EuroSun2022

Program EuroSun 2022 Conference

25-29 September 2022 - Kassel, Germany

Sunday, 25 September 2022

16:00 - 16:30 **Young ISES Get Together**
Hörsaal 4

16:30 - 17:30 **Solar Speed Dating**
Seminarraum 3

18:00 - 20:00 **Welcome Reception**
Foyer Campus Center

Monday, 26 September 2022

09:15 - 10:15 **Opening Ceremony**
Hörsaal 1

09:15 Welcome to the Conference
Klaus Vajen, University of Kassel, EuroSun 2022 Chair and Tomas Olejniczak, RVO, IEA SHC Chairman

09:30 Welcome from the German Federal Ministry for Economic Affairs and Climate Action
Patrick Graichen, BMWK

09:40 Welcome Remarks
Tarek Al-Wazir, Hessischer Minister für Wirtschaft, Energie, Verkehr und Wohnen

09:45 Welcome from the University of Kassel

10:15 - 10:45 **Plenary Session 1: Climate Policies and the Current Energy Crisis**

Hörsaal 1

Climate Policies and the Current Energy Crisis
Brigitte Knopf, Mercator Research Institute on Global Commons and Climate Change (MCC)

Chair: Klaus Vajen, University of Kassel

10:45 - 11:15 **Press Q/A**

10:45 - 11:15 **Coffee Break**

11:15 - 12:45 **Keynote Talk + H-1 PV and PVT Systems for Buildings and Industry**

Hörsaal 4

Chair: Federico Giovannetti, ISFH

11:15 **Keynote Talk:** PVT
Corry de Keizer, TNO

11:45 Energy Performance of Four Prototypes of PVT Collectors. A Comparative Study
Raquel Simón-Allué, ENDEF Solar Solutions

12:00 Performance of Heat Pump Systems with PVT Collectors with Optimized Finned Heat Exchangers Integrated as Single Heat Source
Manuel Lämmle, Fraunhofer ISE

Presented by Sebastian Helmling, Fraunhofer Institute for Solar Energy Systems

12:15 Decarbonizing Heating Supply Systems in Existing Single-family Houses Through PVT - Heat Pump Systems
Bharat Chhugani, Institute for Solar Energy Research (ISFH)

12:30 A PVT Driven Direct Expansion Heat Pump Field Operation Results
Asier Sanz, TECNALIA Research & Innovation

11:15 - 12:45 **N-1 Thermal Energy Storage - Innovative Materials for TES**

Seminarraum 3

Chair: Andreas Hauer, ZAE Bayern

11:15 New Developments in Efficient Pit Thermal Energy Storages for District Heating
Magdalena Berberich, Solites - Steinbeis Research Institute

11:30 Polymeric Stabilization of Salt Hydrates for Thermochemical Energy Storage
Joey Aarts, Eindhoven University of Technology

11:45 Experimental Studies On Heat Transfer Enhancement of Salt Hydrate Based Phase Change Material (PCM) For Efficient Thermal Energy Storage
Rajeev Kukreja, Dr B R Ambedkar National Institute of Technology, Jalandhar

12:15 Modelling Analysis of Phase Change Materials for Reducing Cold Climate Space Conditioning Loads
Calene Baylis, Carleton University

12:30 Development of a Virtual Sensor for State-of-Charge Evaluation of TCM-Energy Storage
Bernhard Zettl, Univ. Appl. Sci. Upper Austria

Presented by Gayaneh Issayan, University of Applied Sciences Upper Austria

12:45 Study of Cao/Ca(OH)2 Selected by MCDM Methodology for High Temperature Thermochemical Heat Storage
Sahand Hosouli, Swansea University

11:15 - 12:45 **E-1 Innovative District Heating and Cooling**

Seminarraum 6

Chair: Daniel Muschick, BEST Bionergy and Sustainable Technologies

11:15 Modelling of 4th Generation District Heating Systems Including Different Thermal Energy Storage Technologies
Miguel Angel Pans Castillo, Loughborough University

11:30 Integration of Different Solar Collectors into District Heating Networks and Floor Space Allocation
Maximilian Stahlhut, TU Chemnitz

11:45 Techno-Economical Assessment of a Solar Regenerated Borehole Heat Exchanger Field with PVT Collectors for District Heating
Finn Weiland, Institute for Solar Energy Research in Hamelin (ISFH)

Presented by Niklas Kracht, Institut für Solarenergieforschung

12:00 Direct Excess Heat Utilization from a High Performance Computer in an Existing Unrenovated Building: A Case Study
David Sauerwein, TU Darmstadt, Fachbereich Architektur, Fachgebiet Entwerfen und Nachhaltiges Bauen

12:15 Impact of Domestic Hot Water Preparation Systems on District Heating Network Design and Operation
Hagen Braas, University of Kassel, Institue of Thermal Engineering, Department of Solar and Systems Engineering

12:30 Operability of District Heating Plants Combining a Large-Scale Solar Thermal Field and Condensing Wood Chip Boilers – a Case Study in Switzerland
Xavier Jobard, Solar Energy and Building Physics Laboratory, School of Management and Engineering Vaud, HES-SO

11:15 - 12:45 P-1 Solar Resources and Energy Meteorology

Seminarraum 2

Chair: Adam Jensen, Technical University of Denmark

11:15 24/365 Firm Solar Power Generation in Switzerland
Jan Remund, Meteotest AG

11:30 Storage Sizing for Renewable Energy Systems – Its Dependence on the Sequential Characteristics of the Meteorological Data, Discussed for Autonomous PV + Storage Systems
Hans Georg Beyer, University of the Faroe Islands

11:45 A Global Catalog of High-Quality Solar Radiation Monitoring Stations
Adam Jensen, Technical University of Denmark

12:00 Quality Control Procedure for Solar Radiation at Minute Resolution
Diego Miranda, Federal University of Pernambuco

12:15 Gap Filling of Solar Data Using Artificial Neural Network for Nine Stations in Pakistan
Zia ul Rehman Tahir, University of Engineering and Technology Lahore

12:45 - 13:45 **Lunch Break**

13:45 - 14:45 Industry Session

Hörsaal 4

In this session, get to know representatives of the EuroSun 2022 Gold Sponsor Viessmann and Supporting Sponsors Enersolve and Qoncept.

