IEE Solar Combi+
Virtual Case Studies

Latest Changes

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Content

1. Changes in Sortech-simulation
2. 4 Proposed changes / sensitivity analysis
3. Changes in performance figures / evaluation

1. Changes in Sortech simulation

- Sortech does not recommend to use their chiller with 12°C/10°C cool water temperatures

  → Reduction of Sortech-simulations (only chilled ceiling)

  16 X 15 = 240 simulations

- Actualized chiller model (2009 edition of ACS08) with adapted control strategy

  → 2 modes: ECO (max. COP, reduced Power) for boiler operation

  POWER (max. Power, reduced COP) for solar op.

- New control strategy for hybrid cooling tower

  → speed control of fan T_MT_set=f(T_HT_in,T_NT_in,Q_set)

2. Change 1: adapted hot side control

- *Formerly* chiller always ran at least with reference temperature (80°C); boiler provided reference temperature if solar system insufficient

- *Adapted*:

  - boiler provides reference temperature only if

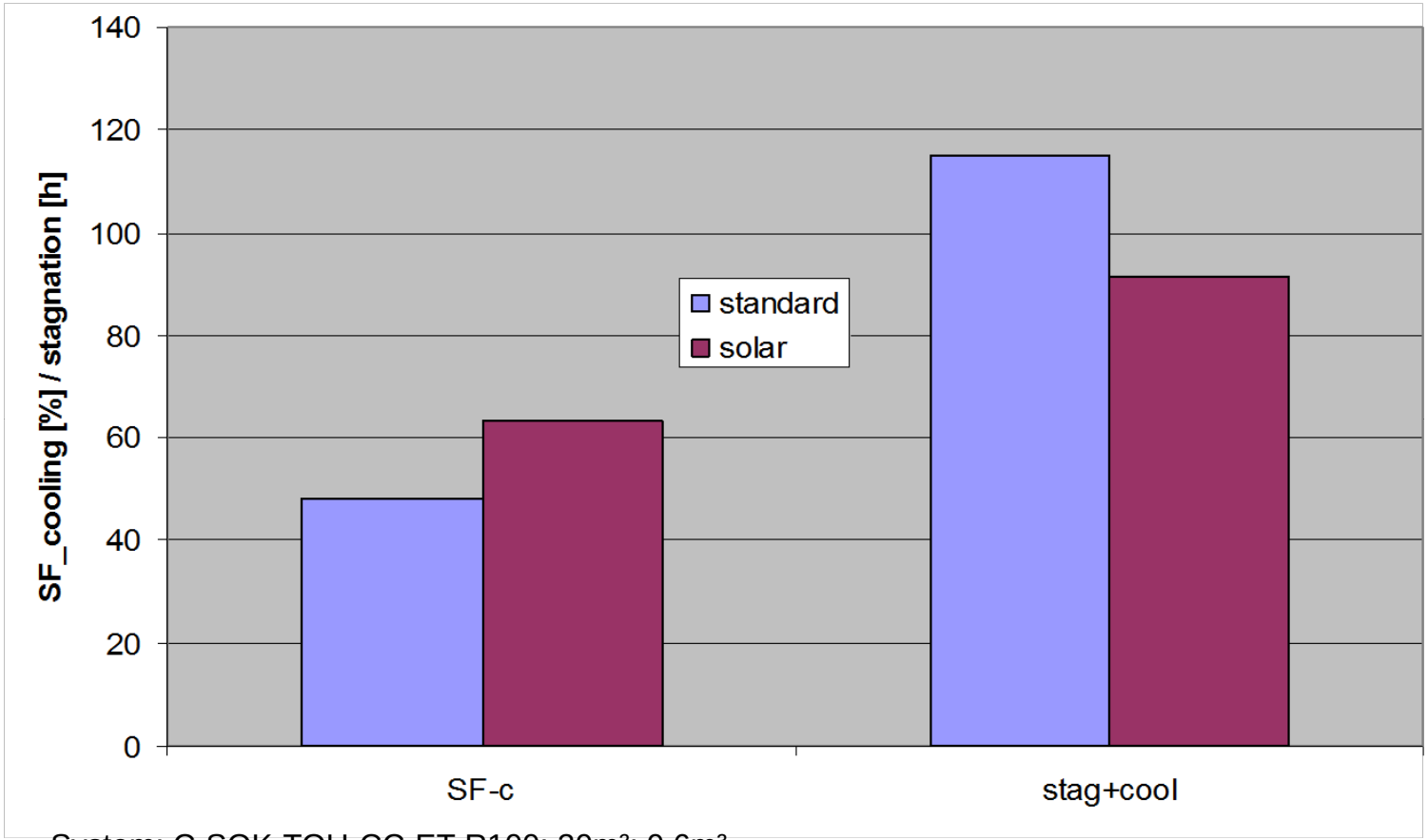
    a) temperature from solar below minimum driving temp.

Sortech + Sonnenklima:	65°C → dT=15K
Rotartica + ClimateWell:	70°C → dT=10K
EAW:	75°C → dT=5K

