

Marketplace

The Solar Heating and Cooling Programme is not only making strides in R&D but also supporting the growth of the solar thermal sector. This section of the newsletter highlights the link between our R&D work and its practical impact on the world.

Solar Process Heat

Simulation Tools to Assess Yield

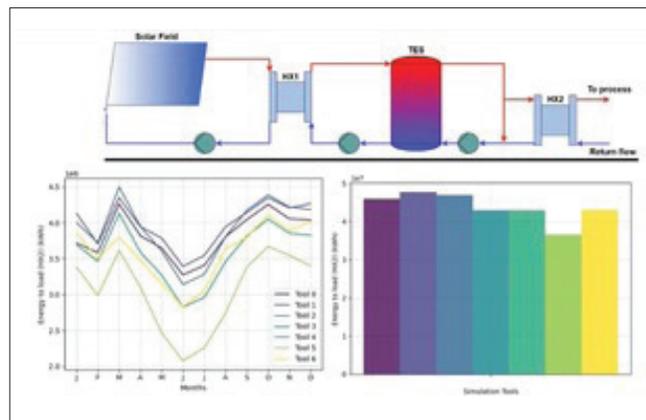
Solar process heat system yields are simulated during feasibility studies and have a decisive influence on the profitability of the project investment. The large number of simulation tools available means that results can differ significantly and possibly create a lack of trust by investors. This is why a group of [IEA SHC Task 64/ SolarPACES Task IV: Solar Process Heat](#) researchers, headed by Jose Cardemil, Associate Professor at Pontifical Catholic University of Chile, decided to evaluate several tools by analyzing their limitations and comparing their results.

The research team selected four operating plants as case studies to conduct yield assessments and identify the sources for the differences:

- Flat-plate collectors at a copper mine in Chile
- I-Axis tracking flat-plate collectors at a paper mill in France
- Linear fresnel collectors in Spain
- Parabolic trough collectors at a dairy factory in Switzerland

The group also defined a standardized way to directly compare the yields from the different simulation tools. Nine tools were compared, including tools created by project developers, tools developed in the context of EU research projects, and several commercial simulation tools:

- NewHeat, France
- CEA, SHIP2Fair, France
- Polysun, SPF, Switzerland
- SAM, NREL, USA
- SHIPCal, Solatom, Spain
- Greenius, DLR, Germany
- Matlab, Polytechnische Universität Valencia, Spain
- SCILAB, Federal University of Paraná, Brazil
- TRNSYS, (CIMAV/México, USeville/Spain, LEPTEN/Brazil)



▲ **Chilean copper mine case study results from the nine simulation tools show smaller differences in the annual yields (right) but significant variations at the monthly level (left).**

A number of the reasons for the differences and uncertainties found in the case studies are:

- How the control scheme is considered
- How the heat exchanger is modeled
- How the position of the system is set (particularly critical for concentrating collectors)
- How the internal flows are modeled
- How thermal capacitances are considered

But one of the most significant impacts on the yield is how the storage is modeled. So the research team is planning to assess the impact of time steps considered for the simulation.

This work is on track to define a standardized way to simulate yields and publish guidelines on the method. The end goal of unifying the criteria for simulations will undoubtedly help reduce perceived risks for investors.