13:45 - 14:45 **Poster Session 1: Applications**

Poster Area

The Poster numbers are based on themes:
A - Solar and Efficient Buildings
B - Energetic Renovation of Buildings
C - Daylighting
D - Solar Domestic Hot Water and Space Heating
E - Innovative District Heating and Cooling
F - Innovative Industrial Process Heat
G - Solar Air Conditioning and Refrigeration
H.- PV and PVT Systems for Buildings and Industry
I - Solar Energy and Heat Pumps
J - Water Purification through Renewable Energy
K - Carbon Neutral University Campus
L - Urban Planning, Solar and Efficient Districts

A01 An Energy Trading Model for a Lab-scale PV Microgrid in the Tunisian Context
Erasmo Elias Alvarado Alvarado, Université de Lorraine

A02 Metrics Behind the Implementation of Photovoltaic Solar Energy in Urban Area
Joyce Aparecida Oliveira de Sousa, Université Savoie Mont Blanc

A04 Solar Decathlon - New Ways of Construction for Decarbonised Buildings
Andreas Gerber, Biberach University of Applied Scienced

A05 Evaluating the Potential of Annual Solar Heat Gains from Manually Operated Shading System
Sunil Raghavendher Kumar, Lund University / ACC Glas och Fasadkonsult AB

A07 Solar Energy Buildings with High Degree of Independence of Energy Supply from Grids
Elsabet Nielsen, DTU Construct, Technical University of Denmark

A09 Economic and Ecological Evaluation of the Energy Supply in Highly Solar Powered Apartment Buildings
Lukas Oppelt, TU Bergakademie Freiberg

A08 Building Energy Efficiency Enhancement through Load Reduction in Air Conditioning System
Rahul Kumar Sharma, IIT Delhi

A10 Hidden Colored Building Integrated Photovoltaics: Technology Overview and Design Challenges
Martina Pelle, EURAC Research

Presented by Alexandra Troi, Institute for Renewable Energy / EURAC Research

F05 Comparative Techno-Economic Analysis of High Temperature Heat Pump and Parabolic Trough Collector System for Industrial Steam Generation: Analysis for Europe
Puneet Saini, Absolicon

F06 Upgradation of Khoa Production Method in Manchar, India using Solar Thermal System
Swanand Tadlimbekar, University of Oldenburg

F07 Optimizing Solar Preheating Applications – by a Practically-applicable, Multi-domain Algorithm
Viktor Unterberger, BEST - Bioenergy and Sustainable Technologies GmbH

Presented by Thomas Colin de Verdière, newHeat SAS

F08 Energy Savings for Gas Preheating in the Gas Transport Sector with Air Dehumidification and Expansion Turbines
Lisa Völker, University of Kassel

G01 Experiments On a Solar Vapour Absorption Refrigeration Cold Storage System
Mani Annamalai, Indian Institute of Technology Madras

Presented by Thilagan Kannappan, Indian Institute Of Technology Madras

G02 The Application of Concentrating Solar Thermal Systems in Hospital Buildings
Argiro Dimoudi, Democritus University of Thrace - Dept pf Environmental Engineering

G03 Performance Assessment of a Solar/biomass Hybrid Heating and Cooling System - Results from a Single-family House Operational Environment
Matteo Dongellini, Department of Industrial Engineering, University of Bologna

G04 Analysis of Constructive Modifications for Enhancing the Performance of Solar Collector/Regenerators for Liquid Desiccant Systems
Fernando Manuel Gómez Castro, University of Kassel

G05 Hybrid Solar Thermal Field (FPC-PTC) Applied For Solar Heating And Cooling Process In The Agroindustry Sector
Josué F. Rosales-Pérez, Pontificia Universidad Católica de Chile

Presented by Manuel Pérez-Garcia, University of Almeria

G06 Covering Energy Demands of Africa with Radiative Cooling and Solar Collection using a Single Device
Roger Vilà, University of Lleida

Presented by Albert Castell, University of Lleida

13:45 - 14:45 **Viessmann Student Event: Kick-Off**
Seminarraum 3

14:45 - 15:00 **Break**

15:00 - 16:30 **Keynote Talk + S-1 RE Strategies, Scenarios, Financing & Policies**
Hörsaal 4

Chair: Bärbel Epp, solrico

15:00 **Keynote Talk:** Solar and the Energy Transition: Challenges and Opportunities
Ute Collier, International Renewable Energy Agency

15:30 Solar Obligation: Effective Instrument for a Strong Acceleration of Solar Market Deployment
Gerhard Stryi-Hipp, Fraunhofer Institute for Solar Energy Systems ISE

15:45 Redefining Energy Security in Europe in the Context of the European Green Deal and the War in Ukraine
Agnieszka Rządkowska, University of Wrocław

16:00 Standardized Economic Evaluation Criteria of Solar Process Heat in Hybrid Systems - Results from IEA SHC Task 64 Subtask E
Jürgen Fluch, AEE - Institute for Sustainable Technologies

16:15 Definitions for Climate Neutrality and their Relevance for the Assessment of Solar Energy based Heating Systems
Harald Drück, IGTE, Stuttgart University

15:00 - 16:30 **I-1 Solar Energy and Heat Pumps**
Seminarraum 3

Chair: Mathias Ehrenwirth, Institute of new Energy Systems (InES) & Chris Bales, Dalarna University

15:00 The Potential of Combined PV and Air Source Heat Pump Systems in German Residential Buildings
Kristina Dabrock, Institute of Energy and Climate Research, Techno-Economic Systems Analysis, Forschungszentrum Jülich

15:15 Comparison of a Centralized with Decentralized Heat Pump Systems in a Multy Family Building
Robert Haberl, SPF / OST Eastern Switzerland University of Applied Sciences

15:30 PV Driven Air Heat Pump Using Overheating Effects as Thermal Battery in Single Family Houses
Alexander Thür, University of Innsbruck / Unit of Energy Efficient Buildiing

15:45 Increasing PV Self-Consumption with Heat Pumps – Sense or Non-Sense of additional Electric Heaters
Michel Y. Haller, SPF Institute for Solar Technology - Eastern Switzerland University of Applied Sciences (OST)

Presented by Andreas Häberle, SPF Institute for Solar Technologies

16:00 100 % Solar Heating with Seasonal Thermal Storage, Solar Thermal Collectors, PV and Heat Pump
Florian Ruesch, SPF / OST

15:00 - 16:30 B-1 Energetic Renovation of Buildings

Seminarraum 6

Chair: Alexandra Troi, EURAC Research

15:00 A Novel Statistical Method to Improve Energy Efficiency of Housing Stock in the South-Eastern Mediterranean Climate
Bertug Ozarisoy, (Alumni) University of East London

15:15 Sustainable and Efficient Energy Supply for the Development of Tourist Villages at the Adriatic and Ionian Sea
Franziska Bockelmann, Steinbeis-Innovationszentrum (SIZ) energieplus

15:30 Renovation of a Multi-Family-House with External Wall Heating System
Toni Calabrese, SPF Institute for Solar Technology / OST-Eastern University of Applied Sciences

Presented by Daniel Philippen, SPF Institute for Solar Technology / OST-Eastern University of Applied Sciences

15:45 Participation Potential for Energy-Active Facades in Future Flexibility Markets
Thomas Ramschak, AEE INTEC

16:00 ATLAS-FeliCity: Supporting Energy Retrofit of the Heritage Building Stock Through A Simplified Digital Twin
Cristina Silvia Polo López, University of applied sciences and arts of southern Switzerland SUPSI

Presented by Alexandra Troi, Institute for Renewable Energy / EURAC Research

15:00 - 16:30 **Workshop: Security of Supply and Energy Transition?**

Seminarraum 2

Speakers:
Henning Meschede, University Paderborn

Speaker
Toralf Pilz, BDEW Bundesverband der Energie- und Wasserwirtschaft e.V.

