Cost Reduction Potential of Polymeric Collectors

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Main differences to solar heating systems with conventional flat plate collectors

- Aluminium collector frame
- Polycarbonat collector cover twin-wall sheet
- Absorber i "high-performance polymers" (PPS)
- Thermal insulation
- Absorber endcap with interated manifold
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Collector
- High-temperature performance polymers
- Flexible lengths
- Light-weight building modules (8 kg/m²)
- Replacing conventional building envelopes (roofs & facades)
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System
- Water as heat carrier
- High-flow system
- Drain-back technology
- Non-pressurized collector loop (installation)
Major Production Steps

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

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

Absorber of extruded structured sheets

Top endcap

Bottom endcap

IR welding

Standardized PEX-piping (floor heating)
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

B2B
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.

Savings due to replacement of other building envelope materials for building integration is not subtracted.
Cost examples: Medium-sized projects (1)

*Ilseng State Prison*

**Costs:**

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

**SUM: 433 €/m² collector area**

8.4 m³ heat store, divided in 6 separate units

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Collector Area</th>
<th>Heat Store</th>
<th>Solar Irradiance (kWh/(m² a))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ilseng State Prison</strong></td>
<td>Retrofit, DHW preparation</td>
<td>237 m²</td>
<td>8.4 m³</td>
<td>1100 kWh/(m² a) solar irradiance*</td>
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<td><strong>Bjørkelangen Elementary School</strong></td>
<td>New-built, DHW preparation</td>
<td>105 m²</td>
<td>5.6 m³</td>
<td>889 kWh/(m² a) solar irradiance*</td>
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<td><strong>Housing Estate Oslo, 34 passive houses</strong></td>
<td>New-built, Solar combisystems with each</td>
<td>14 m²</td>
<td>0.8 m³</td>
<td>1210 kWh/(m² a) solar irradiance*</td>
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* Solar irradiance on tilted collector surface.
# Examples, Norway

### 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*

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<th>LCoHs New Built</th>
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<td>Ilseng State Prison</td>
<td>0.099 €/kWh</td>
<td>0.073 €/kWh</td>
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<td>Bjørkelangen Elementary School</td>
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**LCoHs = 0.035 €/kWh**

**LCoHs = 0.082 €/kWh**

**Electricity costs = 0.115 €/kWh**

### Comments:
- **Ilseng State Prison**
  - Retrofit: roof tiles had to be removed
  - Building is oriented towards east
  - High solar fraction
- **Bjørkelangen Elementary School**
  - Good planning, infrastructure
- **Housing Estate Oslo**
  - 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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