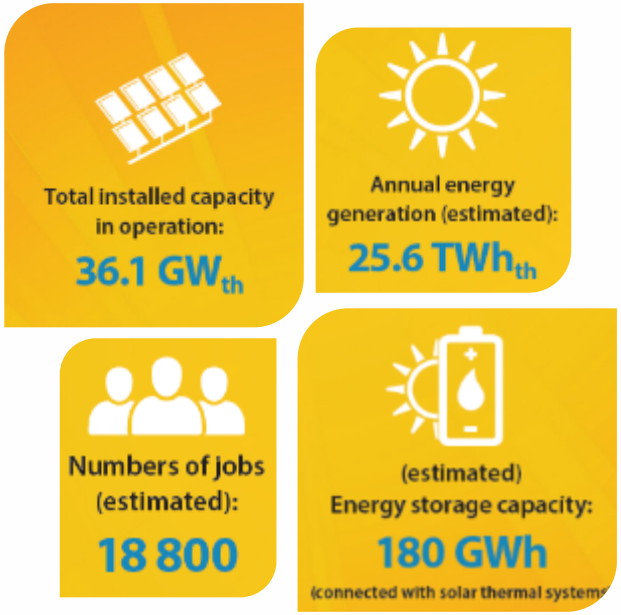
R&I Solar Heating and Cooling Policy Insights

Pedro Dias

Solar Heat Europe/ESTIF Secretary General

SunHorizon Solar Stakeholders Workshop
September 10th 2020

Solar Thermal Heating and Cooling in Europe

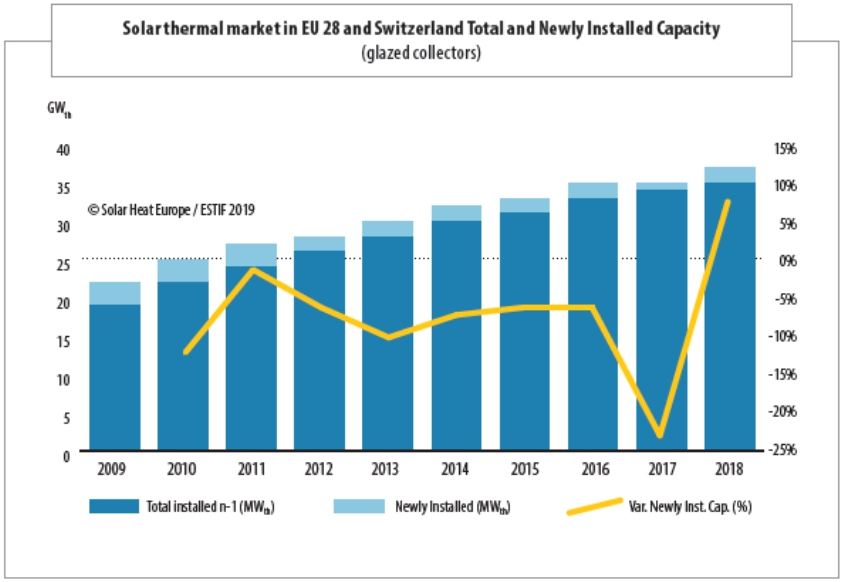


HIGHLIGHTS

Increase in total installed capacity 2019: 1,5 GW$_{th}$ (+ 2,4%)

MEMBERS

Solar Thermal Heating & Cooling Market



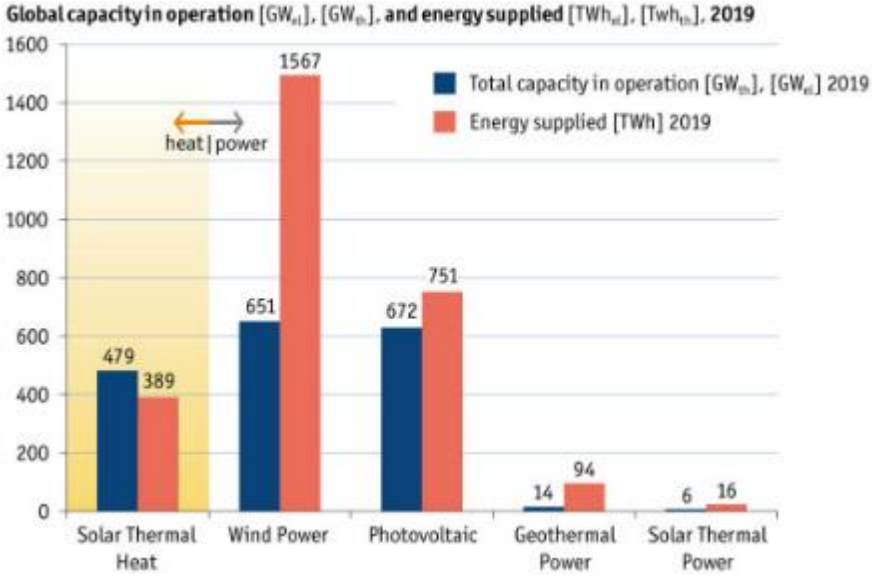
Installed capacity :

- **World: 479 GW_{th}**
- **Europe: 36 GW_{th}**

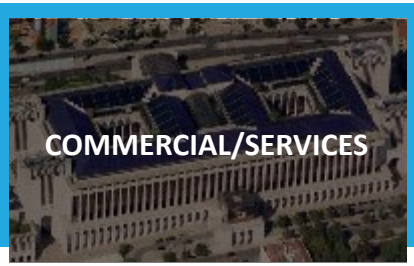
Energy produced :

- **World: 389 TWh**
- **Europe: 26 TWh**

Solar Heat Worldwide 2020
Source: IEA-SHC



Solar Heating & Cooling Applications



The largest solar thermal heating plants in Europe (per sector)

Solar Heat for Industrial Processes: Issoudun, France 2020

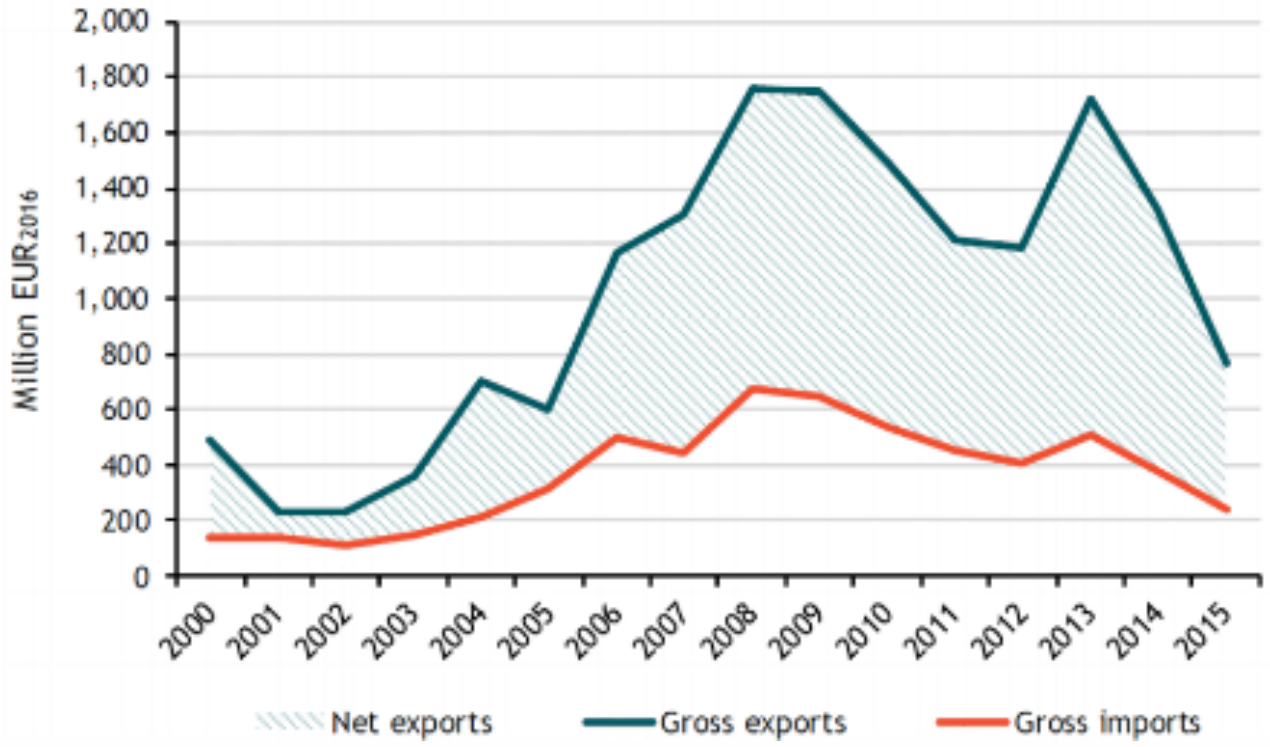
12 MW_{th} of European made flat plate collectors supplying 8 GWh of heat for malting process