  or

    b) cooling load could not be covered in last time step

2. Change 1: adapted Boiler operation



System: C-SOK-TOU-CC-ET-R100; 30m²; 0.6m³

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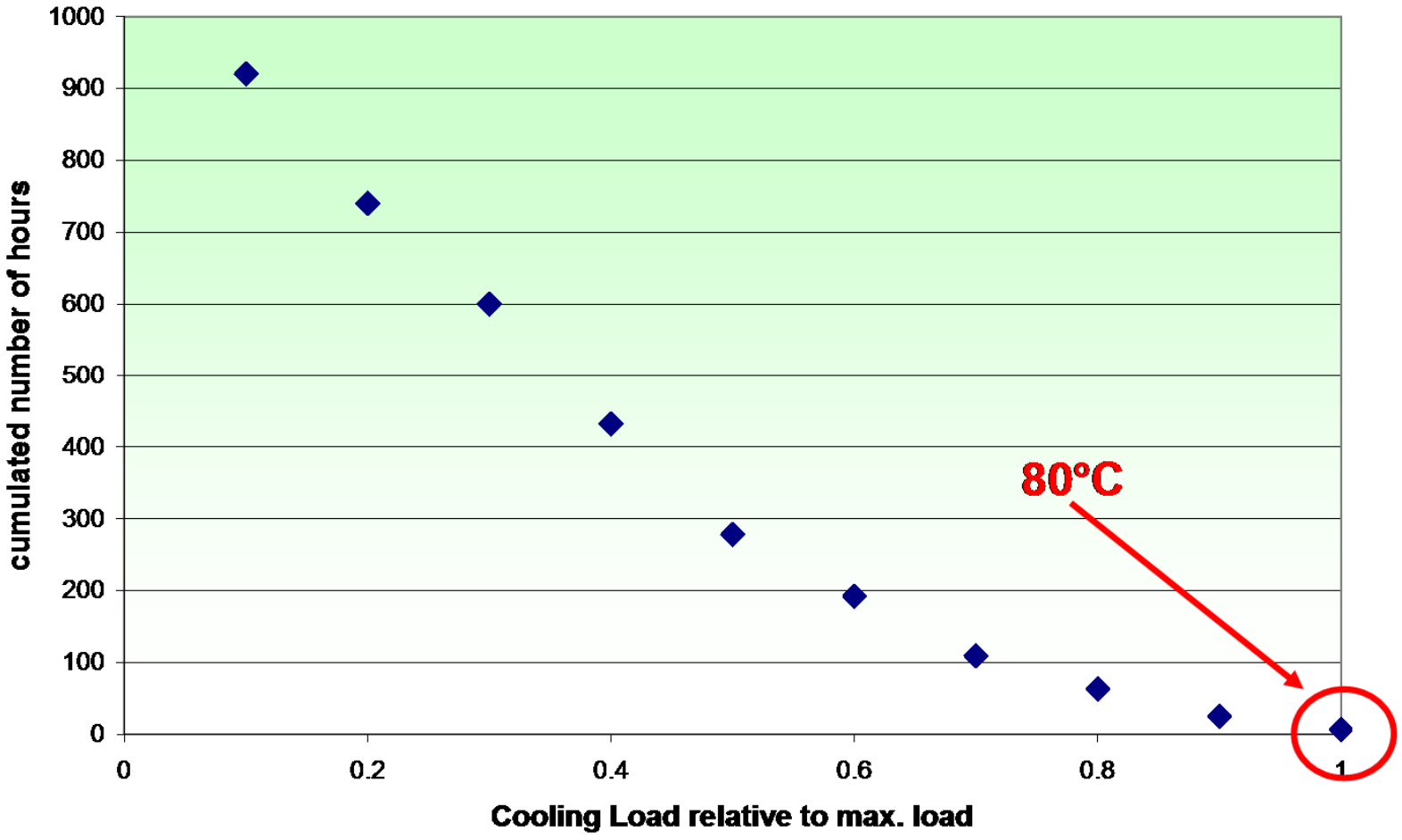
2. Change 2: Change of load file scaling

- *Formerly* the load file was scaled so the maximum cooling load could be met with the reference driving temperature of 80°C.

  → higher driving temperatures lead to on/off – operation since the cold production exceeded the cold demand

2. Change 2: Change of load file scaling



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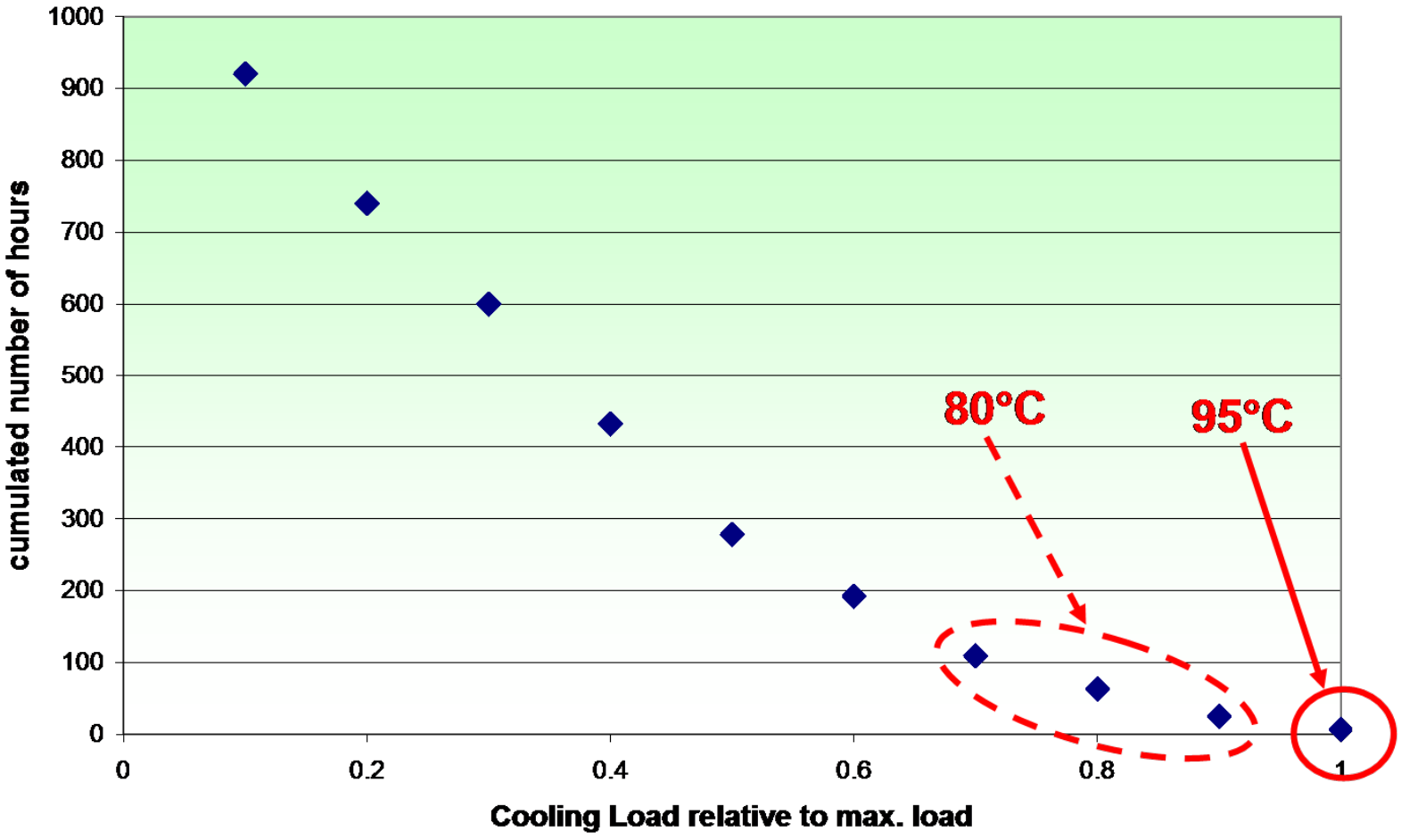
2. Change 2: Change of load file scaling

- *Now*:

  - the load file is scaled to the chilling capacity of the respective chiller at 95°C

