IEA-SHC Task 53 meeting
Madrid, 10th October 2016

Högskolan Dalarna Task 53 related activities

Chris Bales

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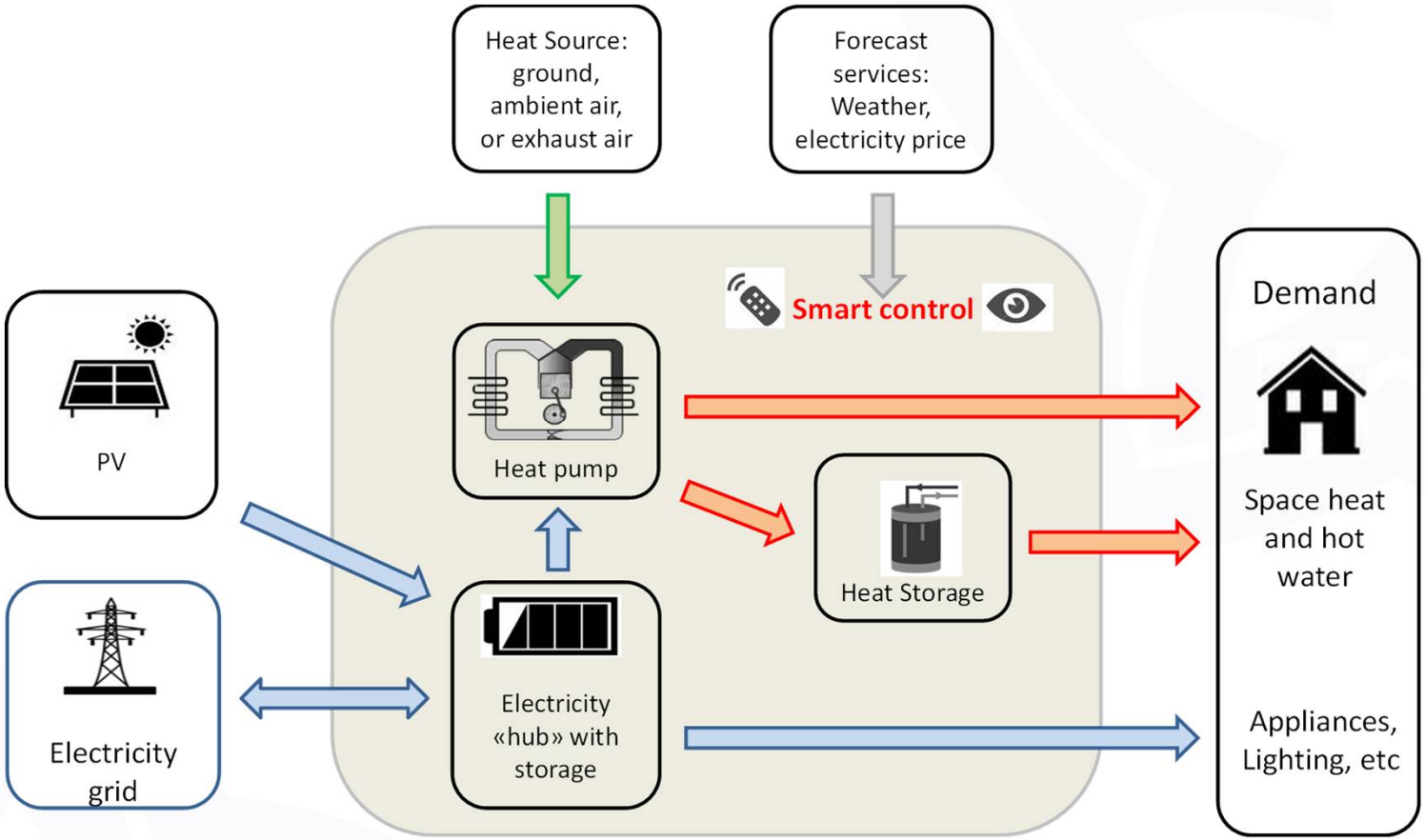
System concept



Collaboration with Swedish industry (Nibe and Ferroamp) and Uppsala Univ.