Solar District Heating: Silkeborg, Denmark 2017

110 MW_{th} of European made flat plate collectors supplying 80 GWh/a of heat to district heating network

Solar Heating & Cooling Export

Figure 5.11 Trade balance for solar heating and cooling



Source Trinomics (2019)

Study on impacts of EU actions supporting the development of renewable energy technologiesù

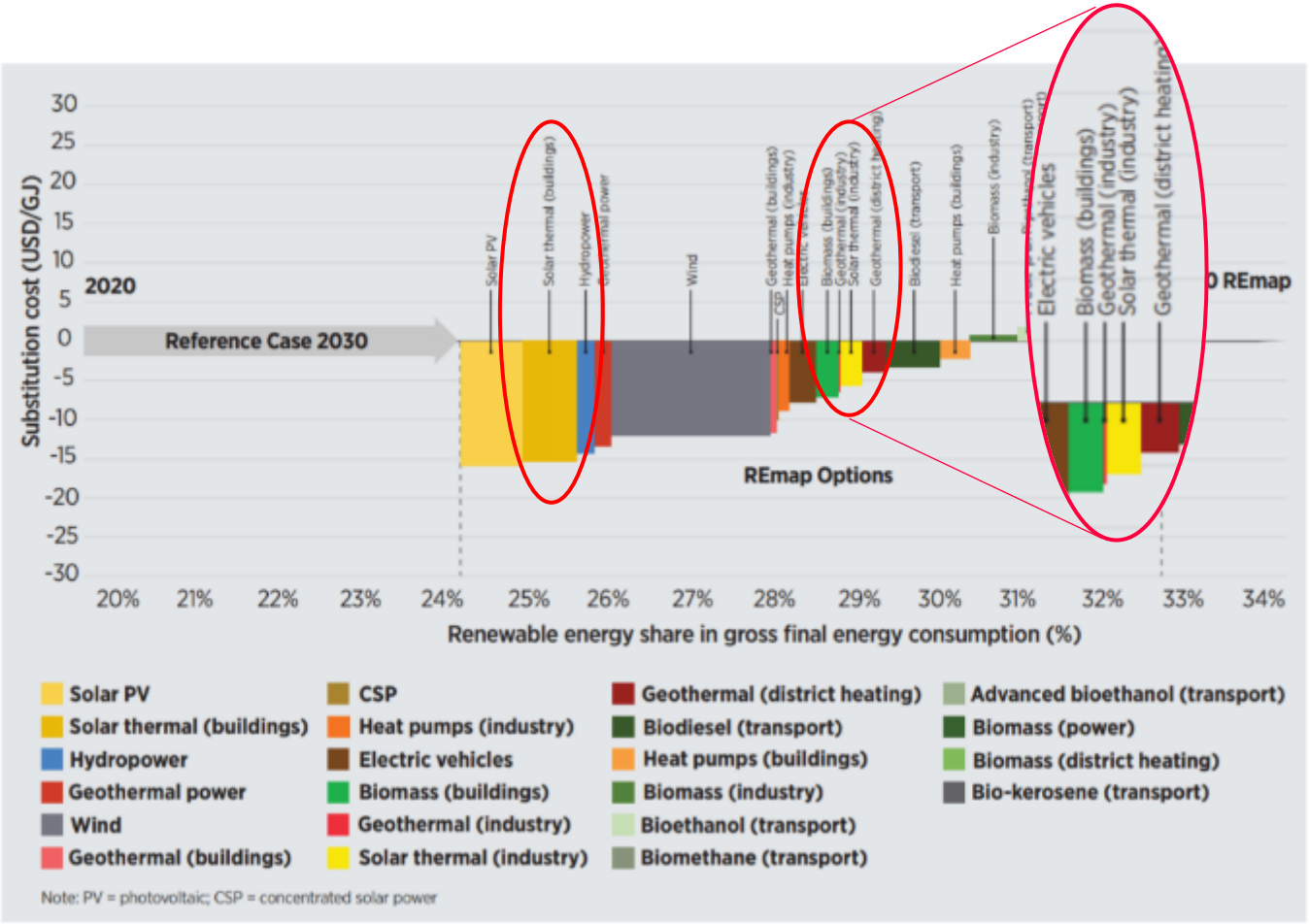
Based on Comext (2018), Lako, P (2008), Eurostat (2018), Wind, I (2009), and Jha, V (2009). Note: Data for 1999 and 2016 was 0 for all countries so it was excluded. For an explanation of the methodology used, see Annex C

Renewable in the energy transition

Cost-supply curve of renewable energy options to go beyond the 27% target for 2030

Substitution costs compared to reference technology & potential increase in RES share