Speaker
Eric Quiring, SMA Solar Technology AG

16:30 - 16:45 **Break**

16:45 - 18:30 **Keynote Talk + S-2 RE Strategies, Scenarios, Financing & Policies**

Hörsaal 4

Chair: Agnieszka Rządkowska, University of Wrocław and Ute Collier, International Renewable Energy Agency

16:45 **Keynote Talk:** New Legislative Requirements and Overview of Market
Pedro Dias, Solar Heat Europe

17:15 Impact of Incentives Towards Lowering the Levelized Cost of Electricity of Concentrating Solar Power Plants in India
Tarun Kumar Aseri, Indian Institute of Technology Delhi

Presented by Tara C. Kandpal, Indian Institute of Technology Delhi

17:30 100% of Renewable Energies at Mallorca Hotels
Andreu Moià-Pol, UIB

17:45 Mini-Grid or Grid Extension? The Strategies for Electrification Schemes Concerning Population Density in Sub-Saharan Africa
Kedar Mehta, Technische Hochschule Ingolstadt

18:00 Promotion of Solar Heat in Industrial Processes: Policy and Law Analysis with Focus on Turkey and Germany
Yelda Erden Topal, Middle East Technical University

18:15 Intracting at Universities - Green the Bottom Line
Jens Knissel, Universität Kassel - FB06 FG Technische Gebäudeausrüstung

16:45 - 18:00 **Q-1 System Modelling, Artificial Intelligence, Digitalization**

Seminarraum 3

Chair: Cedric Paulus, CEA

16:45 Applying Machine Learning Methods and Outlier Detection to Process and Analyse Incomplete Heat Meter Data
Ulrich Trabert, University of Kassel

17:00 Fault Detective - Automatic Fault Detection for Solar Thermal Systems based on Artificial Intelligence
Lukas Feierl, SOLID Solar Energy Systems GmbH

17:15 Detection of Tracker Failures for a 2-Axis Photovoltaic System
Lucas Barboza, Federal University of Pernambuco

Presented by Diego Miranda, Federal University of Pernambuco

17:30 Data-Driven Approach Utilising Random Forest Regression for PV Performance Monitoring
Alexander David, TU Wien

17:45 Efficiency Evaluation and Comparisons of Solar Cell Technologies Based on Measurements from Arabian Peninsula
Yannis Pantazis, IACM-FORTH, Greece

Presented by Yiannis Pantazis, IACM-FORTH, Greece

16:45 - 18:00 **F-1 Innovative Industrial Process Heat**

Seminarraum 6

Chair: Jürgen Fluch, AEE INTEC

16:45 Parametric Analysis of Low-Temperature Solar Air Heater Using a Copper Slag Packed-Bed TES
Ian Wolde, Pontificia Universidad Católica de Chile

17:00 A Novel Method for Assessing the Techno-Economical Compatibility of Solar Thermal Integrations
Andrea Gambardella, Absolicon Solar Collectors AB

17:15 Analysis of Low Temperature Energy Concepts for Industrial Processes
Carles Ribas Tugores, AEE - Institute for Sustainable Technologies

Presented by Sarah Meitz, AEE - Institute for Sustainable Technologies

17:30 How To Combine a Solar Heating Plant and a CHP most Efficiently for Industrial Applications?
Felix Pag, University of Kassel, Institute of Thermal Engineering

17:45 Solar Thermal and Heat Pump Heating Systems in Industry: Model-Based Development of Globally Applicable Design Guidelines
Mateo Jesper, University of Kassel, Department of Solar and Systems Engineering

16:45 - 18:00 **Workshop: Elsevier Publishing Workshop**
Seminarraum 2

18:00 - 18:45 **Happy Hour**
Foyer Campus Center

19:00 - 22:00 **Young ISES Party**
Foyer Campus Center

Tuesday, 27 September 2022

08:30 - 09:00 **Plenary Session 2: InCoRE: International Cooperation in RE Education**

Hörsaal 1

Chair: Jennifer McIntosh, ISES

08:30 InCoRE: International Cooperation in RE Education
Klaus Vajen, University of Kassel and Aline Kirsten Vidal de Oliveira, ABENS

09:00 - 09:30 **Plenary Session 3: (Europe's) Energy Transition after the Ukrainian War + Paths to 100% RE Future**

Hörsaal 1

Chair: Jennifer McIntosh, ISES

09:00 (Europe's) Energy Transition after the Ukrainian War + Paths to 100% Renewable Energy Future
Jan Rosenow, RAP

09:30 - 10:00 **Coffee Break**

10:00 - 11:15 **Keynote Talk + E-2 Innovative District Heating and Cooling**

Hörsaal 4

Chair: Karin Rühling, Technische Universität Dresden

10:00 **Keynote Talk:** Challenges and Opportunities for Solar Thermal in a Rapidly Transforming District Heating and Cooling Sector
Thomas Pauschinger, AGFW | Energy Efficiency Association for Heating, Cooling and CHP

10:30 Solar District Heating versus Renovation of Buildings as Measures for Decarbonization of Heat Supply in Rural Areas
Jan Kelch, University of Kassel

10:45 About the Efficiency of District Heating with Flexible Heat and Temperature Distribution
Sven Paulick, Technische Universität Dresden

11:00 Performance Monitoring of an 800m2 Solar Thermal Plant with Evacuated Flat Plate Collectors coupled to a DHN
Alexis Duret, Laboratory for Solar Energy and Building Physics (LESBAT), School of Management and Engineering Vaud

10:00 - 11:15 N-2 Thermal Energy Storage - New Concepts in TES
Hörsaal 5

Chair: Andreas Hauer, ZAE Bayern

10:00 Load Management for Seasonal Heat Storage Applications based on Sorption Storage Technology
Nayrana Daborer-Prado, University of Applied Sciences Upper Austria

10:15 Experimental Investigation of Two Falling Film Horizontal Tube Bundle Absorbers for a Thermal Absorption Storage Process with H2O/LiBr
Dieter Pressl, Bavarian Center for Applied Energy Research (ZAE Bayern)

10:30 Research Evolution and Trends of Chemical Reaction Heat Storage in the Last Decade
Rebeca Salgado-Pizarro, Universitat de Barcelona

10:45 New Concept for High Temperature Thermal Energy Storage Using a Concrete Tank
Luisa F. Cabeza, University of Lleida

Presented by David Vérez, University of Lleida

11:00 Experimental Investigations on a Single Tank Thermal Energy Storage System for Cooking Solutions
Jimmy Chaciga, Makerere University

11:15 Experimental Investigation of Direct Heated Rock Bed Thermal Energy Storage for Application in Small Scale Solar Power Generation
Ashenafi Kebedom, Mekelle University

Presented by Mulu Bayray Kahsay, Mekelle University

10:00 - 11:15 M-1 Solar Thermal and PVT Collectors and Solar Loop Components
Seminarraum 3