Sortech + Sonnenklima:	65°C	→ dT=30K
Rotartica + ClimateWell:	70°C	→ dT=25K
EAW:	75°C	→ dT=20K

2. Change 2: Change of load file scaling



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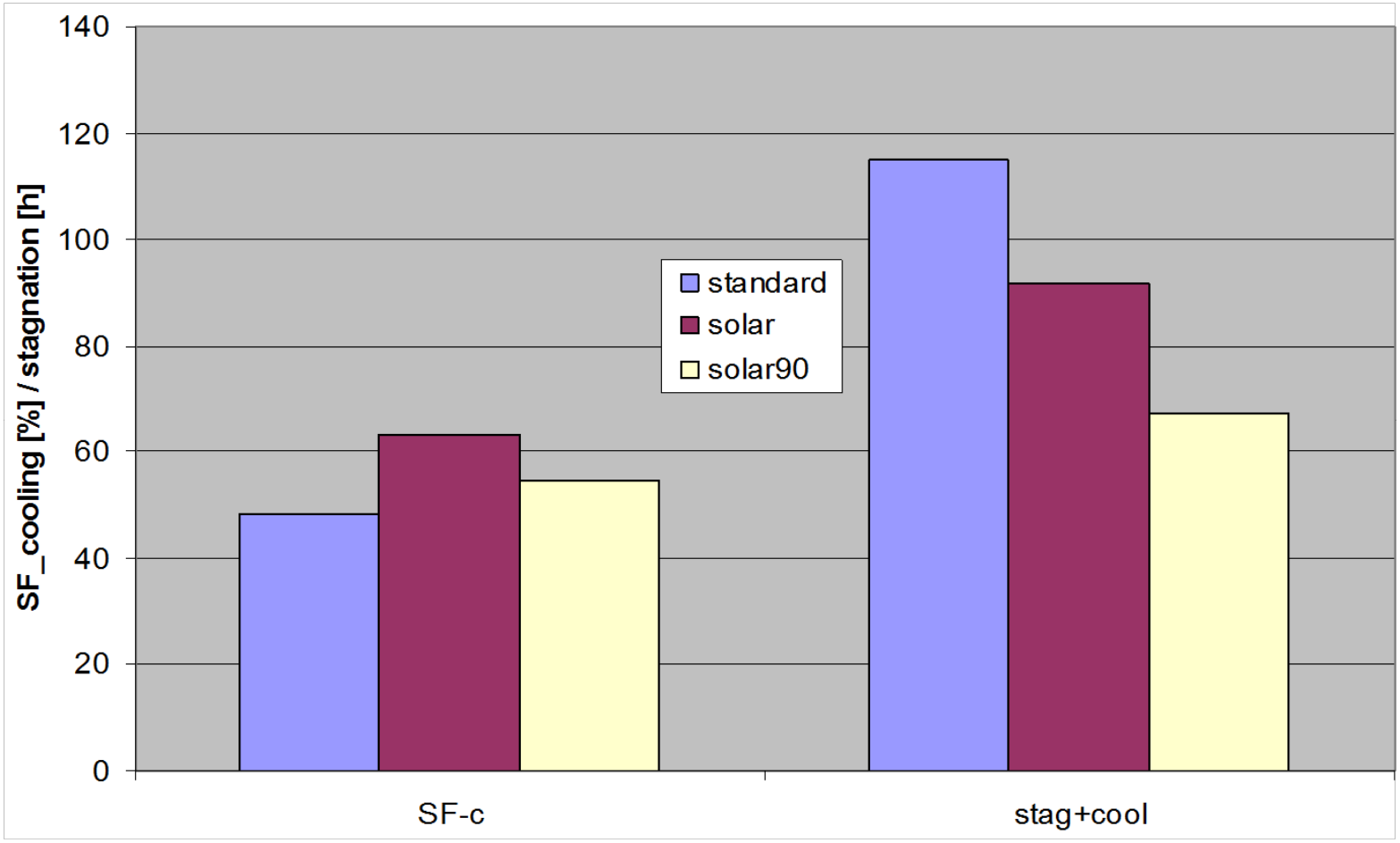
2. Change 2: Change of load file scaling



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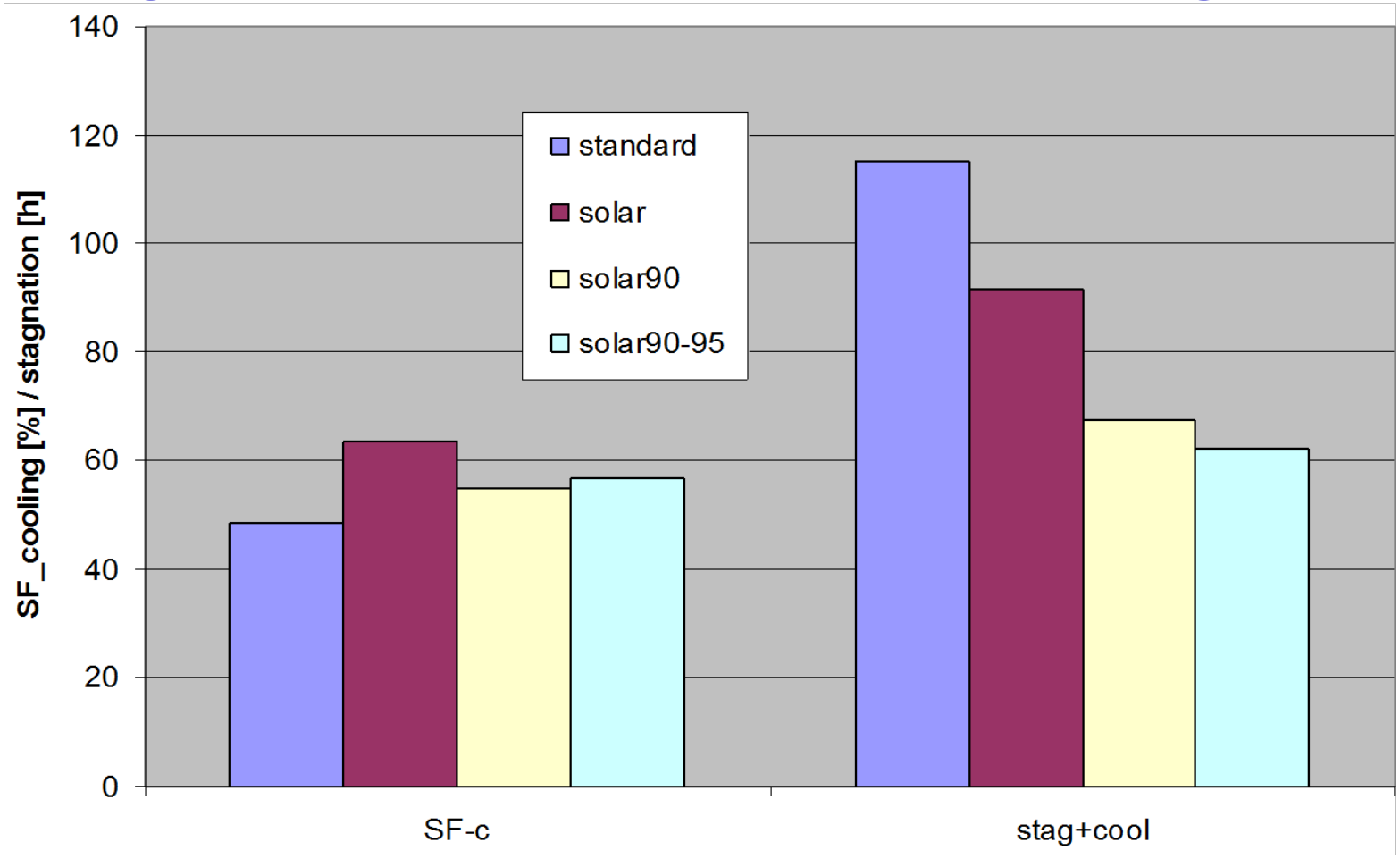
2. Change 3: Increase of maximum storage temp.

