



STAGE-STE

Presentation of Paul Scherrer Institute (PSI) Solar Technology Laboratory www.psi.ch/lst/

***Scientific and Technological Alliance for
Guaranteeing the European Excellence in
Concentrating Solar Thermal Energy***

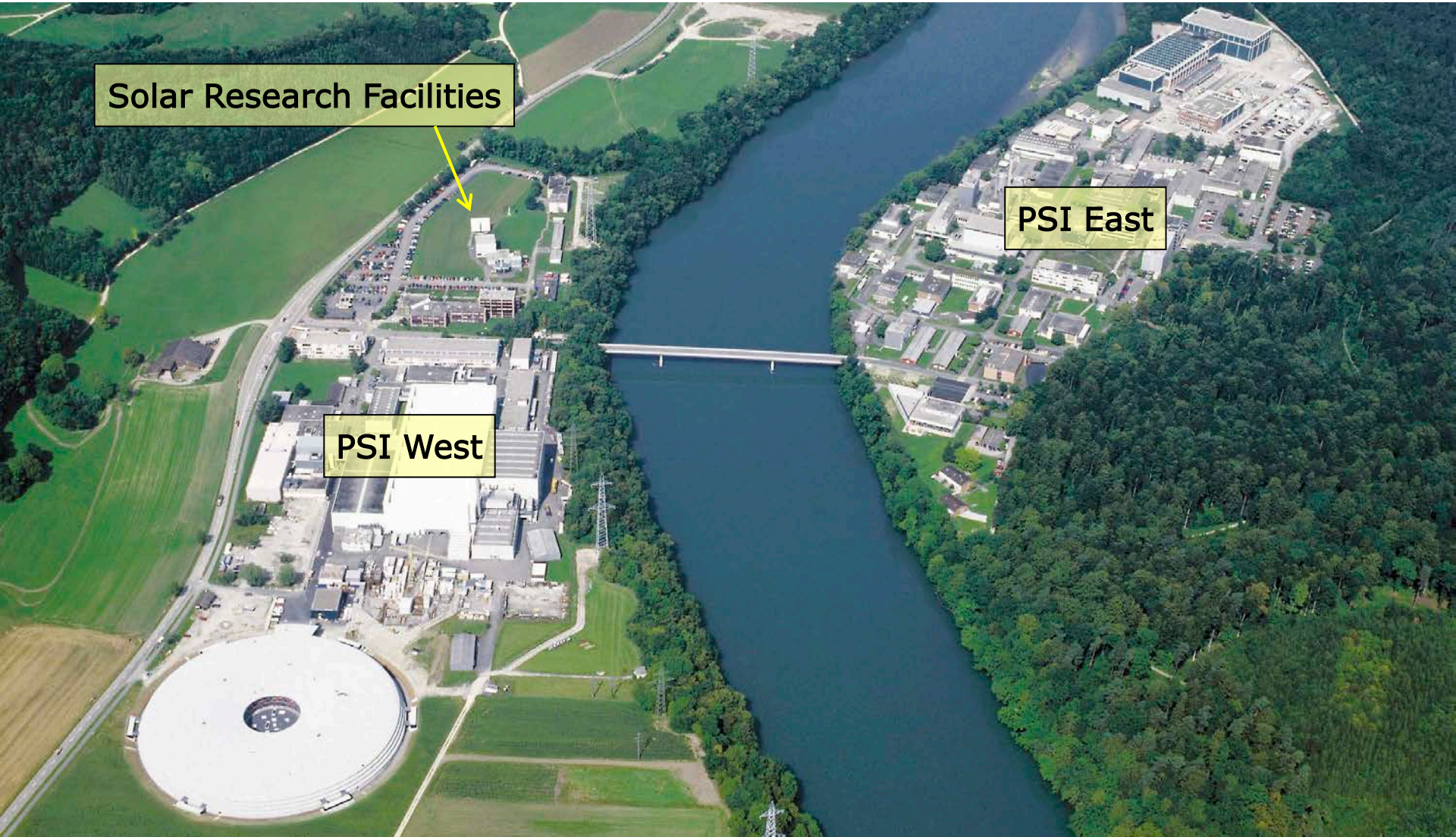
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***FP7 Grant Agreement Nr. 609837
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PAUL SCHERRER INSTITUT



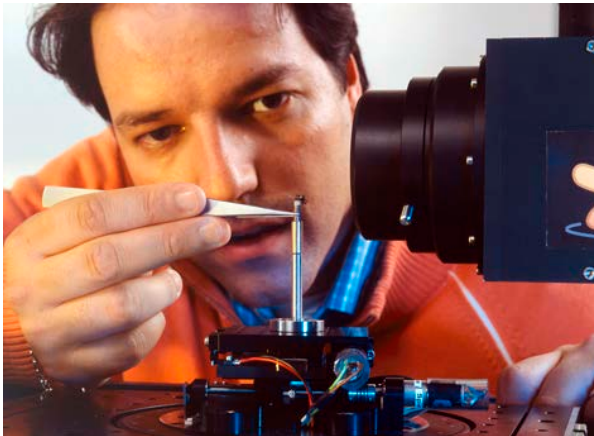


Solar Research Facilities

PSI West

PSI East

PSI is the largest research center for natural and engineering sciences within Switzerland