Chair: Daniel Zenhäusern, SPF Institute for Solar Technology, OST

10:00 Mini Hybrid Parabolic Trough Solar Thermal Power Plant for Firect Steam Generation: Plant Design, Commissioning and Operation
Hamdi Kessentini, Ecole Nationale d'Ingénieurs de Tunis

10:15 A Performance Analysis of a Parabolic Trough Collector using Numerical Computation And Real-Time Parameters
Prashant Saini, IIT Mandi

10:30 Agri Solar Thermal Systems: A Brief Study on the Energetic Potential of Bifacial Solar Thermal Systems
Thorsten Summ, Institute of new Energy Systems (InES)

10:45 TABSOLAR® – A Novel Approach of Thermo-Active (Solar) Building Systems Based on Ultra-High Performance Concrete (UHPC)
Michael Hermann, Fraunhofer Institute for Solar Energy Systems ISE

11:00 Numerical Investigation of the Performance of a Solar Air Heater Equipped with a Packed Bed
Hossein Ebadi, Politecnico di Torino

10:00 - 11:15 **Workshop: Renewable Energy - Insights from Environmental and Behavioural Economics**
Seminarraum 6

Chair: Heike Wetzel, University of Kassel & Jonas Bender, University of Kassel

Speaker
Beate Fischer, University of Kassel

Speaker
Larissa Fait, University of Kassel

Speaker
Victor von Loessl, University of Kassel

11:15 - 11:30 **Break**

11:30 - 12:45 **Keynote Talk + Q-2 System Modelling, Artificial Intelligence, Digitalization**

Hörsaal 4

Chair: Cedric Paulus, CEA

11:30 **Keynote Talk:** Digitizing Energy: How Digitalization is Impacting the Energy Domain and is Offering New Opportunities
Moritz Lauster, Viessmann Climate Solutions SE

12:00 DHgeN: Automated Generation of District Heating Network Layouts for Feasibility Studies
Giuseppe Peronato, Idiap Research Institute

12:15 A Multistep Optimization Procedure for a Fair Sharing of Profits in Energy Communities
Gerald Steinmaurer, University of Applied Sciences Upper Austria

12:30 KNN-Based Ensembles for Day-Ahead Forecasting of Solar Power Outputs
Yannis Pantazis, IACM-FORTH, Greece

Presented by Yiannis Pantazis, IACM-FORTH, Greece

11:30 - 12:45 **L-1 Urban Planning, Solar and Efficient Districts**

Hörsaal 5Chair: Fabian Ochs, University of Innsbruck & Georgios Dermentzis, University of Innsbruck

11:30 Implementation of Ice Storage Tanks into 5GDHC Networks
Maike Schubert, Fachhochschule OST, Institut für Solartechnik SPF

Presented by Martin Neugebauer, SPF Institute for Solar Technology/ Eastern Switzerland University of Applied Sciences (OST)

11:45 Modelling and Simulation of Booster Heat Pump for DHW Preparation in a Multi-Family Building Connected to the District Heating
Mara Magni, Universität Innsbruck Institut für Konstruktion und Materialwissenschaften

12:00 Case Study of a Positive Energy Community for Renewable Energy Sharing
Min-Hwi Kim, Korea Institute of Energy Research

12:15 Towards Net-Zero Neighborhoods in Greece
Georgios Dermentzis, Aristotle University of Thessaloniki

11:30 - 12:15 **O-1 Testing, Certification and Monitoring**

Seminarraum 6

Chair: Stefan Mehnert, Fraunhofer ISE

11:30 Operational Analysis of 5 PVT Heat Pump Systems Based on Field Measurement Data
Sebastian Helmling, Fraunhofer Institute for Solar Energy Systems

11:45 Aggregated Monitoring Results of Residential Buildings with High Solar Fraction in Austria
Veronika Hierzer, AEE INTEC

12:00 Fault Detection for Solar Thermal Systems: Evaluation and Improvement of Existing Algorithms
Christoph Schmelzer, University of Kassel, Institute of Thermal Engineering

11:30 - 12:45 **F-2 Innovative Industrial Process Heat**

Seminarraum 3

Chair: Felix Pag, University of Kassel

11:30 Non-Tracking Asymmetric Shadeless (NASH) Solar Collectors for Decarbonizing Industrial Process Heat Applications
Yogesh Bhusal, Winston Cone Optics

11:45 Modeling of a Solar Heat for Industrial Processes (SHIP) System using Fresnel Collectors
Marco Antonio David Hernández, Universitat Politècnica de València Instituto Ingeniería Energética (IUIIE)

12:00 Techno-Economic Comparison of Steam Generation Systems with Industrial Heat Pumps
Abdulrahman Dahash, Sustainable thermal energy systems/Center for Energy/AIT Austrian Institute of Technology GmbH

12:15 Steam Supply Based on a Novel Solar Cavity Receiver System with a Low-Cost Heliostat Designed for Heat Industrial Processes
Adriana Zurita, Tewer Engineering

12:30 IEA SHC Task 64/SolarPACES Task IV – Subtask C: Uncertainties in Simulation Energy Yield of a PTC Solar Plant for Process Heat
Ignacio Calderón-Vásquez, Pontificia Universidad Católica de Chile

12:45 - 13:30 **Lunch Break**

13:45 - 14:45 **Poster Session 2: Components | Cross-Cutting**

Poster Area

The Poster numbers are based on themes:
M - Solar Thermal and PVT Collectors and Solar Loop Components
N - Thermal Energy Storage
O - Testing, Certification and Monitoring
P - Solar Resources and Energy Meteorology
Q - System Modelling, Artificial Intelligence, Digitalization
R - Sector Coupling and Grid Stabilization
S - Renewable Energy Strategies, Scenarios, Financing and Policies
T - Renewable Energy Education

M01 Optimization of a Low-Cost Heat Sink of a CPV-T Solar Collector
Jesús Castro, Universitat Politècnica de Catalunya

Presented by Deniz Kizildag, Universitat Politècnica de Catalunya

M02 Validation of an Alternative Methodology for Direct Steam Generation Modelling in Parabolic Collectors
Eduardo Gonzalez-Mora, Universidad Autónoma del Estado de México

M03 Effects of Atmospheric Gases on the Efficiency of Heating and Cooling Supply Components: Experimental Investigation of a Plate Heat Exchanger
Martin Heymann, TU Dresden

M04 A Garri Roasting System with Parabolic Solar Collector and Thermal Energy Storage
Ayoade Kuye, University of Port Harcourt

M05 Experimental Investigation on A Novel Flat-Plate Water-Based Photovoltaic-Thermal Module
Wenjie Liu, Institute of Refrigeration and Cryogenics, Shanghai Jiaotong University

M06 Interception on Solar Absorbers: Ray Tracing for Comparison between a Parabolic Reflector and a Compound Parabolic Concentrator
Casiana Lwiwa, Norwegian University of Science and Technology

