

SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

SHIP – successful plants worldwide

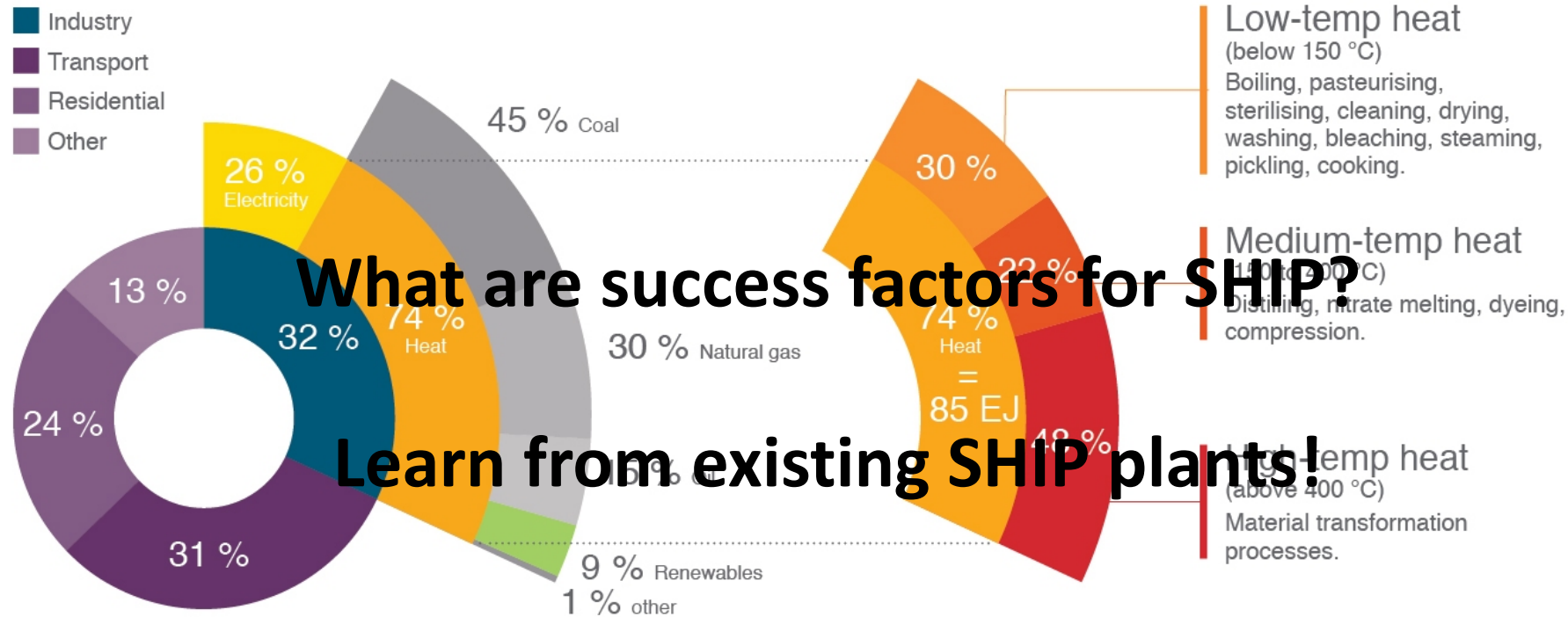
SHC Academy on the joint IEA SHC Task 64 / SolarPACES Task IV

