

Update trabajos IEA Task 64 - Solar Process Heat

Miguel Frasquet

miguel.frasquet@solatom.com



Task 64 IEA-SolarPaces “Solar Process Heat”

<https://task64.iea-shc.org/>

5º Expert meeting (24 Marzo)

60 participantes - 7 entidades españolas

- CIEMAT
- RIOGLASS
- SOLATOM
- TEKNIKER
- UNED
- UNIVERSIDAD SEVILLA
- UPV

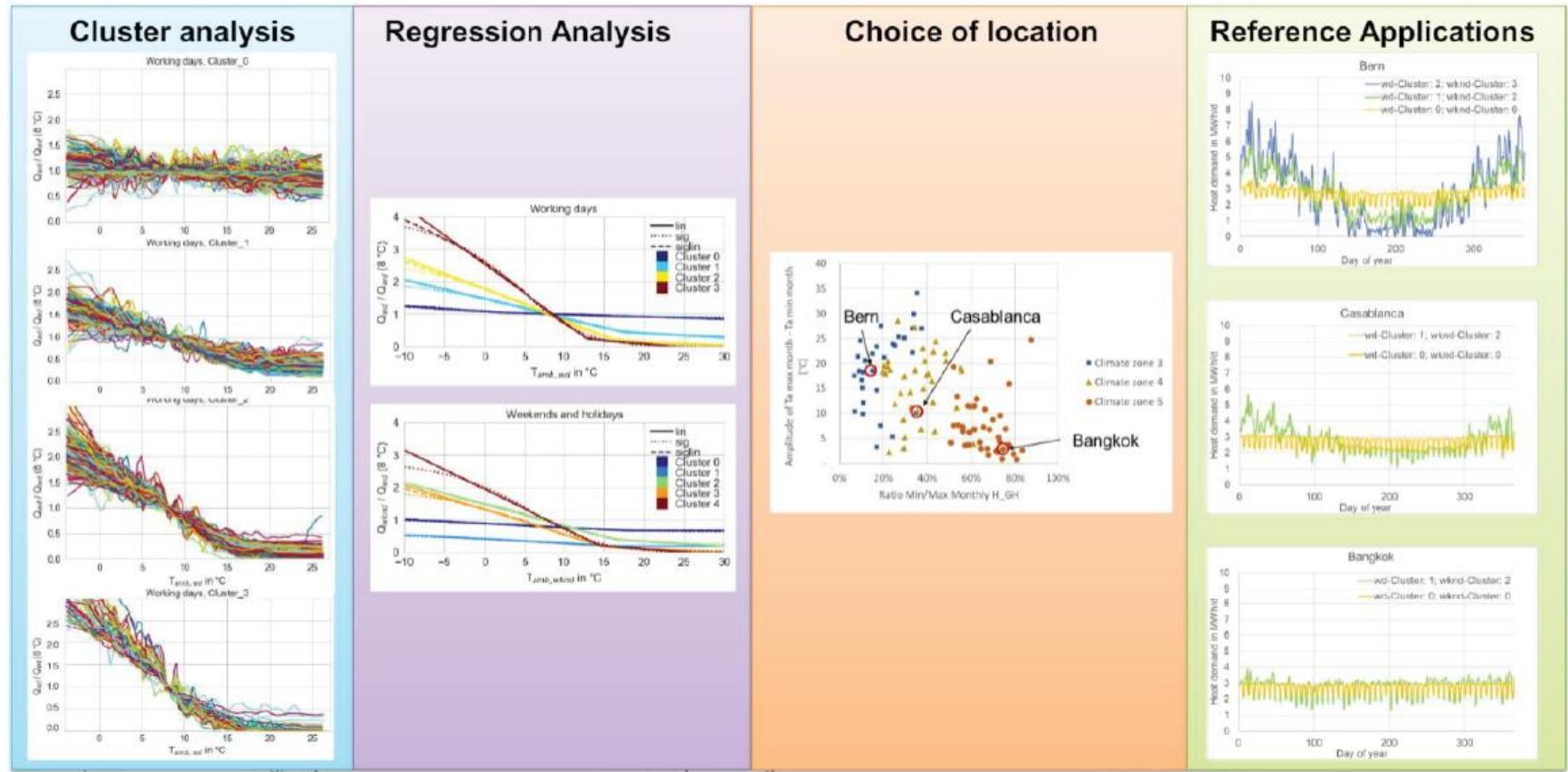
Andreas Häberle

Tobias Hirsch

- SUBTASK A - Integrated energy systems
- SUBTASK B - Modularization
- SUBTASK C - Simulation and design tools
- SUBTASK D - Standardization/Certification
- SUBTASK E - Guideline to market

