SOLAR PAYBACK - TRAIN-THE-TRAINER
SOLAR HEAT FOR INDUSTRIAL PROCESSES

Welcome

Fanny Hübner, M.Sc.

Pedro Horta, Ph.D.

Fraunhofer Institute for Solar Energy Systems ISE

SPB Train-the-Trainer Workshop

São Paulo, 12-14 Nov 2019

www.ise.fraunhofer.de

Solar Payback

Fraunhofer ISE

Presentation of Team

Fanny Hübner, M.Sc.	Expert on System Simulation, Software Development, Techno-Economic Assessments
Dr. Pedro Horta	Senior Expert on Solar Thermal Technology and Process Heat

Fraunhofer ISE - Freiburg
At a Glance

Fraunhofer ISE

Directors:
Prof. Dr. Hans-Martin Henning
Dr. Andreas Bett

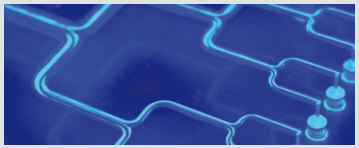
Staff: ca. 1200

Budget 2017: €89.4 million

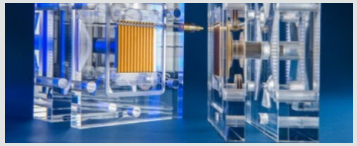
Established: 1981

Photovoltaics

Solar Thermal Power Plants and Industrial Processes



Energy Efficient Buildings



Hydrogen Technologies and Electrical Energy Storage

Power Electronics, Grids and Smart Systems

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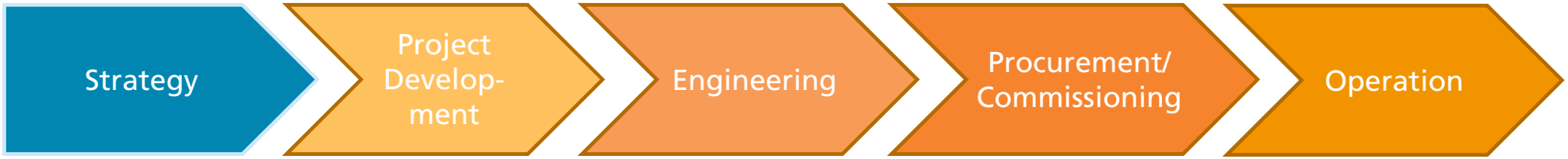
Services for Commercial SHIP Projects



- Technology screening
- RE Master plans
- R&D Roadmaps

- Site assessment
- Processes screening
- Pre-feasibility
- Feasibility

- Pinch analysis
- EE potential
- Optimized Solar integration
- Solar field design
- Quality assurance

- Supplier assessment
- Tender preparation and evaluation
- Performance acceptance testing

- Monitoring
- Operation strategy optimization
- Maintenance optimization
- KPI assessment

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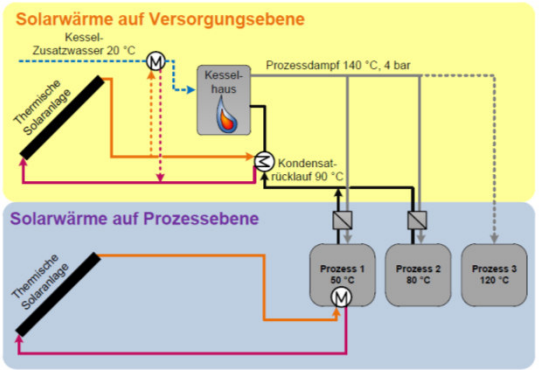
Project references

- **SoProW:** Optimized production and Solar Process heat integration in the Laundry sector
  - Feasibility studies
  - 20 companies in the laundry branch
  - Support BMWi

- **SoProW Demo:** Demo of EE + Solar energy in 3 laundries
  - energy management/monitoring; pinch analysis
  - Support BMWi



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Project references

- **SolVapor:** Solar Process heat in Mexico
  - training on Solar Collector technologies
  - system design and market Potential
  - Support BMBF

- **DAST II Tupro:** EE + Solar energy in Tunisian Industry
  - Solar Process heat assessment
  - EE assessment and implementation
  - Industrial cogeneration monitoring
  - Support GIZ Tunisia