Wolfgang Gruber-Glatzl

AEE INTEC



Final energy consumption and supply



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

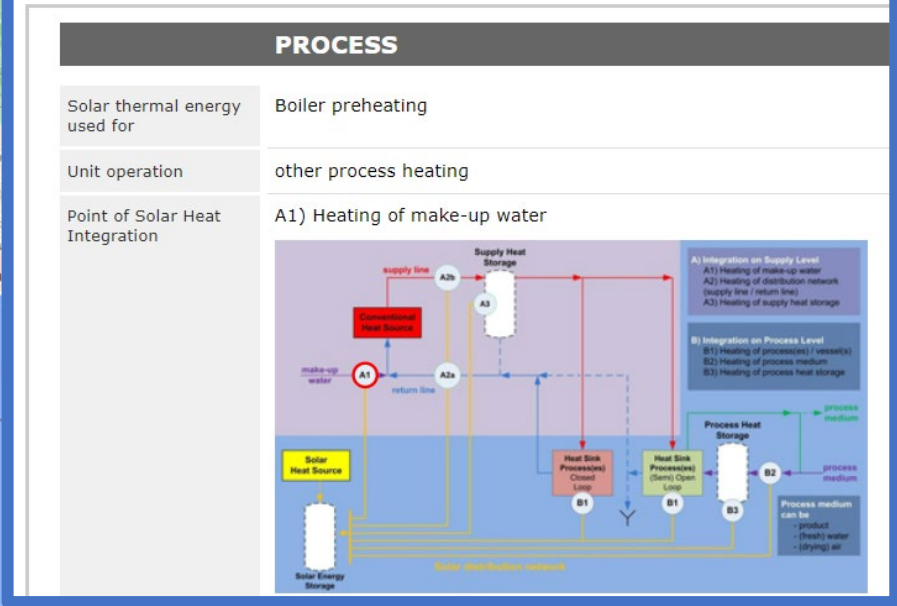
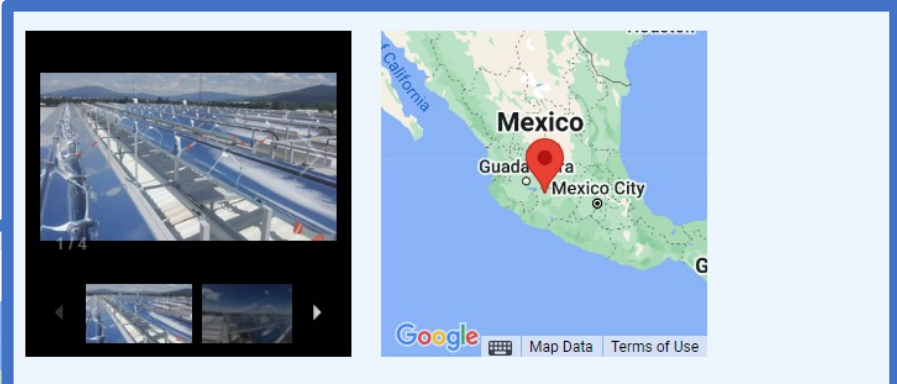
Kind of solar thermal collectors installed