Renewable Energy Prospects for the European Union, EC, IRENA, 2018



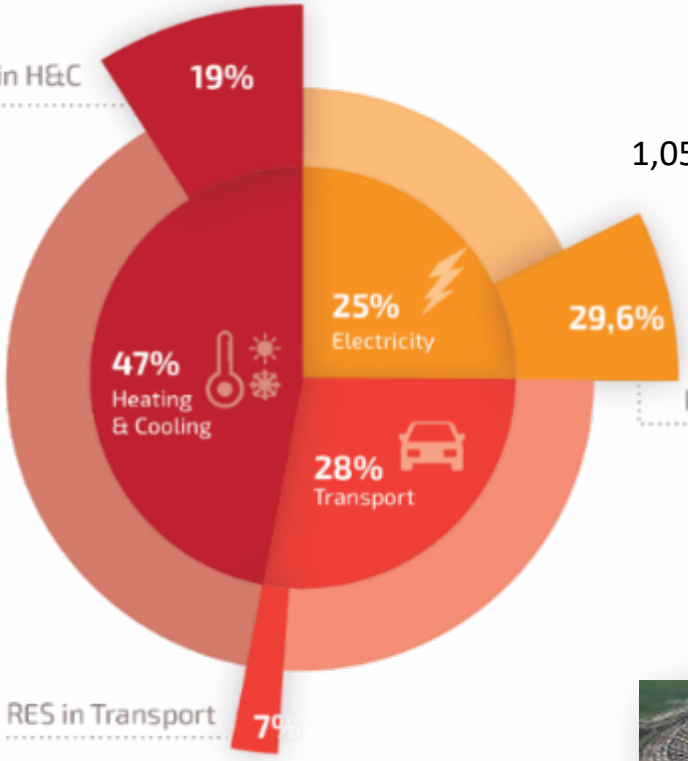
Energy Demand in Europe

EU Final Energy Demand

1,197Twh

1,050Twh

Figure: Buzzle

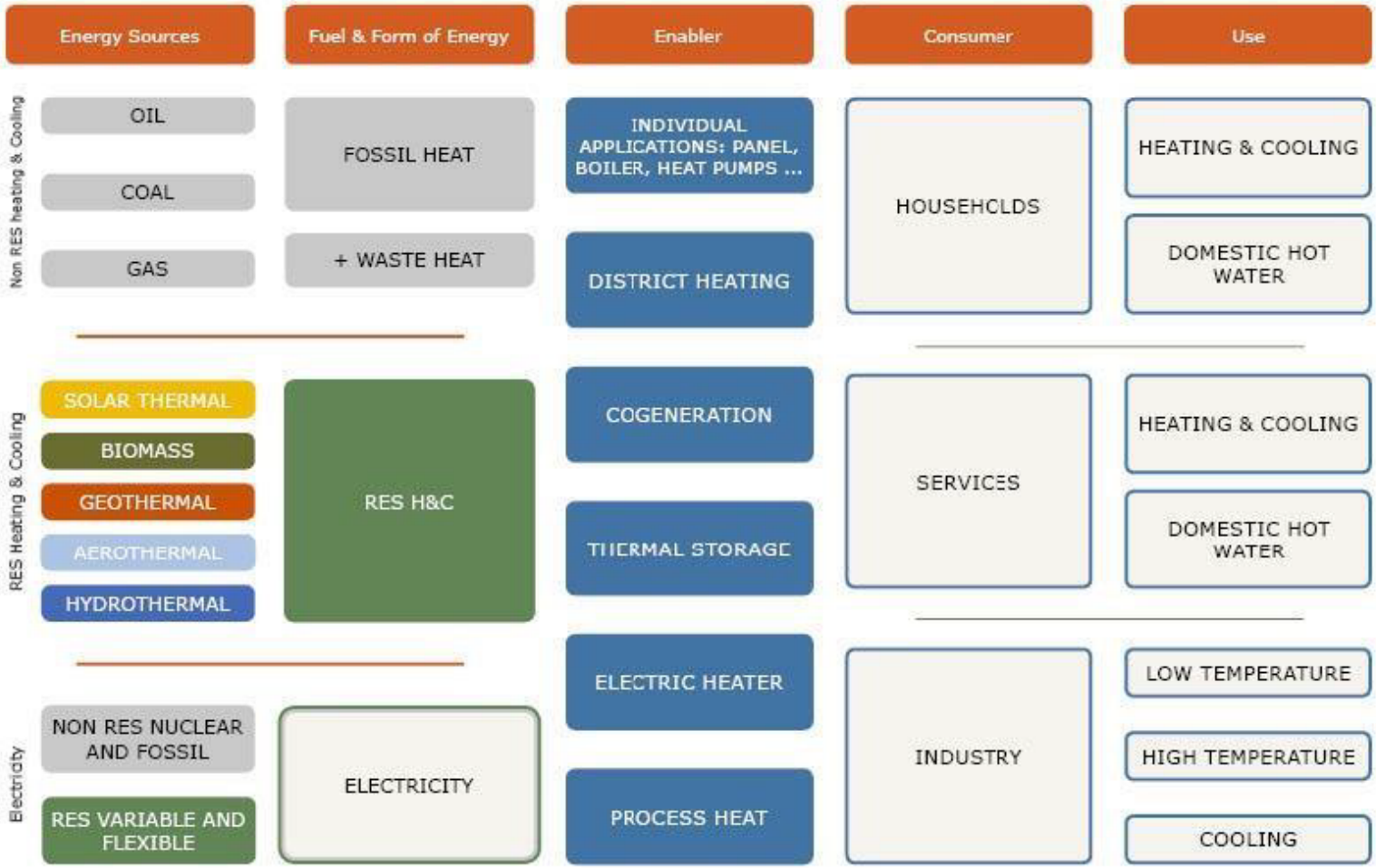


© RHC-ETIP

Figure: Wonderlist

292Twh

Map of the Heating & Cooling Sector

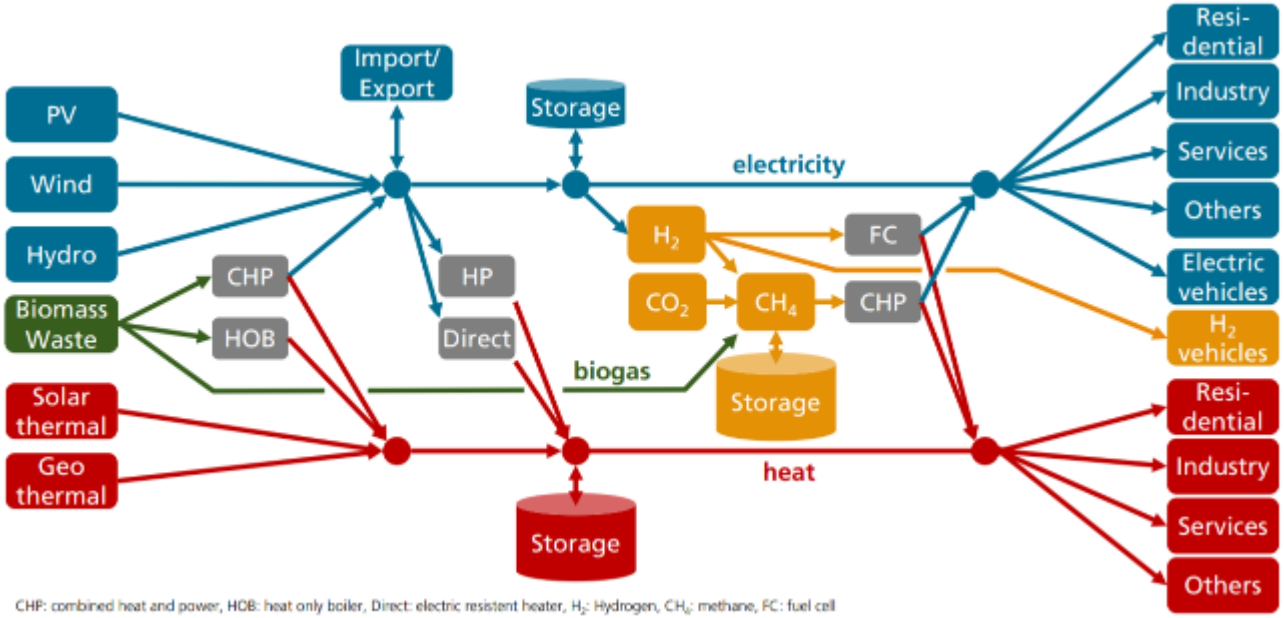


Author: EGEC

Integration of RES-H&C in energy systems & networks

Digitalisation
- Smart Appliances
- Smart Buildings
- Smart Networks

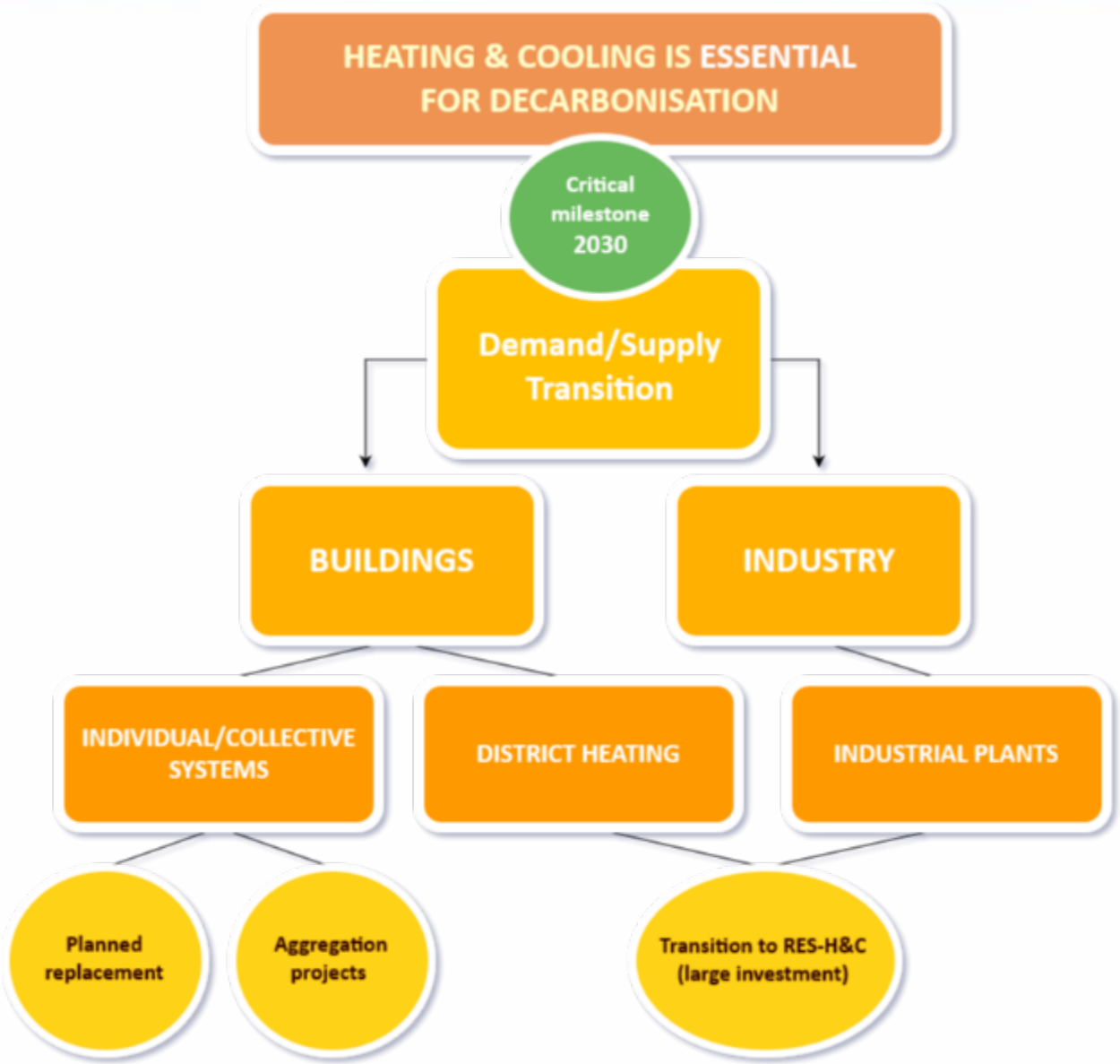
Both thermal and power driven.



