universität innsbruck

Arbeitsbereich für
Energieeffizientes Bauen

SHC
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

Task 53

New Generation Solar Cooling & Heating Systems – Highlights aus dem IEA SHC Task 53

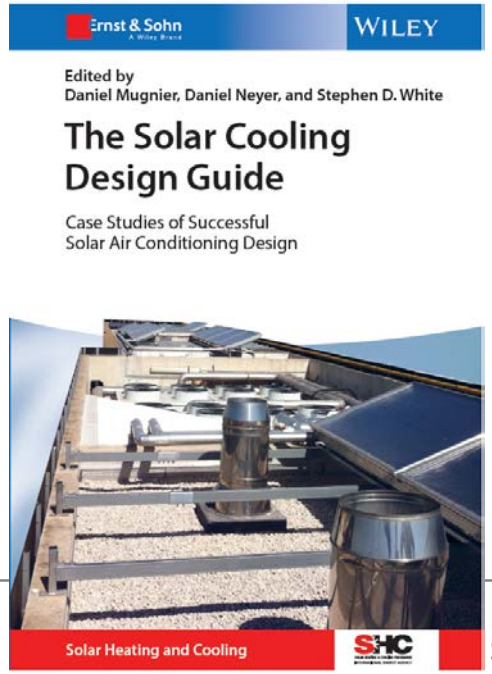
NEYER Daniel, THÜR Alexander

With friendly support by
NEYER Daniel - danielneyerbrainworks
SELKE Tim - AIT Austrian Institute of Technology GmbH
KÖLL Rebekka, FINK Christian - AEE INTEC

FFG
bmvit
IEA FORSCHUNGS KOOPERATION

New Generation Solar Cooling and Heating

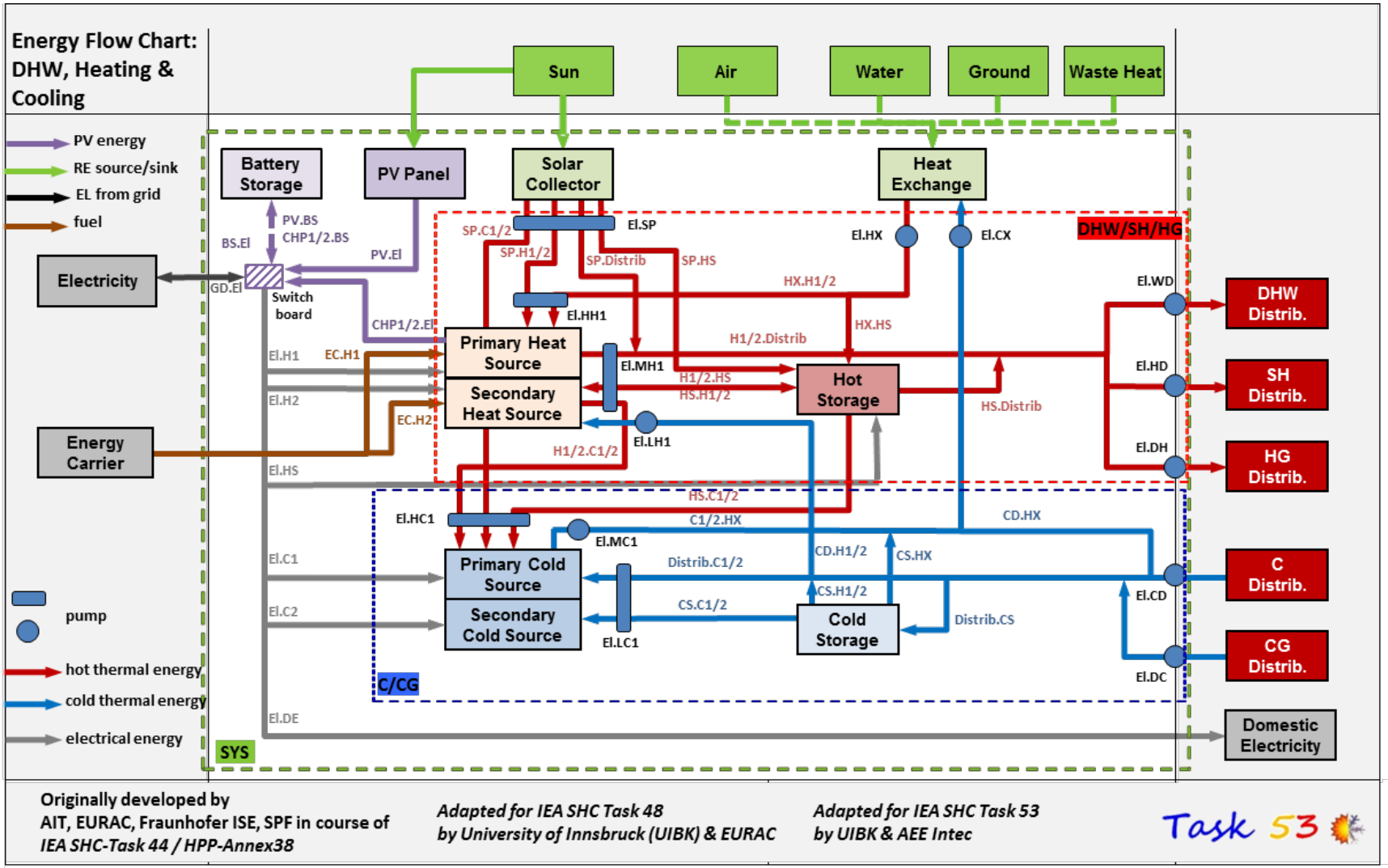
- Huge AUSTRIAN contribution!
  - components & system quality (lead)
  - simulation & design
  - Evaluation & demo projects
- Collection of market available products and system shows main progress in
  - Small scale standard kits
  - Increase of high efficient n-stage
  - Good system performance SPF > 10
- 21 examples at a glance
  - 9 PV / 6 ST / 6 PV & ST
  - Documentation
  - Assessment & benchmarking
- Book publication (Mugnier, Neyer & White)
  - Design guide for solar air conditioning
  - 10 key principles for successful design
  - 3 examples in detail