SUBTASK A - Integrated energy systems

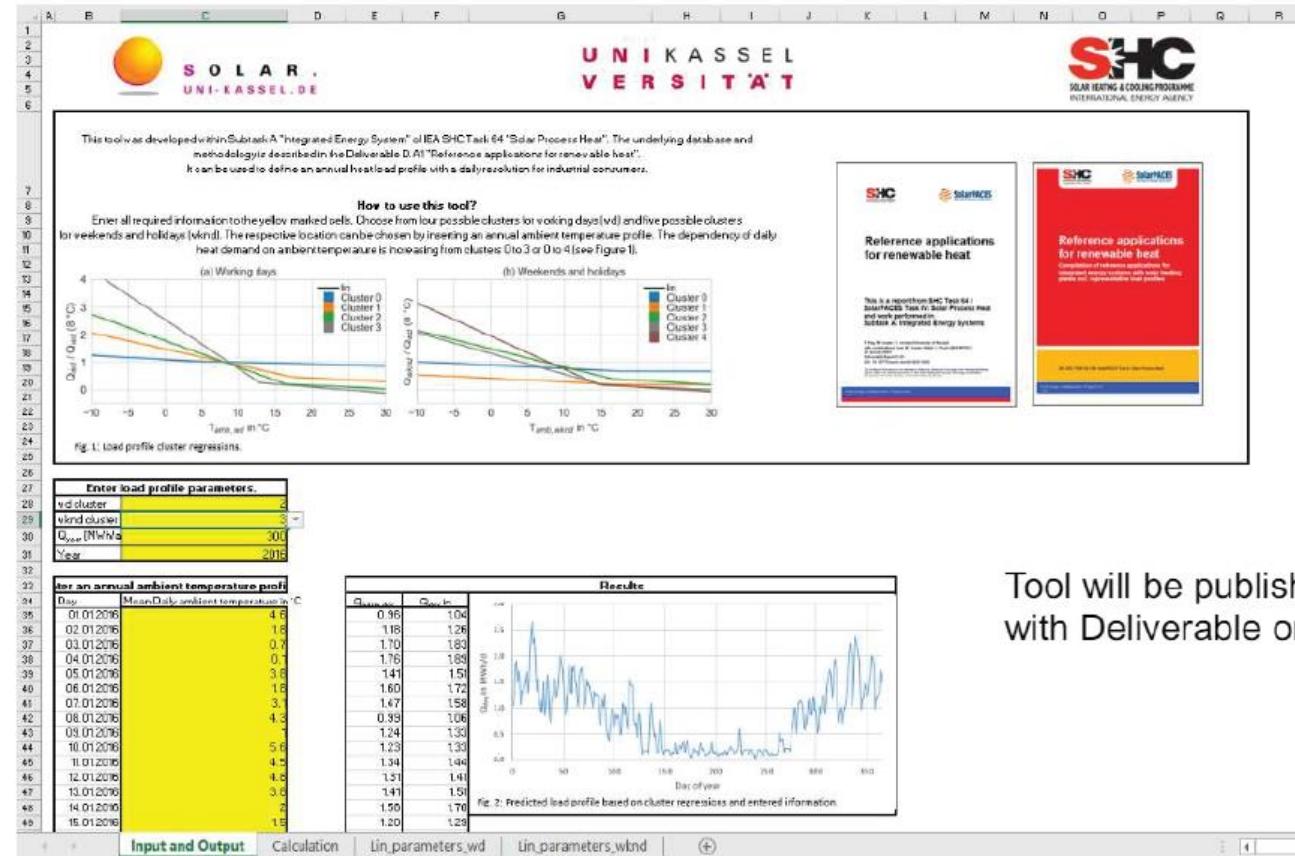
- A1 - Analysis of industrial heat load profiles
- A2 - Choice of reference locations
- A3 - Design of hybrid heat generation systems (Solar + X)



SUBTASK A - Integrated energy systems

Excel tool para la predicción de curvas de carga

- A1 - Analysis of industrial heat load profiles
- A2 - Choice of reference locations
- A3 - Design of hybrid heat generation systems (Solar + X)



- Clusterización principalmente con industrias alemanas
- Variaciones de la curva de demanda con la temperatura ambiente
- Enfocados en baja temperatura

Tool will be published together with Deliverable on Task Webpage

SUBTASK B - Modularization

B1- Modular system concepts for SHIP applications

B2 - Standard components/packages for collectors and hydraulics

B3 - Development of a modular and scalable interface unit for solar process heat applications



SUBTASK B - Modularization

Solar Field Working Fluid

(Pressurized) Water

SAVOSOLAR ?

↔ a) (Pressurized) Hot Water

Thermal Oil ($T_s < 425^\circ\text{C}$)

Direct Steam Generation ($T_s < 280^\circ\text{C}$)

Pressurized Water ($T_s < 240^\circ\text{C}$)

PROTARGET

SOLATOM

RIOGLASS

ABSOLICON

b) Steam

Thermal Oil ($T_s < 425^\circ\text{C}$)

(Pressurized) Water ($T_s < 250^\circ\text{C}$)