CHP: combined heat and power, HOB: heat only boiler, Direct: electric resistent heater, H_2: Hydrogen, CH_4: methane, FC: fuel cell

Source: Fraunhofer-ISE

Heating & Cooling in Energy Decarbonisation



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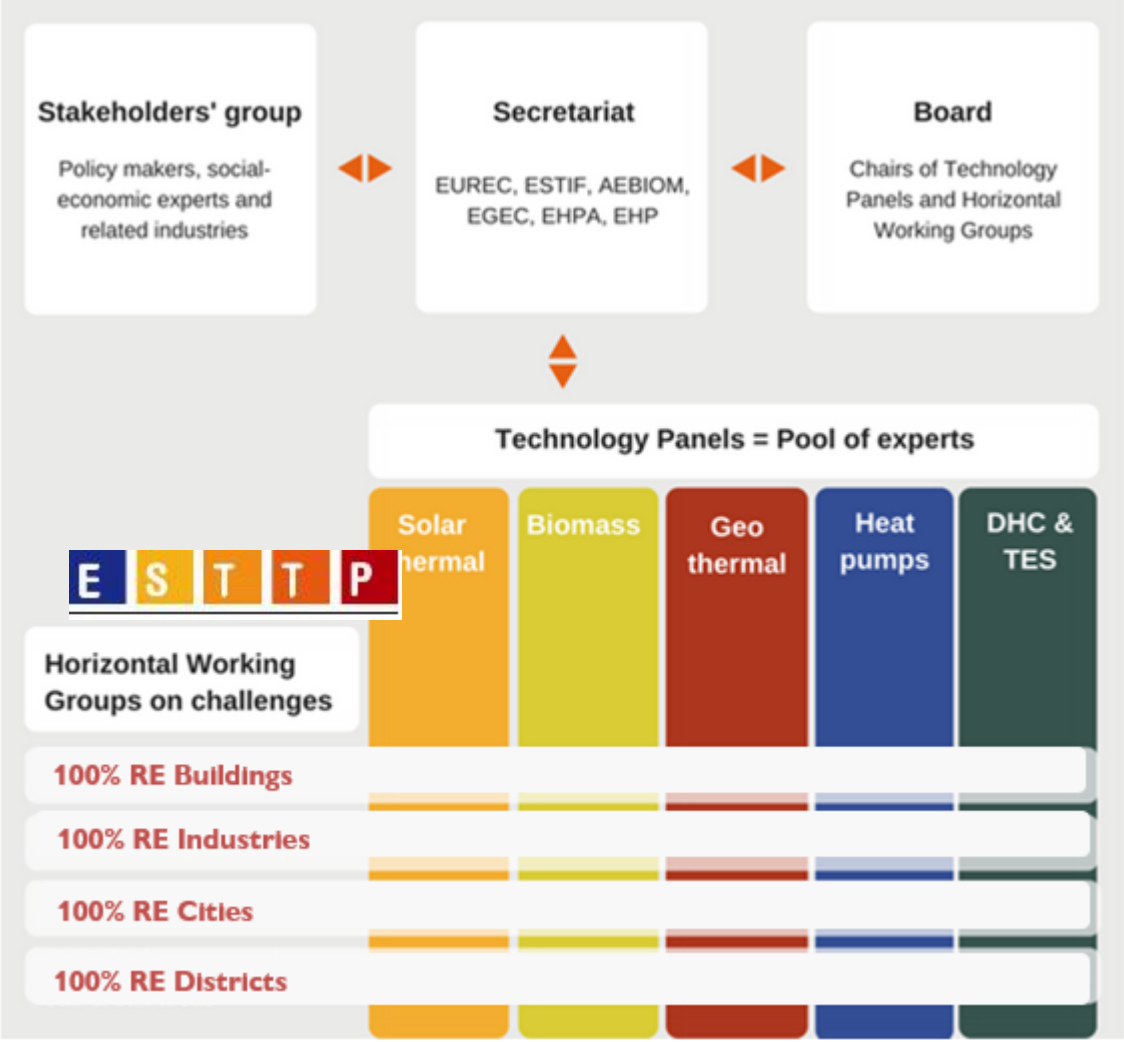

The Secretariat of the European Technology and Innovation Platform on Renewable Heating and Cooling is a project that has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement no. [illegible]

RHC-ETIP Strategic Research and Innovation Agenda

Webinar 15/09 10h00

The Secretariat of the European Technology and Innovation Platform on Renewable Heating and Cooling is a project that has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement N°825998.

RHC-ETIP Annual Conference

100% RHC Event

100% RENEWABLE HEATING AND COOLING FOR A SUSTAINABLE FUTURE

Online edition

15 Oct **2 pm**

2.00 WELCOME & INTRO

MASTER OF CEREMONY
Marisol Oropeza, Business & Mktg. Strategist, matters.mx

KEYNOTE SPEECH
Javier Urchueguía, Chairman, RHC ETIP

RHC ETIP PROJECTS DATABASE
Dan Stefanica, Project Manager, EHPA

2.10 CLEAN ENERGY TRANSITION PARTNERSHIP
Strategic Research & Innovation Agenda · SRIA

PRESENTATION
Michael Hübner, Austrian Ministry of Climate Action
Gerdi Breembroek, NL Enterprise Agency, Adviser

2.20 RHC ETIP & CLEAN ENERGY TRANSITION SRIAS

INTERVIEW
Moderator · Marta San Roman, Int. Sales Dir. Heating, ORKLI
Michael Hübner, Austrian Ministry of Climate Action
Javier Urchueguía, Chairman, RHC ETIP

2.35 QUESTIONS & ANSWERS

2.40 INNOVATIVE TECHNOLOGY DEVELOPMENTS
for a 100% RHC sector

PANEL DISCUSSION
Moderator · Reghina Dimitrisina, Policy Officer, EGEC
Øyvind Skreiberg, Chief Scientist STNRY Bioenergy, SINTEF
Christian Holter, CEO , Solid Solar Energy Systems GmbH
Russell McKenna, Professor, University of Aberdeen
Speaker 4

3.30 THE LITHUANIAN PERSPECTIVE

NATIONAL ROUNDTABLE
Moderator · Eglė Randytė, Managing Dir., VšĮ Atnaujinkime miestą
Indre Buteniene, Head of Strat. Planning, City of Klaipeda
Liudas Getautas, President , LT Heat Pump Assoc.
Valdas Lukoševičius, President , LT District Heating Assoc.
Darius Biekša, Director , LT Energy Agency

4.30 WRAP UP

MASTER OF CEREMONY
Marisol Oropeza, Business & Mktg. Strategist, matters.mx

KEYNOTE SPEECH
Javier Urchueguía, Chairman, RHC ETIP

4.45 END OF THE EVENT

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Solar Thermal Technology Roadmap

- Focused on results by 2020
  - Large Scale Solar Thermal
  - Solar Active House
  - Solar Compact Hybrid Systems

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“

Solar Thermal Projects: SAH

Solar Active House:

