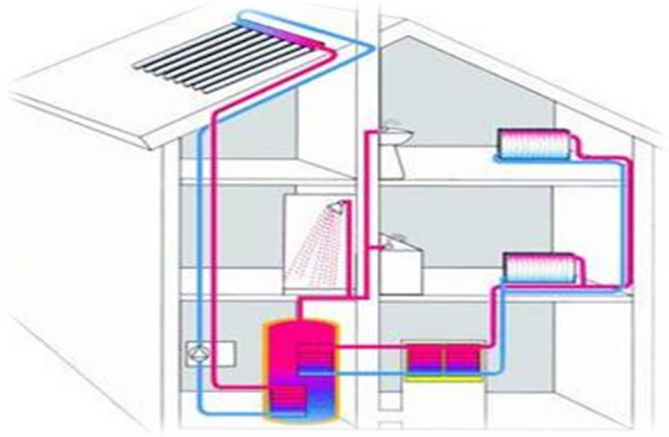
Maximising the impact of EU solar thermal R&D projects:
A solar heat perspective

Pedro Dias, Solar Heat Europe/ESTIF

Solar Heating and Cooling
An introduction

Solar Heating & Cooling

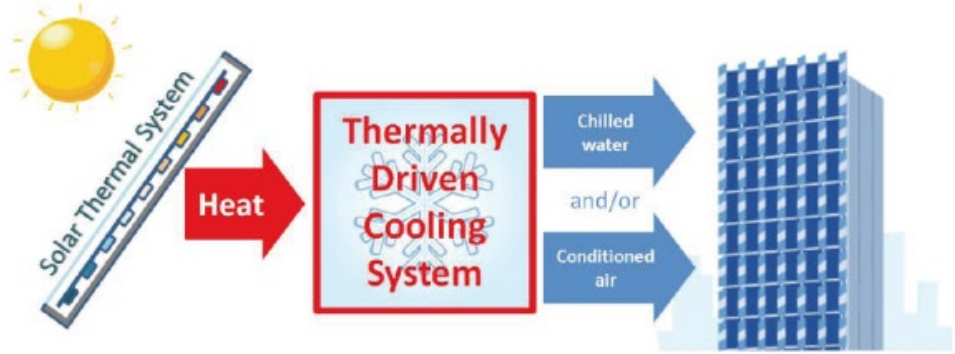


HEATING

- Domestic hot water (dhw)
- Space heating
- Process Heat

COOLING

- Chilled water
- Air conditioning



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Applications

Residential

Commercial/Services

District Heating (and Cooling)

Industrial Process Heat

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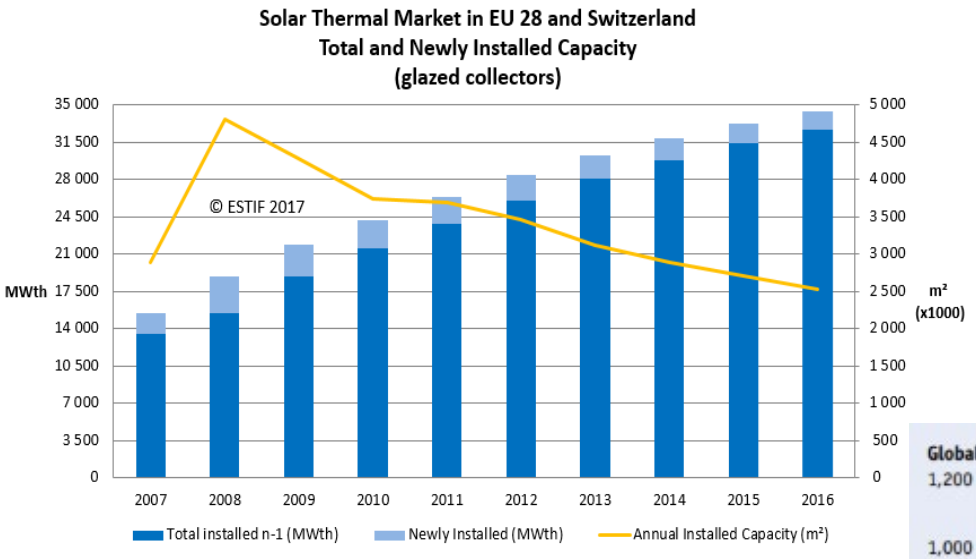
Solar Heating and Cooling Market

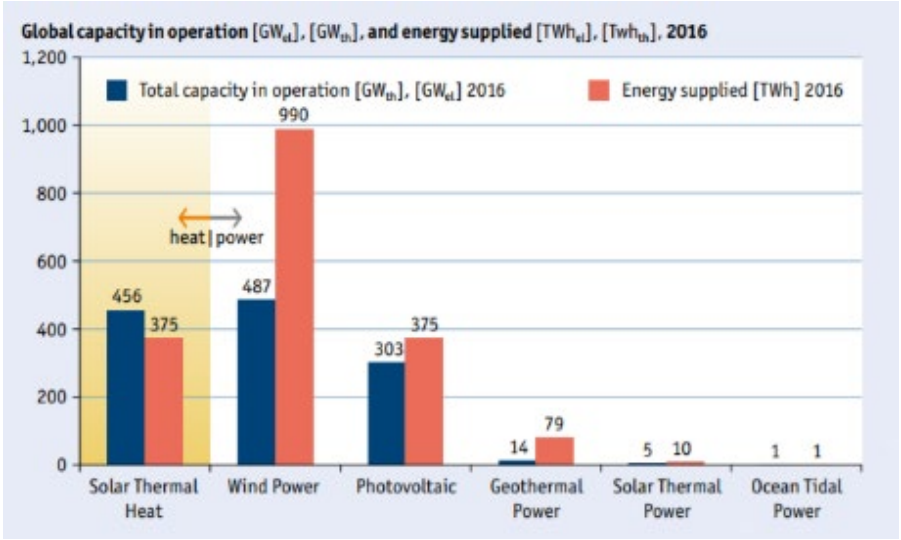


Installed capacity :