We do simulations of system and loads

Design control algorithms together

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Eurosun paper

- Base case for Swedish house with independent PV and heat pump systems
  - New SFH with exhaust air HP
  - Detailed modelling of building (6 zones, floor heating)
  - Short time resolution weather and loads
- Development of 3 algorithms for control using thermal and battery storage
  - Alg1 - Thermal only (building + DHW)
  - Alg2 - Electrical only
  - Alg3 - Thermal and electrical
  - 3 different PV sizes (with same specific battery size)
    - 3.1, 5.7 and 9.3 kW (3.6, 7.2 and 10.8 kWh respectively)

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SFH Building

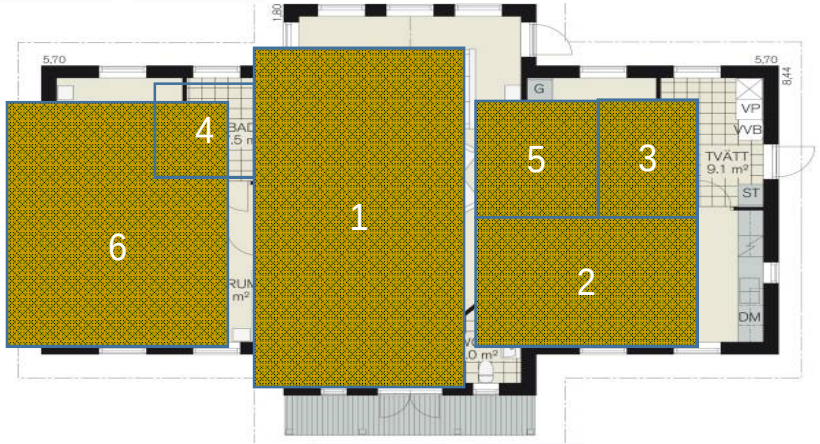
House model ”Domherren”

Floor heating throughout – exhaust air heat pump

(from largest SFH supplier in Sweden)

MacSheep DHW profile (similar to IEA-SHC Task 44)

Thermal energy	kWh year-1
SH load	14923
DHW load	2979
DHW tank losses	669



		Area [m²]	volume [m³]	T_set [°C]
Living room	Zone 1	57	137	21
Kitchen	Zone 2	22.8	55	21
Utility room	Zone 3	9.1	22	20
Bath room	Zone 4	8	19	22
Sleeping room 1	Zone 5	13.4	32	20
Sleeping room 2	Zone 6	36	86.4	20

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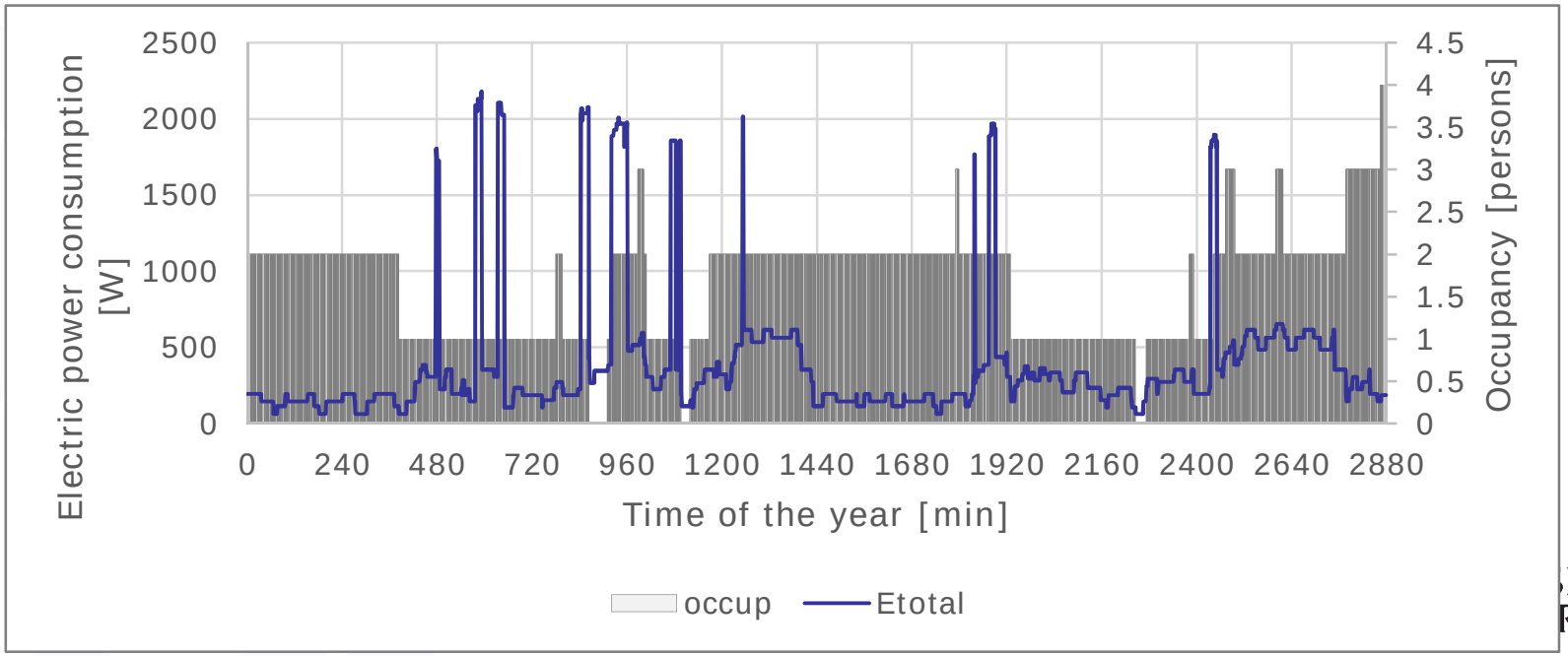
Electrical load and weather