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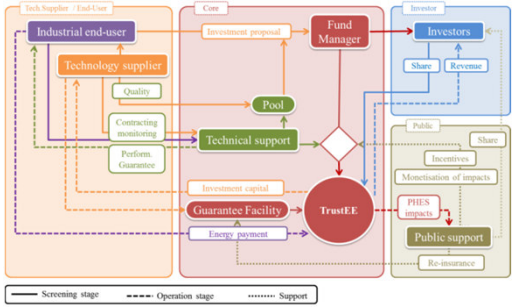
- **IKI Solar payback:** promotion of Solar Process Heat in Brazil, India, Mexico and South Africa
  - Potential, policies, dissemination
  - Training for traineers
  - Energy audit (10/country), Feasability (3/country), Demo (1/country)

- **TrustEE:** definition and implementation of a market based financing model
  - Technical support
  - Contracting, Pricing strategies
  - Securitization measures



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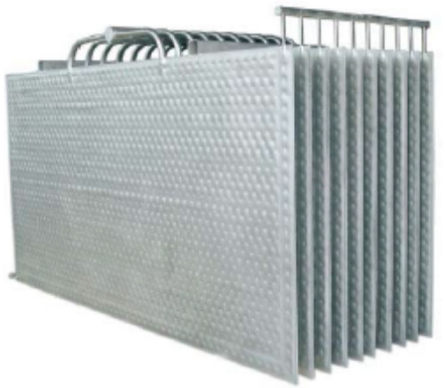
- **SALSA:** testing of PCM based HX concepts and testing of thermal loop components
  - Screw HX PCM/thermal oil or steam
  - Vacuum based circuit insulation
  - Support BMWi , BMU, BMBF

- **PROLATENT:** Innovative process heat storage with organic PCM materials
  - PCM characterization, material selection, PCM modification, storage tank design, integration in Solar Process heat applications



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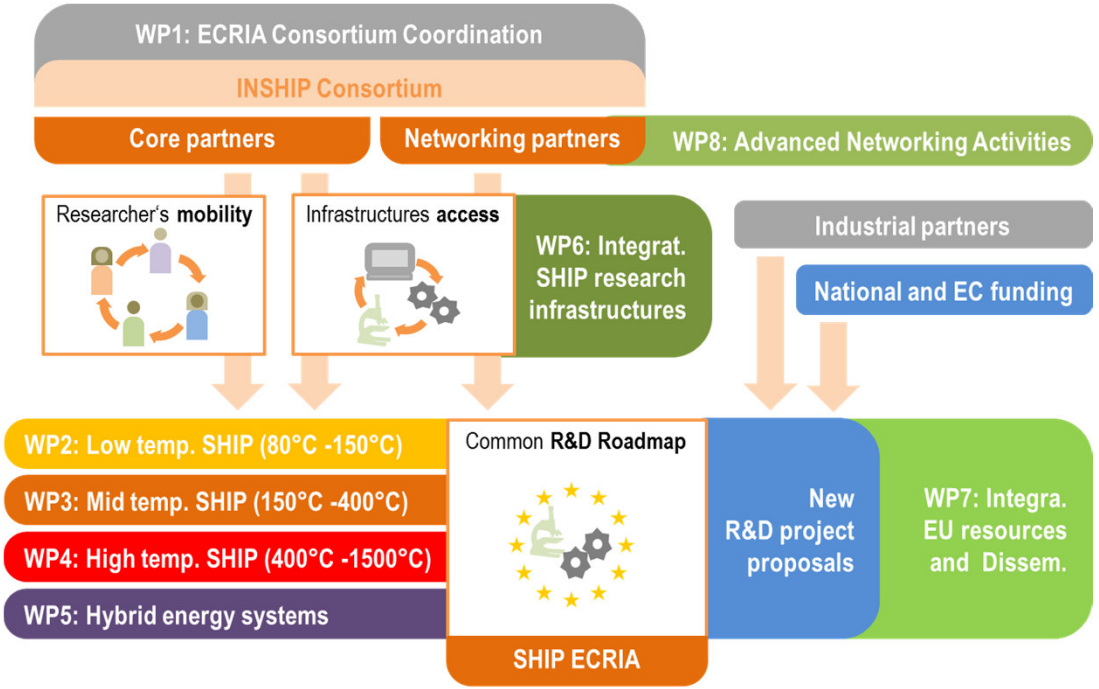
- INSHIP: definition of an ECRIA consolidating existing EU and national resources towards a SHIP R&D Roadmap
  - engagement of a wide range of EU R&D institutions
  - coordinated R&D developed through researcher's mobility and infrastructure access schemes
  - leveraging of EU resources through national funding