M07 Angel-Dependent Features of MorphoColor TM Solar Collectors: Color Stability, IAM, Yield
Stefan Mehnert, Fraunhofer ISE, TestLab Solar Thermal Systems

M08 Modelling a Direct Absorption Solar Collector with Carbon Nanoparticles Dispersed in Water
Miguel Sainz Manas, PROcédés Matériaux et Energie Solaire (PROMES) - CNRS

M09 Heat Pipe Collectors with Overheating Prevention in a Cost-Optimized System Concept: Monitoring of System Performance and Stagnation Loads under Real Conditions
Bert Schiebler, Institut für Solarenergieforschung GmbH

Presented by Julian Jensen, Institut für Solarenergieforschung GmbH

M10 Investigation of Transmission Reduction on Soiled Solar Glass Panes
Abilene Silveira Friebe, Hochschule für Technik und Wirtschaft Berlin (HTW Berlin)

M11 Long Term Thermal Performance Analysis of A Large Scale Flat PLat Solar Collector Field
Yutong Xiang, Technical University of Denmark

M12 CFD Simulation of Two Parabolic Trough Collector Alternatives Receiver with Non-Uniform Heat Flux Distribution
Hatem Bentaher, National Engineering School of Sfax

N01 Numerical Model of Cold Encapsulated Phase Change Material (EPCM)-Based Latent Heat Storage Tank
Konrad Babul, Wrocław University of Science and Technology

Presented by Krzysztof Goljanek, Wrocław University of Science and Technology

N02 Study of Thermal Degradation of Adip Acid as PCM under Stress Conditions: A Kinetic Analysis
Rocío Bayón, CIEMAT - PSA

N03 Comparative Experiments on a Novel CaCl2-Based Composite Material and Zeolite 13X Inside a Sorption Reactor for Solar Energy Storage
Elise Bérut, LOCIE UMR 5271, Université Savoie Mont-Blanc, CNRS

N04 Study of the Thermal Stability of D-Mannitol and the D-Mannitol-Dulcitol Eutectic Mixture for Thermal Storage Aplications
Lourdes Bouzas Vila, University of the Basque Country

Presented by Laura Quant, University of the Basque Country

N05 Techno-Economic Optimization of Large-Scale Thermal Energy Storage for Future District Heating Systems
Abdulrahman Dahash, Sustainable thermal energy systems/Center for Energy/AIT Austrian Institute of Technology GmbH

N06 Sulphates as Solid-solid Based Thermal Energy Storage Materials
Stefania Doppiu, CIC energiGUNE

N07 Numerical Investigation of Energy Absorption in Dual Metal Hydride Bed based Thermo-Chemical Energy Storage System
Sumeet Kumar Dubey, INDIAN INSTITUTE OF TECHNOLOGY DELHI

N08 The Experimental Performance Characterisation of a Three Module Phase Change Energy Storage System for Domestic Heating Application
Philip Eames, CREST Loughborough University

N09 Experimental and Numerical Investigations of a Latent Heat Storage for Cooling of Data Center
Jianhua Fan, Department of Civil and Mechanical Engineering, Technical University of Denmark

Presented by Gerald Englmair, Department of Civil and Mechanical Engineering, Technical University of Denmark

N10 Numerical Investigation of a Large-Scale Water Pit Heat Storage
Meng Gao, Technical University of Denmark

N11 Life Cycle Assessment (LCA) of Several Concentrating Solar Plants (CSP) in Tower Configuration with Different Storage Capacity in Molten Salts
Gemma Gasa, University of Lleida

Presented by Luisa F. Cabeza, University of Lleida

N12 Sorption Test Bench for Zeolite and Salt-Composite Based Thermochemical Storage
Gayaneh Issayan, University of Applied Sciences Upper Austria

N13 Performance Investigation on Cascade Latent Heat Storage for Various Geometric Orientations
Shubham Jain, Indian Institute of Technology Delhi

N14 Characterization of Enhanced Biobased Phase Change Material with Graphene Nanoplatelets
Elisangela Jesus D'Oliveira, Northumbria University at Newcastle

N15 Life Cycle Assessment of Large Thermal Energy Storage Systems for District Heating Networks - Comparison between Pit Storage and Tank Storage with special Focus on the Use of Recycling Materials for Enhanced Thermals Insulation.
Harald Kicker, Instiute of Polymeric Materials and Testing / Johannes Kepler University Linz

N16 Degradation Investigation of Myristic and Oleic Acid for Latent Heat Storage
Franziska Klünder, Fraunhofer Institut For Solar Energy Systems

N17 Prediction of the Discharging Time of a Latent Heat Thermal Energy Storage System with a UA Approach
Andreas König-Haagen, University of the Basque Country

N18 Loading Slim Hot Water Tanks with and without Swirl Generation - First Results
Felix Oestreich, University of Technology Chemnitz

N19 Kinetic Analysis of TGA Measurements When Evaporation Is a Degradation Process in PCM
Laura Quant Colón, CIEMAT - PSA

N20 The Polymorphism of Bio-Based Esters as Phase Change Materials: A Methodological Approach
Rebecca Ravotti, Lucerne University of Applied Sciences and Arts HSLU/University of Edinburgh

N21 A Novel Alginate/Expanded Graphite based Composite for use in Solar and Waste Heat Storage
Jack Reynolds, Swansea University

N22 Development of an Open System for Evaluating Material Charging Characteristics from Industrial Waste Heat
Jack Reynolds, Swansea University

N23 Thermal Energy Storage Capacity on Mineral Zeolite
Oscar Seco Calvo, CIEMAT

N24 Assessing Specific Heat Capacity of Chilean Copper Slag for High Temperature Thermal Energy Storage
Valentina Segovia, Pontifical Catholic University of Chile

N25 Effect of Design Characteristics on Pit Thermal Energy Storage (PTES) Performance
Ioannis Sifnaios, Technical University of Denmark

N26 Seasonal Power-to-Heat Storage based on Ca(OH)2 - Development of Pilot Plant
Venizelos Eleftherios Sourmelis Terzopoulos, German Aerospace Center

N27 Room-Integrated Large Hot Water Storage
Gloria Streib, ZAE Bayern

N28 Sorption Heat Storage for Solar Heat Integration in Industrial Processes in Harsh Climates.
Salvatore Vasta, CNR-ITAE

N29 Parametric Study of Structured Thermocline Storage Systems
Jordi Vera Fernandez, Heat and Mass Transfer Technological Center (CTTC)-Universitat Politècnica de Catalunya (UPC)

N30 Numerical Investigation and Performance Evaluation of Food Grain Drying Unit Integrated with the Thermal Energy Storage System.
Ashutosh Verma, Dr B R Ambedkar National Institute of Technology Jalandhar

Presented by Rajeev Kukreja, Dr B R Ambedkar National Institute of Technology Jalandhar

N31 Experimental and Numerical Investigation on the Thermocline Expansion in Packed-bed Thermal Storage Tank with Sensible Fillers
Baoshan Xie, Laboratoire de Thermique et Energie de Nantes (LTEN), UMR CNRS 6607, Nantes Université