- World: 456 GW_{th}
- Europe: 34 GW_{th}

Energy produced :

- World: 375 TWh
- Europe: 24 TWh



Solar Heat Worldwide 2017
Source: IEA-SHC

RHC – ETIP platform

An introduction

Facts and figures

- Solar thermal platform founded in 2005
- 2008 enlarged to RHC-platform
- Officially endorsed by European Commission
- More than 800 members from almost all European countries, some from abroad:
  ca. 40% industry
  ca. 35% research & academia
  ca. 5% government, public agencies
  ca. 20% NGO, others
- Became an ETIP in January 2016

Structure of the RHC-ETIP

The scope and operational structure of the RHC-ETIP are such as to ensure a balanced and active participation of the major stakeholders at the appropriate levels, including all concerned industries, scientific research organisations, public authorities, users and civil society.

Secretariat
Head of the secretariat: Paola Mazzucchelli
EUREC, ESTIF, AEBIOM, EGEC, EHPA

RHC-ETIP Board
President: Gerhard Stryi-Hipp
(President and 18 Members, including Vice-Presidents)

Stakeholders Group
All members
Annual meeting

Technology Panels

Solar Thermal Technology Panel	Biomass Technology Panel	Geothermal Technology Panel	Heat Pumps Technology Panel
Chair & President RHC-ETIP: Bernd Hafner, Viessmann Werke	**Chair & Vice-President RHC-ETIP:** Rainer Janssen, WIP Renewable Energies	**Chair & Vice-President RHC-ETIP:** Javier Urchueguía, GEOPLAT	**Chair & Vice-President RHC-ETIP:** Dave Pearson, Star Refrigeration

Cross-Cutting Technology Panel
Chair & Vice-President RHC-ETIP: Wolfram Sparber, EURAC research

Horizontal Working Groups

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Vision, Strategy and Roadmaps

Common Vision
2020 - 2050

Strategic Research Priorities of Solar thermal, Biomass, Geothermal and Cross-cutting
➔ **Strategic Research & Innovation Agenda**

Technology Roadmaps of Solar thermal, Biomass, Geothermal and Cross-cutting
➔ **Common Implementation Roadmap**

2011 **2012** **2013** **2014**

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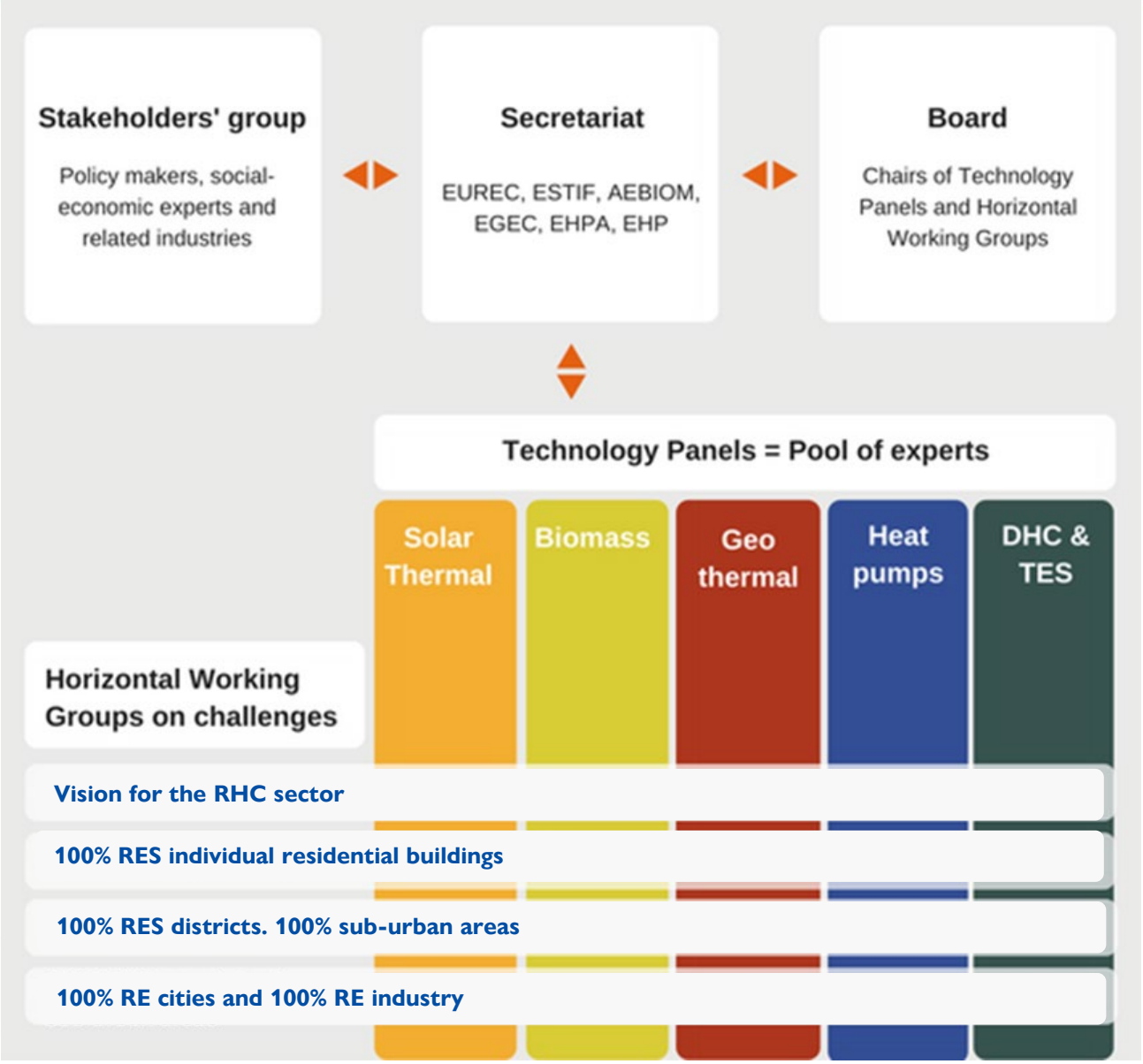
Updates on RHC-ETIP structure & activities