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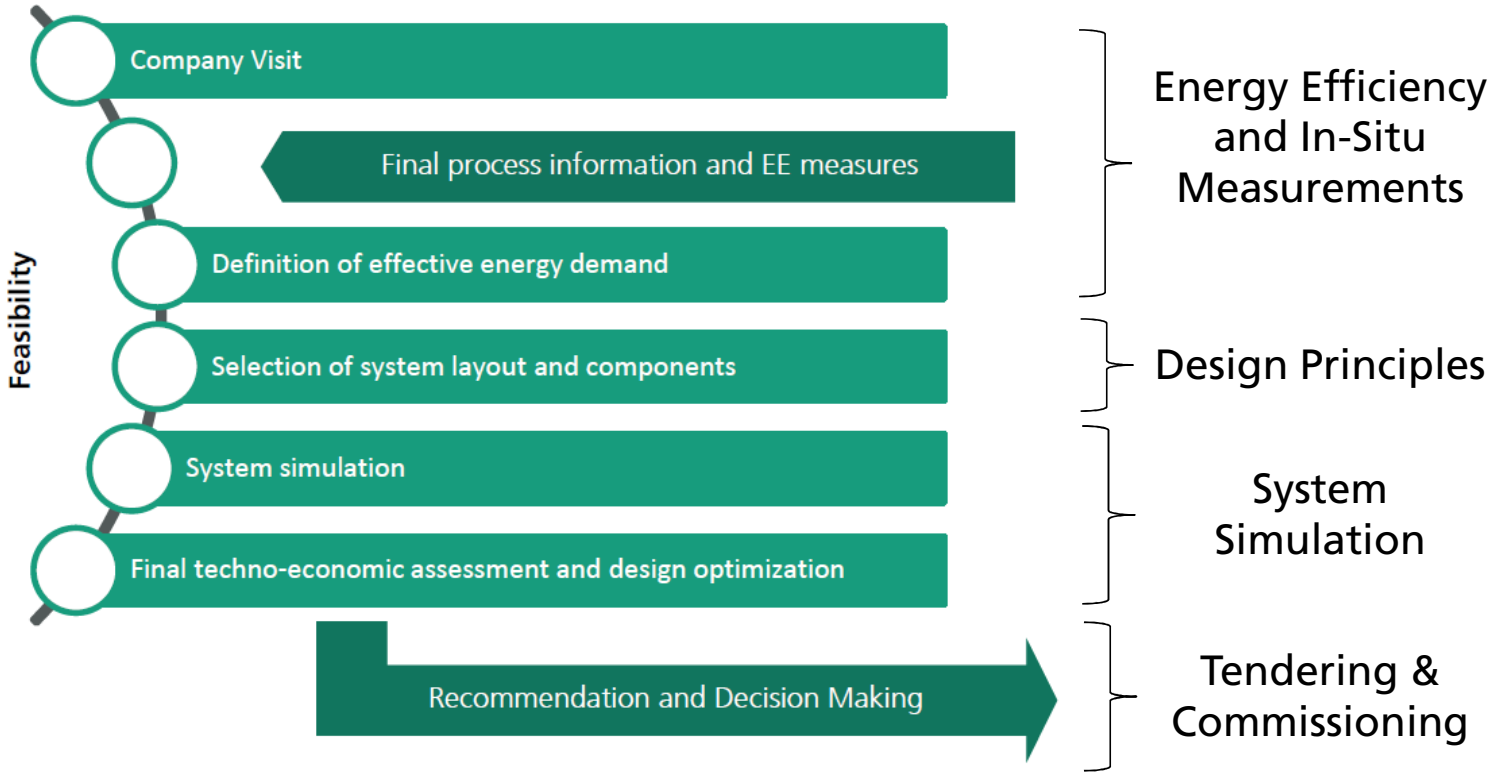
Participation in other projects and R&D groups