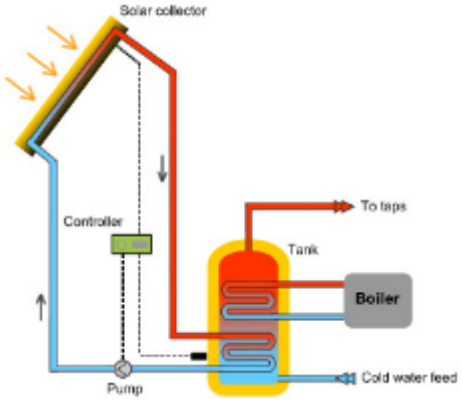
- Arkol (DE)
- HP-LP-SOLAR-FAÇADE

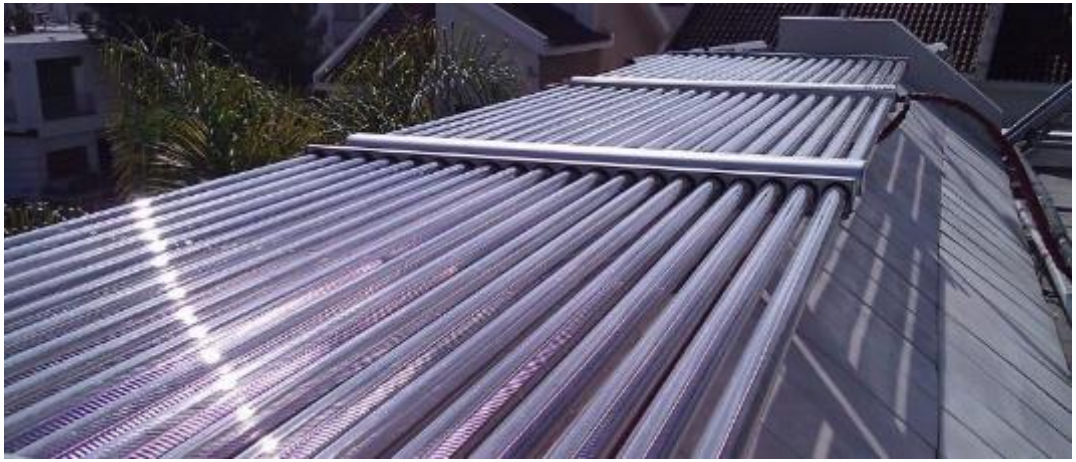
Pictures form project „HeizSolar“ & Arkol

Solar Thermal Projects: SCOHYS

Solar Compact Hybrid Systems:

- SYSTHEFF
- MacSHEEP
- Zeosol

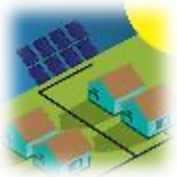




ESTTP R&I recommendations

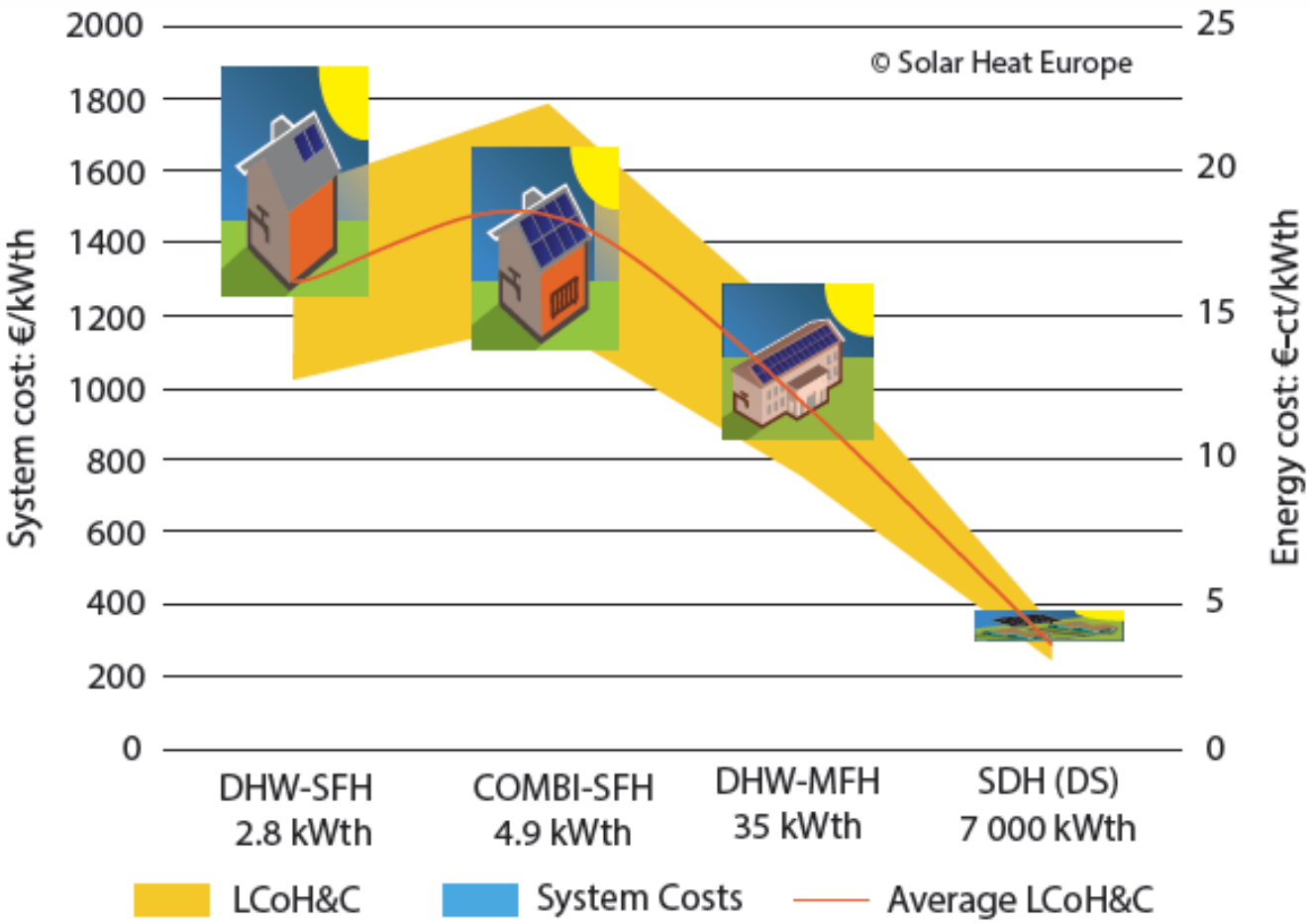
- R&I investments for RES-E & RES-H&C should be dealt separately in funding programs
  - Sector coupling actions can be include in either, though E & H should be separate
- Horizon Europe should cover more high TRL projects
  - More balanced approach between basic research and demonstration
  - Promote solutions integrating several RES-H&C technologies
- SHC requires large scale demonstration projects
  - Process heat, applying SHC to different sectors (different demand profiles)
- SHC required low to mid TRLs on:
  - Collectors (PVT, polymer, high vacuum)
  - Solar cooling
  - Materials
  - Storage materials

Industrial challenges



- Scalability
- Smartness
- Hybrid solutions
- Sector Coupling
- Thermal Energy Storage
- Building integration
- Competitiveness