O01 Absorber Surface Durability Standard Testing ISO 22975-3 vs. Measured Thermal and Humidity Stress of Absorber Surface at Extreme Test Site
Thomas Kaltenbach, Fraunhofer Institute for Solar Energy Systems ISE

O02 Novel Hardware-in-the-Loop Approach for Thermal Systems
Tobias Reum, Technische Hochschule Ingolstadt

Presented by David Klump, Technische Hochschule Ingolstadt

O03 Flow Rate Estimation In Glandless Circulator Pumps - Influence Of Temperature And Water-Glycol Heat-Transfer Fluids
Christian Sauer, Universität Kassel, Institut für thermische Energietechnik, Fachgebiet Solar- und Anlagetechnik

O04 Cost-Effective Energy Balancing of Thermal Systems Based on Temperature Measurements Only
Manuel Joschka Seiz, Solar and Heat Technology Stuttgart

P01 Assessment of Downward Longwave Radiation Models in Clear-Sky Desert Conditions
Dunia Bachour, QEERI – Qatar Environment & Energy Research Institute

P02 A Comparaison of Eight Transposition Models Applied for Different Orientations at Minute Resolution
João Victor Furtado Frazão de Medeiros, Federal University of Pernambuco

Presented by Diego Miranda, Federal University of Pernambuco

P03 Study of the Solar Potential of an Urban-Rural Territory in a Mountainous Area
Apolline Ferry, LOCIE

P04 Experimental Device to Measure the Spectral Transmittance of Soiling on Photovoltaic Covers under Outdoor Performance Conditions
Gabriel López, Universidad de Huelva

P05 A Comparative Study on Solar Radiation Datasets for Photovoltaic Energy Prediction at High Latitudes
Mattia Manni, Norwegian University of Science and Technology

P06 Mapping Radiative Cooling Potential Predictions for Africa
Jesús Monterrubio, UNIVERSITY OF LLEIDA

Presented by Albert Castell, UNIVERSITY OF LLEIDA

P07 Management and Operation of Qatar's Solar Radiation Monitoring Network
Daniel Perez-Astudillo, QEERI/HBKU

P08 Study on Analysis of Solar Panel Efficiency in Vietnam a Power Comparison Before and Post Cleaning
Surender Rangaraju, Lincoln University College / Snetel Technologies

P09 Use of Energy Meteorological Data for Model Predictive Control Algorithms of Hydrogen Metal Hydride Storage Systems
Antonia Schelnberger, University of Applied Sciences Bonn-Rhein-Sieg, Intl. Centre for Sustainable Development (IZNE)

P10 Dual Axis Optimization of Solar Photovoltaic at Various Sites in Pakistan
Zia ul Rehman Tahir, University of Engineering and Technology Lahore

P11 Airborne and OpenGeo Data for Energy System Model Applications
Susanne Weyand, German Aerospace Center (DLR)

Q01 Implementation of Adapted Black Box Models for the Performance Characterization of Commercial Sorption Chillers
Amín Altamirano, Le Cnam/Lafset

Q02 Photovoltaic System Performance Prediction by Cluster Self Referencing with No External Data
Ian Cole, University of Cyprus

Presented by Stefani Peratikou, Cyprus University of Technology

Q03 Fault Detection in Solar Thermal Systems Using Machine Learning
Florian Ebmeier, Eberhard Karls Universität Tübingen

Q04 Digital Representation of Heating Systems for Fault Detection Purposes
Matthias Georgii, University of Kassel

Q05 An Experimental Testing of Model-Based Control of Energy Storage in Demonstration Solar House
Kyoung-ho Lee, Korea Institute of Energy Research

Q06 Simulated Evaluation on Simplified Inverse Model for a Solar School Building
Kyoung-ho Lee, Korea Institute of Energy Research

Q07 Building Information Modeling for Solar Energy Systems
Wael Mandow, Institute for Solar Energy Research in Hamelin (ISFH)

Q08 Data Clustering and Genetic Algorithm for the Design Optimization of a Hybrid Concentrated Solar System for SHIP
Valéry Vuillerme, CEA

Q09 Powershade - Enhanced Control for PV Solar Shades
Stephan Moser, HELLA Sonnen- und Wetterschutztechnik GmbH

Q10 Partial Shading Pattern Modeling in Solar PV System Using MATLAB/Simulink
Tarikua Mekashaw Zenebe, NTNU

R01 Optimal Sizing of Gensets and Capacitor Bank for Integration of Large Scale Solar PV into Grid
Habibullah Amiry, Da Afghanistan Breshna Sherkat

R02 Battery Electric Storage System Control Strategies to Optimize the Use of Photo Voltaic Panels and Energy Flexibility Services of Buildings Towards the Grid
Wim Zeiler, TU Eindhoven

S01 Techno-Economics of Central Tower Receiver Power Plants in India: Effect of Heat Transfer/Thermal Storage Media
Tarun Kumar Aseri, Indian Institute of Technology Delhi

Presented by Tara C. Kandpal, Indian Institute of Technology Delhi

S02 What Can PV Self-supply Do for System Integration?
Sarah Becker, Fraunhofer IEE

S03 Electric Self-production for LV Subscribers: Is It Better to Have Decentralized or Centralized PV Production?
Mariam Chouket, National Engineering School of Tunis El Manar

S04 Renewable Energy Education: Gendered Design and Innovation in the Context of a Small Island Developing State
Mohammad Khalil Elahee, University of Mauritius

S05 Efficiency of Electricity Self-Production for Medium Voltage Subscribers in Tunisia
Khawla Elmalleh, national engineering school of Tunisia

S06 Passive Houses and Its Implications in Turkey - Lessons Learnt from Germany Experience
Ilgın İrem Gündüz, MIDDLE EAST TECHNICAL UNIVERSITY

Presented by Yelda Erden Topal, Middle East Technical University

S07 Status, Barriers and Drivers for Biogas Deployment in Tunisia: A Comprehensive Review
Amani Jemili, National Engineering School of Tunis

S08 Technical Feasibility Study of Micro-Grid Integration to Electrify Rural Settlements of Sub-Saharan Africa
Bertha Lwakatare, Institute of new Energy Systems (InES)

S09 A Constraint of Global Scale Nuclear and Fossil Fuel Power Usage Which Favors Solar Energy But Missed by Local Energy Technologists and Governments' Policy Makers
Rajan Sodankur, CSIR-Central Salt and Marine Chemicals Research Institute

Presented by Lavkumar Mehta, KPMG

S10 The Innovative Water Mattress for the Dairy Cattle as a Component of the Renewable-Based Cooling System for the Livestock Buildings: RadMAT Project
Anna Szczepanowska, Wroclaw University of Science and Technology

T01 Mauritius Island State: Gendered Pledges for Energy Management in Households
Sooparrnah Poorun, UNIVERSITY OF MAURITIUS