- IEA SHC Task 49 / SolarPACES Annex IV - “Solar Process Heat for Production and Advanced Applications”
- STAGE-STE (FP7, Grant Agreement 609837): European Excellence in Concentrating STE (WP11 Line Focus)
- EERA JP Energy Efficiency in Industry
- EERA JP Concentrated Solar Power
- IEA SolarPACES Task IV – “Solar Heat Integration in Industrial Processes”

Solar Process Heat Design Steps
Feasibility Studies



Agenda for Tuesday

08.00 – 08.30	Registration and welcome coffee
Opening Session	
08.30 – 09.15	Opening • *ABRASOL*
Fundamentals of Energy Efficiency and Solar process Heat	
09.15 – 9.30	Presentation of Solar Payback project and Fraunhofer ISE • *Fanny Hübner*
09.30 – 10.45	Introduction to Solar process heat potential, suitable industrial processes and sectors, suitable solar technologies • *Dr. Pedro Horta*
10.45 – 11.00	Coffee Break
11.00 – 12.00	Introduction suitable solar technologies • *Dr. Pedro Horta*
12.00 – 13.00	Lunch
13.00 – 14.45	Main components: Solar collectors, thermal storage and heat exchangers • *Dr. Pedro Horta*
14.45 – 15.00	Coffee Break
15.00 – 16.00	Main components: Solar collectors, thermal storage and heat exchangers • *Dr. Pedro Horta*

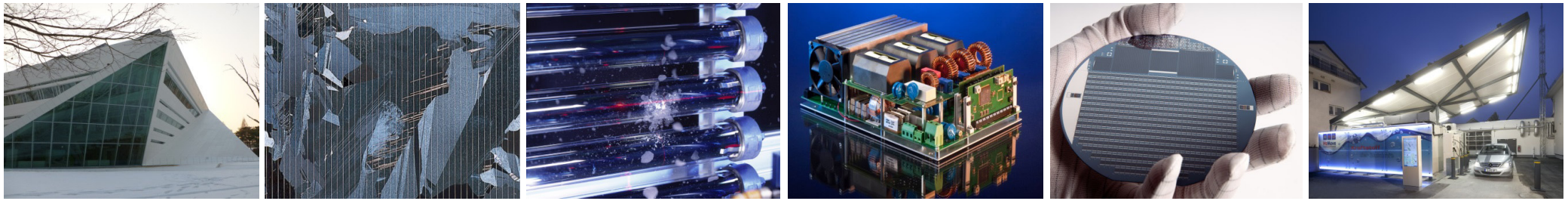
Agenda for Wednesday

08.30 – 09.00	Registration and welcome coffee
09.00 – 09.15	Summary of the previous day • *Dr. Pedro Horta*
Energy Efficiency and Solar System Design	
09.15 – 10.45	Energy Efficiency: Thermal Energy Audit principles and measurement procedures • *Dr. Pedro Horta*
10.45 – 11.00	Coffee Break
11.00 – 12.00	Pinch Analysis: Concepts and assessment tool • *Fanny Hübner*
12.00 – 13.00	Lunch
13.00 – 14.45	Design principles: Integration concepts, simulation tools, technical pre-feasibility and feasibility procedures and technical relevant KPIs • *Dr. Pedro Horta*
14.45 – 15.00	Coffee Break
15.00 – 16.00	Solar Process Heat Design: Optimized design of a Solar Process Heat system using system simulation • *Dr. Pedro Horta*

Agenda for Thursday

08.30 – 09.00	Registration and welcome coffee
09.00 – 09.15	Summary of the previous day • *Dr. Pedro Horta*
Energy Efficiency and Solar System Design	
09.15 – 10.45	Investment Assessment for with cash flow method and business models for SHIP • *Fanny Hübner*
10.45 – 11.00	Coffee Break
11.00 – 12.00	Solar Payback Online Calculator • *Fanny Hübner*
12.00 – 13.00	Lunch
13.00 – 13.30	Technical Tendering: Relevant Call for Tenders contents, assessment and ranking of proposals • *Dr. Pedro Horta*
13.30 – 14.00	Commissioning: Relevant commissioning procedures, definition of commissioning checklist, definition of customer and supplier scope of responsibilities • *Dr. Pedro Horta*
15.00 – 16.00	Discussion and Conclusion

Thank you for your Attention!



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