- *Formerly* the storage could only be charged up to 91°C
- *Now*:

  The maximum temperature is 95°C

2. Change 3: Increase of maximum storage temp.



System: C-SOK-TOU-CC-ET-R100; 30m²; 0.6m³

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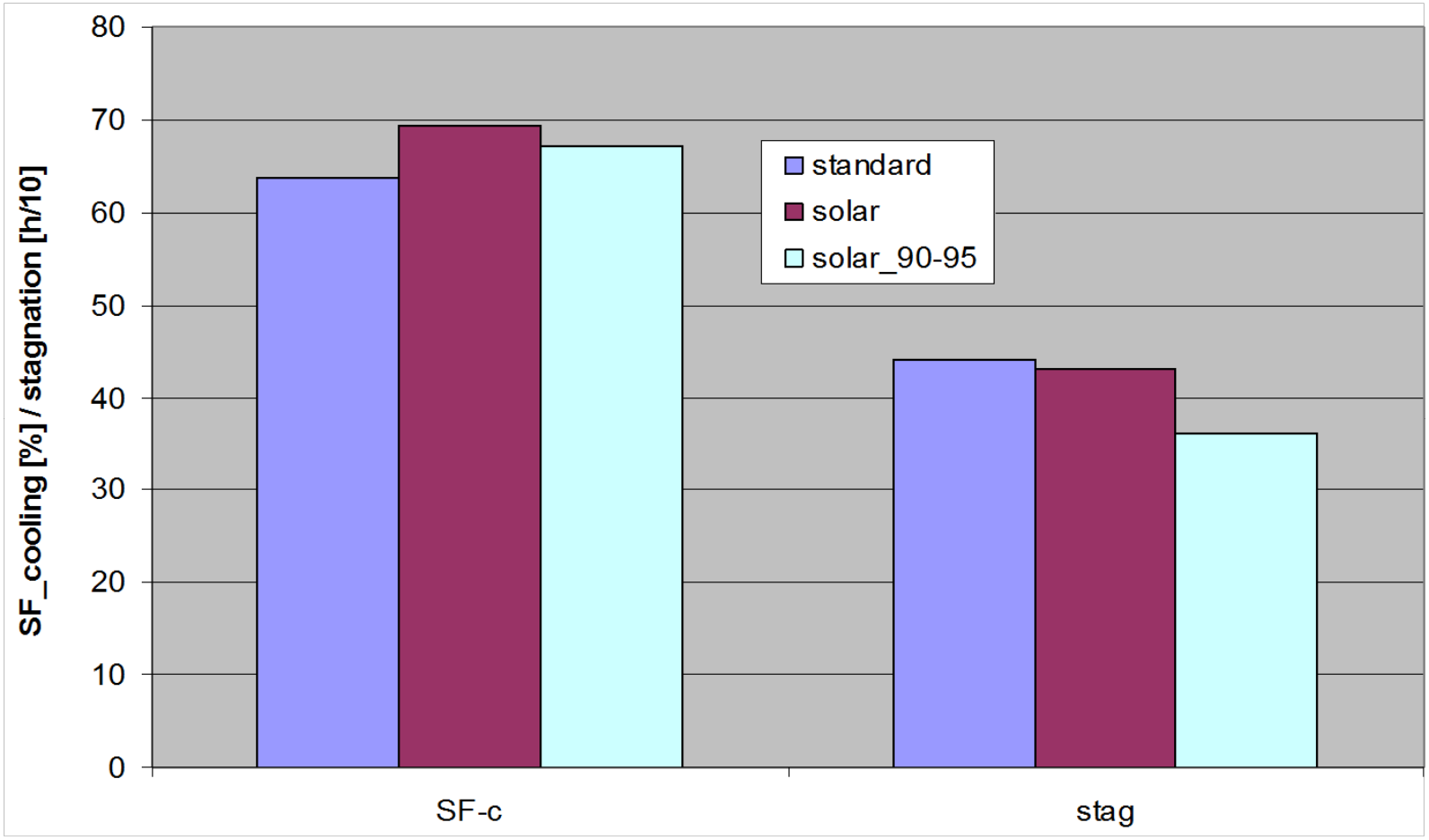
2. Change 3: Increase of maximum storage temp.



System: E-SOR-TOU-CC-ET-R100; 21.5m²; 1.6m³

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2. Idea 4: Two load files for reduced stagnation

