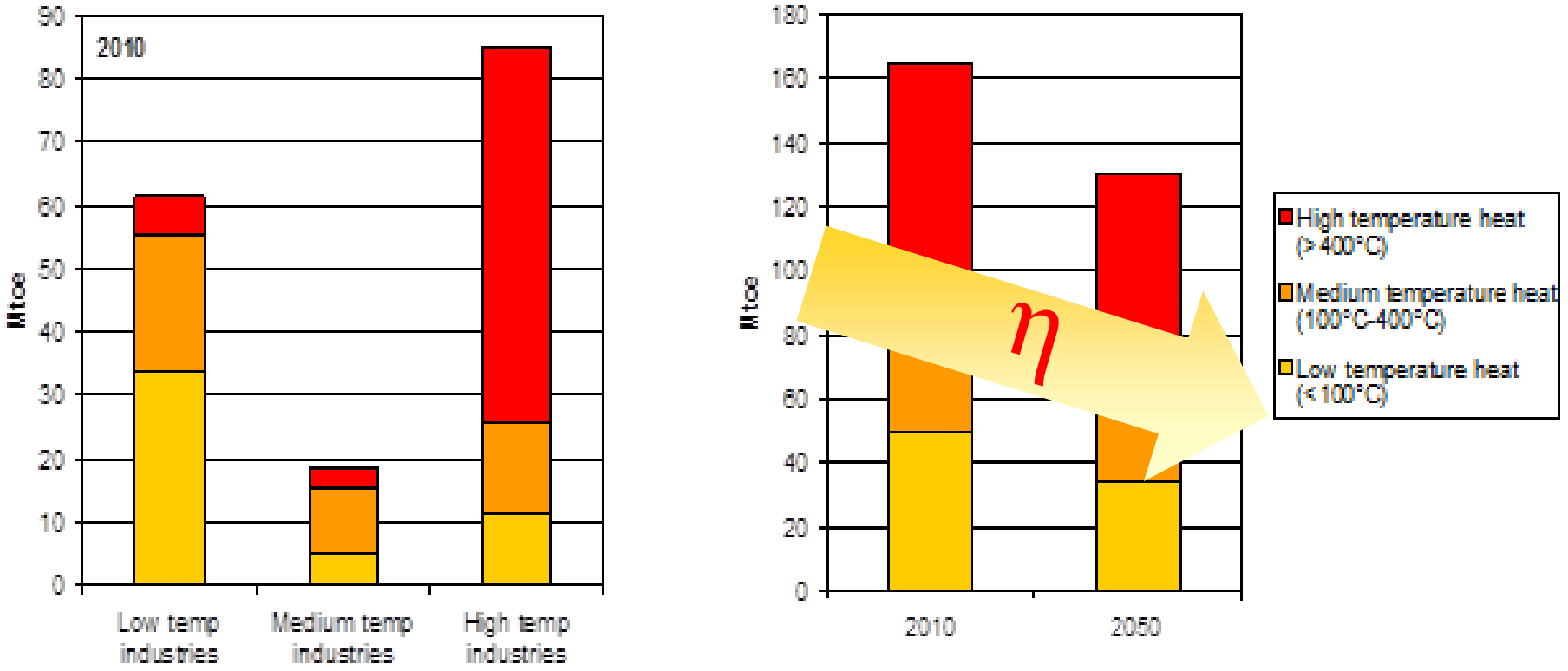
Source:ETP RHC, 2011

Industrial heat demand by temperature level and industrial sector



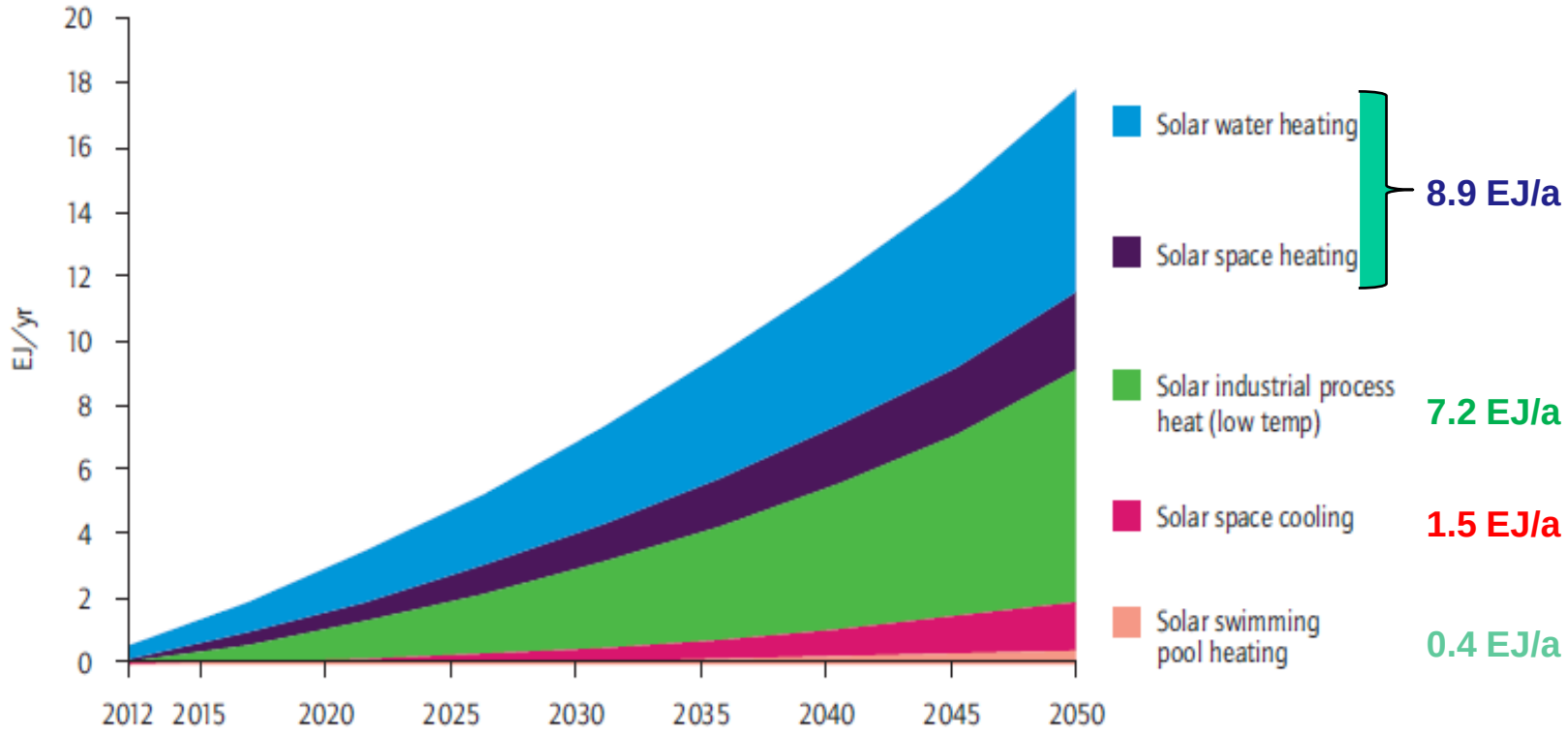
Source: ECOHEATCOOL

Industrial heat demand by temperature level and industrial sector



Industrial heat demand by temperature level in the EU in 2010 (left) and industrial heat demand in the EU in 2010 and expected demand in 2050 (right). Source: OECD / IEA (2012).

