
Cost Reduction Potential of Polymeric Collectors

TASK 54

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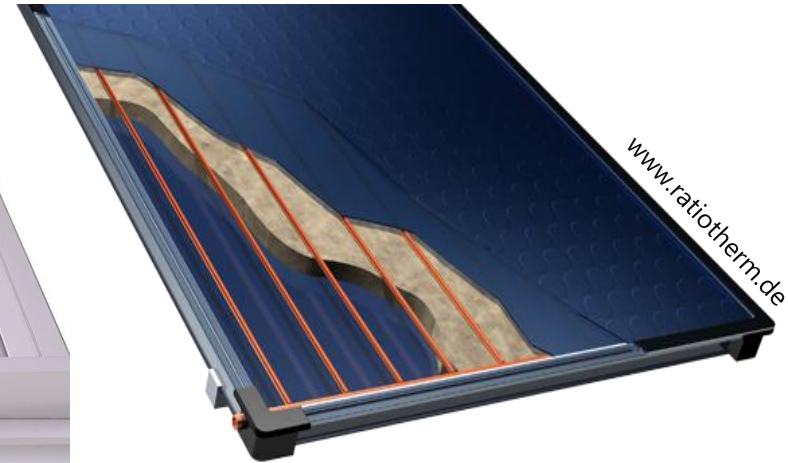
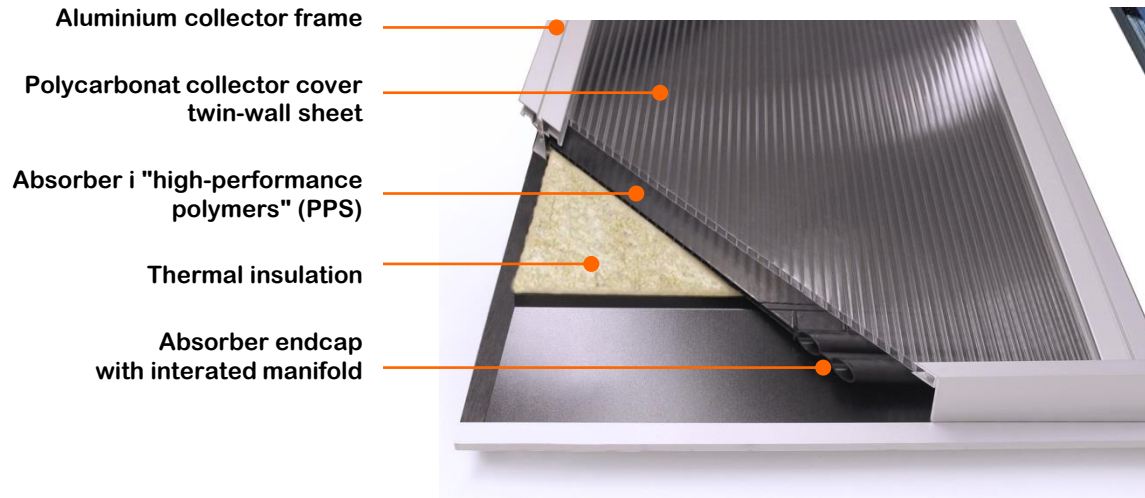
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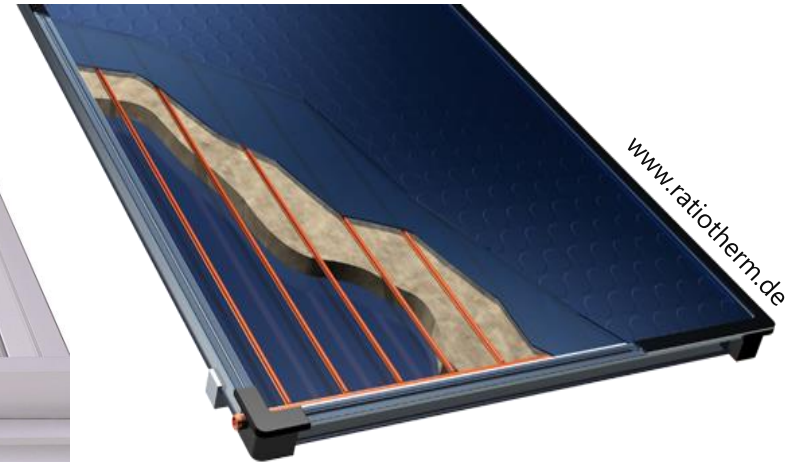
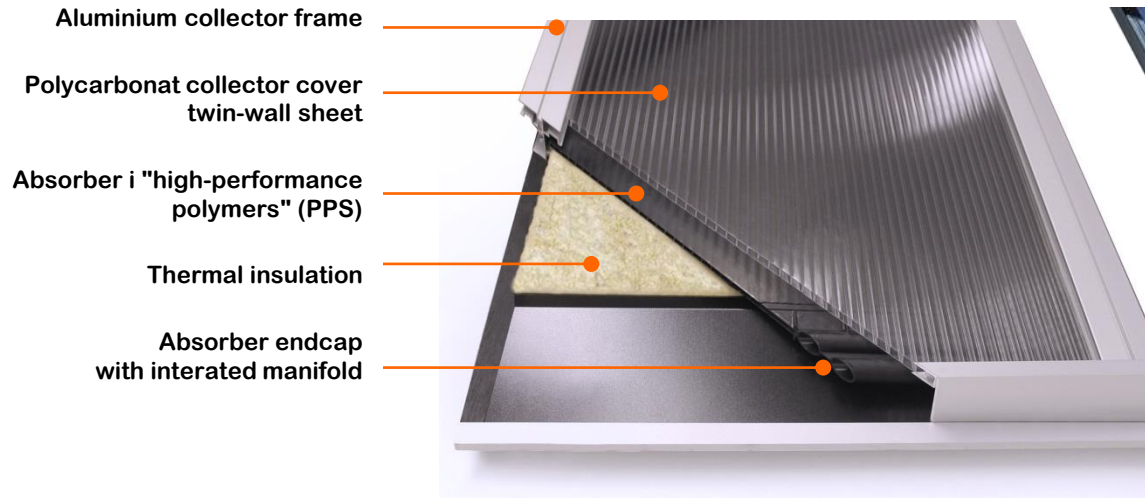
Sophia Antipolis, France