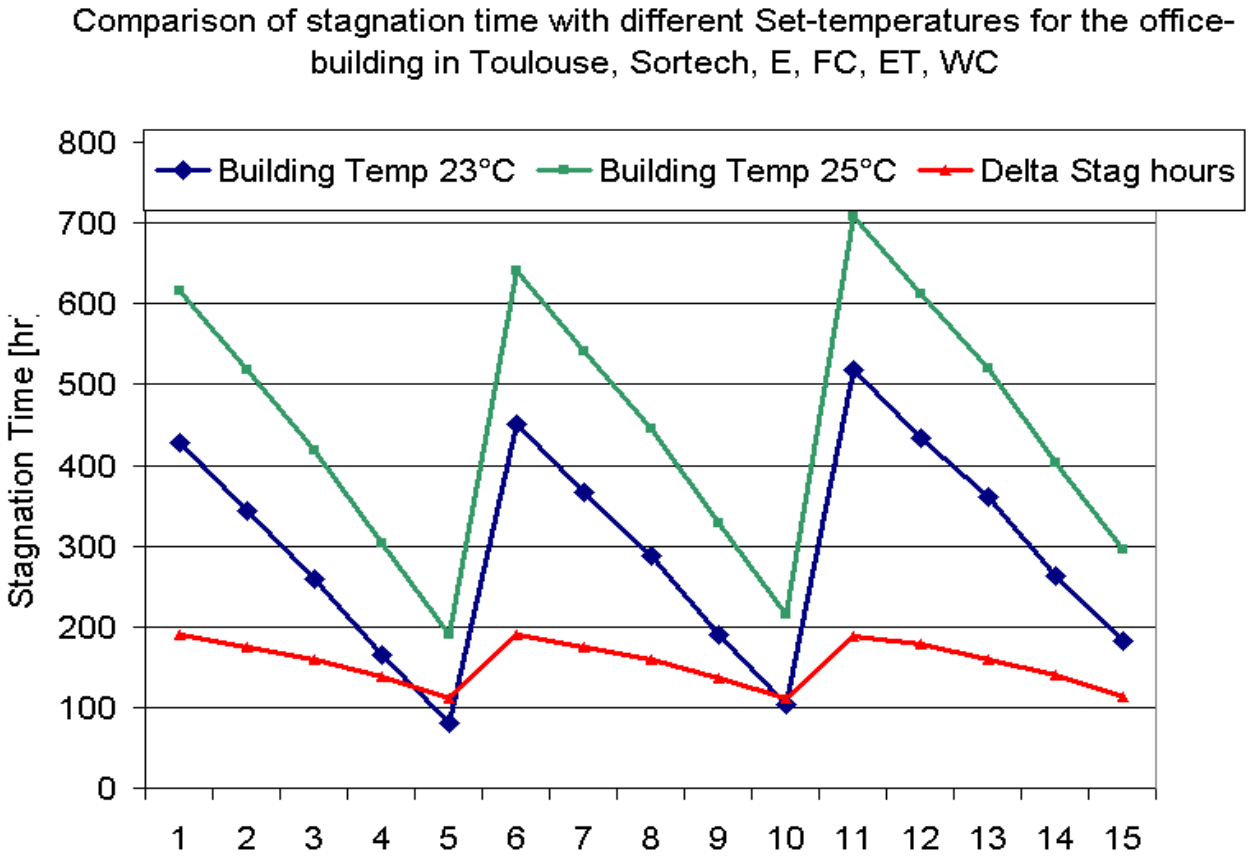
- *Proposal:*

  Combining two loadfiles to reduce stagnation time

-> Unsolved Question

  - How to consider the additional cold (+ parasitic electricity, etc.) in the evaluation??

2. Change 2: Change of load file scaling



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3. Changes in performance figures

- Solar fraction System E

  - considering storage losses and losses in collector system

- Electric efficiency cooling and heating in system E and C:

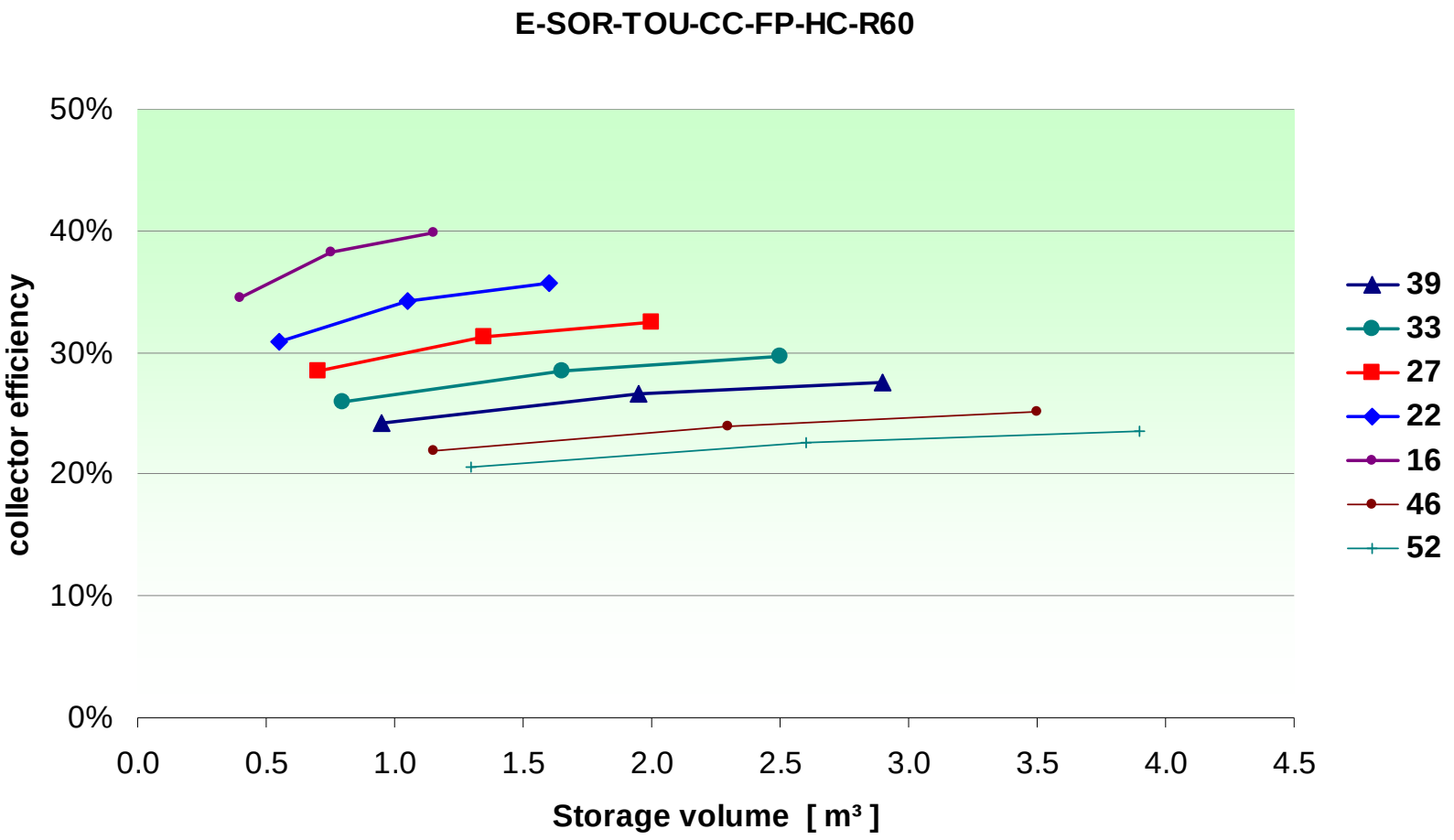
  - new factor for solar pump energy

- Storage losses

  - direct TRNSYS output

-> Changed analysis macro!