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ESTIF

Solar Heating and Cooling R&I challenges

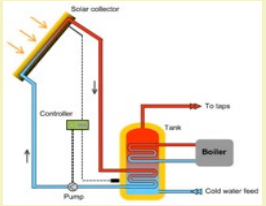
ST Challenges & Research Topics

CHALLENGES

- **Cost reduction**
- **Simplification and compactness**
- **High solar fraction per building**
- **Solutions for industrial processes**

Roadmap: MAIN RESEARCH TOPICS

SCOHYS: Solar Compact Hybrid Systems



SAH: Solar-Active-Houses

Solar fraction above 50%
Nearly zero-energy building

SHIP: Solar Heat for Industrial Processes

Low temperature < 100° C
Mid temperature < 250° C

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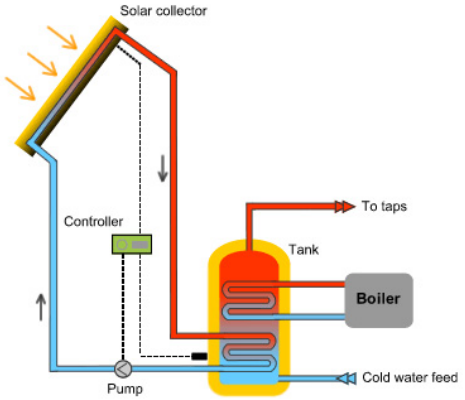
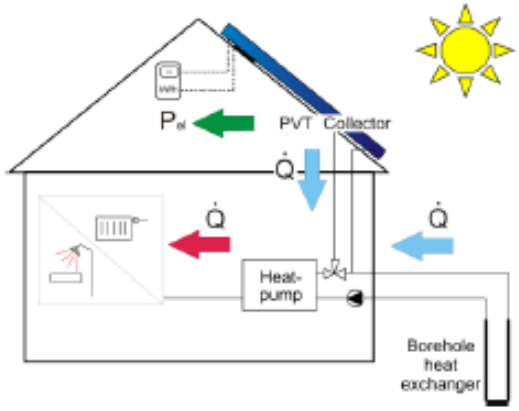
Solar Compact Hybrid Systems - SCOHYS

for the existing building stock and new „standard“ buildings





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Solar Compact Hybrid Systems - SCOHYS

Objectives

- **reduction of the solar heat costs** by 50%,
- **increased compactness**
  with reduced space requirements and installation time
- **improved reliability and performance**

Three main R&I actions

- SCOHYS for single family homes (DHW and combi systems)
- SCOHYS for DHW in multifamily homes
- SCOHYS for DHW & space heating (combisystems) for multifamily homes

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Solar-Active-House - SAH

An attractive solution to achieve nearly zero-energy buildings, which are required by the European Union from 2021 onwards

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Solar-Active-House - SAH

Objectives

- **Reduction of solar heat cost of SAH**
- **Development of SAH as a standardised solution,** applicable by professional planners and construction companies
- **Solar heat to be provided at costs comparable combi system (**15-20€ct/kWh)

Three main R&I actions

- SAH60 as a standardized solution for new built SFH
- SAH60 for small MFH and refurbished building
- SAH60 cost competitive with other NZEB

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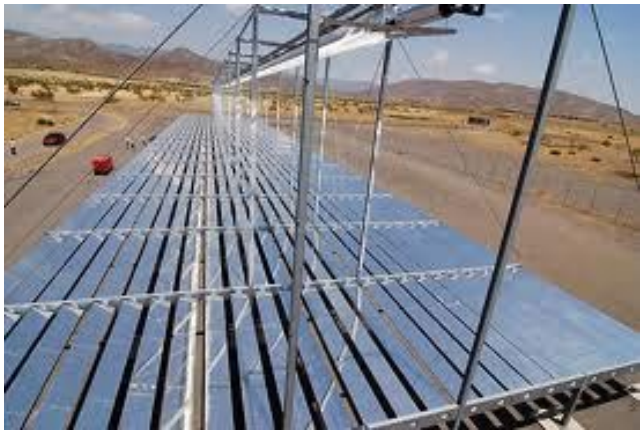
Solar Heat for Industrial Processes

Reducing fossil fuel demand of the industry
Process temperatures up to 250° C, means both low and medium temperature applications



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Solar Heat for Industrial Processes

Objectives

- **Reduction of SHIP solar heat costs** to 3-6 €cent/kWh for low temperature applications (<100°C) and 4-7 €cent/kWh for medium temperature applications (<250°C)
- **Enabling the construction of 700 SHIP systems**, with 875 MWth installed capacity (1,250,000 m2 collector area)

Main R&I actions

- Systems to be scaled up to 0.75-10 MWth with a solar fraction increased to 40-50% for heat demand
- Start-ups on the model of ESCO so as to develop SHIP projects.