Solar energy storage

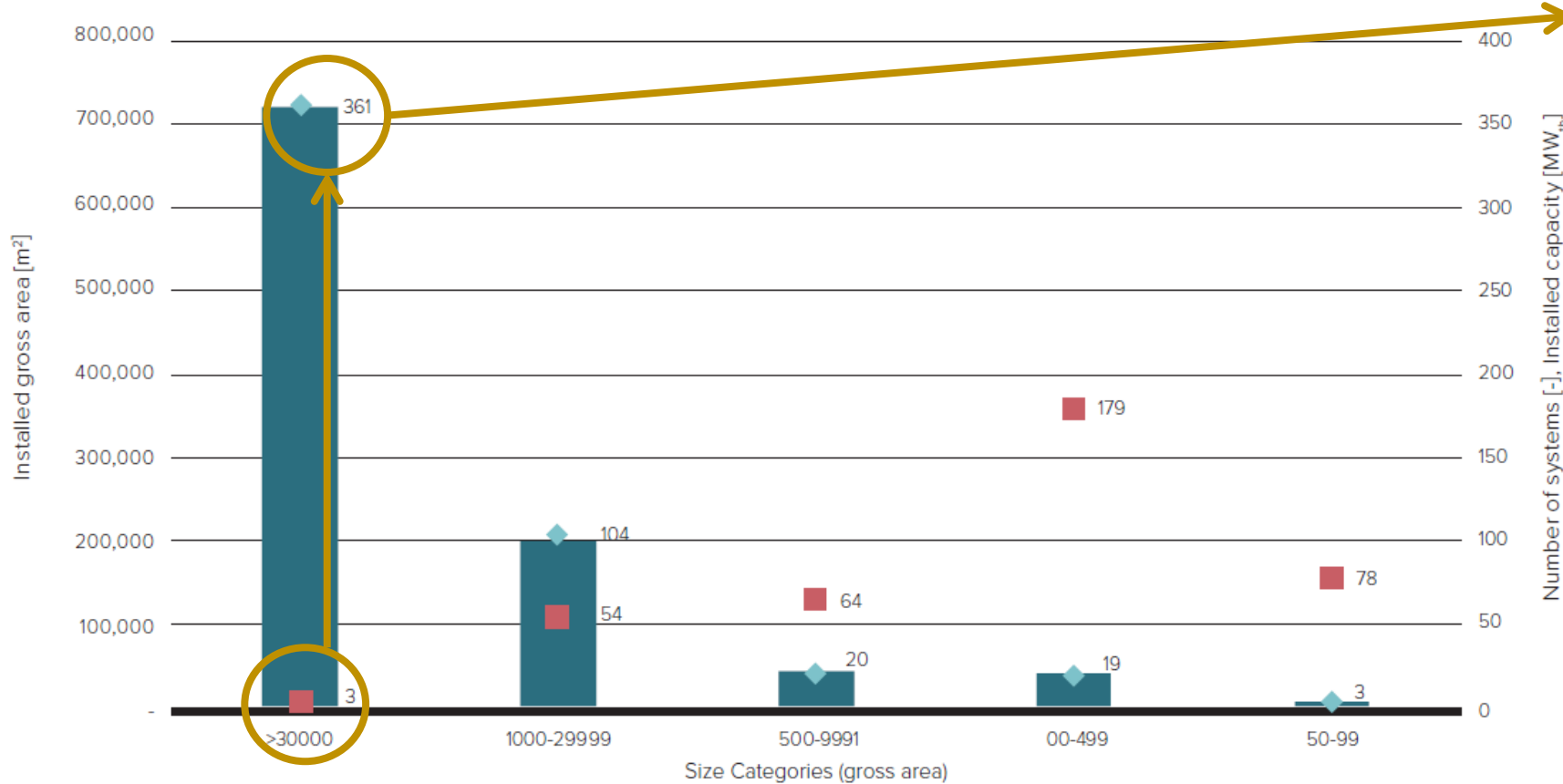
Point of Solar Heat Integration

Solar thermal engineering company

Karte Satellit



SHIP plants in operation March 2022



1 plant = 59% of installed power



Source: GlassPoint Solar - GlassPoint press kit, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=46892266>

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

Figure 11: Solar process heat applications in operation at the end of March 2022 by capacity and collector area (Source: IEA SHC Task64/IV SHIP database)

■ Gross Area [m²gross] ◆ Thermal Power [MW_{th}]
 ■ Number of systems [-]

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 – Leveliced Cost of Heat** for long-term energy security
- Example:
 - Maltery Issoudun, France
 - 14.000 m² by SavoSolar
 - ESCO Model by NewHeat