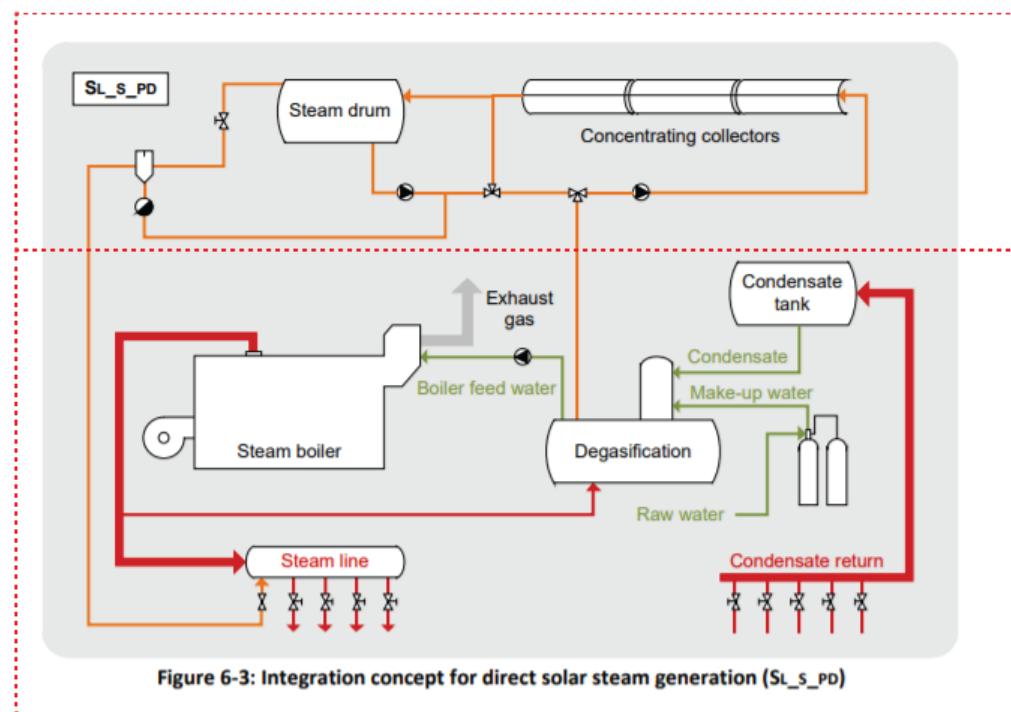
ABSOLICON

ABSOLICON

c) Hot air

SUBTASK B - Modularization

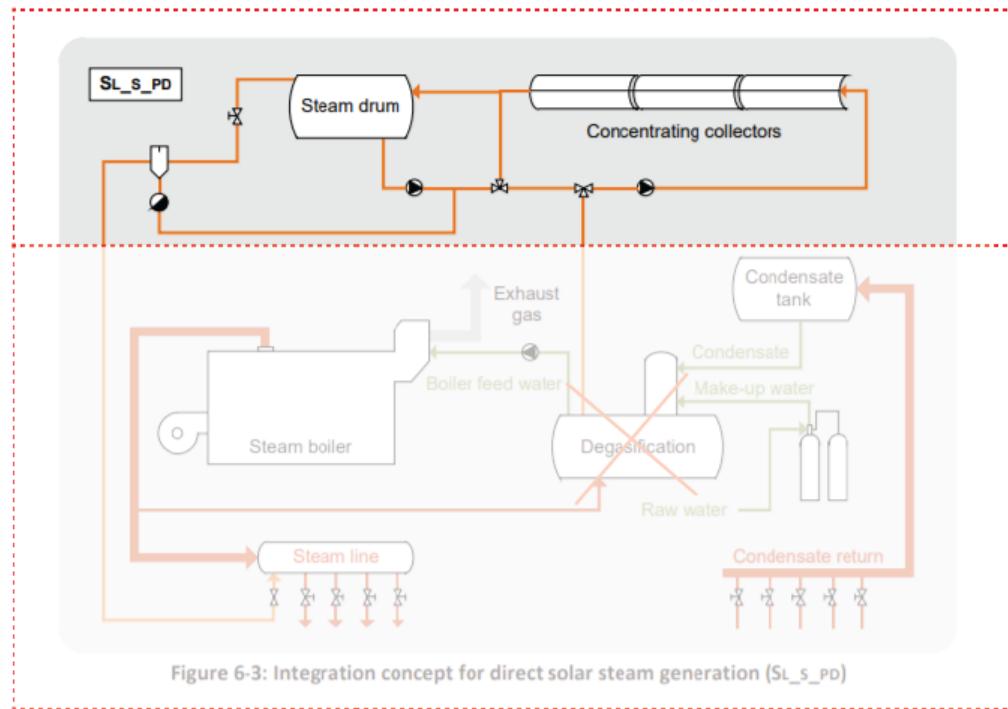
Integration scheme SL_S_PD



Solar BOP - Existing projects

Consumer equipment - Commercial visits
from SOLATOM

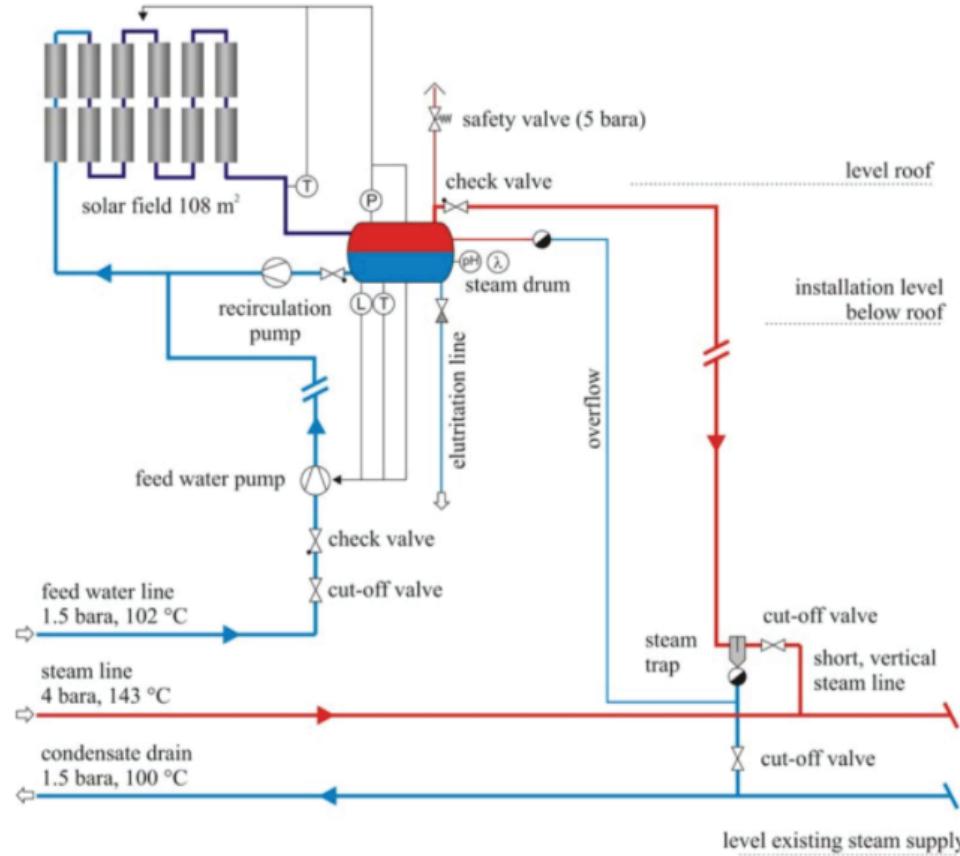
Integration scheme SL_S_PD



Solar BOP - Existing projects

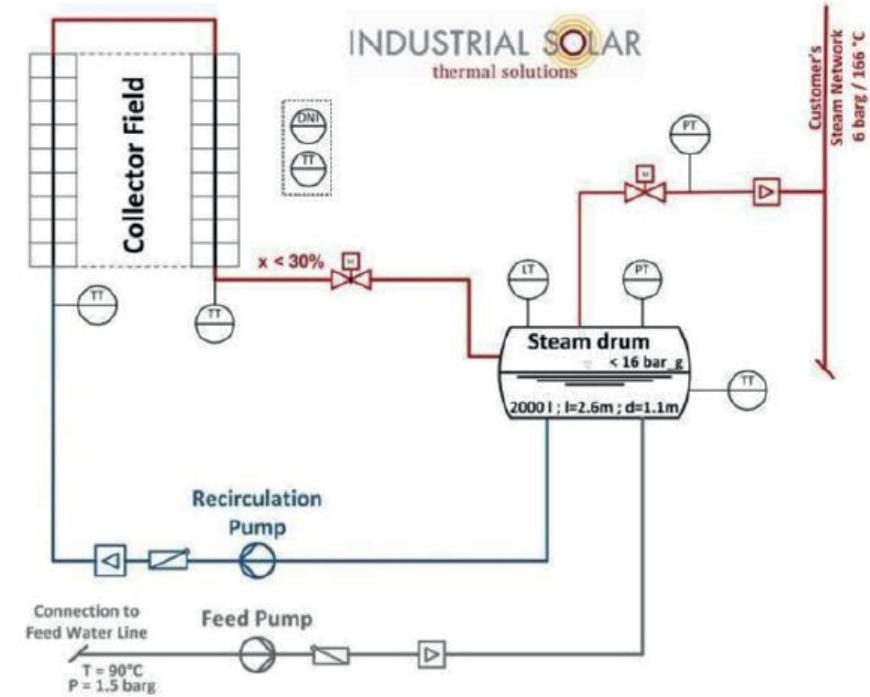
Consumer equipment - Commercial visits
from SOLATOM