Technical and economic assessment
T53E4 Tool - Energy Ecology Economy Evaluation Tool

- Uniform Methodology for assessment and benchmarking
  - Compare renewable heating & cooling
  - Benchmark against reference and other renewables
  - Task53 Standard & local specific
  - Key figures for each (sub-)system
- Database
  - Technical (efficiency, COP, SCOP, EER, SEER,…)
  - Ecological (primary energy conversion, CO2equ,…)
  - Economic (Investment, replacement, maintenance, …)
- Technical Key Figures
  - Primary Energy Ratio: PER_{NRE}, $PER_{NRE.ref}$
  - Primary Energy savings: $f_{sav.NRE}$
  - Electricity equivalent seasonal performance factor: SPF_{equ}
- Economic Key Figures
  - Levelized cost of energy: LCOE
  - Avoidance costs: CO_2/PE_{NRE},
  - CostRatio: $LCOE_{SHC}/LCOE_{REF}$

T53E4 Tool - Energy Ecology Economy Evaluation Tool

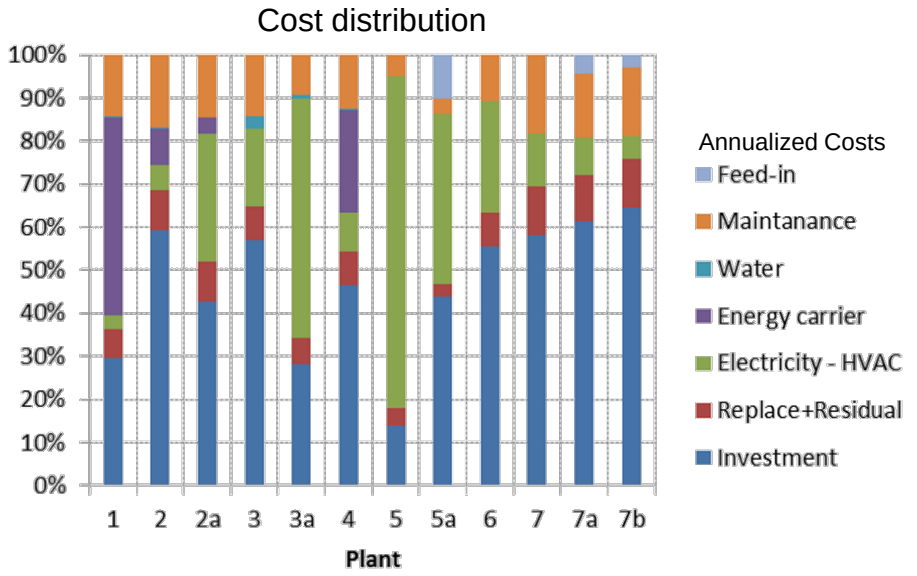


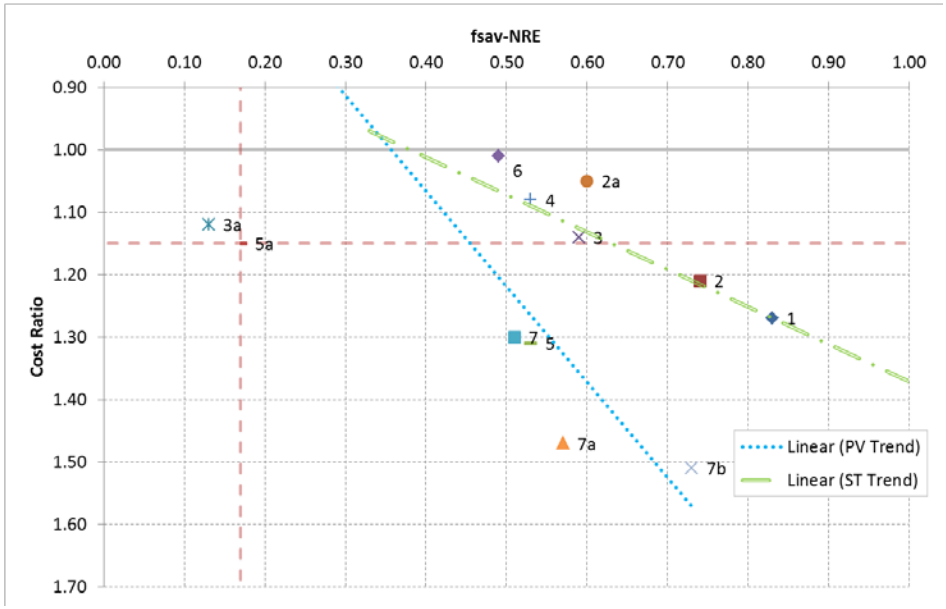
PV vs. ST systems

» 7 examples at a glance
- status 10/2016; update 11/2017
- PV: 3(+3); ST: 4(+2)
- DHW + C: 7; SH+DHW: 3; SH+C: 1, DHW: 1
- Austria/France/Spain

» Conclusion
>50 % PE_{NRE} savings & CR > 1
Higher solar fraction → higher costs
SHC can become cost competitive
SHC costs are investment dominated

» Next steps
Update to 21 examples + derivatives
Clustering: Application, Location
Sensitivity: Boundary conditions





universität innsbruck

Arbeitsbereich für
Energieeffizientes Bauen

bmvit

IEA FORSCHUNGS KOOPERATION

FFG

Daniel NEYER

Universität Innsbruck
Institut für Konstruktion und Materialwissenschaften

Arbeitsbereich Energieeffizientes Bauen
Technikerstraße 13, 5. Stock, A-6020 Innsbruck

Telefon +43 512 507-63652
Mobil +43 512 507-976618
Fax +43 512 507-63698
E-Mail daniel.neyer@uibk.ac.at

Daniel NEYER

danielneyerbrainworks
CORE I the cybernetcis of
renewable energy and efficiency

Oberradin 50,
6700 Bludenz

+43 664 2826529 Mobil
daniel@neyer-brainworks.at E-Mail