- PSI funds (global budget) 250 MCHF (≈ 200 M€)
- External funding 100 MCHF



- Staff (full-time jobs) 1500
- Doctoral students ca. 300
- Apprentices 90
- External users in 2013 ca. 2400

PSI performs world-class research in three main subject areas:



Matter and Material



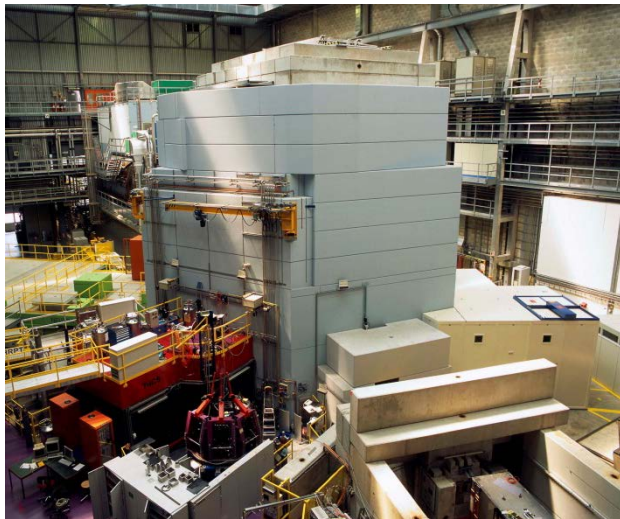
Energy and Environment



Human Health

By conducting fundamental and applied research,
PSI works on long-term solutions for major challenges facing society, industry and science.

Swiss Spallation Neutron Source – SINQ



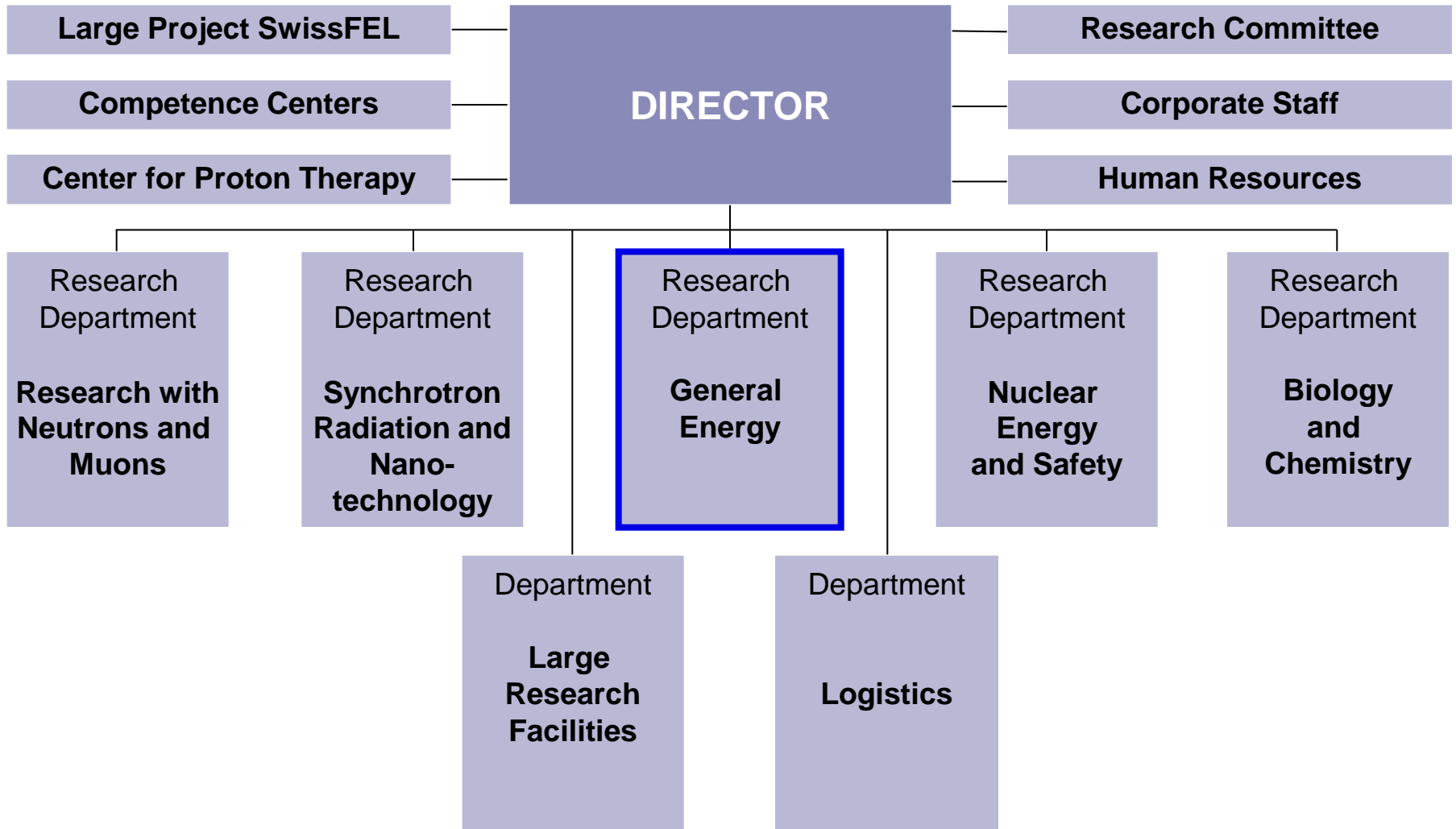
High-Intensity Proton Accelerator – HIPA