26 April 2018

Main differences to solar heating systems with conventional flat plate collectors



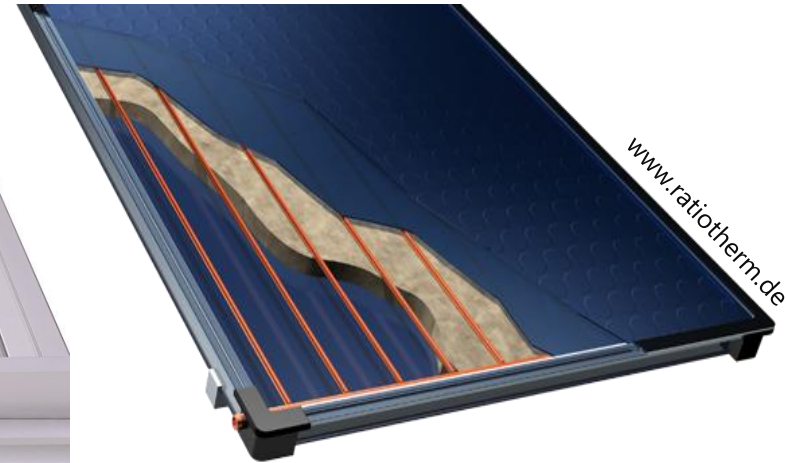
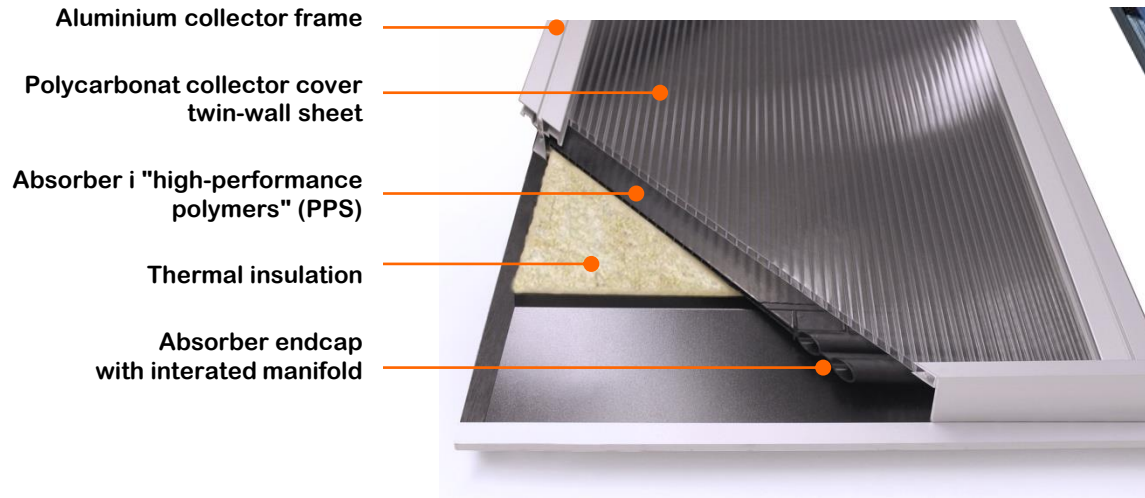
Main differences to solar heating systems with conventional flat plate collectors