Learning Curves



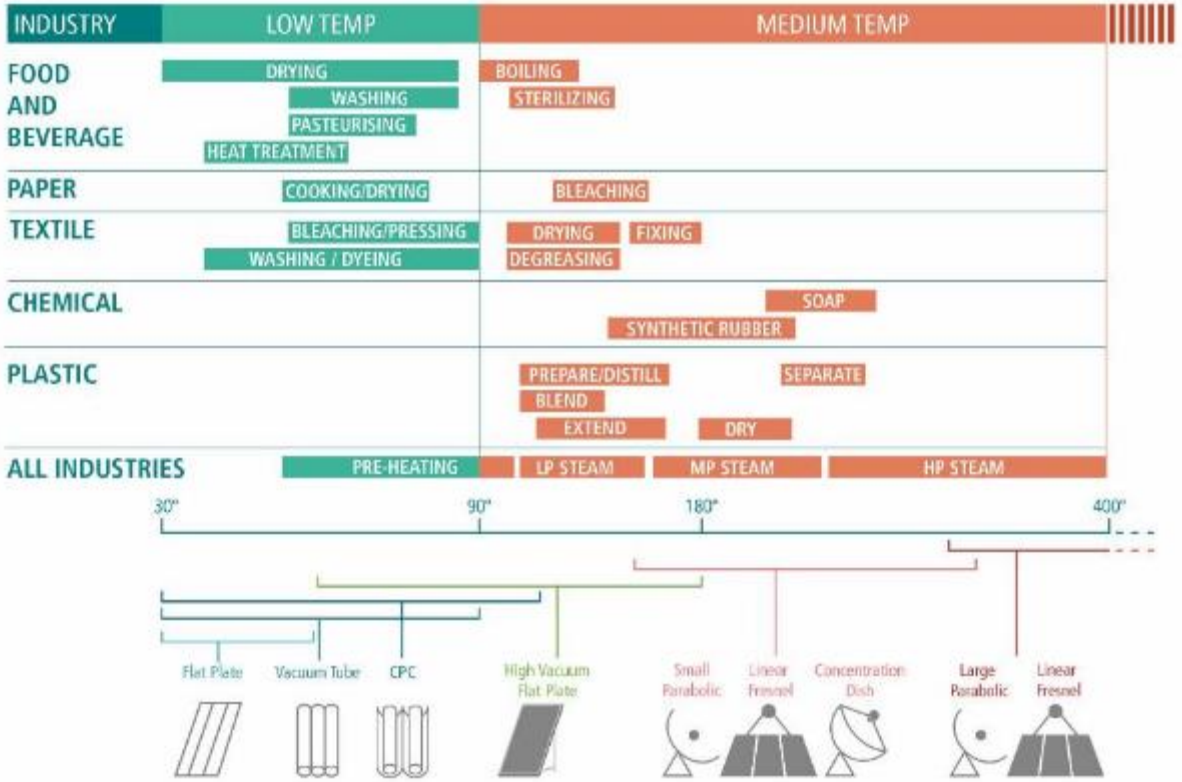
Scalability

- Scalability
  - Explore economies of scale
    - SDH: 20-35 EUR/MWh
  - Broaden the range of large applications
    - Solar Heat for Industrial Processes (SHIP)
      - More demonstration covering different industrial sectors and processes
    - Solar District Heating (SDH)
  - Increase reliability
    - Improve guarantees of performance

Photos from: S.O.L.I.D.

Scalability

Market Segments for Different Collectors
SHIP example



© TVP Solar

Smartness

- Smartness
  - Improvements in:
    - Heat metering
    - Function & yield control
    - Plug-and-Flow
    - Interconnectivity
    - Smart sector integration

Figure: Resol

Hybrid solutions

- Develop novel hybrid solutions
  - Combine technologies
    - Components: E.g. PVT
    - Systems: E.g. HP&ST
  - Combine sources
    - Several RES-H&C
    - Solar heat with RES-E
  - Promote & develop new solutions for the BIG Enabler
    - **Thermal Energy Storage**

Figure: Homestead

Figure: Sonnenkraft

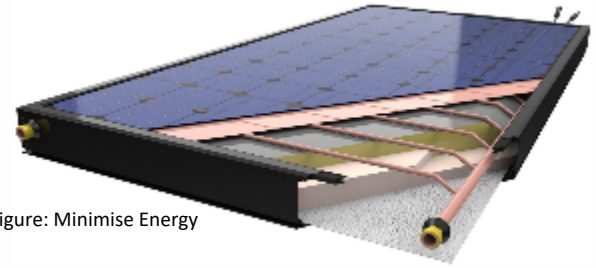
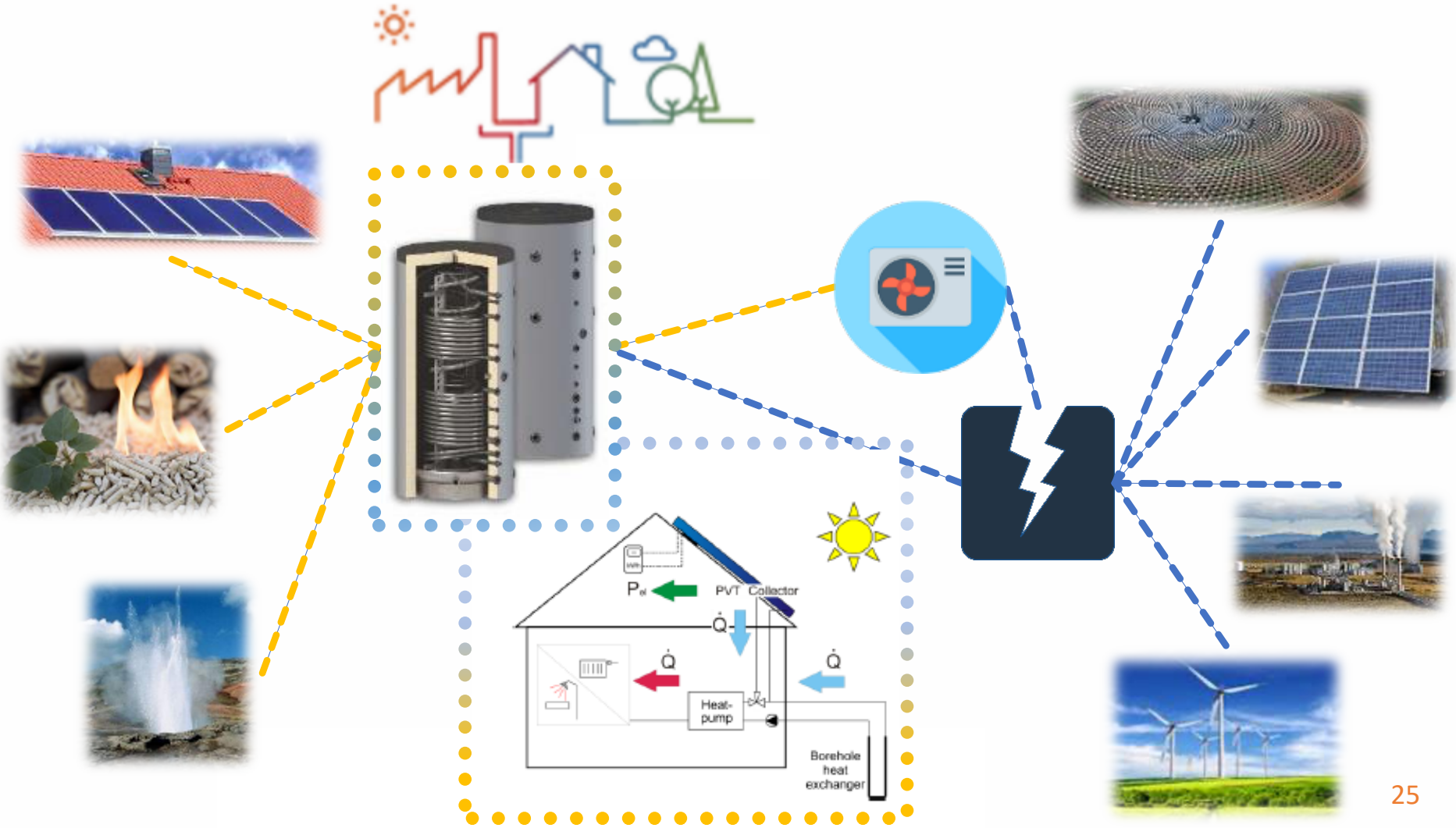
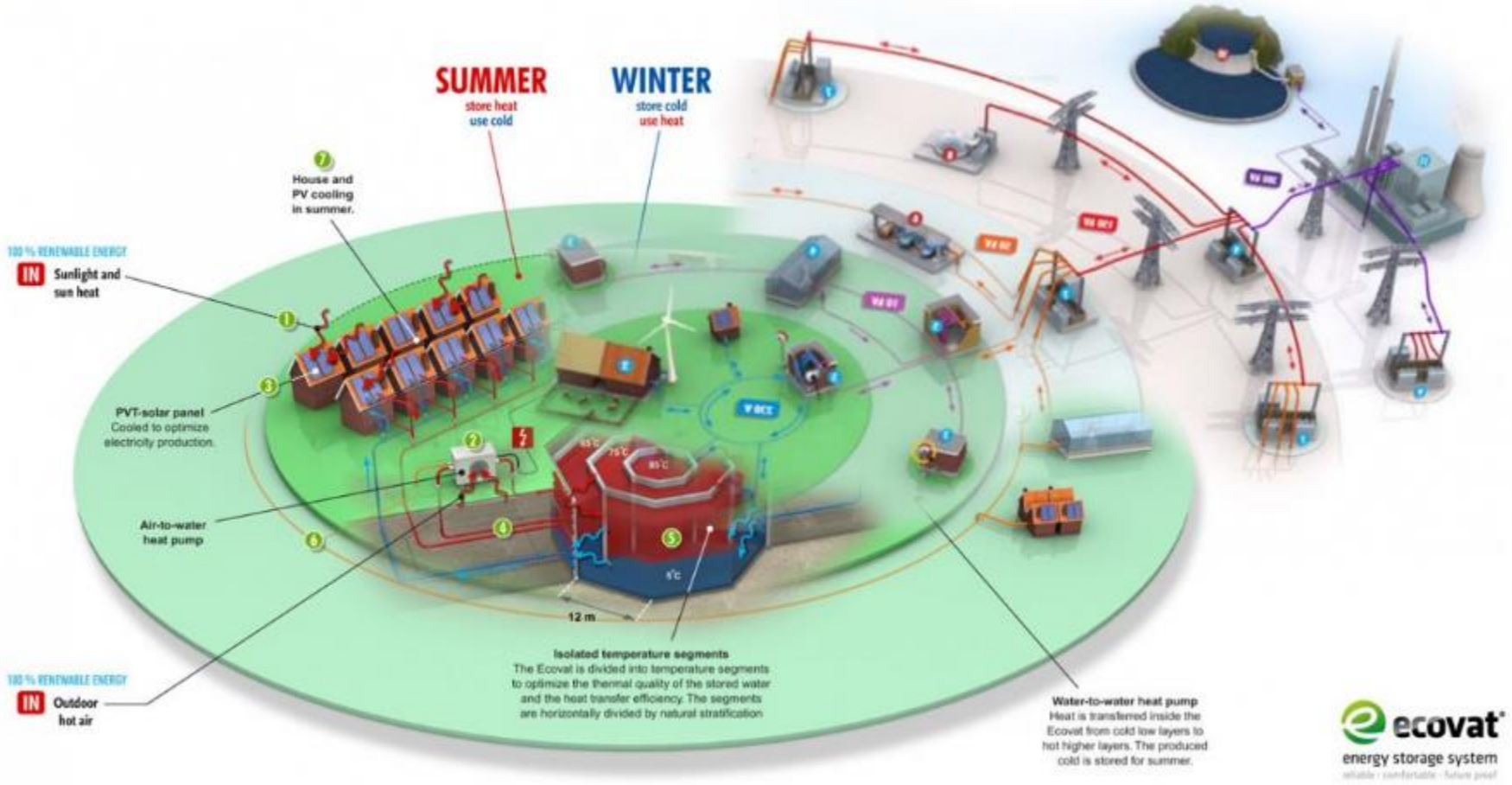