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Solar Heating and Cooling R&I Projects

Solar Thermal Projects: SDH, SHIP

Solar District Heating:

- SUNSTORE4
- SDH ‘series’

Solar Heat for Industrial Process:

- FRESH NRG
- ENTHALPY

Pictures form projects „SunStore4“ & „Fresh-Ngr“

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Solar Thermal Projects: SAH

Solar Active House:

- Arkol (DE)
- HP-LP-SOLAR-FAÇADE

Pictures form project „HeizSolar“ & Arkol

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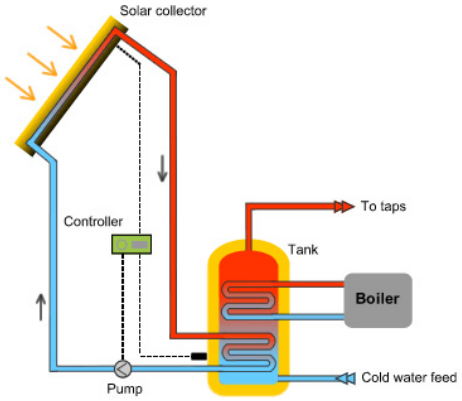
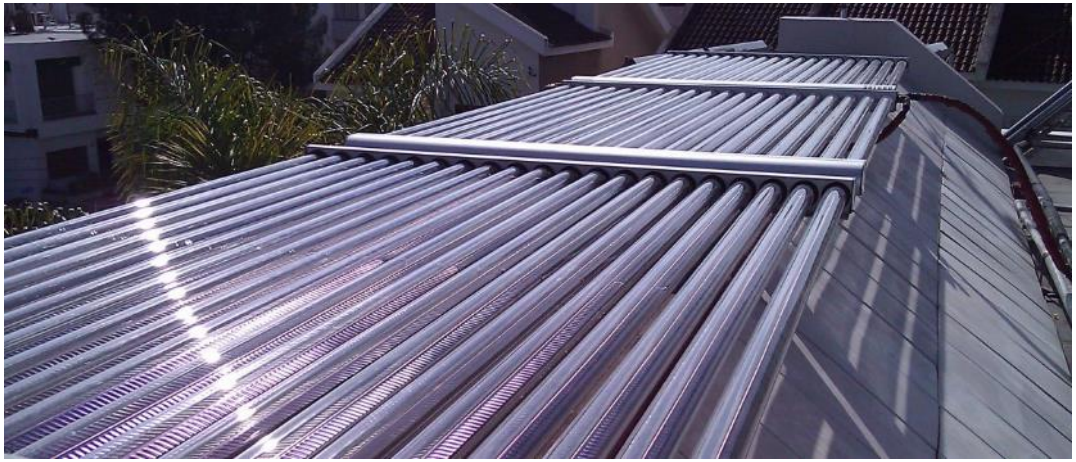
Solar Thermal Projects: SCOHYS

Solar Compact Hybrid Systems:

- SYSTHEFF
- MacSHEEP
- Zeosol





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Ongoing challenges for SHC R&I

International and national R&D projects focus on:

- Development of **hybrid Heating & Cooling** solutions
- Development of **hybrid PVT collectors** (PV & ST)
- **Thermal storage,** seasonal and diurnal, small and large scale
- The **decentralisation of feed-in of solar heat** into DH networks
- **ST in combination with CHP** in DH networks
- **Land availability** (large systems)**, policy and market support**
- **And … several more**

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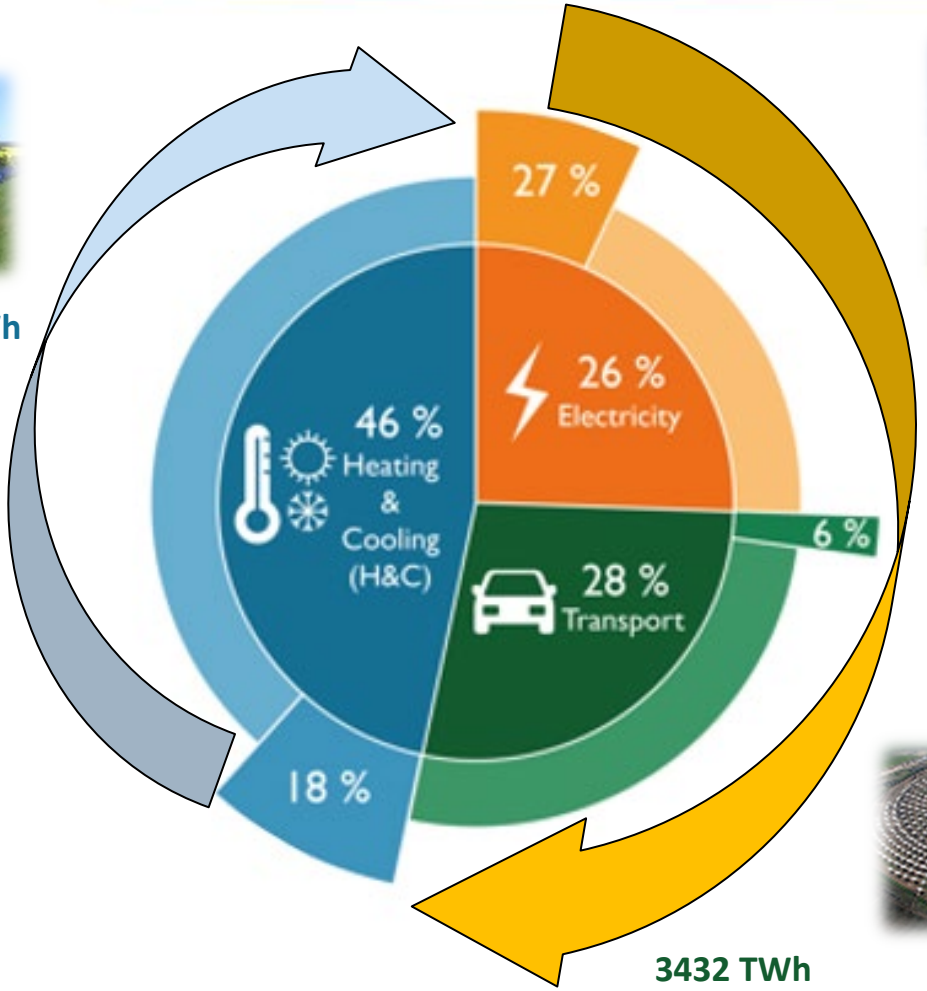
A solar heat perspective