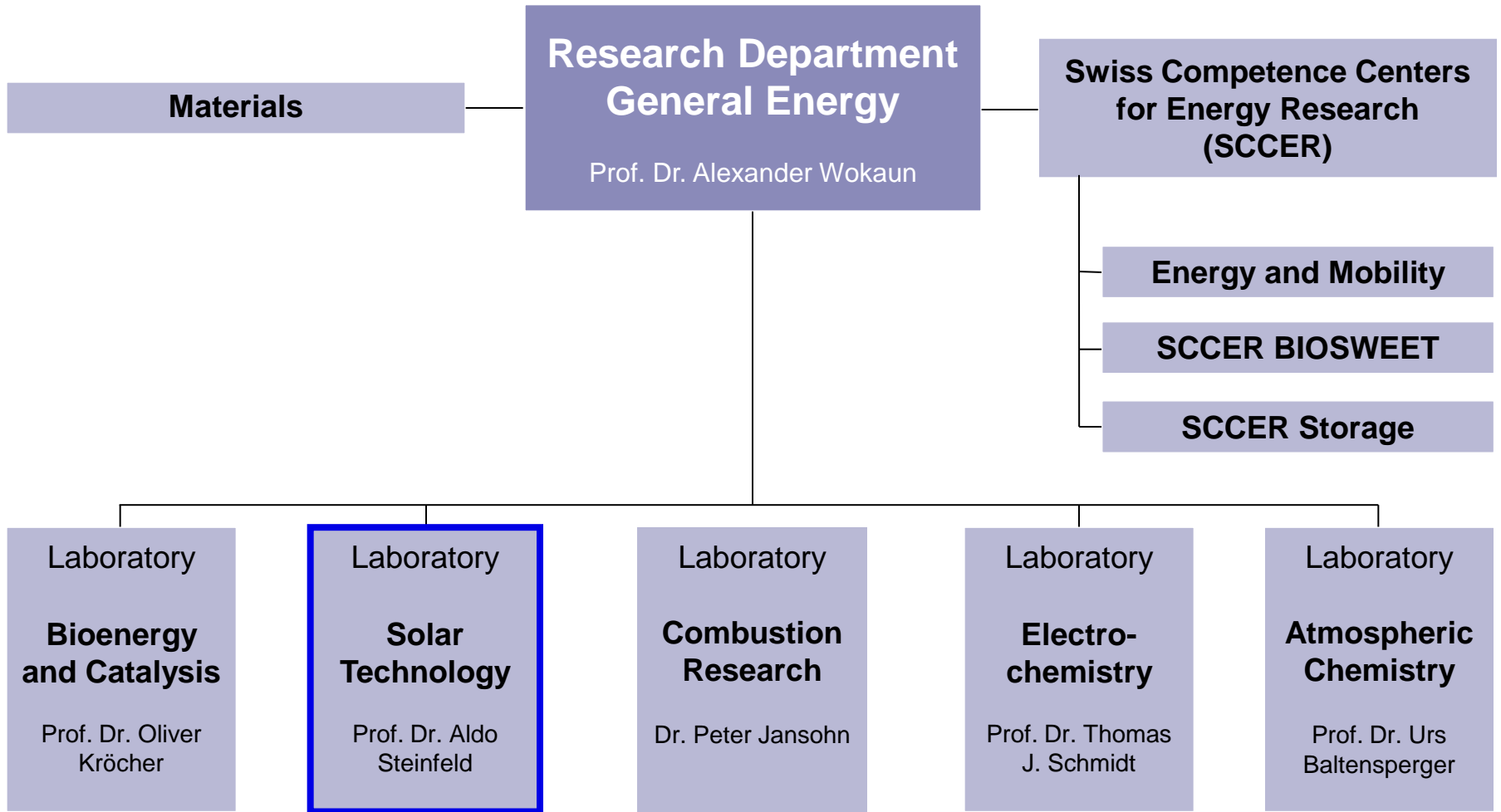
Swiss Light Source – SLS



PSI – Organisational Chart



PSI – General Energy Department (ENE)





Solar Technology Laboratory

– in close collaboration with Professorship of Renewable Energy Carriers at ETHZ

Staff (2014):

- 1 laboratory head
- 1 deputy head
- 2 senior scientists
- 3 postdocs
- 7 PhD students
- 5 engineers and technicians

Current research priorities:

- Solar thermochemical production of fuels (e.g. H₂, syngas, liquid hydrocarbons)
- Solar decarbonisation of fossil fuels
- Solar production of commodities
- Solar thermal processing and recycling of energy-intensive materials

STL – Capabilities and Major Infrastructure

Research Mission

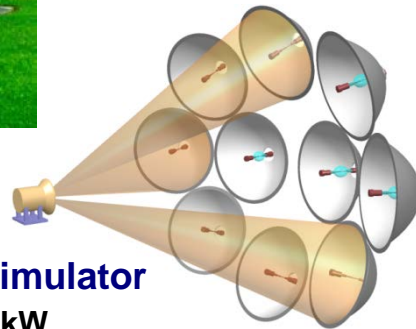
Develop science & technology for producing solar fuels at an industrial scale via thermochemical process that is competitive with any other solar-to-fuel process

Experimental Facilities (flyer: http://www.psi.ch/lst/FacilitiesEN/Solar_Facilities_Flyer.pdf)