Figure: Minimise Energy

Sector coupling

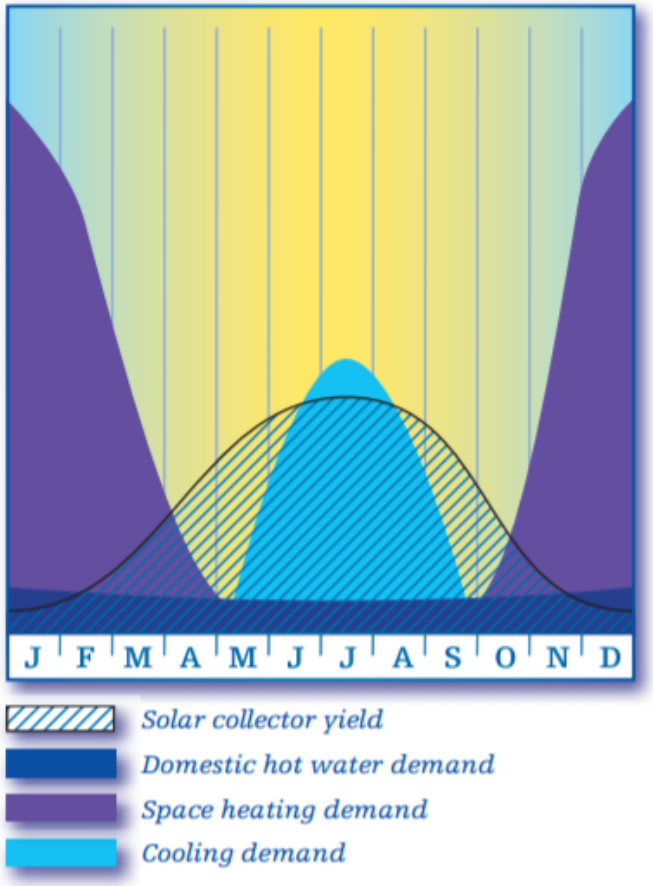


Sector coupling



Thermal Energy Storage

- Thermal Energy Storage (TES)
  - Positive for solar heating & cooling
    - Low cost
    - Seasonal/diurnal
  - Essential for:
    - Smart thermal grids / Sector coupling
    - 100% solar heat solutions
  - Make TES central topic in energy transition
    - Bring relevant players to invest in TES
  - Different TRL levels of TES solutions

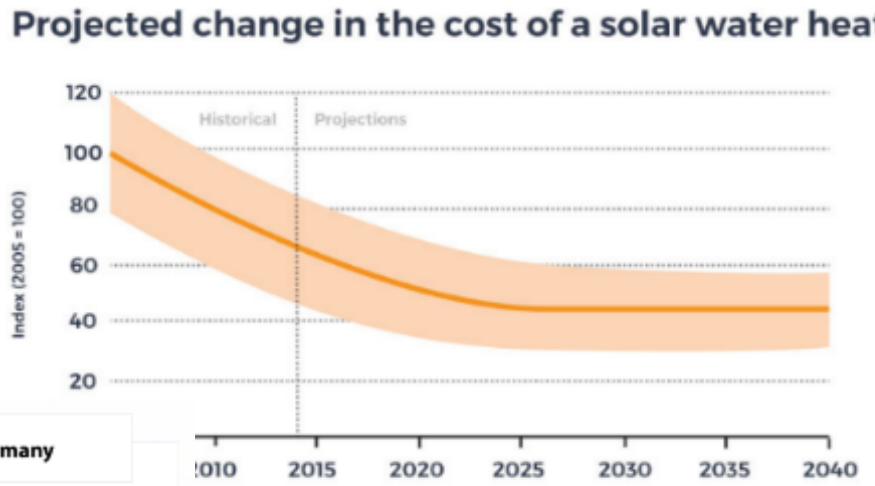


Building Integration

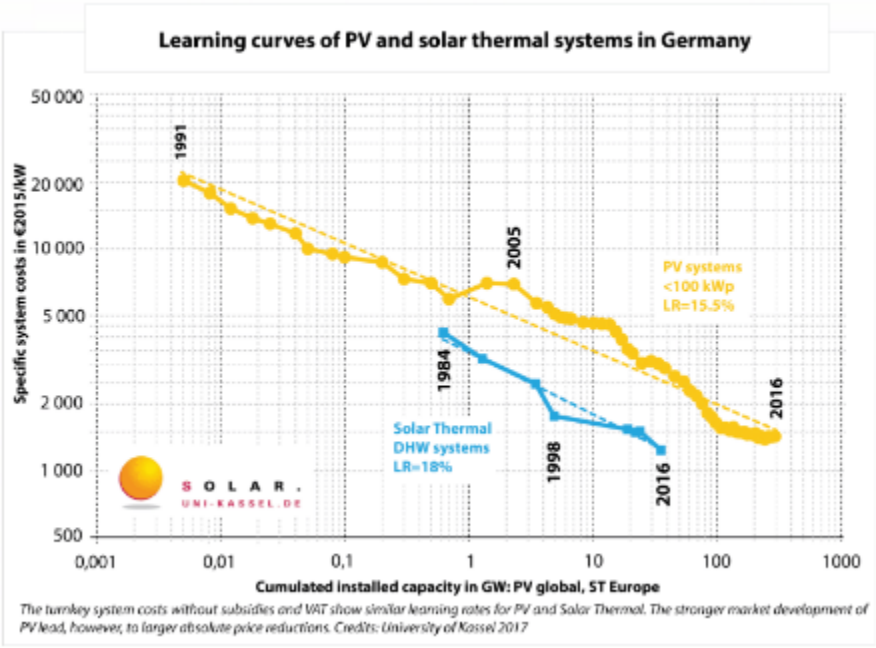
- Building integration
  - Improve BIS: building integrated solar
    - solar thermal
    - PV
    - PVT
  - Solutions focused on
    - New built
    - Large renovations