Source: Kyotherm

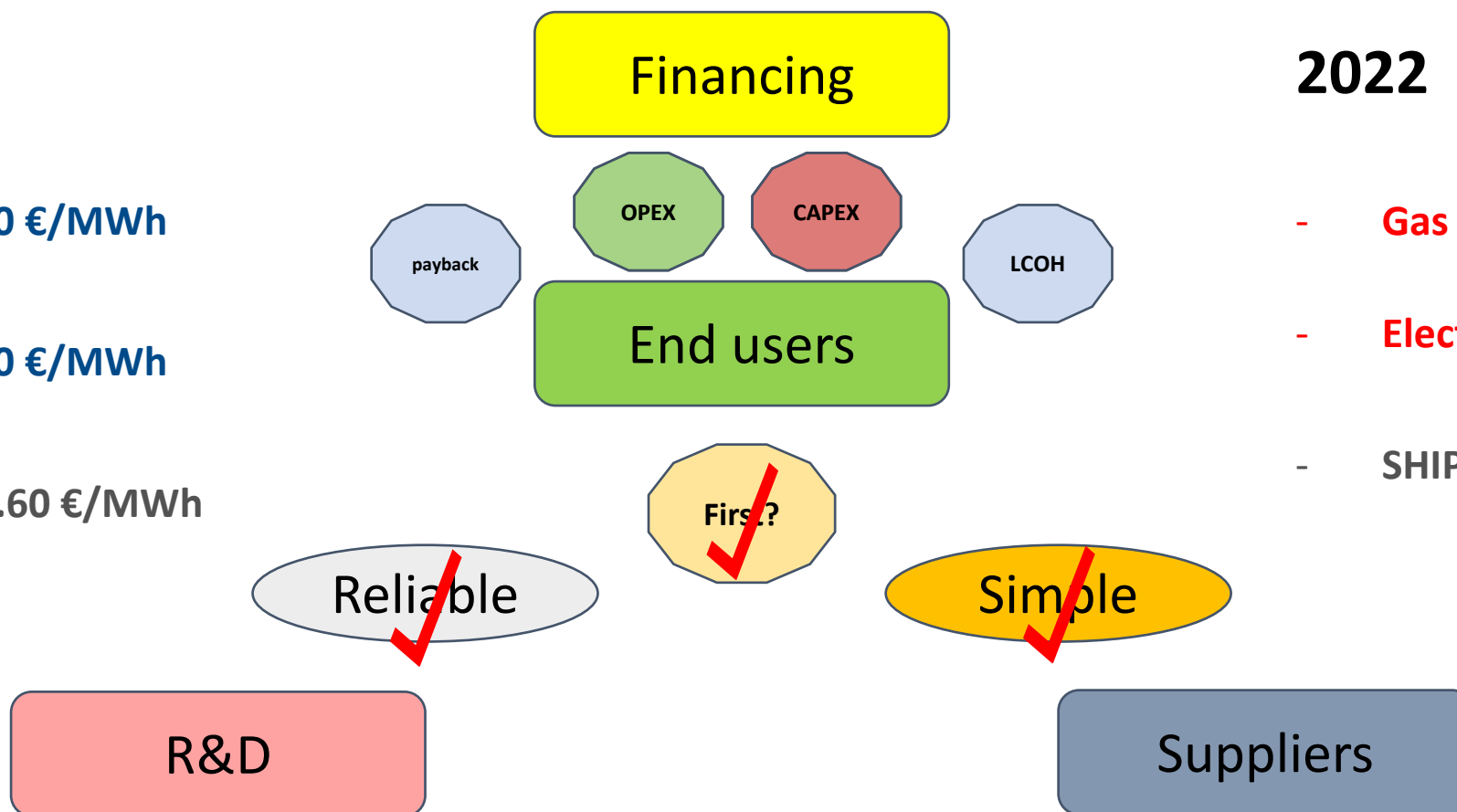
Success factor 1 – Turnkey solution

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

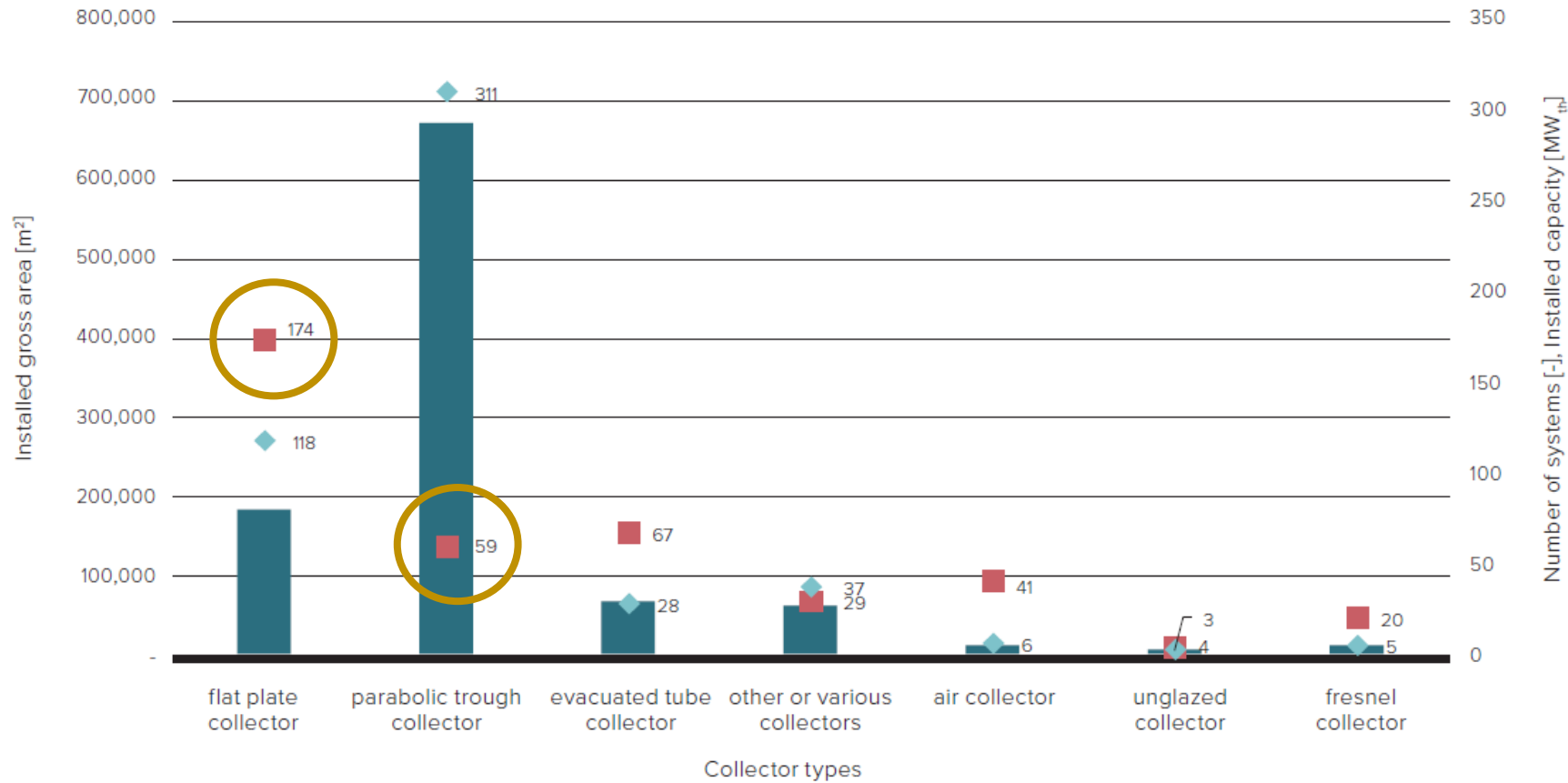


Figure 12: Solar process heat applications in operation at the end of March 2022 by collector type
 (Source: IEA SHC Task49/IV SHIP database)

■ Gross Area [m²_{gross}] ◆ Thermal Power [MW_{th}]
■ Number of systems [-]

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 flate 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