4. Results



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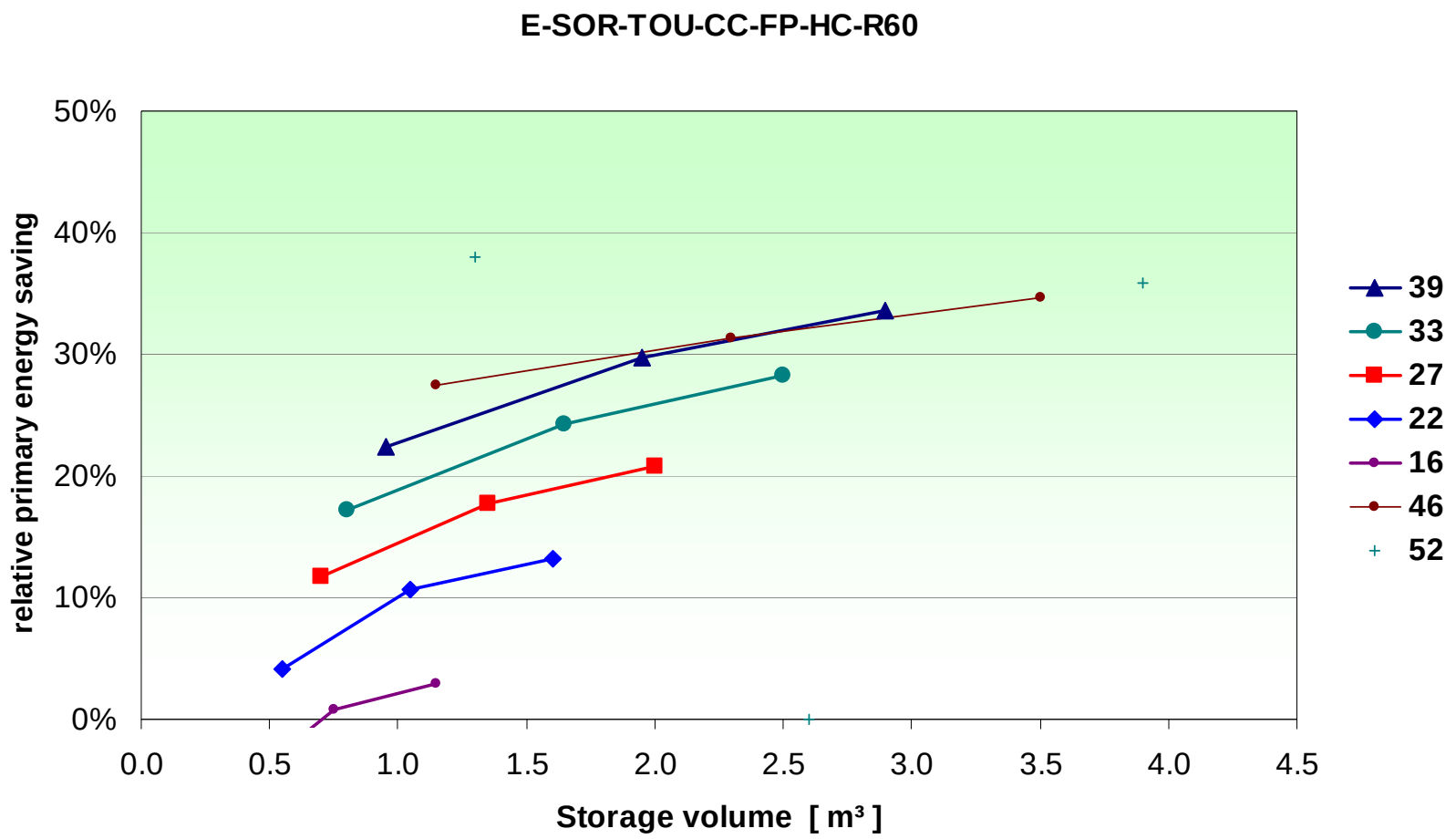
4.



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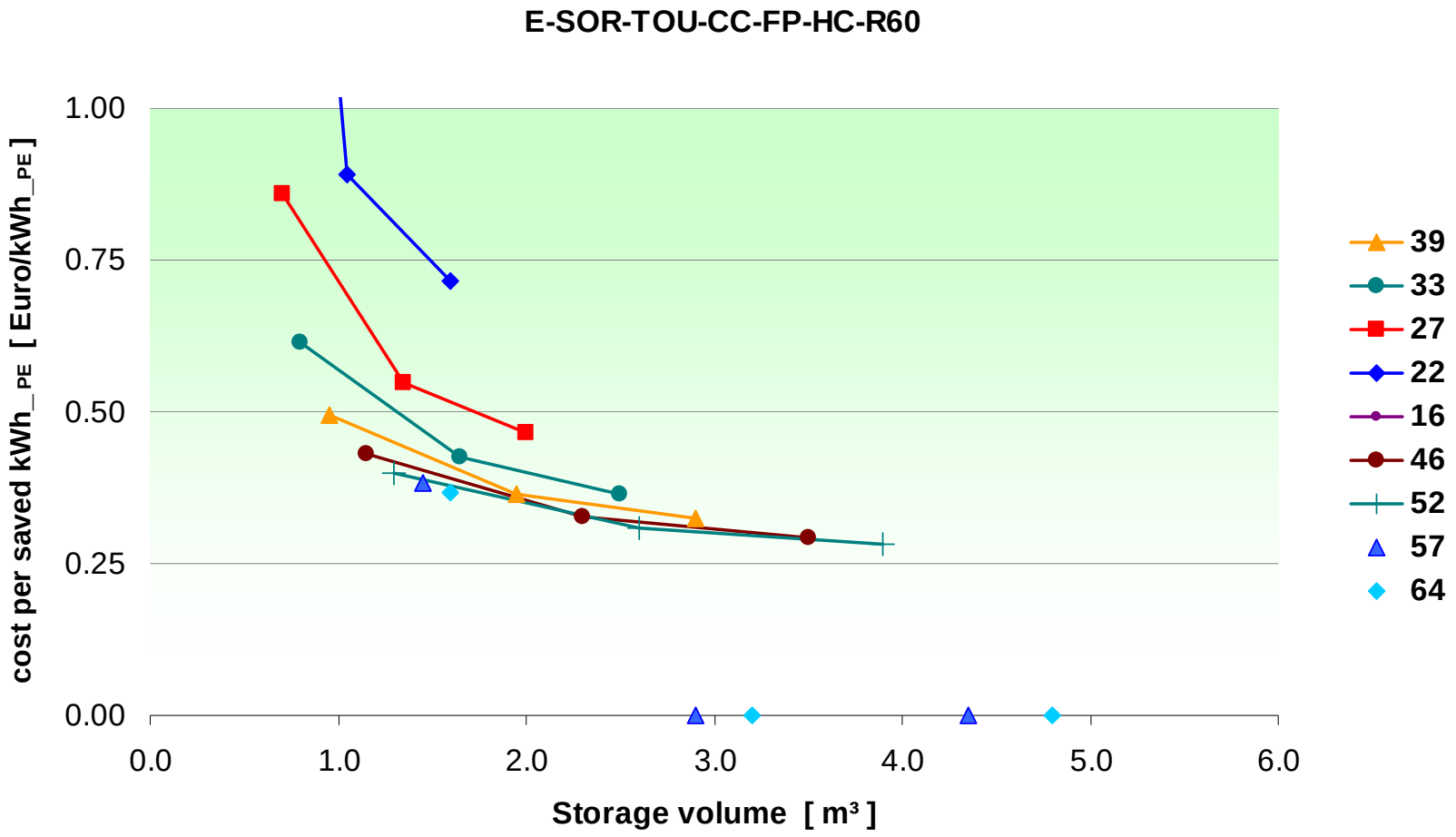
4. Results