Solar Furnace

Radiative Power: 40 kW
Radiative Flux: 5,000 suns



High-Flux Solar Simulator

Radiative Power: 50 kW
Radiative Flux: 11,000 suns



Chemistry & Physics Labs

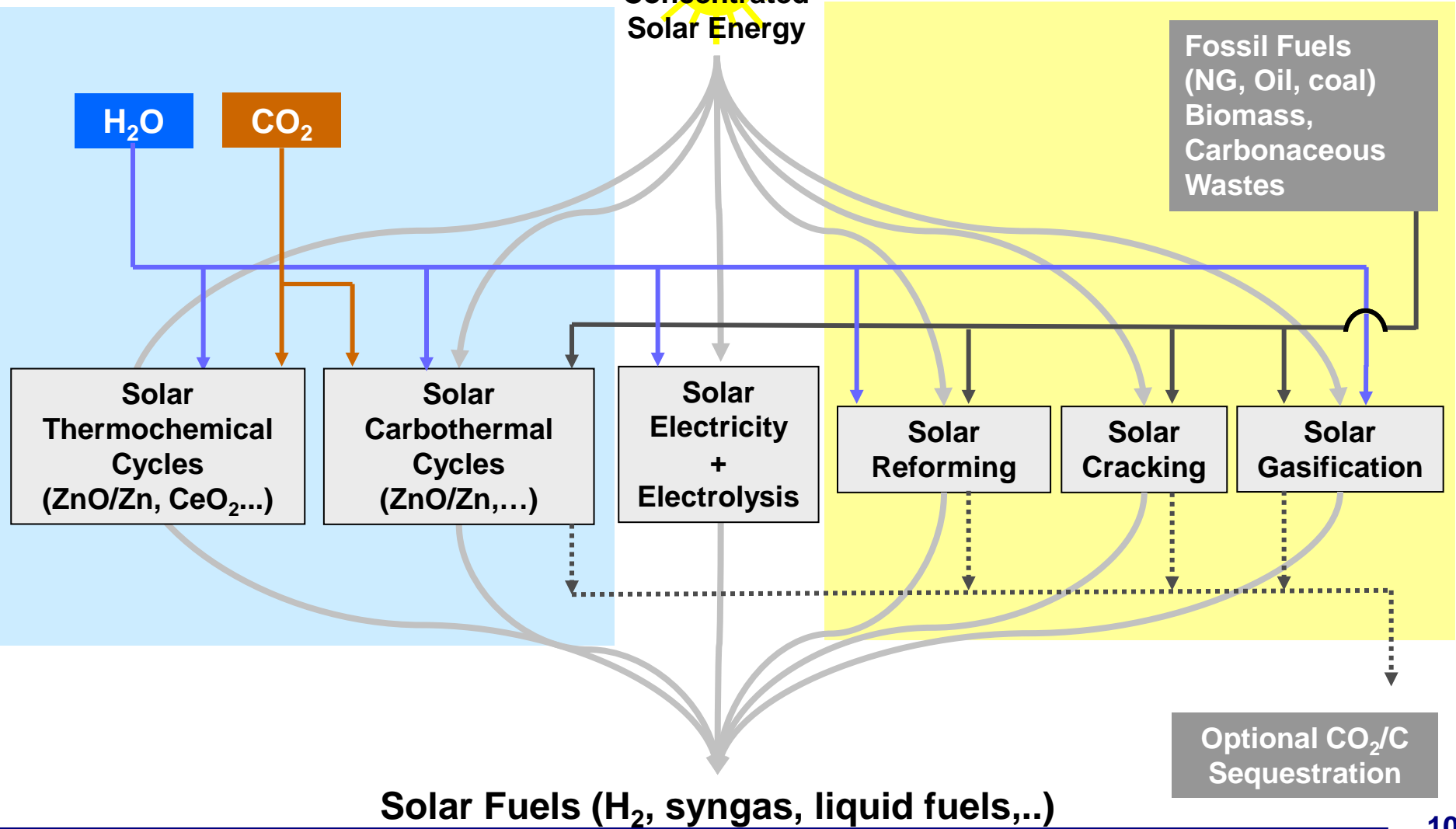


STL – Pathways to Solar Fuels

H₂O/CO₂-splitting

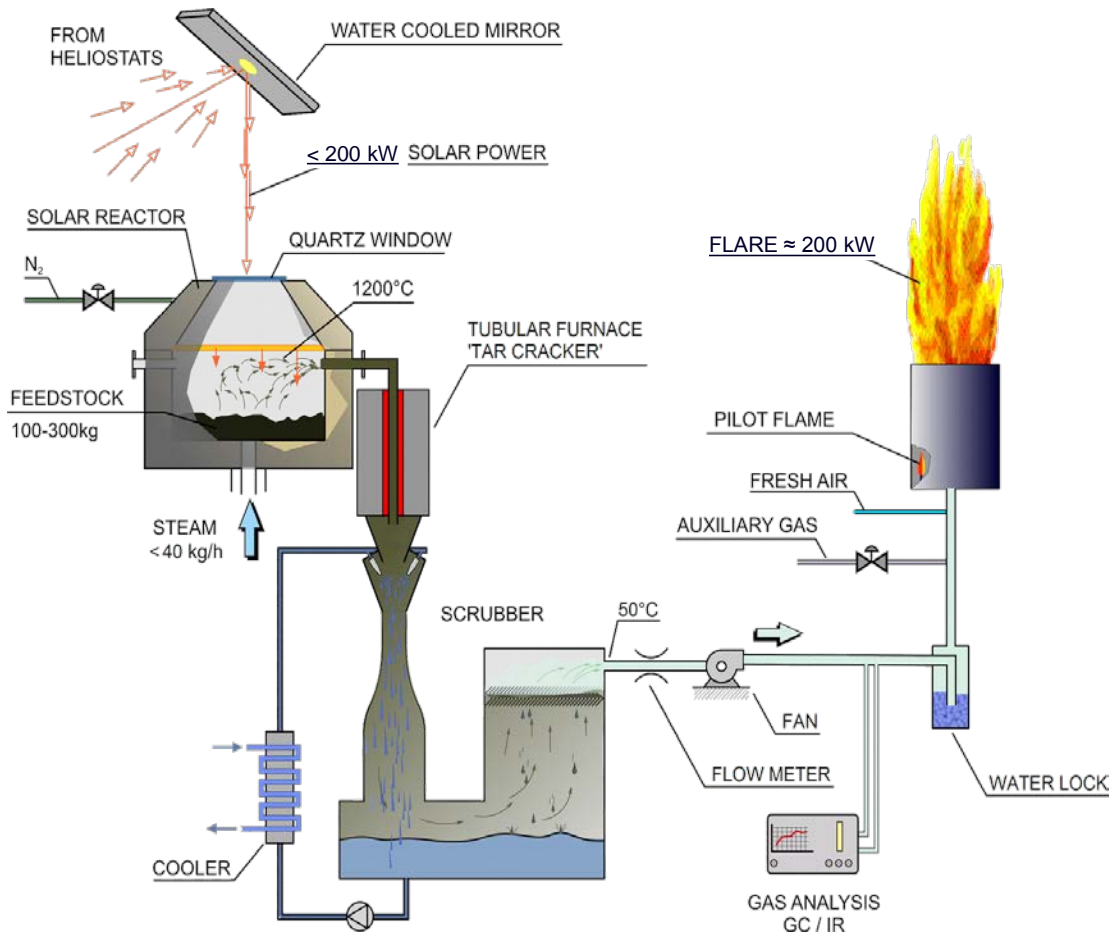
Concentrated Solar Energy