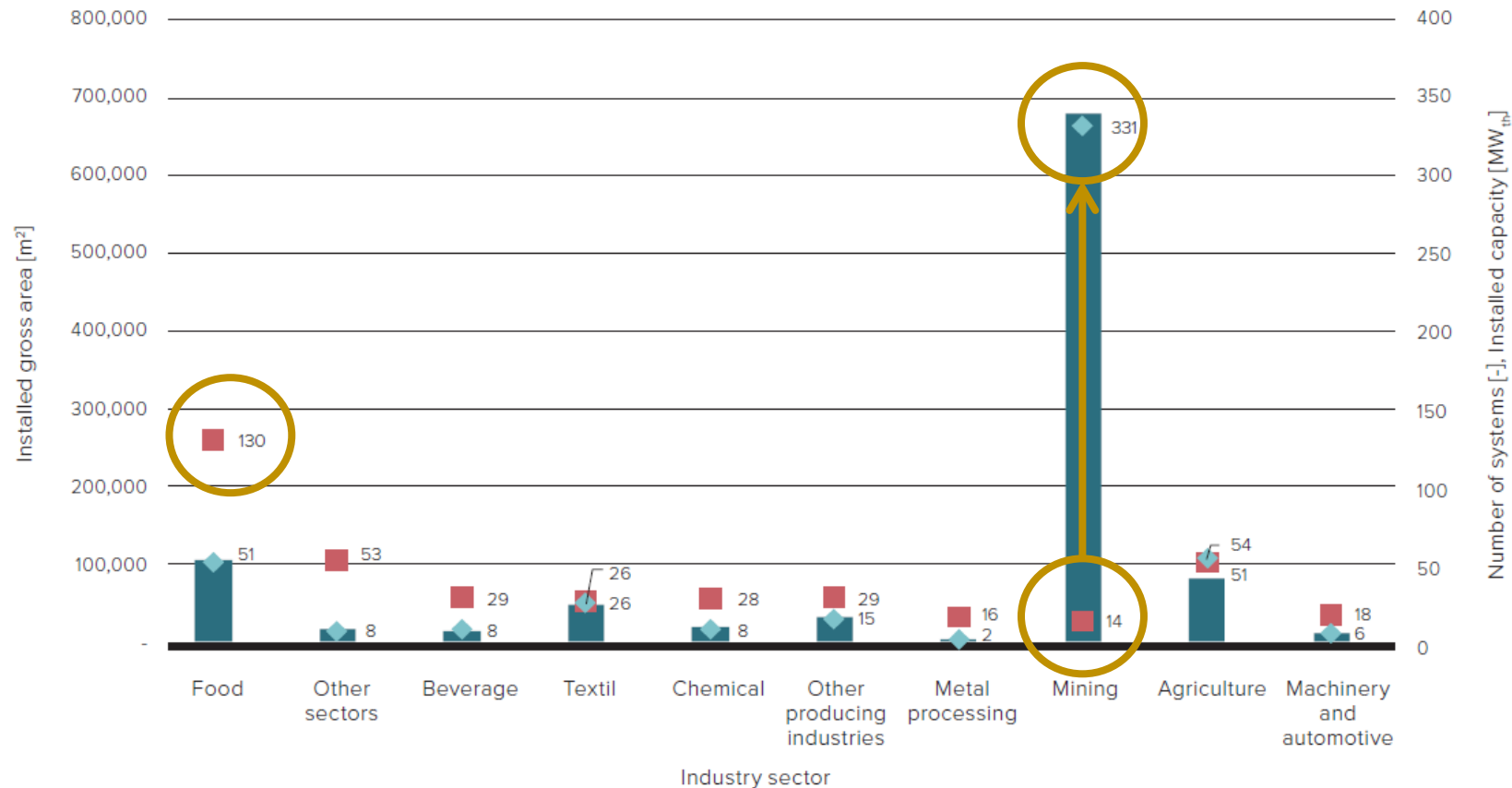


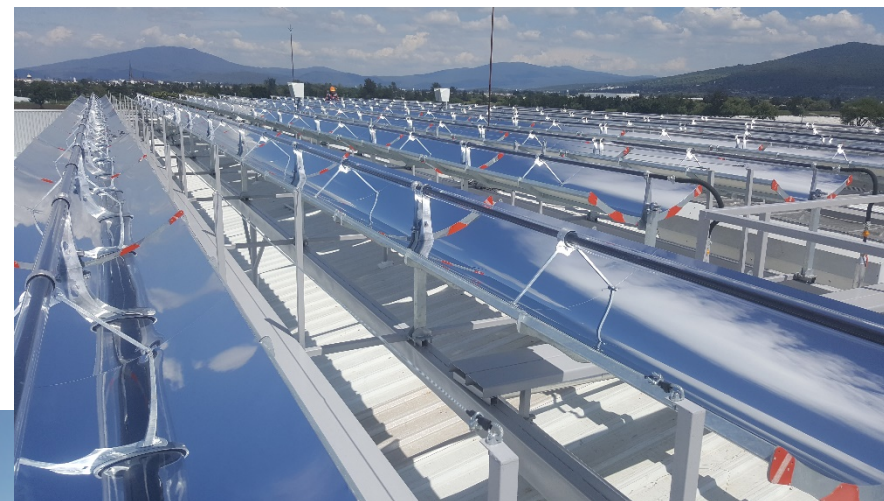
Figure 13: Solar process heat applications in operation worldwide at the end of March 2022 by industry sector
(Source: IEA SHC Task64/IV SHIP database)