P3 Demonstration Plant Alanod

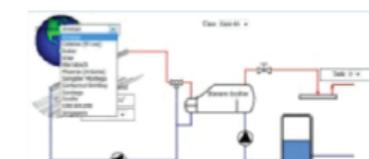
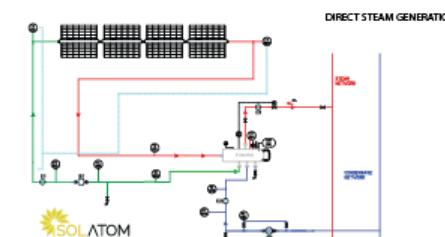
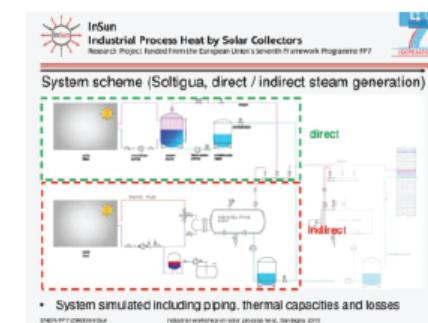
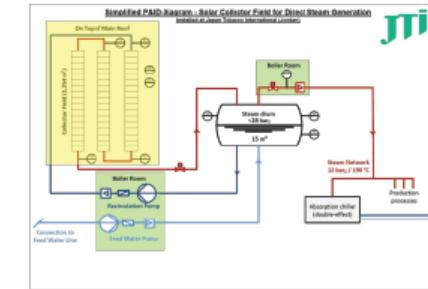
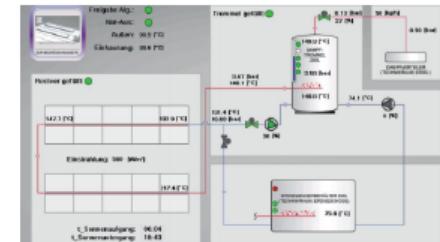
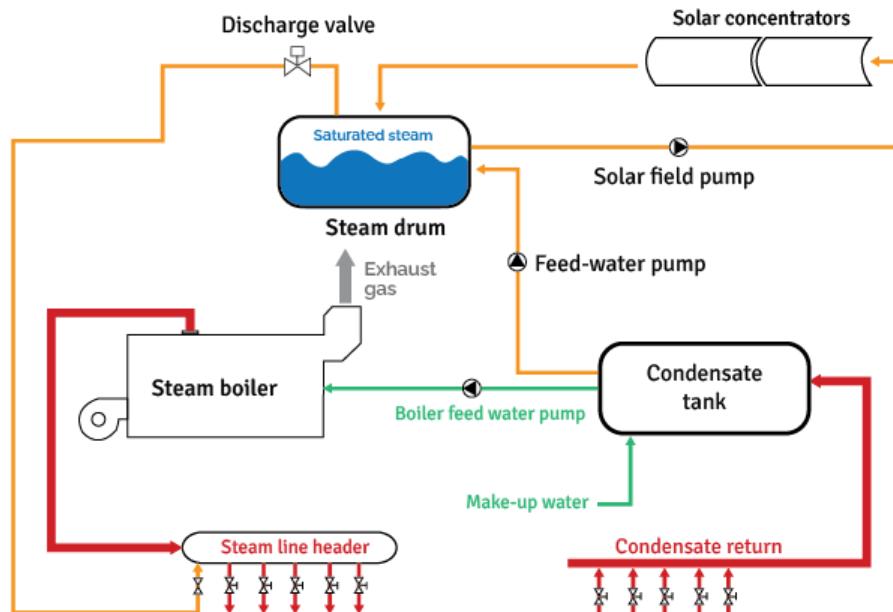