Figures: AEE Intec

Competitiveness

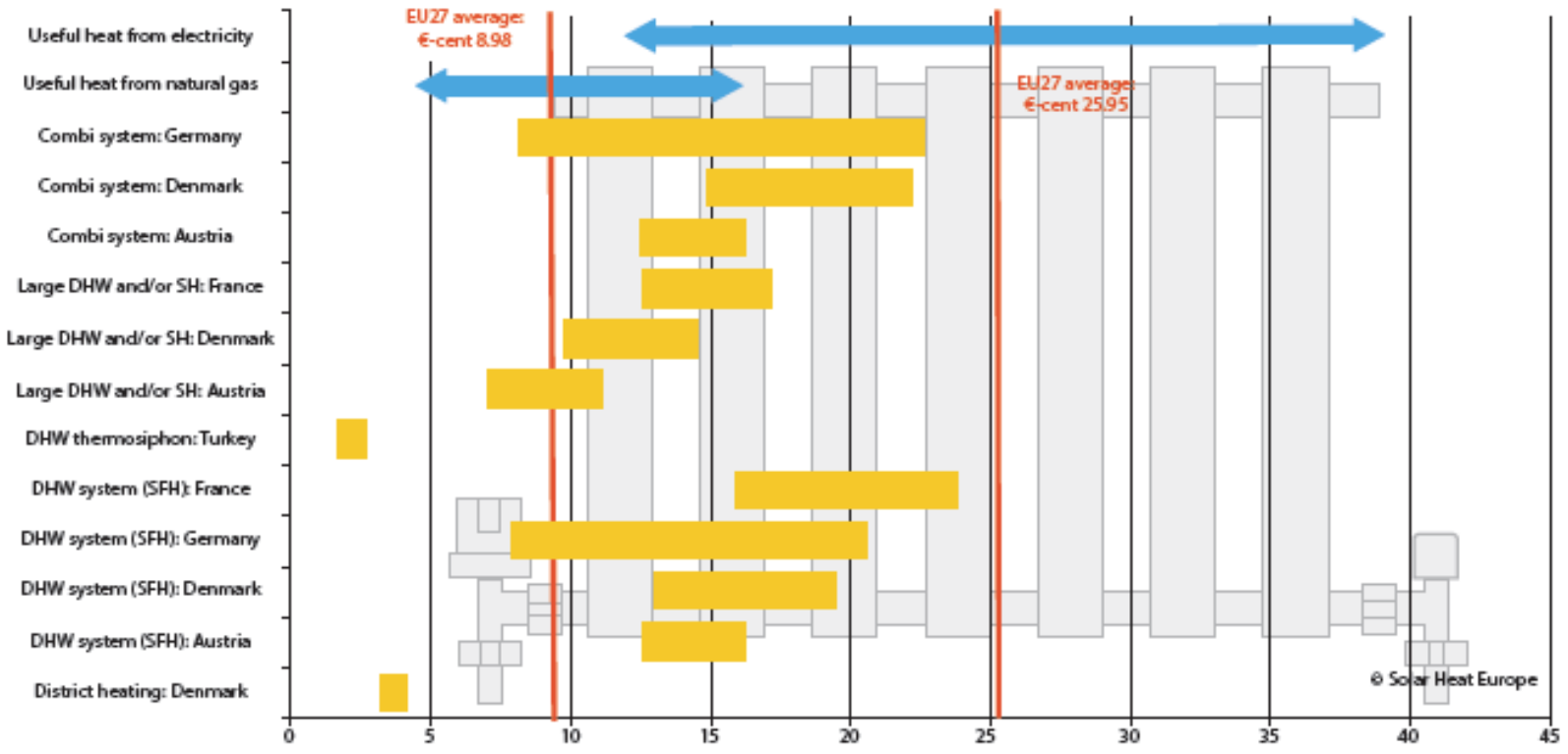


Source: World Energy Outlook 2016



The turnkey system costs without subsidies and VAT show similar learning rates for PV and Solar Thermal. The stronger market development of PV lead, however, to larger absolute price reductions. Credits: University of Kassel 2017

Competitiveness

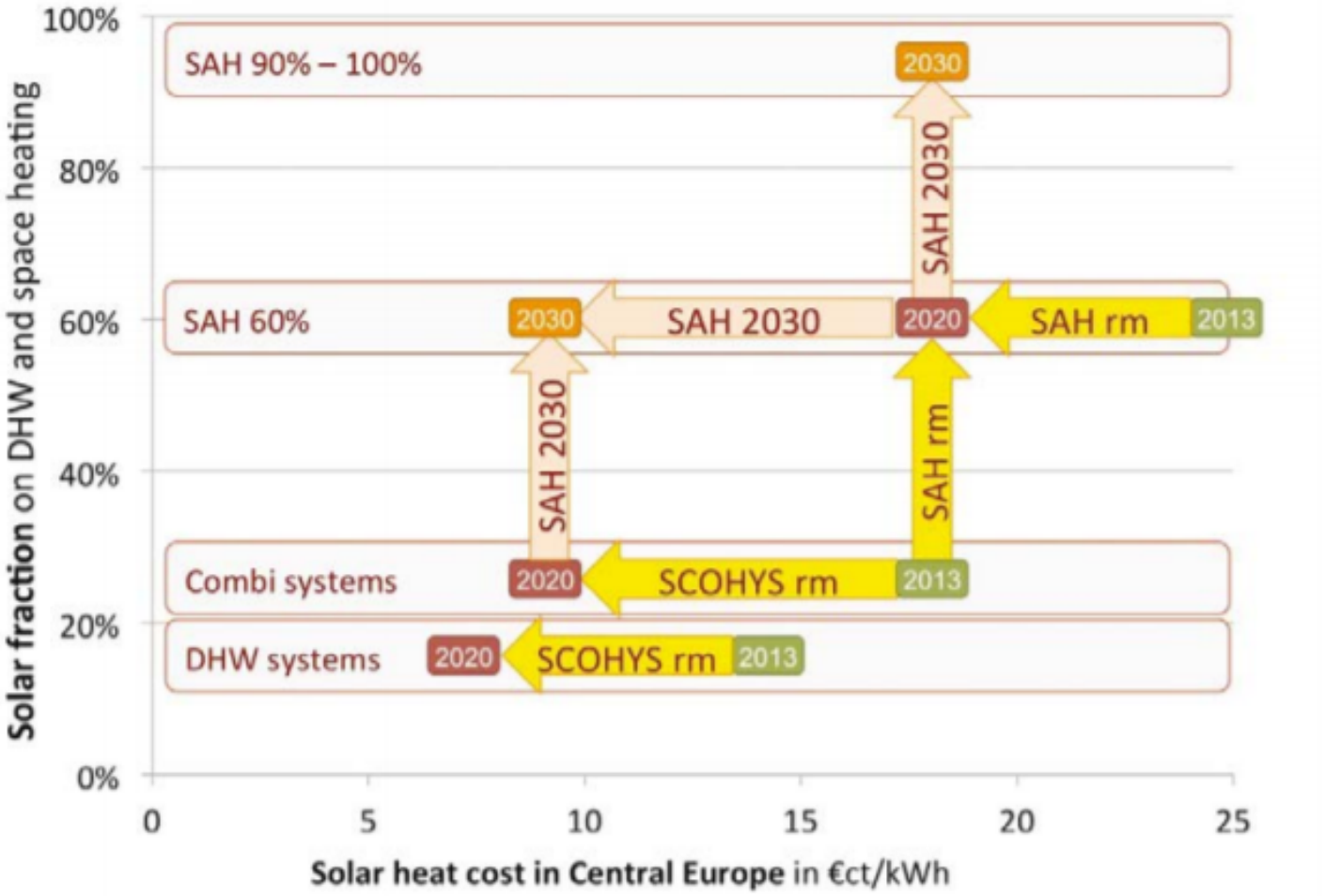


Range of solar thermal heat costs for different types of solar thermal systems in different European regions (average costs over lifetime), compared with the range of costs for useful Useful heat considers the losses by converting natural gas and electricity into heat. The conversion efficiency of 85% for gas and 95% for electricity is assumed. Costs of natural gas and electricity of 2016, to domestic consumer.

Sources: solar heat systems: IEA-SHC & AEE-Intec; natural gas and electricity: Eurostat.

LCoH comparison between solar heat, gas and electricity

Competitiveness



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