■ Gross Area [m²gross] ◆ Thermal Power [MW_{th}]
■ Number of systems [-]

Source Chart: 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: INVENTIVE POWER SAPI DE CV



Source: MODULO SOLAR SA 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
 - Addressing 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
 - Plant by plant documentation with details
 - Verification of supplier data
 - By AEE INTEC
- Solar Payback → www.solar-payback.com
 - 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

Suppliers of Turnkey Solar Process Heat Systems

Search

- Solar supplier without references: 5
- Solar supplier with collector production and ...: 9
- Solar supplier with references: 18
- Solar supplier with collector production and...: 41

Solid Energy Systems, Austria
Number of references: 17
Total collector area of references: 13,676 m²
[Link to references](#)
Service: heat supply contract
[More info](#)

SHIP Database: Detailed information per plant

Solar Thermal Plants Database

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:

[show all](#)

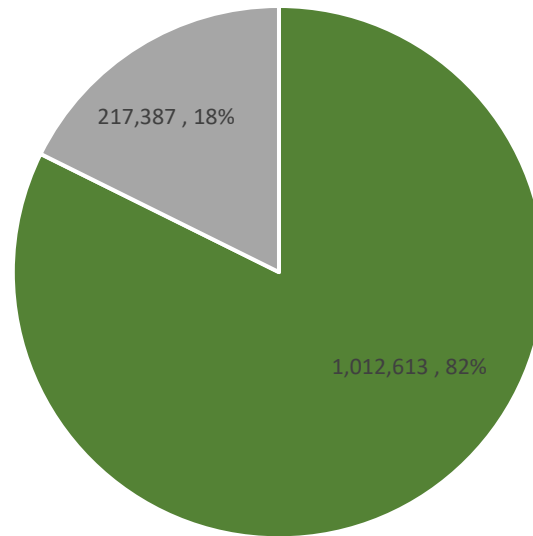
published unpublished / with unpublished changes supported by me

Displaying all 5 projects

- AVL Graz**
Hans-List-Platz 1, Graz, Austria
Operation start: 2015
- Fleischwaren Berger**
Koglerstraße 8, 3443 Sieghartskirchen Austria
Operation start: 2013
- Gatorade**
Phoenix, Arizona United States
Operation start: 2008
- Körner Kvk**
Wies Austria
Operation start: 2007
- Peitler Vineyard**
Leutschach Austria
Operation start: 2003

82% of collector area covered in SHIP database

Gross collector area [m²gross]



■ SHIP Database ■ Not Documented

SHIP Database: Detailed information per plant

Solar Thermal Plants Database

FILTER

Name contains:

Country:

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Industry sector:

Unit operation:

Gross collector area, m²: Min Max

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Austria
Operation start: 2003

Get your data, resources and informationen!