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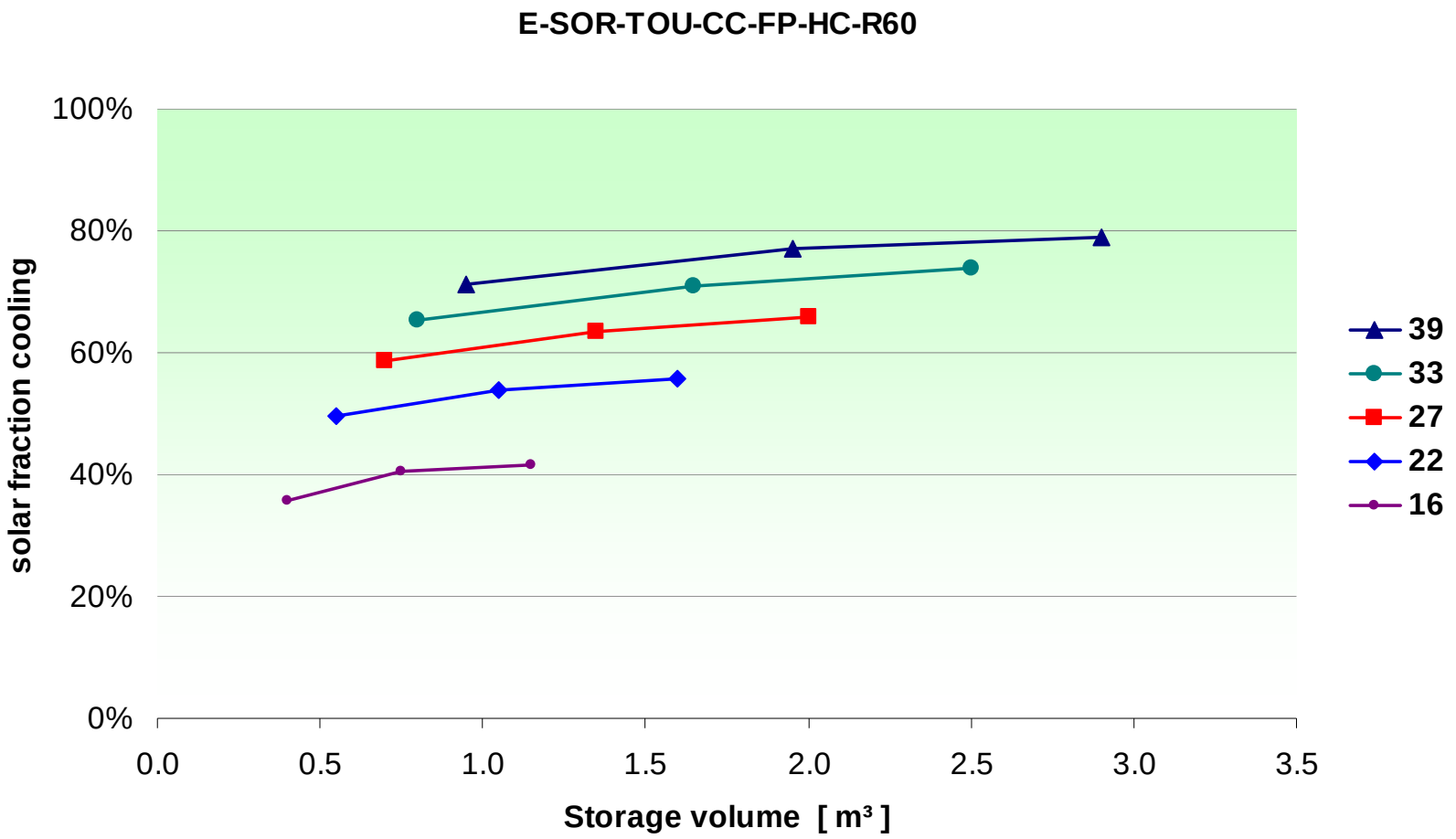
4. Results