Collector

- High-temperature performance polymers
- Flexible lengths
- Light-weight building modules (8 kg/m²)
- Replacing conventional building envelopes (roofs & facades)

Main differences to solar heating systems with conventional flat plate collectors



Collector

- High-temperature performance polymers
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- Replacing conventional building envelopes (roofs & facades)

System

- Water as heat carrier
- High-flow system
- Drain-back technology
- Non-pressurized collector loop (installation)

Major Production Steps

Structured sheet extrusion



- The number of production steps is significantly reduced compared to conventional solar collector production.



Cutting



End-cap assembly and coating



Cutting of other sub-components



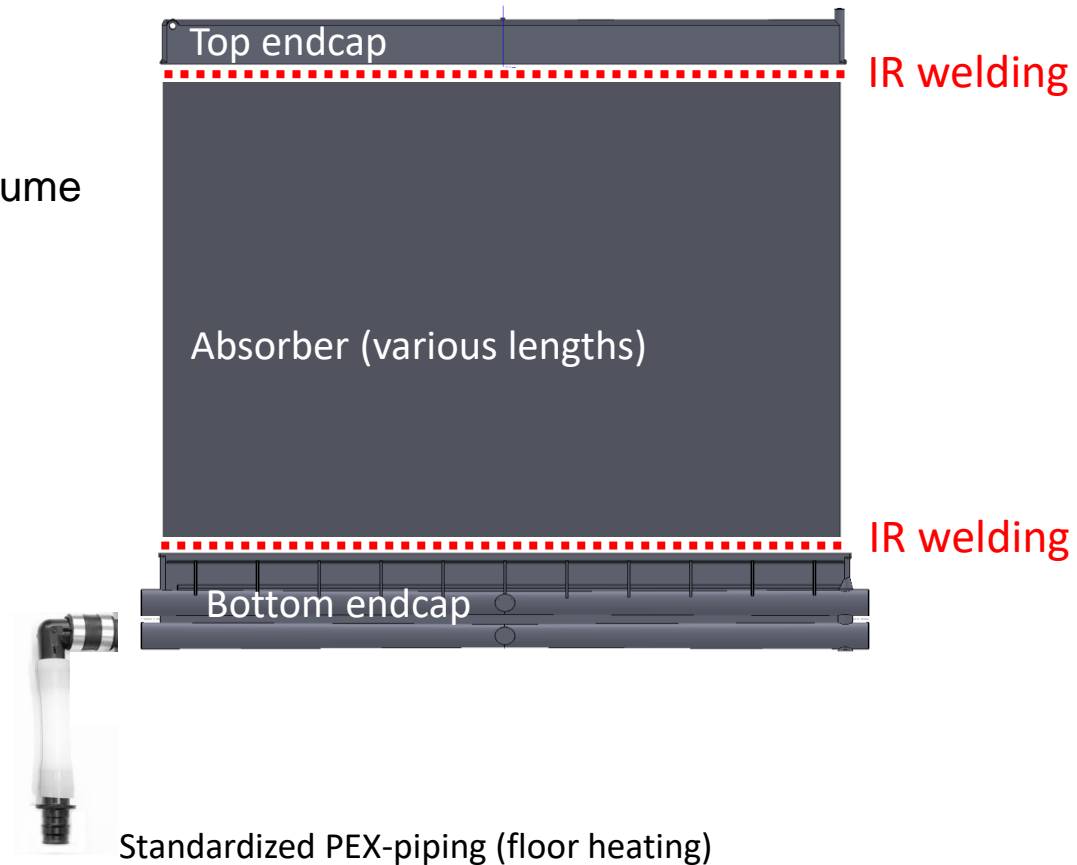
Transport & installation

Absorber production

- Highly-industrialised processing
- Very few production steps
- Low production costs with high volume
- Integrated design

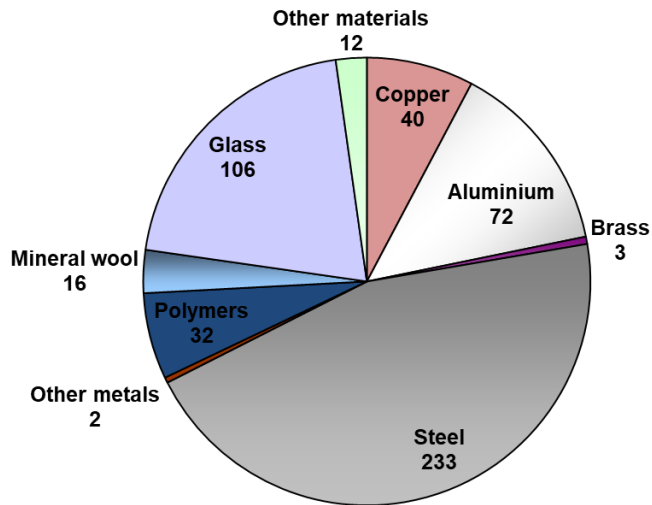


Absorber of extruded structured sheets

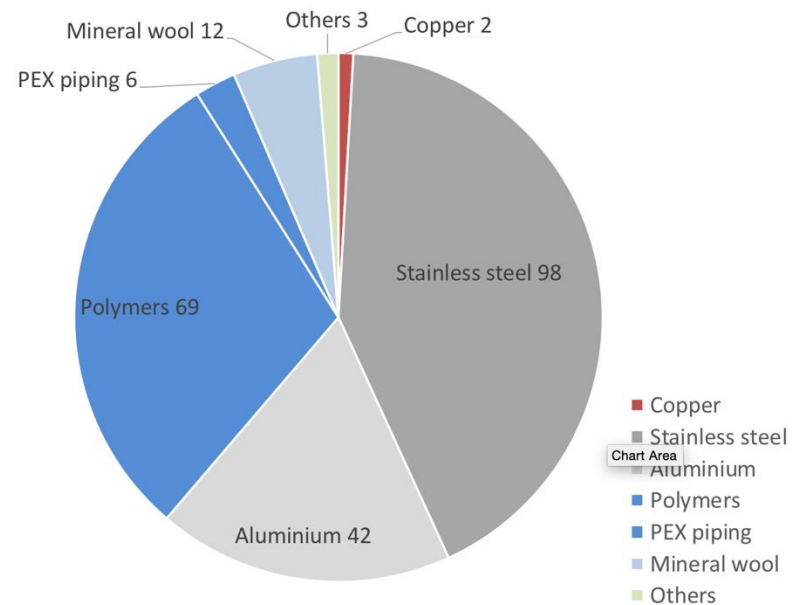


Weight of components, Solar combisystem

Average value of material (kg)
"Combisystems 2008" with
Conventional flat-plate collector

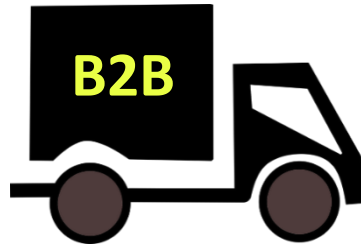


Material weight comparison (in kg)
Combisystem, Housing Estate Oslo:
Polymeric AventaSolar collector



Solar Thermal Value Chain

No wholesaler / distributor!