Presented by Abdel Khoodaruth, UNIVERSITY OF MAURITIUS

13:45 - 14:45 **Viessmann Student Event: Case Study Working Time**
Seminarraum 3

14:45 - 15:00 **Break**

15:00 - 16:30 **Keynote Talk + A-1 Solar and Efficient Buildings**
Hörsaal 4

Chair: Monika Woloszyn, University Savoie Mont Blanc

15:00 **Keynote Talk:** Solar Decathlon Europe 22 - Experiences and Perspectives of a Student Building Competition
Karsten Voss, University Wuppertal

15:30 Theoretical Investigations of Electric Heating Concepts for Residential Buildings
Dominik Bestenlehner, University of Stuttgart, IGTE

15:45 Analysis of Solar Thermal Polygeneration Systems for the Residential-Commercial Sector
Luis M. Serra, GITSE-I3A, Department of Mechanical Engineering, Universidad de Zaragoza

Presented by Eduardo A. Pina, GITSE-I3A, Universidad de Zaragoza - Industrial Process and Energy Systems Engineering, EPFL

16:00 An Exploratory Interplay between Daylight, General and Task Lighting for Visual Comfort and Electricity Savings in a Personal Office Space
Chantal Basurto Davila, Idiap Research Institute

Presented by Roberto Boghetti, Idiap Research Institute

15:00 - 16:30 **N-3 Thermal Energy Storage - Applications of TES Technologies**

Hörsaal 5

Chair: Andreas Hauer, ZAE Bayern

15:00 Thermal Performance of Eccentric High-Temperature Latent Heat Storage System: Passive Heat Transfer Enhancement Strategy
Alok Kumar Ray, University of Queensland and IIT Delhi Academy of Research

15:15 PCM Cold Storage Development for Solar and Server Room Cooling
Gerald Englmair, Technical University of Denmark (DTU), Department of Civil and Mechanical Engineering

15:30 Thermal Assessment of a Packed-Bed TES Integrated to a Turbo-Assisted LFC for Medium Temperature Applications
Ignacio Calderón-Vásquez, Pontificia Universidad Católica de Chile

15:45 Demonstration of a Latent Heat Storage Unit Using a Pillow-Plate Heat Exchanger in a Zero Emission Building
Olav Galteland, SINTEF Energy AS

16:00 Design of Water Sorbent Composites of Commercial Granulated γ-Alumina and CaCl2 for Solar Energy Storage
Alenka Ristić, National Institute of Chemistry Slovenia

16:15 Assessment of Plastic Crystal System for Medium-Temperature Thermal Energy Storage (80ºC-190ºC)
Ángel Serrano, Centre for Cooperative Research on Alternative Energies (CIC energiGUNE)

15:00 - 16:30 **K-1 Carbon Neutral University Campus**

Seminarraum 6

Chair: Thomas Bednar, TU Wien & Anton Maas, University of Kassel

15:00 A Holistic Energetic Transformation Concept for the Heating and Cooling Supply of a University Campus
Diana-Iulia Stanica, Technische Universität Berlin, Hermann-Rietschel-Intitute

Presented by Felix Schumann, Technische Universität Berlin, Institute of Geology Engineering

15:15 The Issue of Climate Neutrality – How Do We Really Account Emissions?
Oliver Opel, FH Westküste

Presented by Marlies Wiegand, FH Westküste

15:30 Derivation of Heating Load Profiles on the Basis of Demand-Consumption Analyses
Michael Krause, Fraunhofer Institute for Energy Economics and Energy Systems Technologie IEE

15:45 Transformation of a University Campus: Comparison of Ranking Methods for Temperature Reduction from Network and Building Perspective
Henrik Neusuess, Universtät Kassel

Presented by Jens Knissel, Universtät Kassel

16:00 Identification of Temperature Reduction Potentials in Heating Circuits based on Measurements
Stina Fox, Universität Kassel - FB06 FG Technische Gebäudeausrüstung

16:15 Identification of Waste Heat Potentials and Their Integration Into a District Heating Subgrid
Weena Bergstraesser, Solar and Systems Engineering, University of Kassel

15:00 - 16:30 M-2 Solar Thermal and PVT Collectors and Solar Loop Components

Seminarraum 3

Chair: Tomas Matuska, Czech Technical University in Prague

15:00 Spectral Beam Splitting in Compound Parabolic Collector Based Photovoltaic Thermal System
Mohit Barthwal, Indian Institute of Technology Delhi

15:15 Efficiency and Temperature-Dependence of Novel Evacuated PV-T Collectors
Daniela De Luca, University of Naples "Federico II"; CNR-ISASI

15:30 Hardware-in-the-Loop Integration of PVT Models using Internet of Things-enabled Communication
Josef Meiers, Saarland University, Chair of Automation and Energy Systems

15:45 Development and Indoor Testing of a High-Performance PV/thermal (PVT) Panel with Integral Stagnation Control
Lucio Mesquita, Natural Resources Canada - CanmetENERGY

16:00 Empirical Validation of Low-Temperature PVT Collector for Heat Pump Integration
Francisco Beltrán, KTH Royal Institute of Technology

16:15 Modelling and Experimental Verification of an Unglazed Metal Facade Collector Model
Viacheslav Shemelin, Czech Technical University in Prague, University Centre for Energy Efficient Buildings

16:30 - 16:45 **Break**

16:45 - 18:00 **Keynote Talk + G-1 Solar Air Conditioning and Refrigeration**

Hörsaal 4

Chair: Salvatore Vasta, CNR-ITAE

16:45 **Keynote Talk:** Solar Cooling
Uli Jakob, HFT Stuttgart

17:15 Adapted Components and Show Cases on Solar Cooling Systems in Sunbelt Region Countries
Marco Beccali, Università degli Studi di Palermo

Presented by Ben Alex Baby, Università degli Studi di Palermo

17:30 Experimental Assessment of A Solar-assisted Absorption-compression Hybrid Heat Pump System for Both Heating and Cooling
Erjian Chen, Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University

17:45 Parabolic Trough Collector (PTC) System for Combined Cooling and Heating Supply for a Factory Building in Izmir, Turkey
Ahmet Lokurlu, SolitermGroup GmbH

16:45 - 18:00 **L-2 Urban Planning, Solar and Efficient Districts**

Hörsaal 5 Chair: Georgios Dermentzis, University of Innsbruck & Fabian Ochs, University of Innsbruck

16:45 Heat Pumps in Positive Energy Districts
Carsten Wemhoener, Institute of Energy Technology, Eastern Switzerland University of Applied Sciences

17:00 Municipal Heat Planning to Exit from Coal, Oil and Natural Gas in a German Major City
Tim Vaupel, Institute for Solar and Systems Engineering

17:15 Heat Pumps, Photovoltaics and Energy Storage in Buildings – Load Characteristics and Flexibility Options on District Level
Fabian Ochs, University of Innsbruck