RES-H&C contribution to decarbonisation

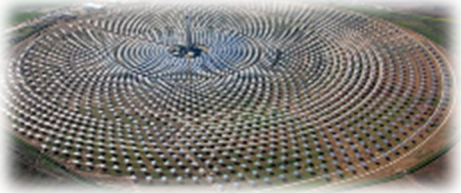
5738 TWh

Figure: Buzzle

Figure: Wonderlist

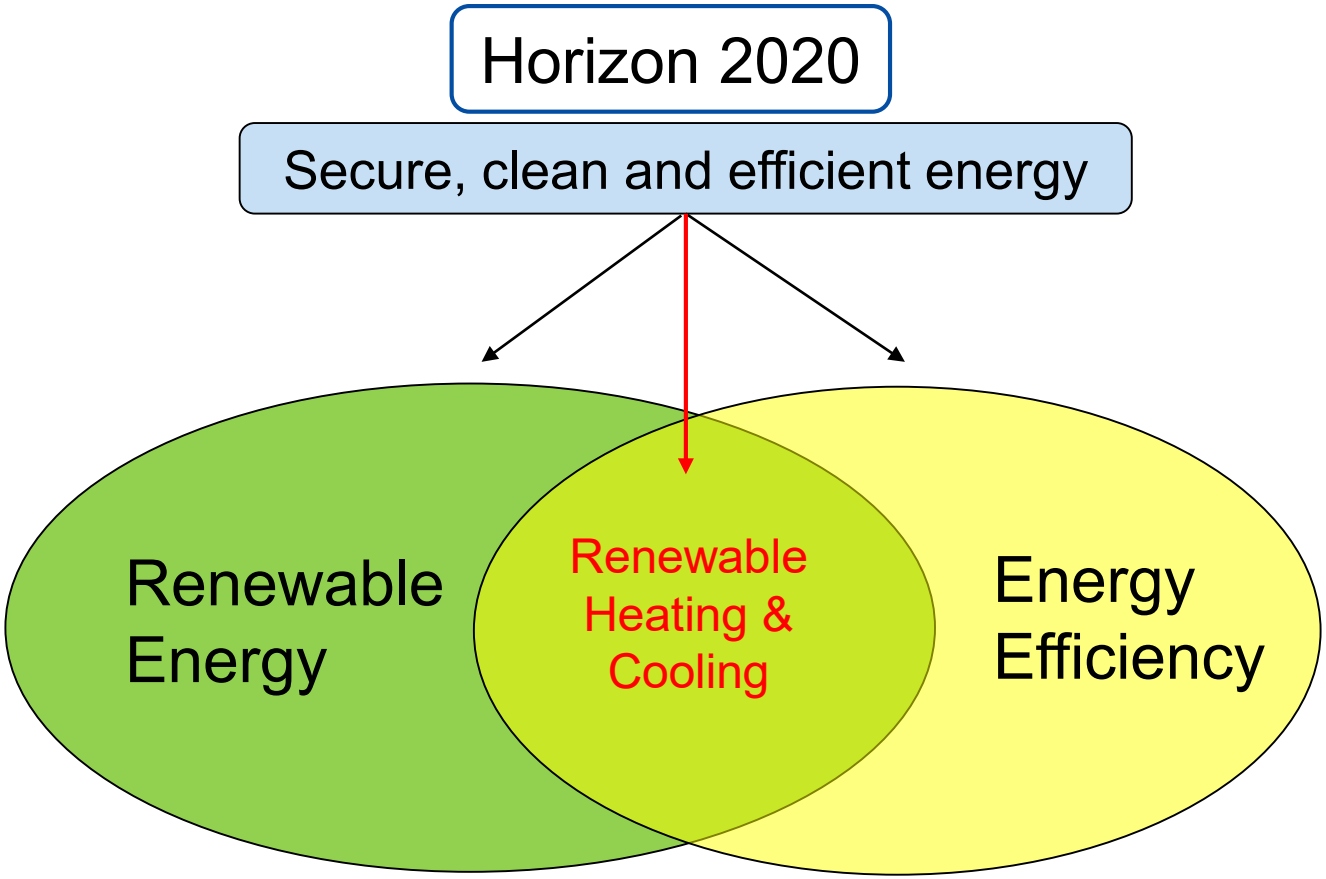


3175 TWh



3432 TWh

