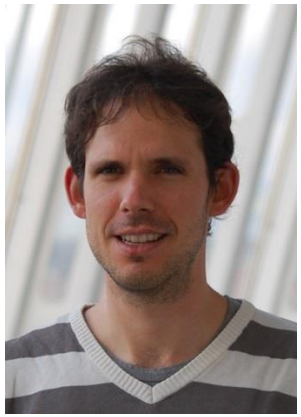
LCoH Calculation Method

Heat Cost Calculations Applied to Solar Thermal Systems

Yoann Louvet



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SOLAR ACADEMY SHC
FOR HEATING & COOLING IN BUILDINGS & INDUSTRY

TASK 54

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

Initial investment (€) ?

Subsidies (€)

O&M costs (€/a)

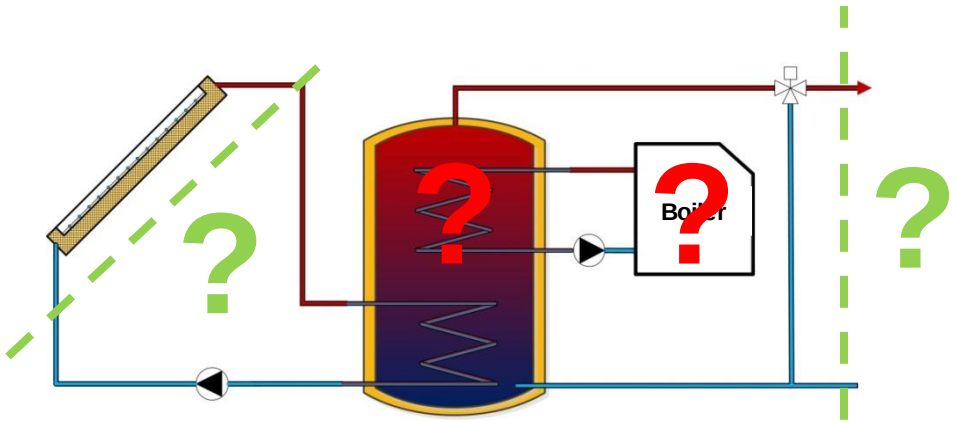
$$LCoH = \frac{I_0 - S_0 + \sum_{t=1}^{T} \frac{C_t}{(1+r)^t}}{\sum_{t=1}^{T} \frac{E_t}{(1+r)^t}} \quad \frac{€}{kWh}$$

Period of analysis (years)

Discount rate (%)

Reference energy (kWh/a) ?

- Task 54:
  - $r = 0$
  - $S_0 = 0$
  - All costs excluding VAT



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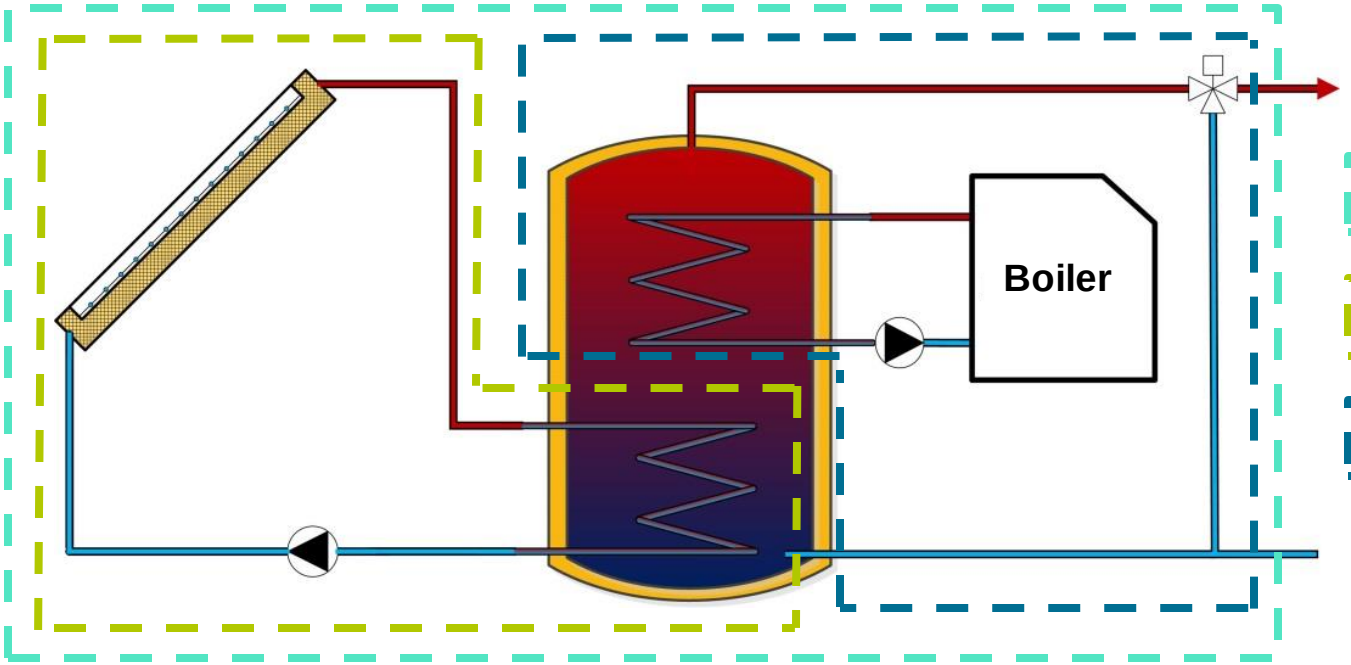
System Boundaries and LCoH

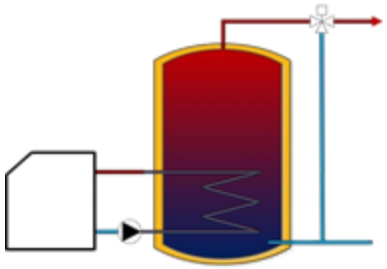


LCoH**o** (**o**verall)

LCoH**s** (**s**aved)

LCoH**c** (**c**onventional)

	LCoHs	LCoHc
I_0	Solar components – Store credit	Reference conv. system
E_t	Saved final energy	Final energy consumption



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

	Conventional	Solar
Investment I_0 [€]	6500	3850
O&M C_t [€/a]	1280	117

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

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!