- Occupants file constructed with Markov-chains by Widén J. (Uppsala University)
  - Method derived from monitoring and activity studies
  - 2 minute resolution
  - Annual consumption = 3440 kWh
- Norrköping 2007 measured weather data
  - 1 minute resolution



Comparison of control strategies

- Alg2 (batteries) gives greater saving than Alg1 (thermal storage – with current DHW store)
- Alg3 savings are ~= as combined savings Alg1+Alg2
  - Independent of one another

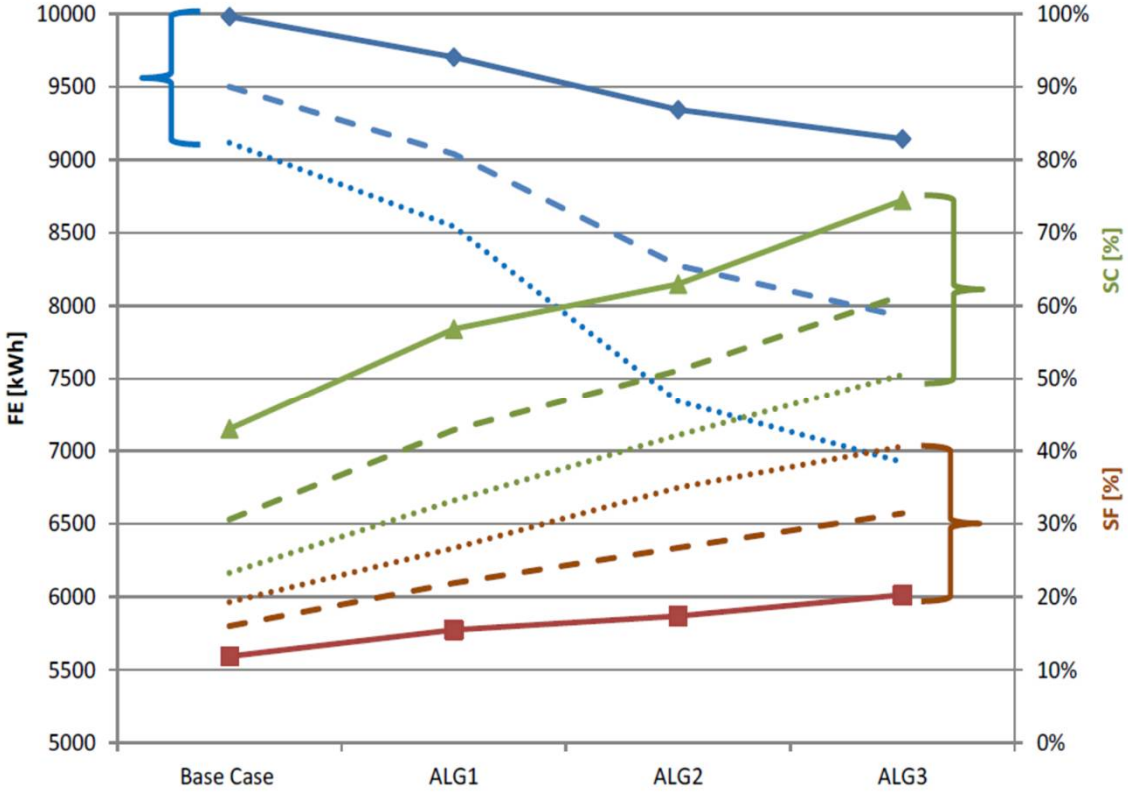
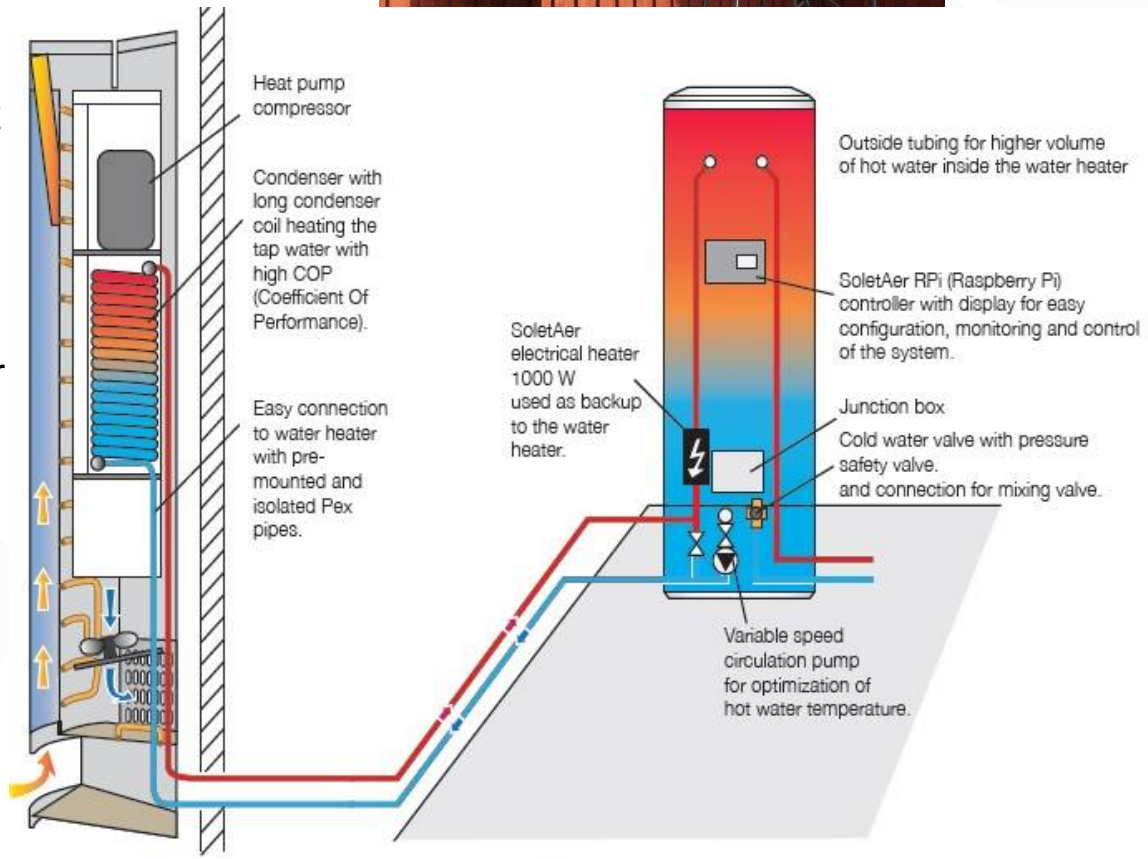


Fig 3: Comparison of the key figures between the base case and the control algorithms 1, 2 and 3. Final energy in blue (diamonds), self-consumption in green (triangles) and solar fraction in brown (squares). The PV sizes are denoted with solid lines (3.1 kW), dashed lines (5.7 kW) and dotted lines (9.3 kW).

Soletaer

www.du.se

- Swedish start-up company
  - Development engineers from Thermia
  - Solar thermal + HP
  - Only DHW
  - Collector is also evaporator
  - Natural convection refrigerant loop for solar thermal part
- Master thesis project
  - Lab measurement of collector performance (simple solar simulator)
  - Suggestion for improvement
  - Test of new prototype
    - Reduced losses
    - Potential for further improvement



Soletaer

Participation in Task 53??

- No financing as yet
- Applied for national project with Nibe/Ferroamp
  - 2018-20
  - System development
  - Field tests
  - Development and use of whole system testing
  - Participation in Task 53
- Otherwise slower progress with internal funding
  - ???participation in Task 53

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