Roadmap vision of solar heating and cooling by sector (EJ/yr)



Solar heating and cooling capacity could produce annually by 2050:
16.5 EJ solar heat (16% of TFE low temp. heat)
1.5 EJ solar cooling (17% of TFE cooling)

Source: IEA SHC Roadmap, 201)

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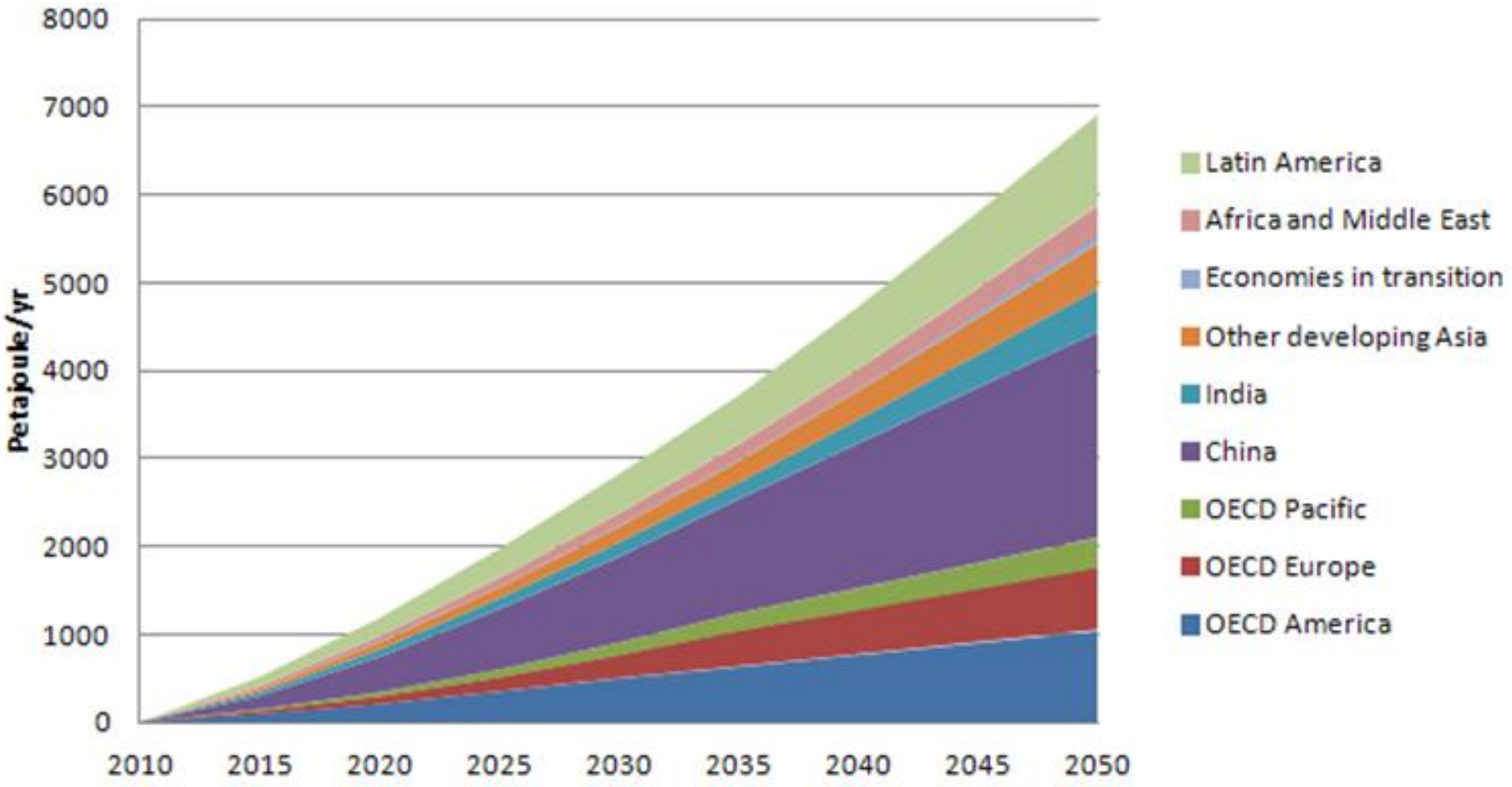

Source: IEA SHC Roadmap, 201)

To make use of the potential…