SHIP – successful plants worldwide

SHC Academy on the joint IEA SHC Task 64 / SolarPACES Task IV
What are success factors for SHIP?

Learn from existing SHIP plants!
SHIP Database ship-plants.info

FILTER

Name contains
Country
Year of operation start
From year To year
Industry sector
Unit operation
Gross collector area, m²
Min Max
Kind of solar thermal collectors installed
Solar energy storage
Point of Solar Heat Integration
Solar thermal engineering company

PROCESS

Solar thermal energy used for
Boiler preheating
Unit operation
other process heating
Point of Solar Heat Integration
A1) Heating of make-up water

SolarPACES
Solar Power & Chemical Energy Systems
INTERNATIONAL ENERGY AGENCY
SHIP plants in operation March 2022

1 plant = 59% of installed power


Total numbers:
394 plants
1,012,613 m² gross area
507 MWth

Source Chart: Solar Heat Worldwide 2022 – AEE INTEC
Source Data: SHIP database www.ship-plants.info
Success factor 1 – Turnkey solution

• Selling heat – not collectors
• Changing perspective towards LCOH – Levelized Cost of Heat for long-term energy security

• Example:
  • Maltery Issoudun, France
  • 14.000 m² by SavoSolar
  • ESCO Model by NewHeat

Source: Kyotherm
Success factor 1 – Turnkey solution

2015
- Gas < 30 €/MWh
- Electricity < 90 €/MWh
- SHIP 40..60 €/MWh

2022
- Gas > 180 €/MWh
- Electricity > 250 €/MWh
- SHIP 40..60 €/MWh
SHIP per collector type

Figure 12: Solar process heat applications in operation at the end of March 2022 by collector type
(Source: IEA SHC Task49/IV SHIP database)

Source Chart: Solar Heat Worldwide 2022 – AEE INTEC
Source Data: SHIP database www.ship-plants.info
Success factor 2 – Innovation

• Collectors <100 °C have hundreds of implementation but:

• Collectors >100 °C can cover wider share of process heat demand

• Example: Vacuum flat plate collector (up to 180 °C)
  • Integration on supply line (steam, hot water, thermal oil)
  • Economy of scale
  • Utilizes diffuse radiation

• Future innovations:
  • Hybridisation with heat pumps
  • Seasonal storage with excess heat combination

Source: TVP Solar
SHIP per sector

Figure 13: Solar process heat applications in operation worldwide at the end of March 2022 by industry sector
(Source: IEA SHC Task64/IV SHIP database)

Source: Solar Heat Worldwide 2022 – AEE INTEC
Source Data: SHIP database www.ship-plants.info
Success factor 3 – Multiplication, Standardisation

- Success story Mexico with 2 companies in competition in a dynamic market
- Reduced planning costs
- Standardisation in system design
- Knowing the needs of industries
- High replicability in industries
- Competition

Source: MODULO SOLAR SA DE CV

Source: INVENTIVE POWER SAPI DE CV
IEA SHC Task64 / SolarPACES Task IV

• Subtask A – Integrated energy systems
  Felix Pag (Universität Kassel)

• Subtask B – Modularisation
  Diego Alarcón (CIEMAT)

• Subtask C – Simulation- and design tools
  José-Miguel Cardemil (Pontificia Universidad Católica de Chile)

• Subtask D – Standardisation and certification
  Vassiliki Drosou (CRES)

• Subtask E – Guideline to Market
  Wolfgang Gruber-Glatzl, Jürgen Fluch (AEE INTEC) & Peter Nitz (Fraunhofer ISE)
Subtask E – Guideline to Market

• Big picture

  • Adressing relevant aspects and barriers
  • Place SHIP as core part of hybrid industrial energy systems
  • Platform for researchers, technology suppliers, project developers and end-users

  • E1: Innovation
  • E2: Competitiveness
  • E3: Financing options
Many more examples on:

- SHIP Database → [www.ship-plants.info](http://www.ship-plants.info)
  - Plant by plant documentation with details
  - Verification of supplier data
  - By AEE INTEC

  - Yearly solar supplier survey
  - Fact sheets on selected plants
  - By Solrico

- Collaboration on data and cross-referencing
Link of the 2 databases

**Solar Payback:** Information on # of references and collector area

**SHIP Database:** Detailed information per plant
82% of collector area covered in SHIP database

SHIP Database: Detailed information per plant
Get your data, ressources and informationen!

Solar Payback

SHIP Database

CBC Brewery

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SolarPACES
Solar Power & Chemical Energy Systems

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16 - SHC Academy - Wolfgang Gruber-Glatzl - AEE INTEC
SHIP Database Relaunch – Small Teaser

- More features on filtering
- New map layout with plants location
- Automatic charts and data exports

- Add and edit new plants
- Release in 2023