Decarbonisation

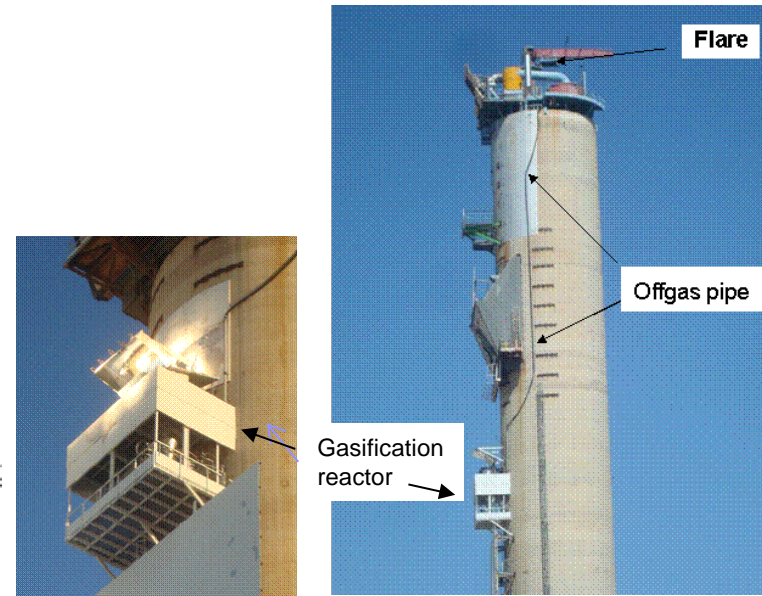


Solar gasification of carbonaceous feedstock

Two-cavity packed-bed reactor technology demonstrated on 150 kW_{th} scale at PSA (Partners: PSI / ETHZ / Holcim)



150 kW_{th} solar gasification pilot plant in operation at PSA's solar tower facility