RES Heating & Cooling in H2020



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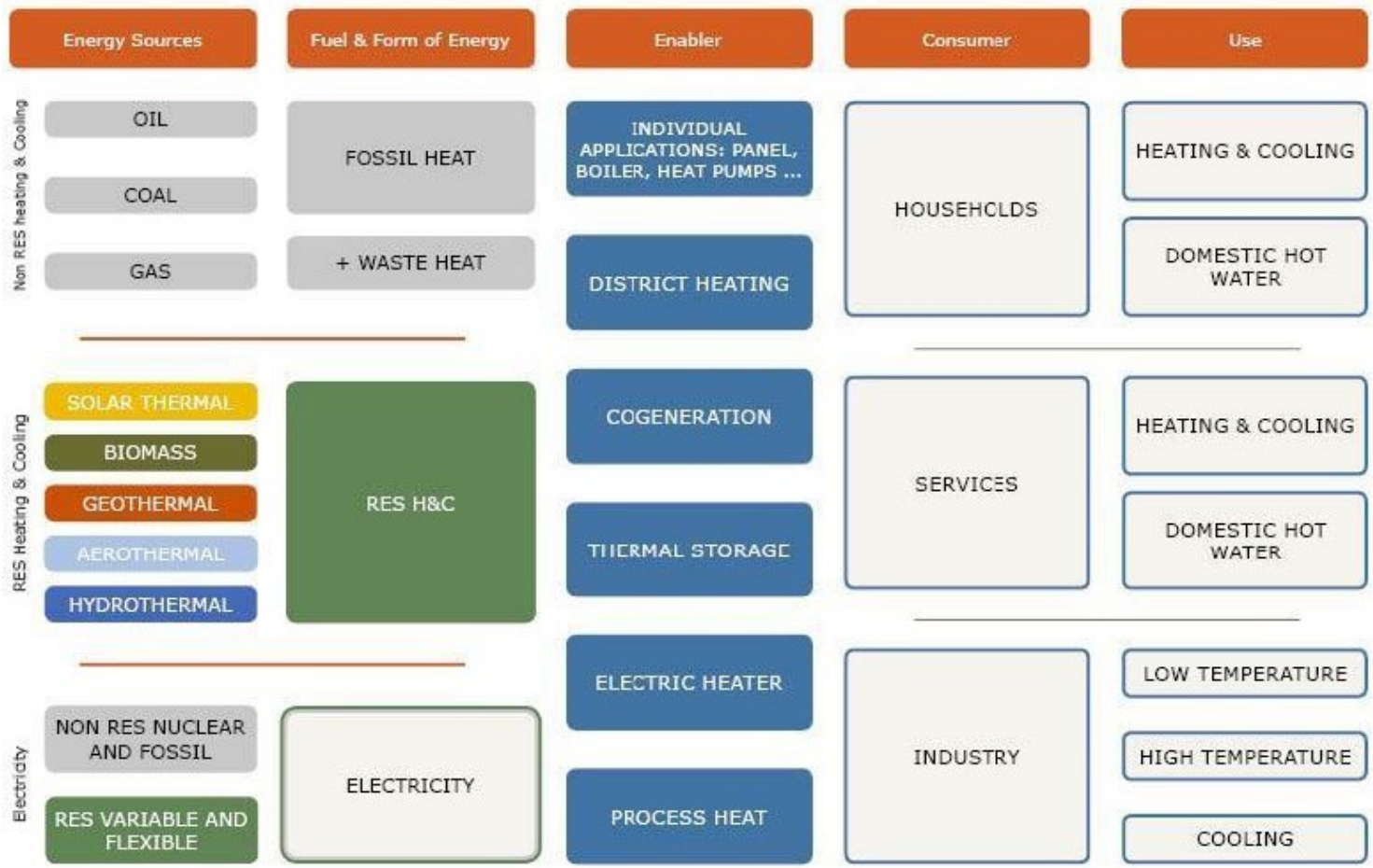
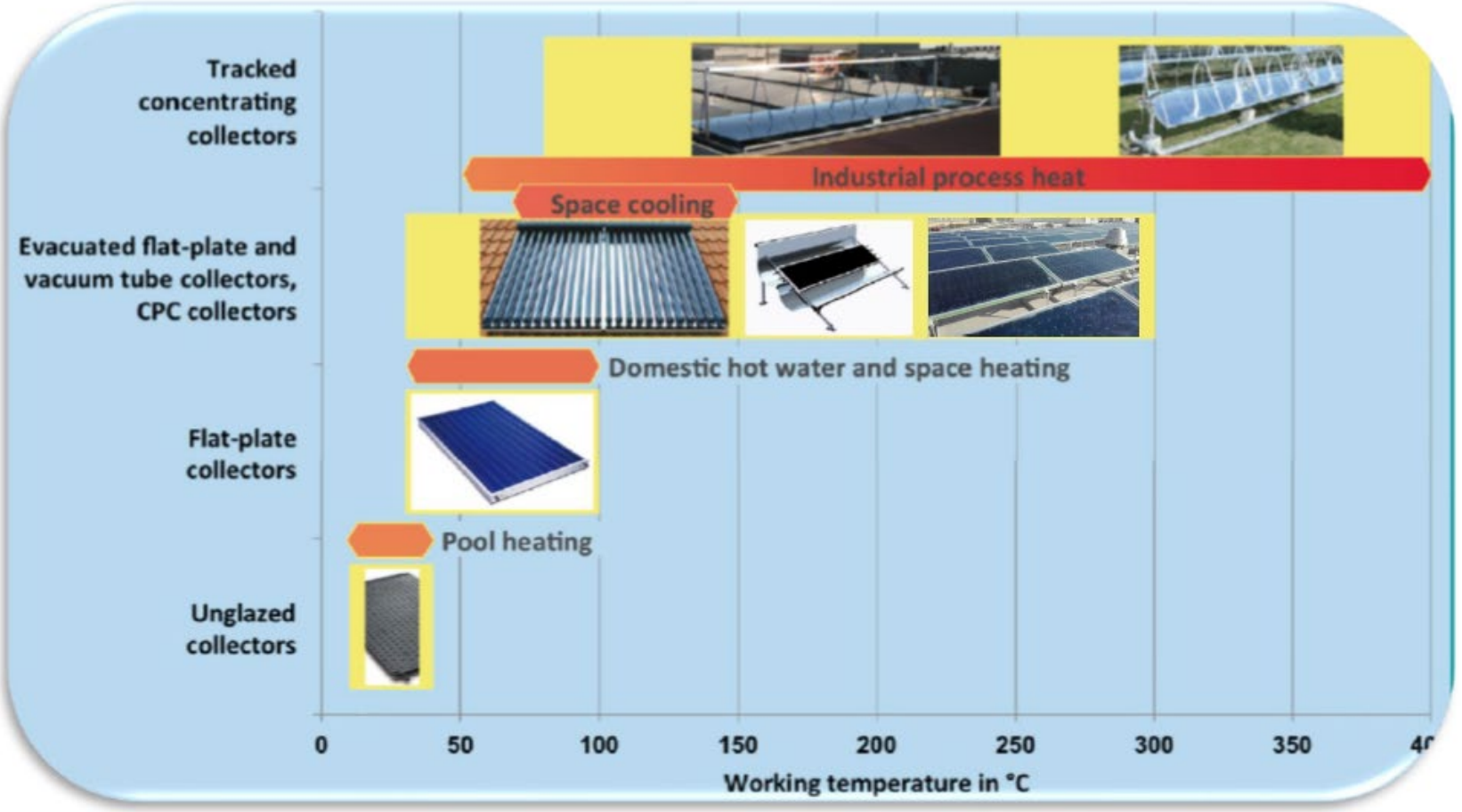
Complexitity of Heating & Cooling