SHIP Database

Solar Payback

Copyright: Brauerei Rothaus

Country: Germany
Customer: Brauerei Rothaus
Industry: Food and Beverage
Application: Brewery
Collector Type: Evacuated tube
SHIP Supplier: Enersolve
Year of commissioning: 2018
Pixel: 4500 X 2532



Turkey, Others, 2021



Germany, Brewery, 2018



Cyprus, Steam generation, 2018

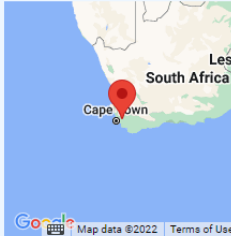



Cyprus, Water preheating, 2020



Cyprus, Water preheating, 2020

CBC Brewery



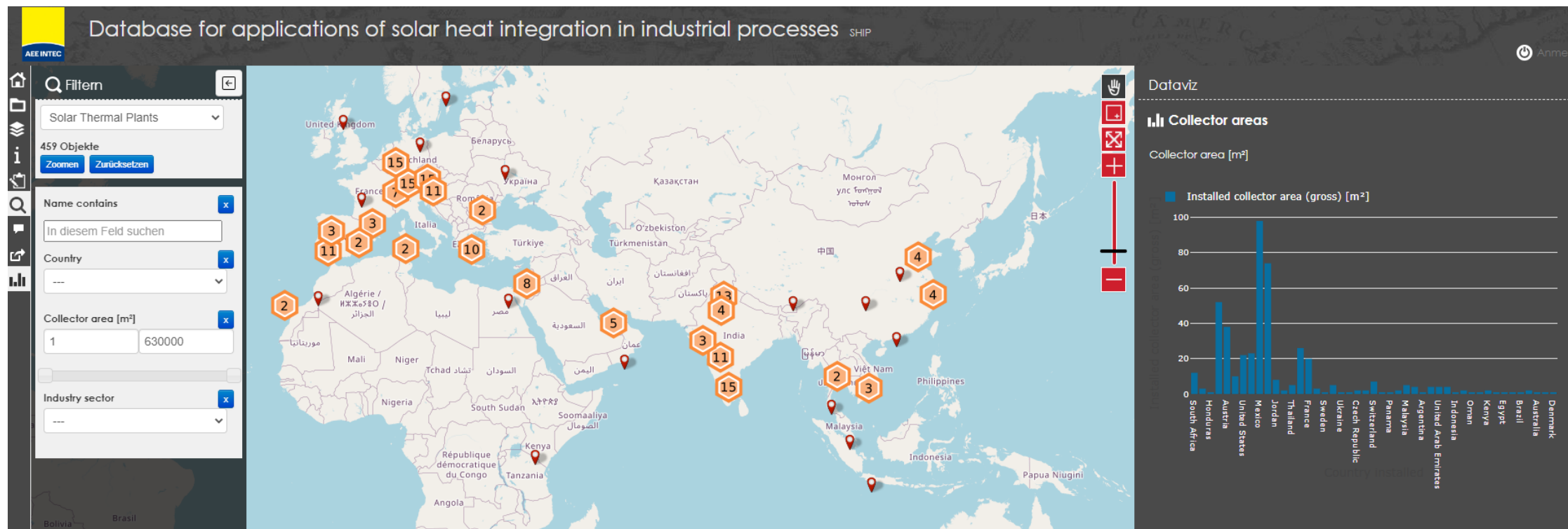
[Edit project](#)
[Manage photos](#)

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[unpublish](#)
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[maintainers \(1\)](#)

TECHNICAL PARAMETERS	
Collector technology	flat plate collector
Collector name	GREENoneTEC
Installed collector area (gross), m ²	120.0
Installed collector area (aperture), m ²	
Installed collector area (absorber), m ²	
Installed thermal power (estimated), kW _{th}	84.0 (Default value calculated by multiplying the gross collector area by 0.7 kW _{th} /m ²)
Solar collector loop heat transfer fluid	water/glycol
Solar energy storage	short-term water storage
Storage volume, m ³	10

General
Solar
Process
Eco
Lessons
Source

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

An aerial photograph of a modern, multi-story building with a prominent facade of large, blue-tinted solar panels. The building is surrounded by a paved courtyard and a road. In the background, there are trees and other residential buildings under a clear blue sky. A yellow and blue logo is overlaid in the top left corner, and a white box with the text 'IDEA TO ACTION' is positioned in the middle left.

AEE INTEC

IDEA TO ACTION

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Twitter: [@AEE_INTEC](https://twitter.com/AEE_INTEC)

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<https://task64.iea-shc.org/>
www.ship-plants.info