PSI – Research Topics Related to WP9

Carbonaceous feedstock successfully processed to syngas

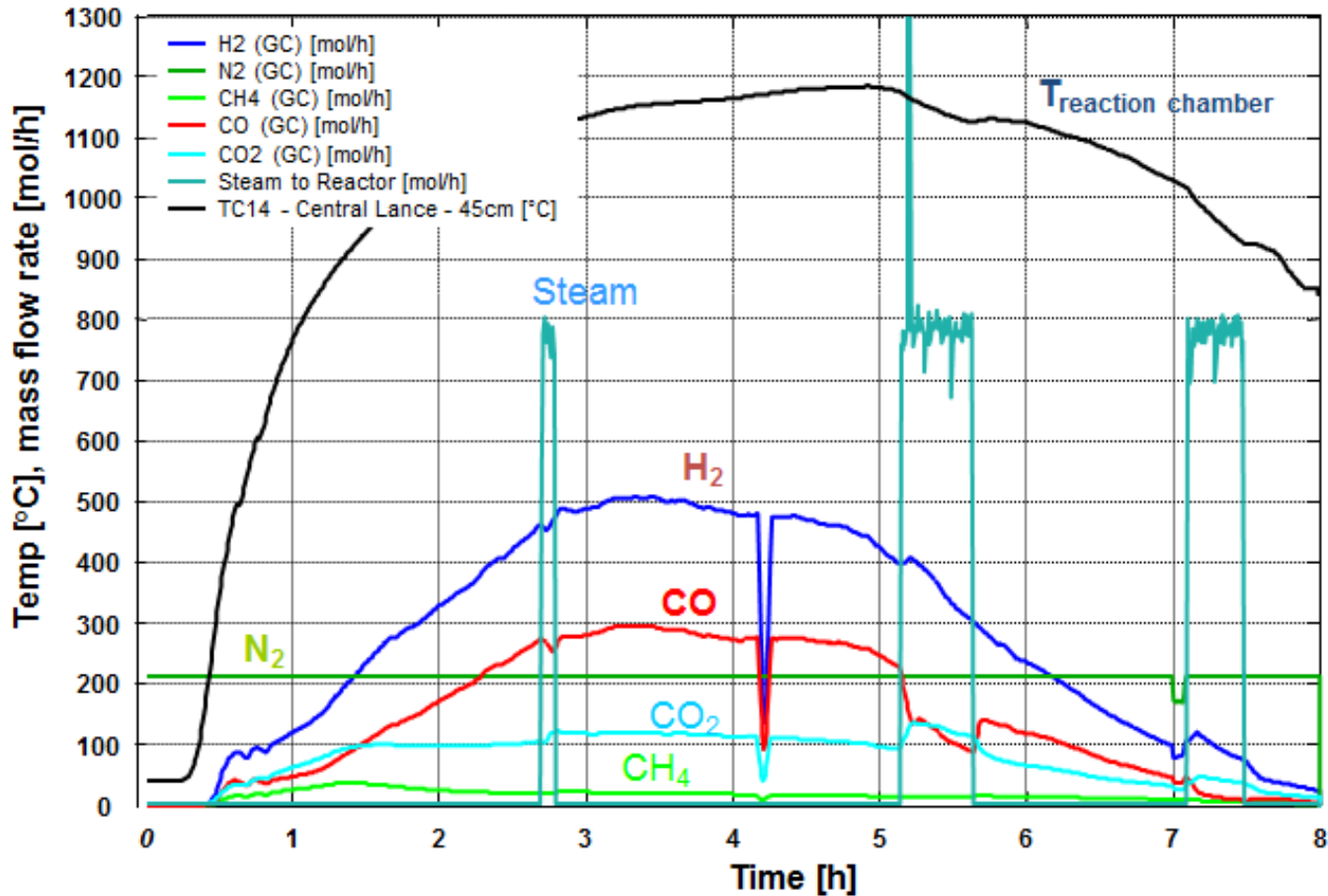


View into 150 kW_{th} solar reactor (1.1 m x 1.1 m inner area) prior to solar tests

Partners: Holcim, PSI & ETHZ
 Funding: Holcim, CTI, PSI, ETHZ

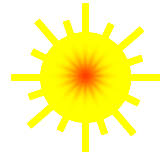
PSI – Research Topics Related to WP9

Experimental run with wet bagasse

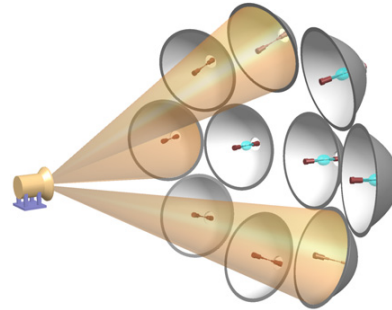


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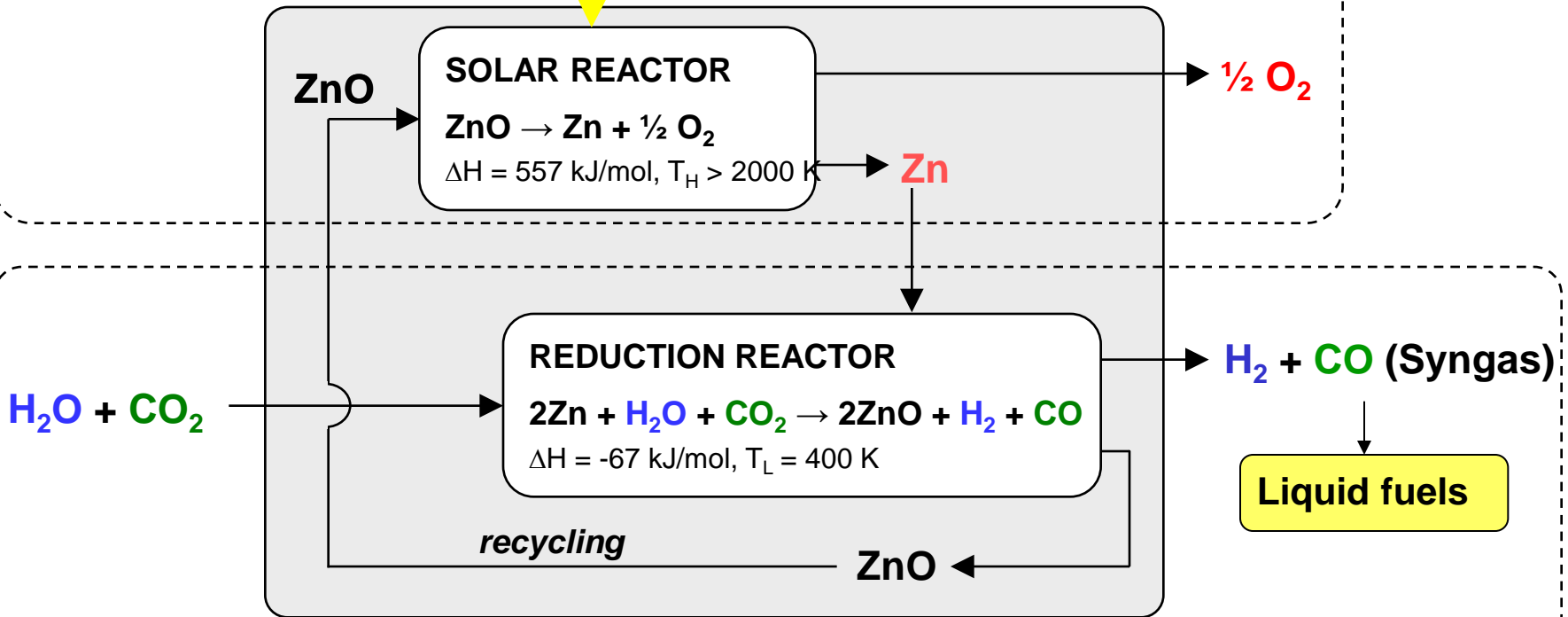
PSI – Research Topics Related to WP9