Specificities of Solar Heating and Cooling



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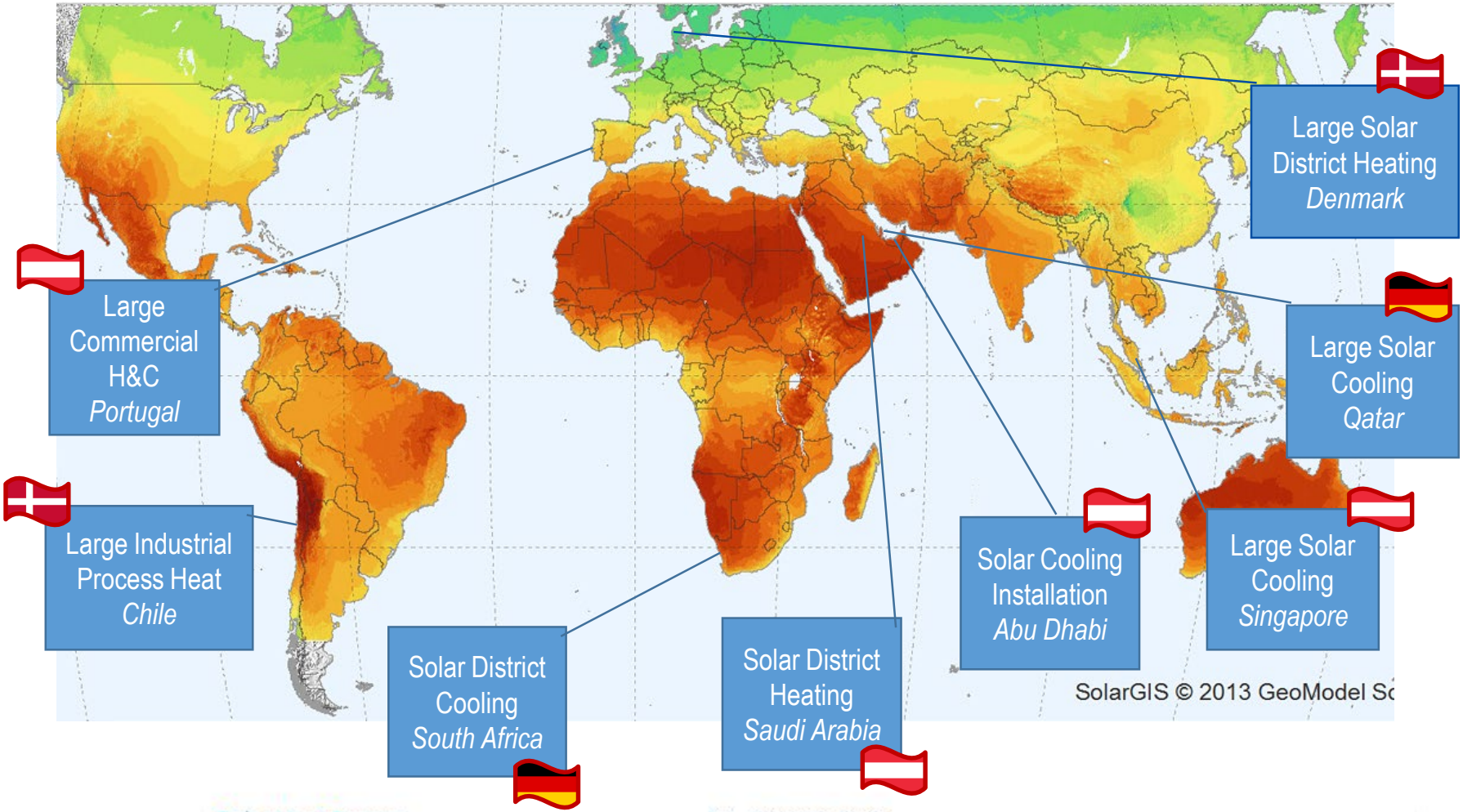
Know-how vs. Global Market