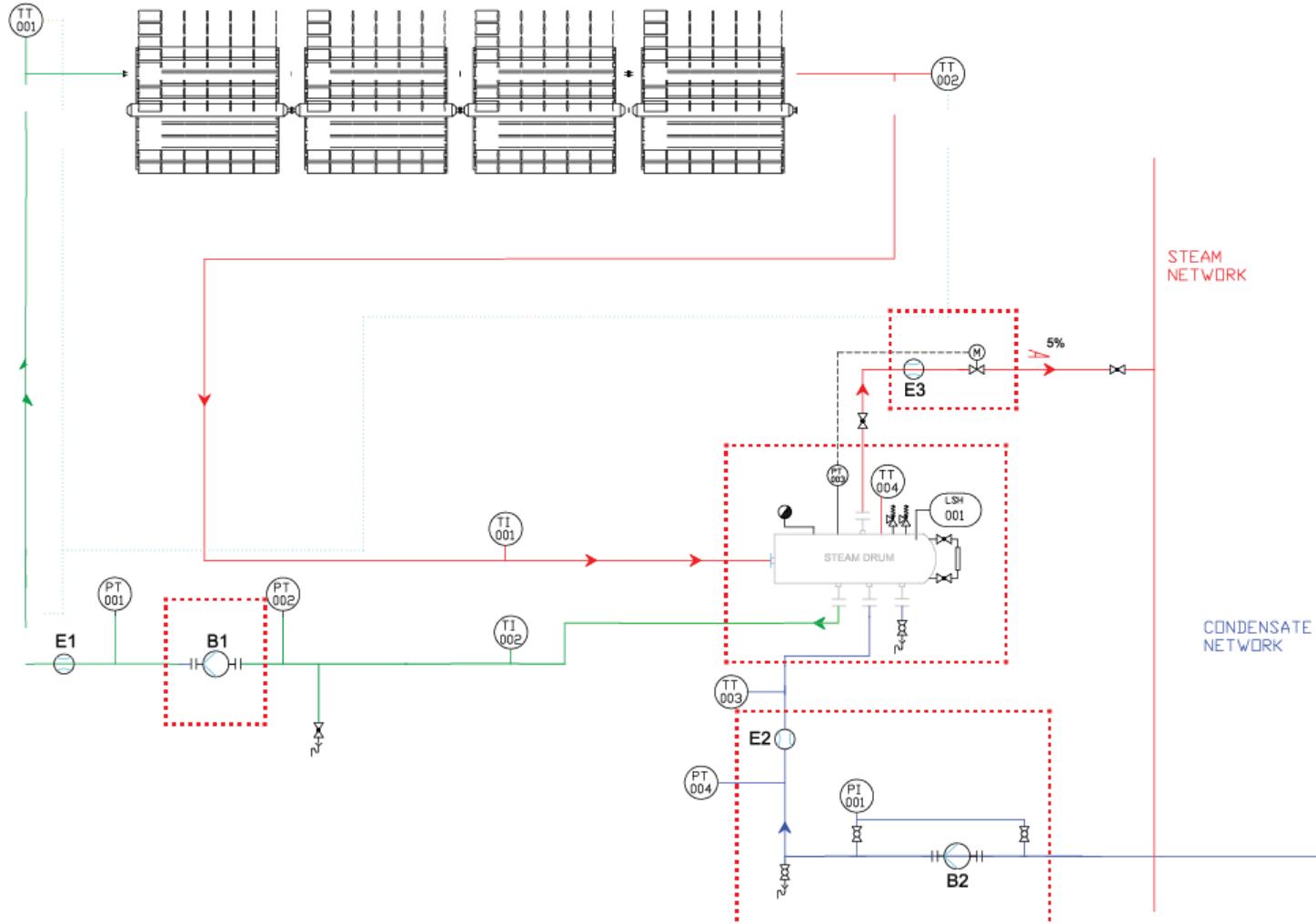
<https://elib.dlr.de/52237/>

RAM Pharma installation



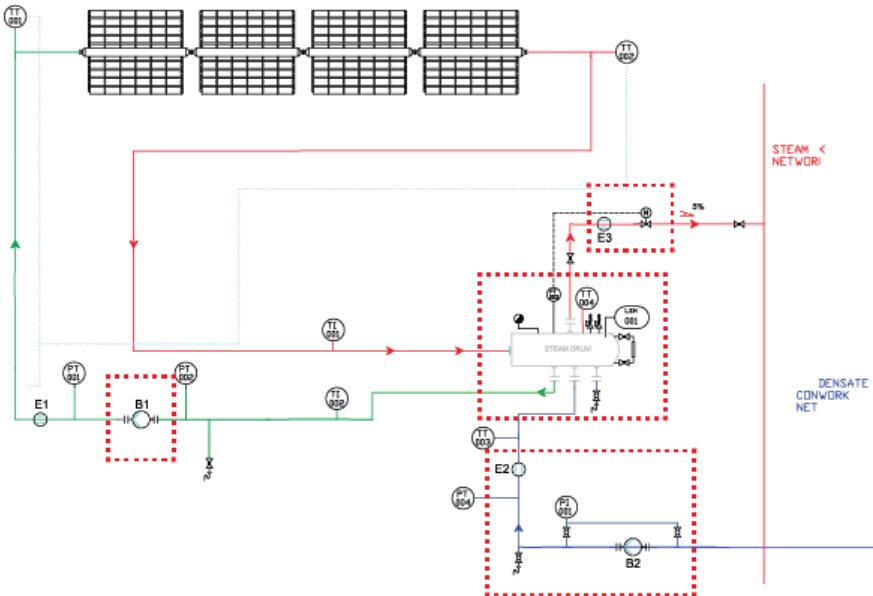
<https://slideplayer.com/slide/12096539/>





- 1) Steam drum
- 2) Solar field pump
- 3) Discharge system
- 4) Feed water system

Unsolved questions regarding DSG:



- 1) Steam drum - Startup and shutdown process:
 - Fill with air
 - Fill with water
- 2) Solar field pump
- 3) Discharge system - Steam flow measurement at low ranges
- 4) Feed water system

Looking for external inputs



DSG needs YOU!

Activity B2 “Standard components/packages for collectors and hydraulics”:

Common to every integration scheme

- + Definition of an standard system for solar radiation measurement in SHIP systems



Common to steam schemes (indirect & direct)

- + Saturated steam flow measurement at low range
- + Standard water treatment unit

SUBTASK C - Simulation and design tools

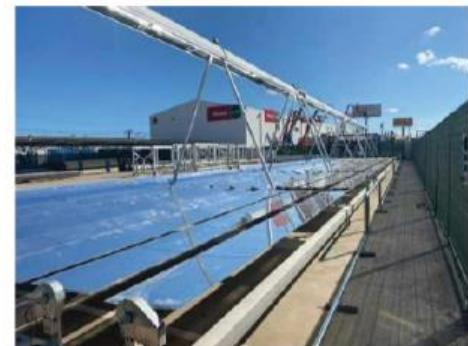
C.1 Identification and Evaluation of available simulation tools for SHIP

C.2 Simulation Tools for Solar Process Heat

C.3 Yield assessment of Actual Solar Process Heat

- ✓ Case Study 1: Cooper mining in Chile
- ✓ Case Study 2: Paper mill in France
- Case Study 3:
- Case Study 4: DSG Linear FRESNEL - SOLATOM

- Inputs: "Standardized" simulation parameters + meteo data
- Expected results: "Standardized" results data that should be supplied for the assessment.