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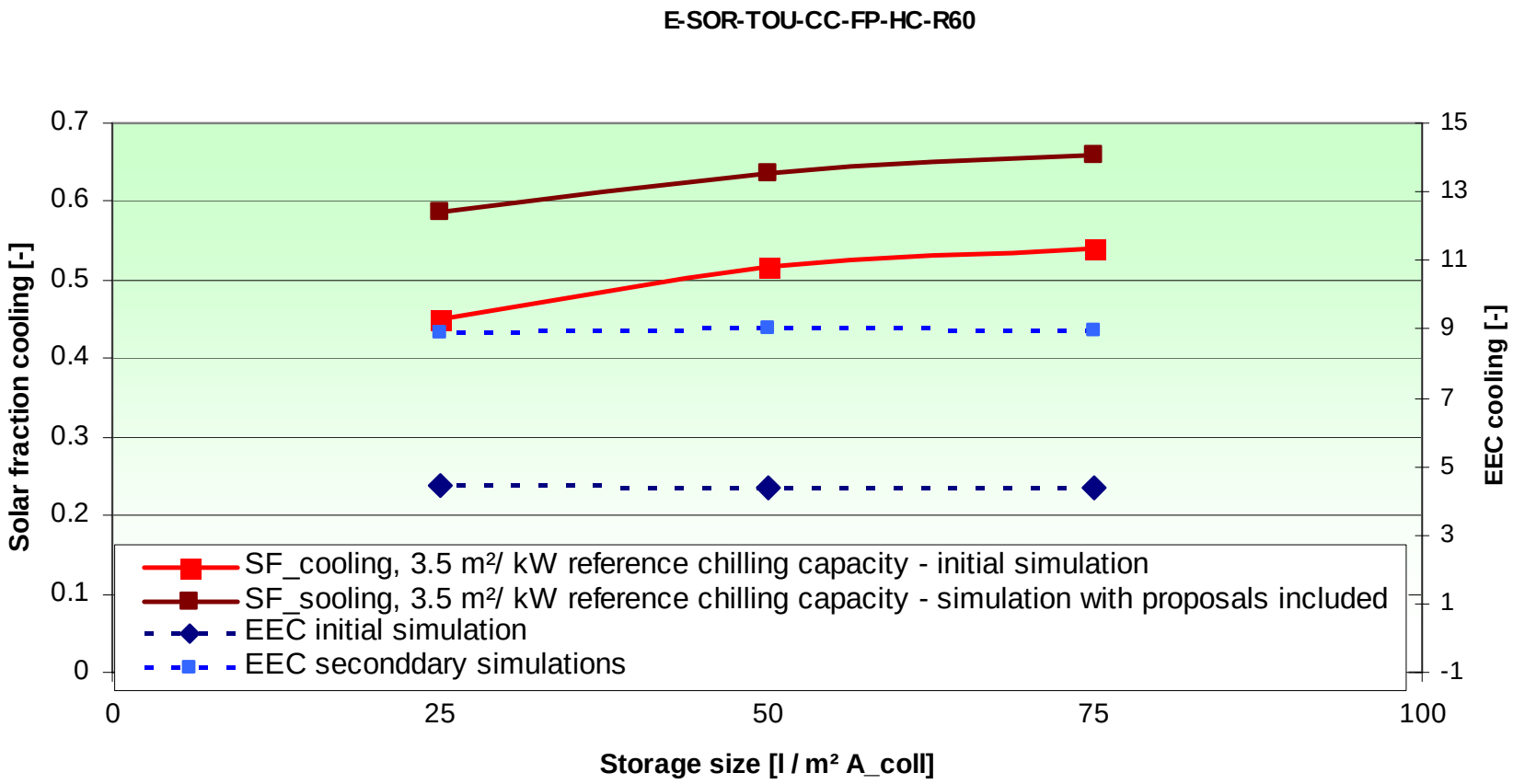
4. Results



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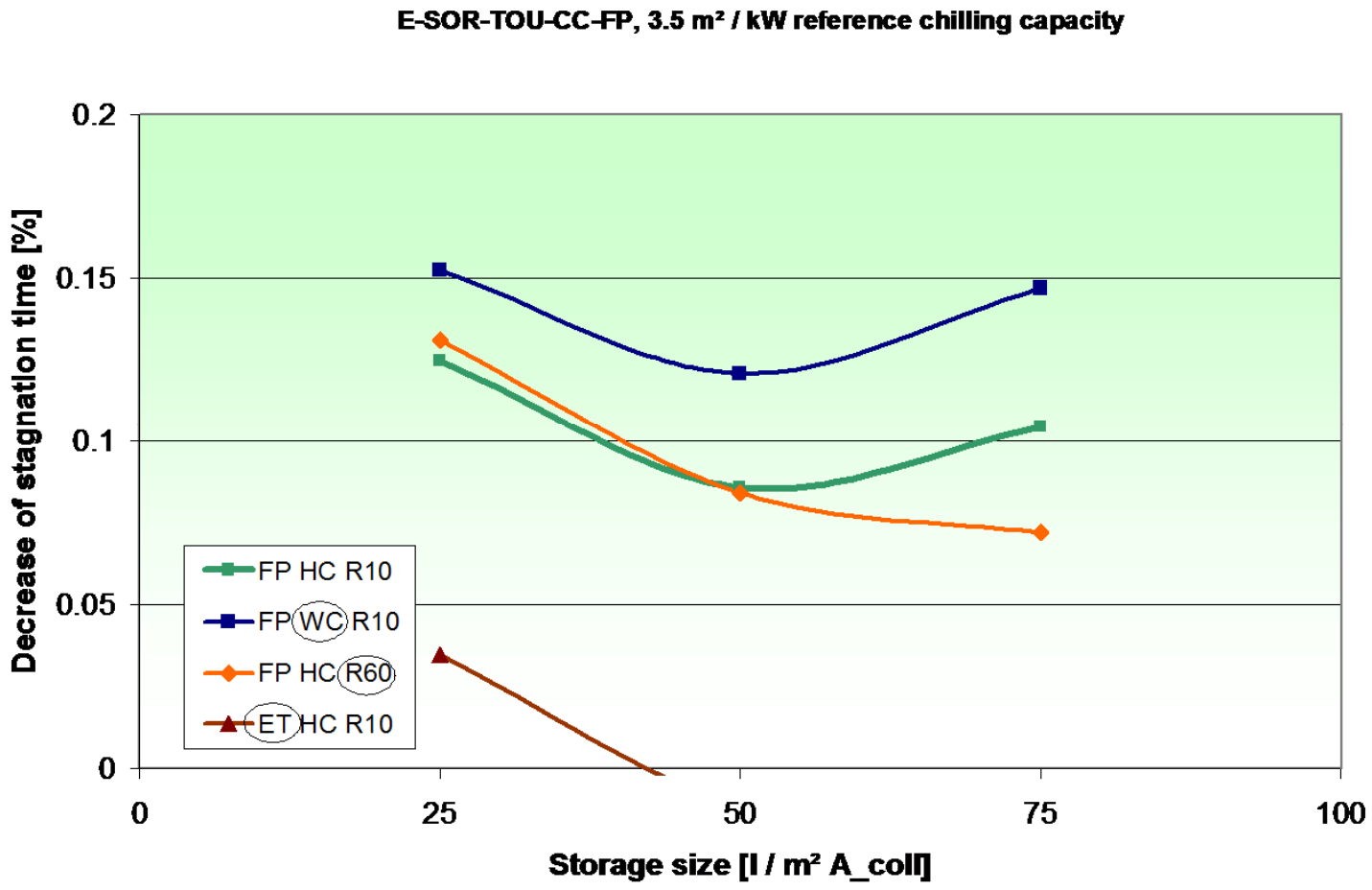
4. Results



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