Concentrated
Solar Energy

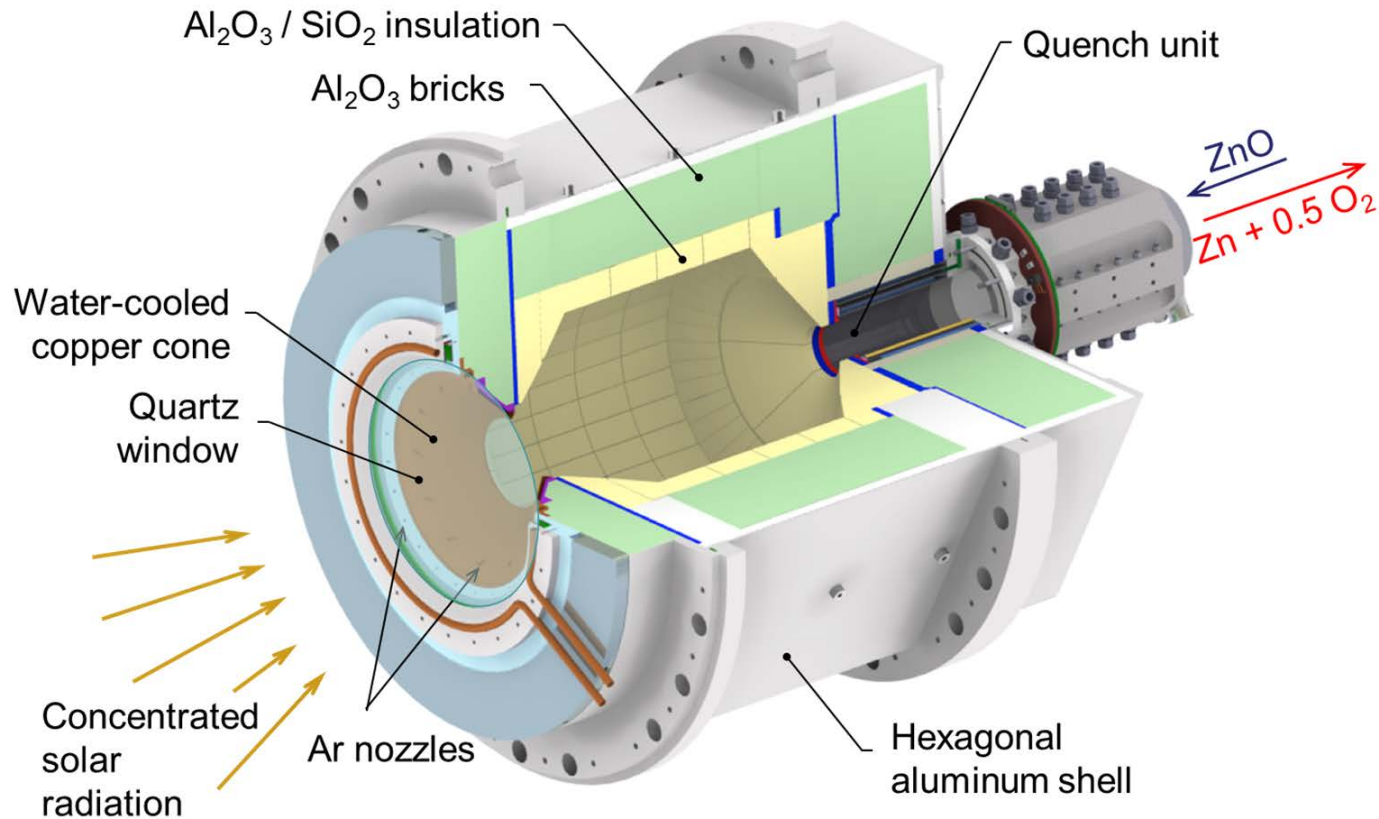


Solar fuels
from thermo-
chemical
cycles



Partners: PSI & ETHZ
 Funding: SFOE, PSI, ETHZ

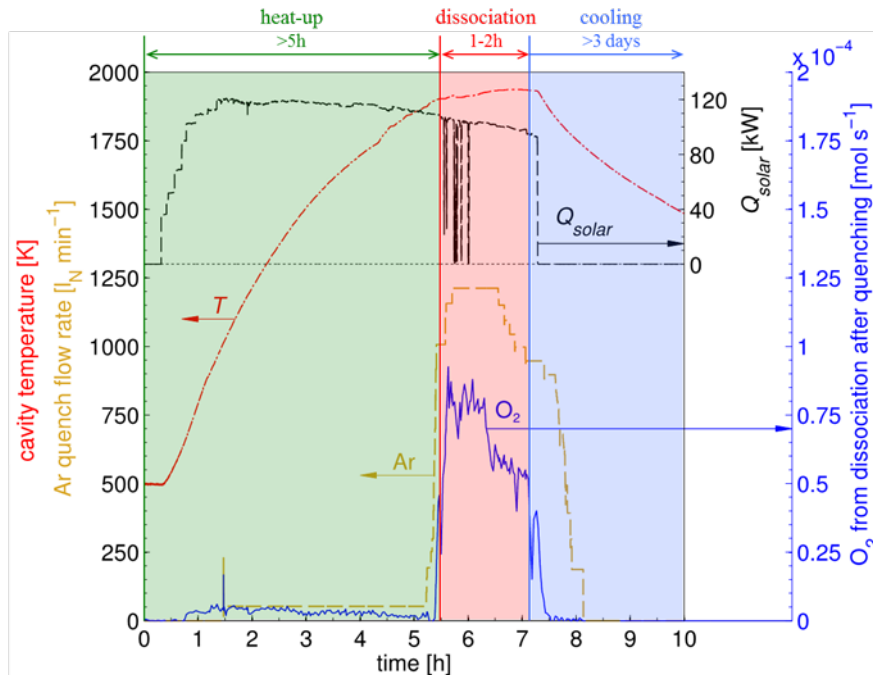
Solar reactor technology for ZnO dissociation



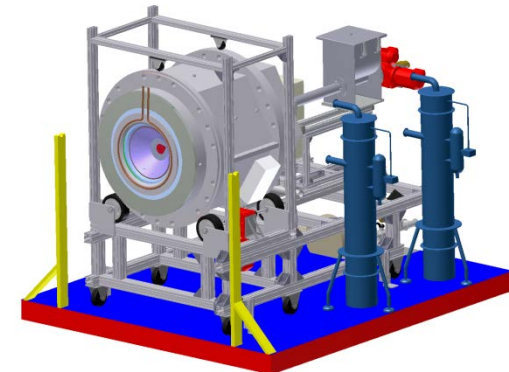
Solar experimental campaign 2012

100 kW_{th} solar thermochemical reactor for ZnO dissociation:

- More than 65 hours of on-sun testing (3-9 hours per run)
- Mechanically and thermally stable cavity lining



1 MW Solar Furnace (MWSF)
CNRS, Odeillo, France

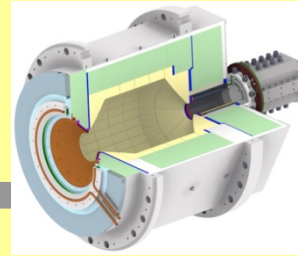


Partners: PSI & ETHZ
Funding: SFOE, PSI, ETHZ

STL – Solar Technology Road Map

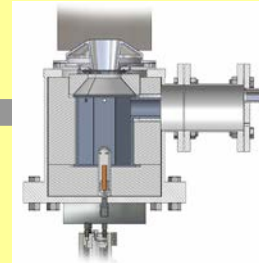
From conceptual design to scale-up demonstration

**H₂O/CO₂-SPLITTING
THERMOCHEMICAL CYCLE (Solar2Zinc)**



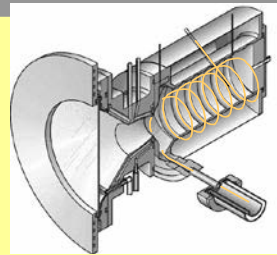
Scale-up
0.1 MW

**DECARBONIZATION
OF FOSSIL FUELS (SYNPET, SOLSYN)**

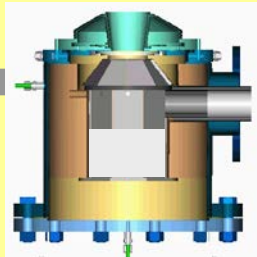


Scale-up
0.15 MW

Scale-up
0.5 MW



SOLZINC



Scale-up
0.3 MW

**Commercial
Application**

Research by PSI/ETH

Technology Transfer

Development by Industry

2005

2009/2010

2011

Partner in

- **WP1** Consortium Governance and Management Issues (2 PM)
- **WP2** Integrating Activities to Lay the Foundations for Long-lasting Research Cooperation (6 PM)
- **WP3** Enhancement of STE Research Facilities Cooperation (6 PM)
- **WP4** Capacity Building and Training Activities (9 PM)
- **WP5** Relationship with Industry & Transfer of Knowledge Activities (5 PM)
- **WP6** International Cooperation Activities (7 PM)

Leading (Coordinator: Anton Meier)

- **WP9** Solar Fuels (32 PM)

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