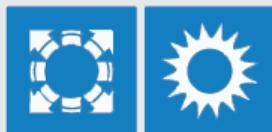
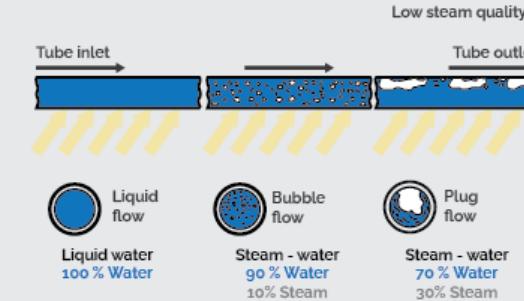
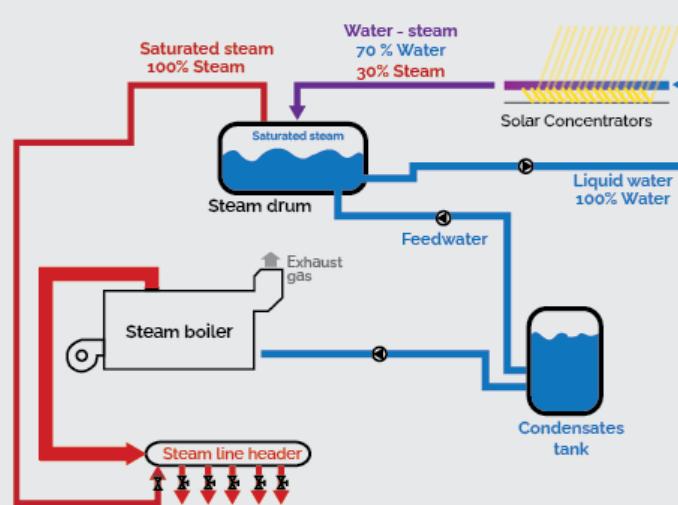


CASO 4: DSG with Fresnel

SHIPcal

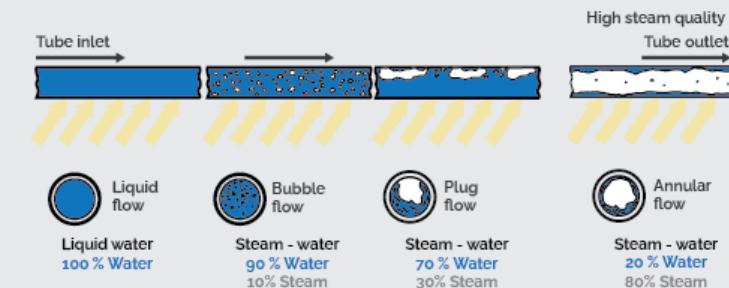
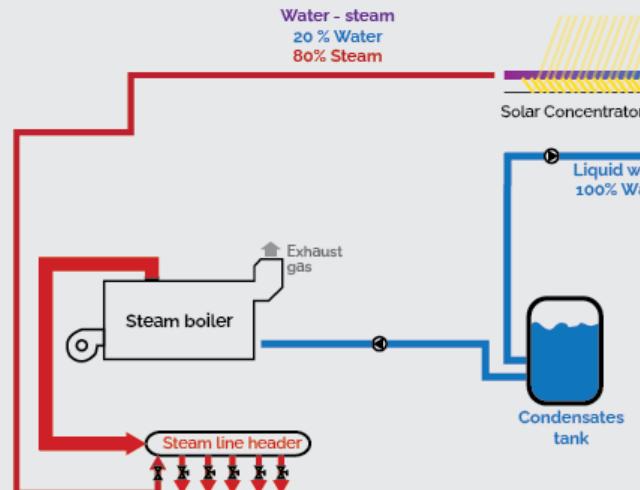
SL_S_PD model
v.1.4.2

Sistema con recirculación



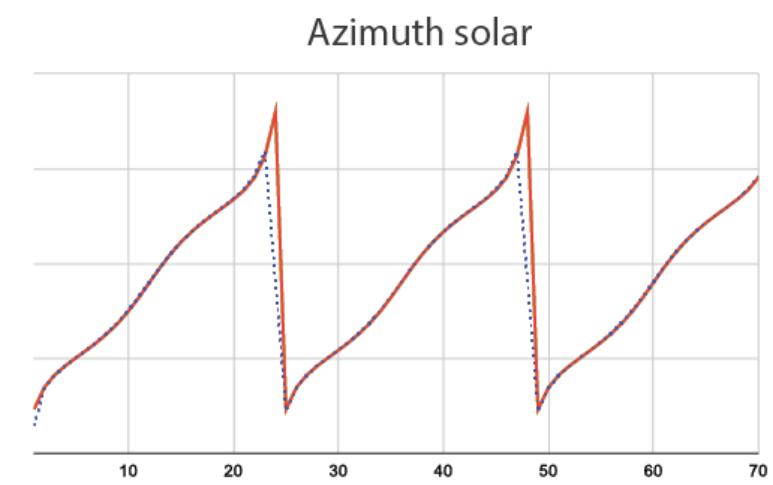
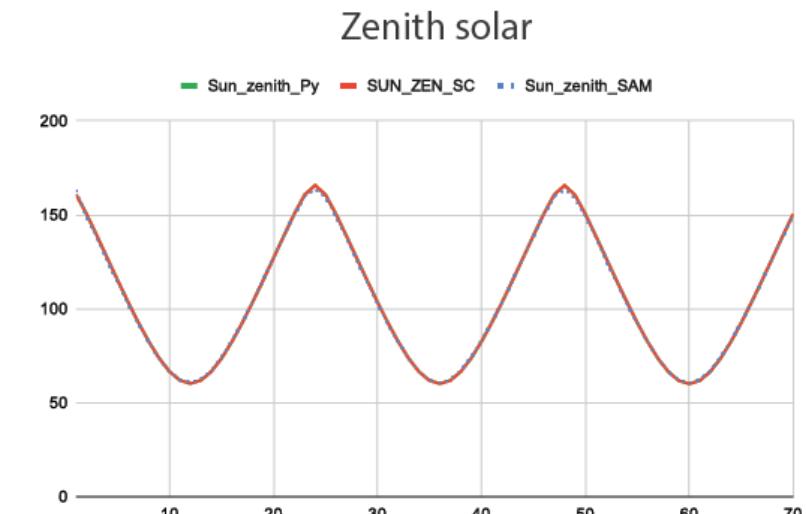
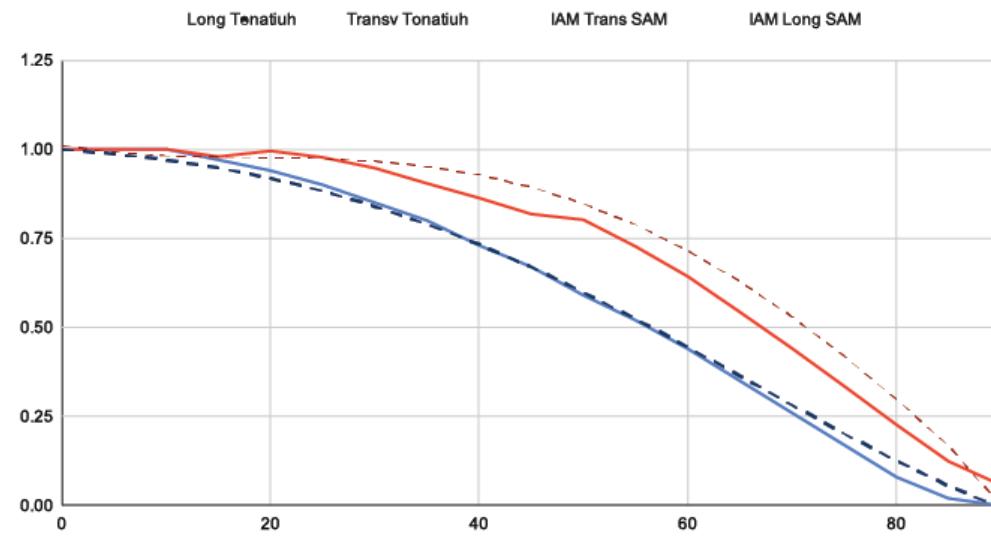
IPH Linear Fresnel
Direct Steam
v.2020.11.29