1. Architecture
+ Energy
Consultant

2. Production

3. Distribution
Transport

4. Installation

5. Installed
System

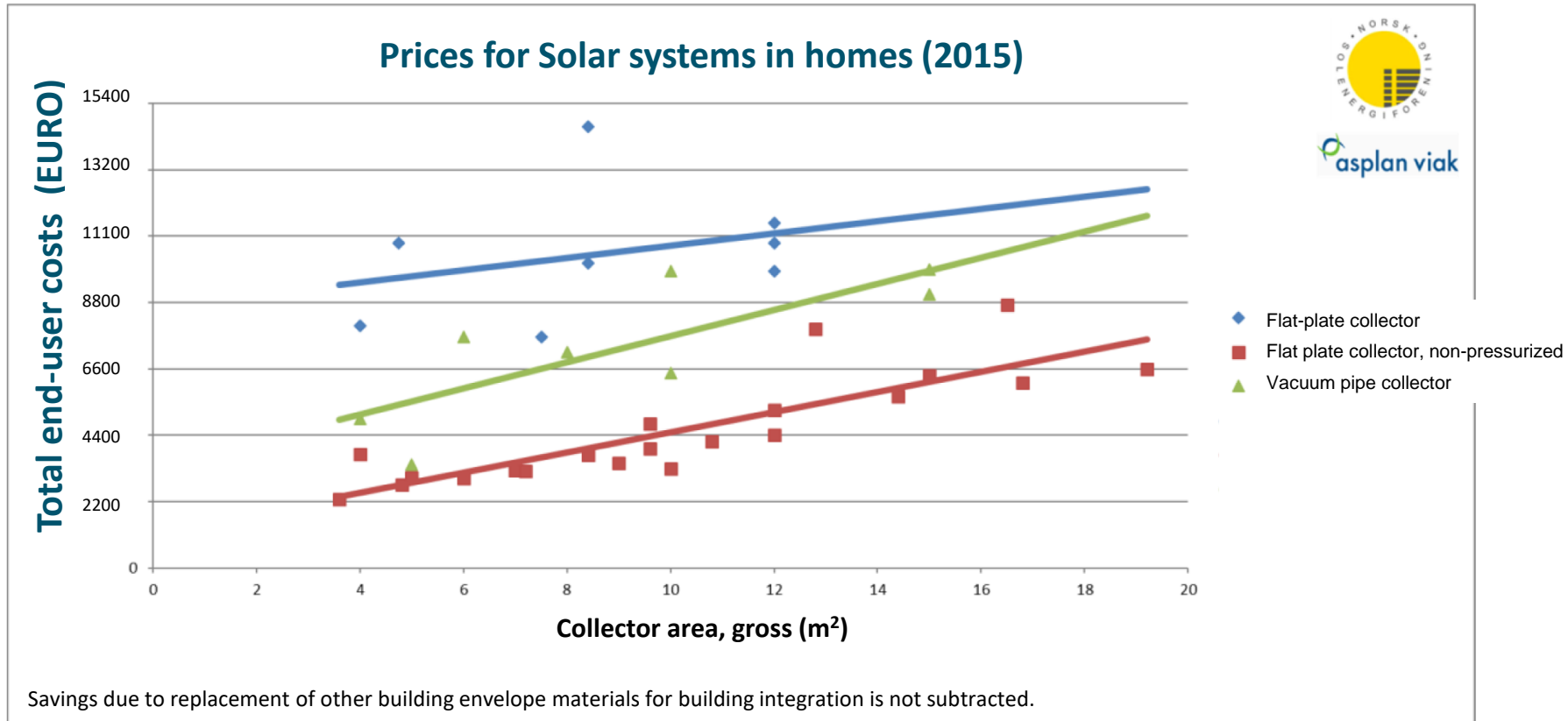
6. Operation
and
Maintenance

7. LCOHs



Prices of solar heating systems in private homes

- Total end-user costs incl. solar collector system and heat store, reported by the customers, include installation, but exclude VAT and subsidies.