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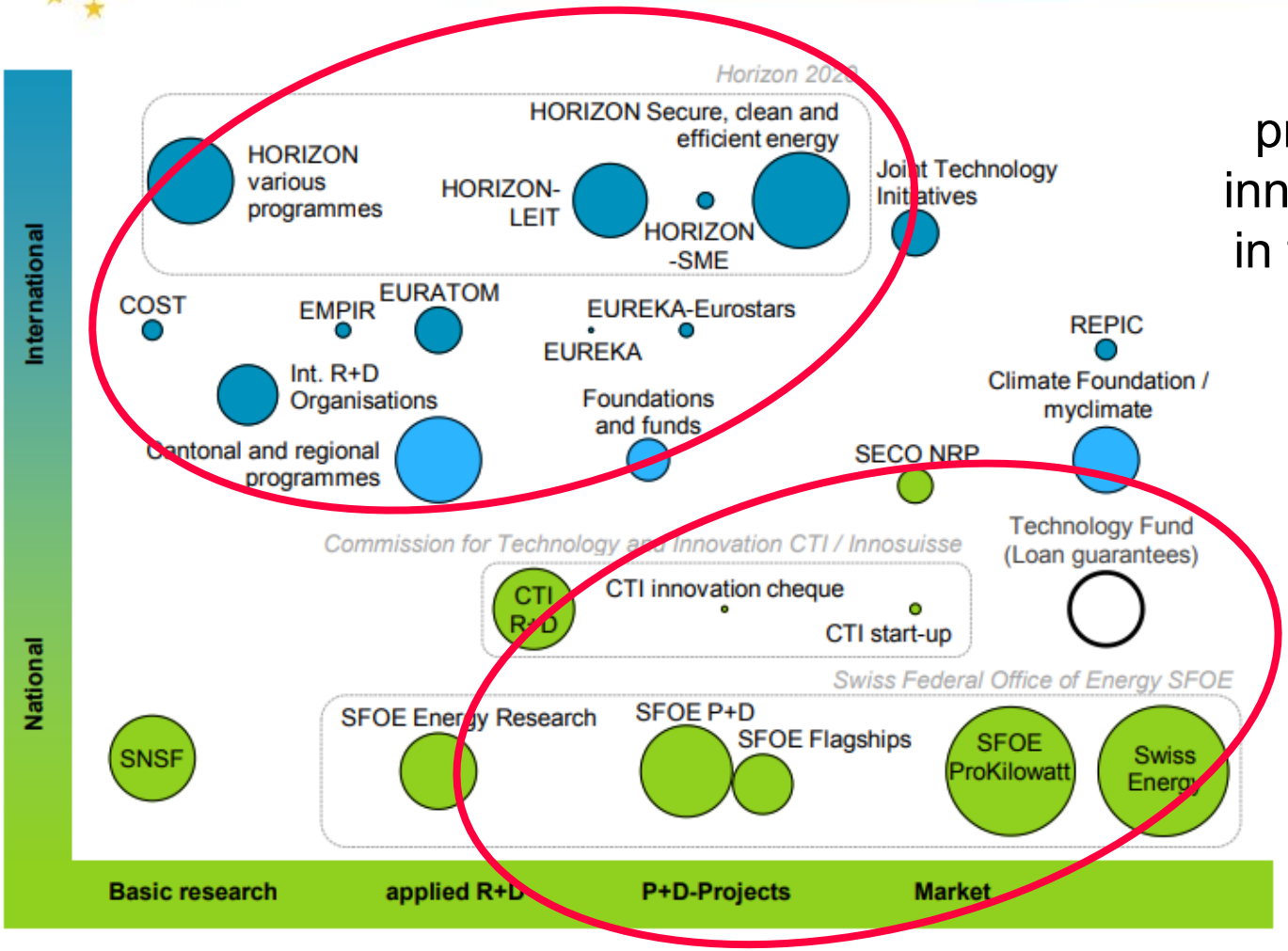
R&I at national & EU level



Support programmes for innovative projects in the energy field

Source: Opportunities for Innovation Support in the Energy Field, www.bfe.admin.ch, SFOE, 2017

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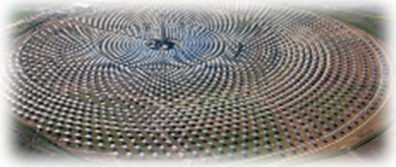
System Approach & Technology integration



Industrial engagement

SMEs

- Close customer relations
- Management overload
- Limited access to capital
- Highly adaptative
- Capacity to innovate

Large companies

- Economies of scale
- Bureaucracy & staff costs
- Complex financing options
- Resilient to failure
- Capacity to integrate

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Summary

- **The Heating & Cooling sector is broad and complex, requiring specific R&I answers**
  - Identify needs of R&I considering different energy sources, energy forms, enabling technolgoies, type of consumers and different uses.
- **SHC covers a broad range of temperatures and applications (2kW DHW to 200 MW DH)**
  - Very diverse areas for R&I. All with potential, all needing more R&I at different TRL levels.
- **Know-how is in Europe, market may be elsewhere**
  - Create the right conditions for international cooperation and for investment projects with EU technology applied in other regions.
- **Need to adequate national and European R&I support - Overall and per sector**
  - SHC (and RHC) need low and high TRLs, both at national and EU level.
- **Solutions needed at city or residential scale, integrating technologies and energy forms**
  - Thermal storage is a critical enabler being overlooked.
- **SMEs are the heart of Europe and at the heart of the RHC sector**
  - They need to be at the heart of R&I programmes.

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THANK YOU FOR YOUR ATTENTION !

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