Sistema de paso directo

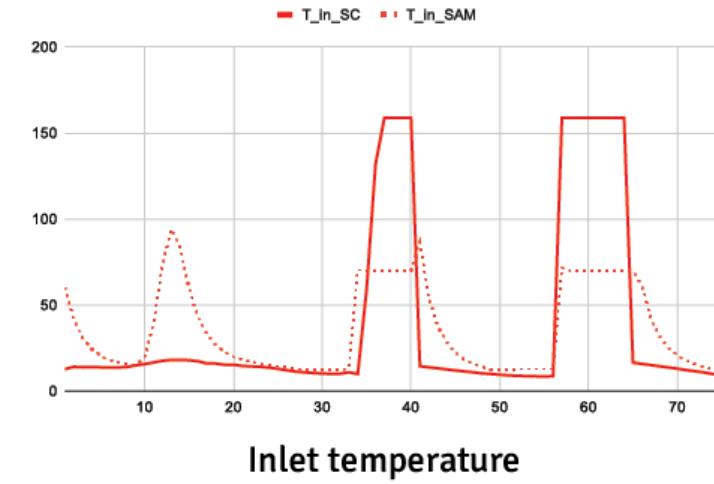
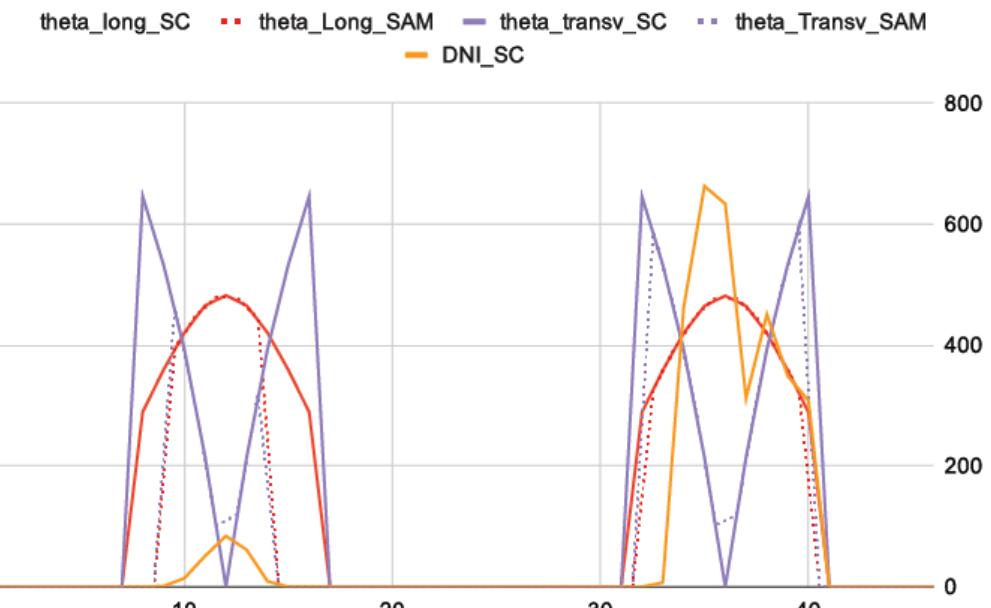


- Based on Task 64 Subtask C. Case 4 “Steam generation”

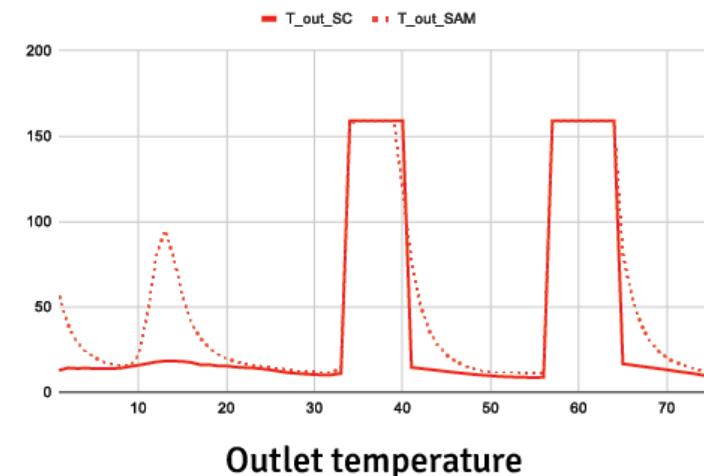
- Same IAMs as in SAM
- SOLATOM’s FLT20 IAMs



