LCoH Calculation Method

Heat Cost Calculations Applied to Solar Thermal Systems

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Price reduction of solar thermal systems
Introduction

- Price reduction assessment in Task 54 requires:
  - Reference systems
  - Common indicator and methodology

- Levelized Cost of Heat (LCoH):
  - Often used in power sector (LCoE)
  - Growing usage in the heat sector
  - Assess the impact on heat costs of
    - costs reduction along the value chain (production to decommissioning)
    - system performance improvements
LCoH Equation

\[
LCoH = \frac{I_0 - S_0 + \sum_{t=1}^{T} \frac{C_t}{(1 + r)^t} + \sum_{t=1}^{T} \frac{E_t}{(1 + r)^t}}{\sum_{t=1}^{T} (1 + r)^t}
\]

- Initial investment (€)
- Subsidies (€)
- O&M costs (€/a)
- Period of analysis (years)
- Discount rate (%)
- Reference energy (kWh/a)

Task 54:
- \( r = 0 \)
- \( S_0 = 0 \)
- All costs excluding VAT
System Boundaries and LCoH

LCoHo (overall)
LCoHs (saved)
LCoHc (conventional)

<table>
<thead>
<tr>
<th>LCoHs</th>
<th>LCoHc</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_0$</td>
<td>Reference conv. system</td>
</tr>
<tr>
<td>Solar components – Store credit</td>
<td>Final energy consumption</td>
</tr>
<tr>
<td>$E_t$</td>
<td>Saved final energy</td>
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</tbody>
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Reference conv. system
Example: Reference SDHW System in Germany (SFH)

- 5 m² FPC (gross), 300 l store, back-up: gas condensing boiler
- Saved final energy: 2.2 MWh/a
- Final energy demand: 13.4 MWh/a
- T = 20 years

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Solar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment $I_0$ [€]</td>
<td>6500</td>
<td>3850</td>
</tr>
<tr>
<td>O&amp;M $C_t$ [€/a]</td>
<td>1280</td>
<td>117</td>
</tr>
</tbody>
</table>

$$LCoH = \frac{I_0 + \sum_{t=1}^{T} C_t}{\sum_{t=1}^{T} E_t}$$

- LCoHs: 13.9 €ct/kWh
- LCoHc: 11.9 €ct/kWh
- LCoHo: 12.2 €ct/kWh
Summary

- LCoH is a sensitive indicator: detailed assumptions necessary!
- Depends for solar thermal systems on
  - System design
  - Customer behaviour
  - Climatic situation
  - Service life time and maintenance

- 10 reference systems (5 countries) defined in Task 54

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Thank you for your attention!