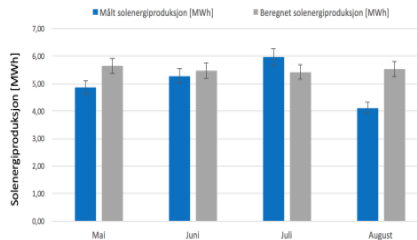
Cost examples: Medium-sized projects (1)

Ilseeng State Prison

Costs:

Solar collector, heat store, pumps, control system, pipes, removal of tiles, installation, engineering and administration.

SUM: 433 €/m² collector area



SDHW-system with 237 m² solar collectors



Cost examples: Medium-sized projects (2)

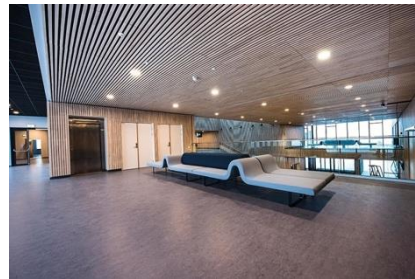
Bjørkelangen Elementary School

Solar heating system for domestic hot water preparation.
105 m² facade integrated solar collectors
5.6 m³ heat buffer store

Costs

Solar collector, heat store, pipes and controller, incl. installation: **SUM: 370 €/m² collector area**

Savings due to replacement of other materials/components are not included.



Cost examples: Solar combisystem (3)

Housing Estate Oslo with 34 passive houses



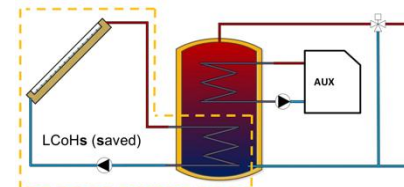
34 houses with totally 480 m² roof integrated solar collectors, decentralized with 0.8 m³ heat stores, incl. 100 liters DHW preheater and piping, operation control of the auxiliary heat supply and solar heating system, installation- and start-up support.

Costs

SUM: 370 €/m² collector area



Examples, Norway



Lifetime 20 years



Ilseng State Prison

Retrofit, DHW preparation
237 m² Collector area
8.4 m³ Heat store
1100 kWh/(m² a) solar irradiance*



Bjørkelangen Elementary School

New-built, DHW preparation
105 m² Collector area
5.6 m³ Heat store
889 kWh/(m² a) solar irradiance*

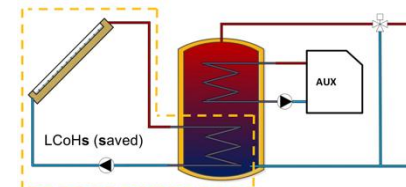


Housing Estate Oslo, 34 passive houses

New-built, Solar combisystems with each
14 m² Collector area
0.8 m³ Heat store
1210 kWh/(m² a) solar irradiance*

* Solar irradiance on tilted collector surface.

Examples, Norway



Lifetime 20 years



Ilseng State Prison

Retrofit, DHW preparation
237 m² Collector area
8.4 m³ Heat store
1100 kWh/(m² a) solar irradiance*

LCoHs_retrofit = 0.099 €/kWh
LCoHs_new built = 0.073 €/kWh



Bjørkelangen Elementary School

New-built, DHW preparation
105 m² Collector area
5.6 m³ Heat store
889 kWh/(m² a) solar irradiance*

LCoHs = 0.035 €/kWh



Housing Estate Oslo, 34 passive houses

New-built, Solar combisystems with each
14 m² Collector area
0.8 m³ Heat store
1210 kWh/(m² a) solar irradiance*

LCoHs = 0.082 €/kWh

Electricity costs = 0.115 €/kWh

Comments:

- Retrofit: roof tiles had to be removed
- Building is oriented towards east
- High solar fraction

Comments:

- Good planning, infrastructure

Comments:

- Passive houses: designed for high solar fraction
- Installation partly included

* Solar irradiance on tilted collector surface.

Thank you for your attention!

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