Comparación ángulos de incidencia



Inlet temperature



Outlet temperature

Produced

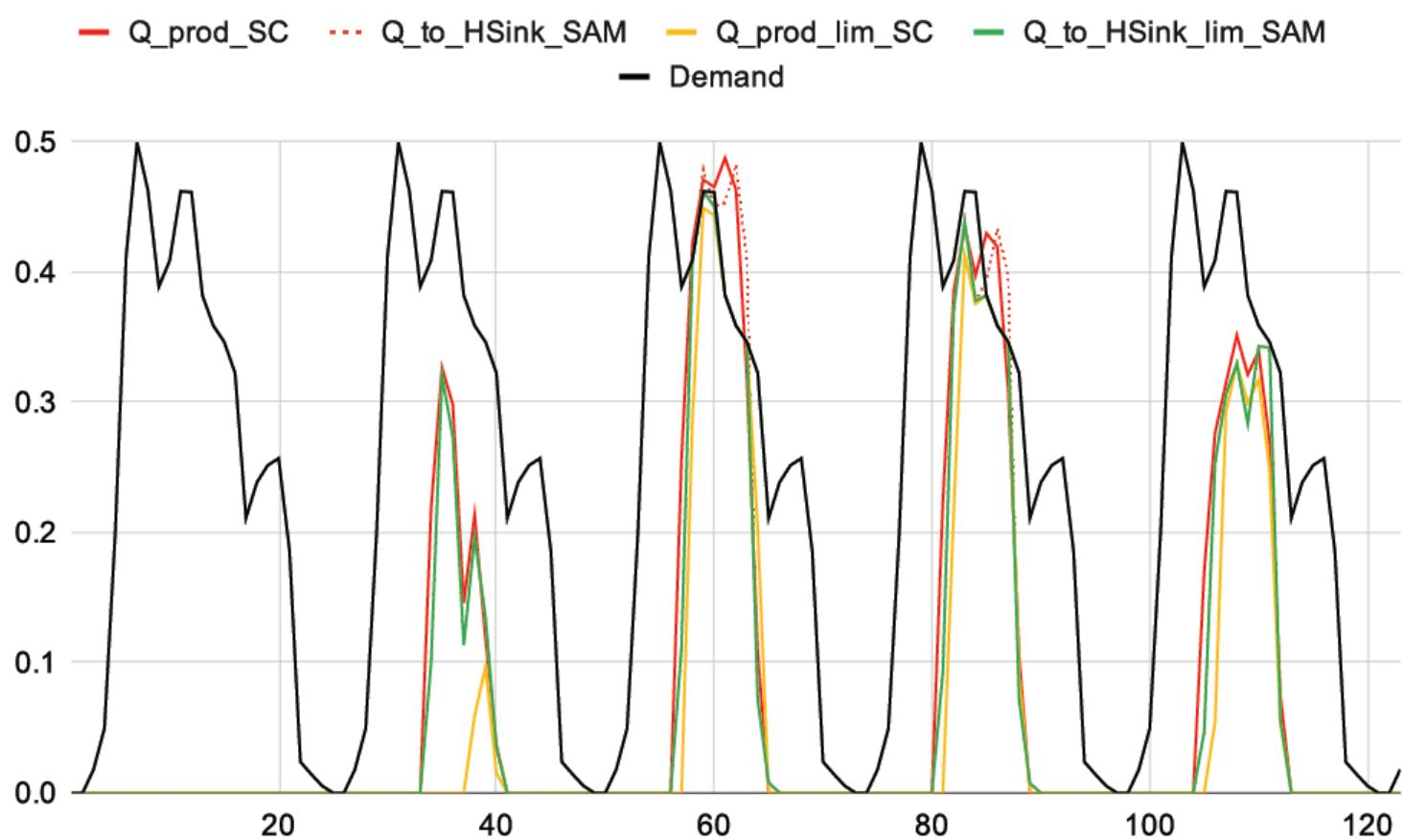
A SAM = 1.525 MWh
SHIPcal = 1.594MWh 104 %

B SAM = 1.525 MWh
SHIPcal = 1.578 MWh 103%

Produced limited

A SAM = 1.450 MWh
SHIPcal = 1.393 MWh 96%

B SAM = 1.450 MWh
SHIPcal = 1.378 MWh 95%





SUBTASK D - Standardization/Certification

D1- Explore the relevant standardization and certification area & analyze relevant standardization potential. Mapping of relevant standards

D2 - Identify gaps and proposal for new standardization work. Establish links with on-going standardization committees in European level and International level.

D3 - Feed into relevant technical committees. Develop a standardization document according to CENCENELEC rules : Solar Process Heat-CWA (CEN-CENELEC Workshop Agreement).

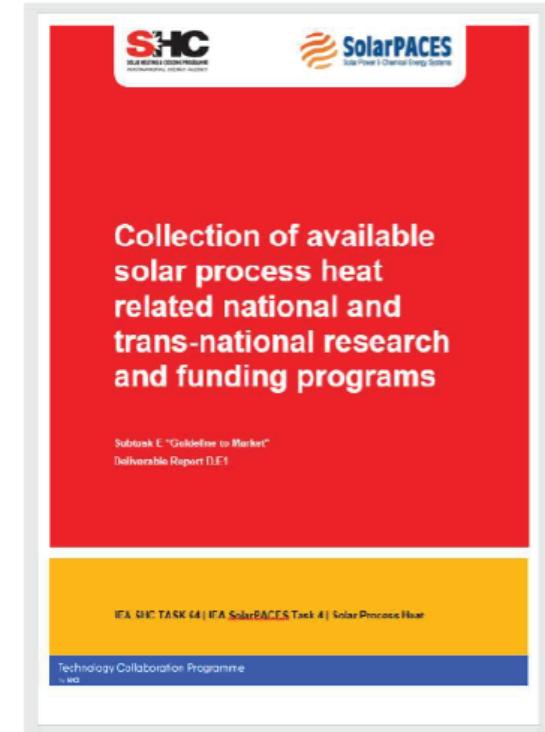
D3 - Explore the relevant certification schemes in European and International level. Introduce relevant inputs based on the Task work and outcomes

SUBTASK E - Guideline to market

E1: Innovation - Stimulate further innovation

E2: Competitiveness indicators - Create higher transparency and comparability of competitiveness.

E3: Financing models - Develop and provide information on financing options for SHIP



Deliverable DE.1 “Collection of available solar process heat related national and trans-national research and funding programs”