17:30 Comparison of Solar Planning Tools
Matthias Haase, ZHAW

16:45 - 18:00 **O-2 Testing, Certification and Monitoring**

Seminarraum 3

Chair: Stefan Mehnert, Fraunhofer ISE

16:45 Accelerated Aging Test and Service Life Time Estimation for Solar Collectors
Stephan Fischer, University of Stuttgart, Institute for Building Energetics,Thermotechnology and Energy Storage IGTE

17:00 DHW Tanks - 40 % Savings by Better Stratification
Robert Haberl, SPF / OST Eastern Switzerland University of Applied Sciences

17:15 Accelerated Ageing Test Bench for Advanced Ceramic Slabs under Extreme and Controlled CSP Conditions
Inma Canadas, CIEMAT - PSA

16:45 - 18:00 **Workshop: How Could the Deployment of Energy storage Support the Integration of Solar Energy?**

Seminarraum 6

This workshop deals with the question how the deployment of energy storage could support the integration of solar energy. After a general introduction by Teun Bokhoven, it will take a closer look at three different tasks:
-> Task 35 "Flexible Sector Coupling"(Christoph Rathgeber, ZAE Bayern)
-> Task 39 "Large Thermal Energy Storages for District Heating"(Wim van Helden, AEE Intec)
-> Task 41"Economic Evaluation of Energy Storage"(Andreas Hauer, BVES)

Speaker
Teun Bokhoven, IEA Energy Storage (ES) TCP

Speaker
Andreas Hauer, ZAE Bayern

Speaker
Christoph Rathgeber, University Munich

Speaker
Wim van Helden, AEE INTEC

18:30 **Conference Dinner at Markthalle Kassel**

Wednesday, 28 September 2022

08:30 - 09:00 **Plenary Session 4: Future of Existing Buildings and Neighborhoods, Cities**

Hörsaal 1

Chair: Bulent Yesilata, Ankara Yildirim Beyazit University

08:30 Future of Existing Buildings and Neighborhoods, Cities
Lea Ranalder, UN-Habitat

09:00 - 09:30 **Plenary Session 5: The Role of Solar Heating in a Future Renewable Energy System**

Hörsaal 1

Chair: Tomas Olejniczak, RVO

09:00 The Role of Solar Heating in a Future Renewable Energy System
Werner Weiss, AEE INTEC

09:30 - 09:45 **IEA-SHC Award**

Hörsaal 1

The IEA SHC Solar Award recognizes an individual, company, or private/public institution that shows outstanding leadership or achievements in the field of solar heating and cooling and that supports the work of the IEA SHC. The 2022 award will recognize a Solar Heating or Cooling project to reduce energy use and costs in social housing.

09:45 - 10:00 **Break**

10:00 - 11:30 **Keynote Talk + N-4 Thermal Energy Storage - TES for Grid Integration of RES**

Hörsaal 4

Chair: Luisa F. Cabeza, University of Lleida

10:00 **Keynote Talk:** Energy Storage to Boost Solar Energy Deployment
Teun Bokhoven, IEA Energy Storage (ES) TCP

10:30 Increasing Renewable Energy Integration using Advanced Residential Thermal Energy Storage
Reda Djebbar, Natural Resources Canada - CanmetENERGY-Ottawa

10:45 Industrial Waste, By-products and Commercial Solid Particles to be used in Concentrating Solar Power Plants: A Comparison
Marc Majó Robles, University of Barcelona

Presented by Ana Inés Fernández, University of Barcelona

11:00 Novel Modeling Toolkit for Optimized Design and Integration of Large-Scale Underground Hot-Water Thermal Energy Storages in Future Local and District Energy Systems
Michael Reisenbichler, AEE INTEC

Presented by Wim van Helden, AEE INTEC

11:15 Aluminium-Redox-Cycles for the Production of Heat and Electricity in Buildings based on Renewable Energies
Yvonne Isabell Baeuerle, Eastern Switzerland University of Applied Sciences - SPF Institute for Solar Technology

10:00 - 11:30 T-1 Renewable Energy Education

Hörsaal 5

Chair: Birgit Steffenhagen, Hochschule Stralsund & Frank Späte, OTH – Technical University of Applied Sciences

10:00 The Life and Death of a Solar Energy Course - Lessons in Challenge Based Learning
Nelson Sommerfeldt, KTH Royal Institute of Technology

10:15 Development of a Small-Scale Plant for Electricity and Water Supply in Rural Regions of Côte D'Ivoire as Part of the First Ivorian Dual Study Program with Focus on Renewable Energies
Lukas Saars, Hochschule Niederrhein - Institute for Energy Technology and Energy Management

10:30 Solar Decathlon Prototypes and their Use as Post-Competition Living Labs in Higher Education
Torsten Masseck, Universitat Politècnica de Catalunya

10:45 Master's Courses at Solar Energy Conferences
Yoann Louvet, University of Kassel

11:00 Energy Scenarios: Designing the Renewable World of Tomorrow Together
Theresa Gothe, University of Applied Sciences Osnabrück

11:15 Renewable Energy and PtX-Technologies in Education
Birgit Steffenhagen, Hochschule Stralsund

10:00 - 11:30 **G-2 Solar Air Conditioning and Refrigeration**

Seminarraum 3

Chair: Uli Jakob, HFT Stuttgart

10:00 How To Cool A Warming World? – The Potential of Photovoltaic Green Cooling with Natural Refrigerants in Sunbelt Countries
Paul Kohlenbach, Berlin University of Applied Sciences and Technology (BHT)

10:15 Energy Analysis Of A Solar-Driven Hybrid Air Conditioning System With An Absorption Heat Pump And A Desiccant Evaporative Cooling System
Juan Prieto, Universitat Rovira i Virgili, Mechanical Engineering Department CREVER.

10:30 Optimal Conceptual Design of a Novel Façade-Integrated Adsorption Cooling System
Simon O. Weber, Institute for Acoustics and Building Physics, University Stuttgart

10:45 A New Method for Determining the Nusselt and Sherwood Numbers in Simultaneous Heat and Mass Transfer in Solar Collector/Regenerators
Fernando Manuel Gómez Castro, University of Kassel

11:00 Annual Energy Performance of a Solar/Biomass HVAC System: Experimental Characterization through Concise Cycle Tests
Matteo Dongellini, Department of Industrial Engineering, University of Bologna

11:15 An Innovative Solar-Powered Cooling Device, Based on Climate-Friendly Refrigerant and Thermal Energy Storage: “COOLSPACES 4 LIFE” Project
Konrad Babul, Wrocław University of Science and Technology

Presented by Krzysztof Goljanek, Wrocław University of Science and Technology

10:00 - 11:30 **H-2 PV and PVT Systems for Building and Industry**

Seminarraum 6

Chair: Corry de Keizer, TNO

10:00 Development of Novel Colored Photovoltaic Modules with Improved Angular Stability and High Energy Efficiency
Krishna Manwani, École polytechnique fédérale de Lausanne (EPFL)

10:15 PV System Performance Analysis of PERC, HIT, and CIGS Module Technologies in Five Locations in Peru.
Jan Amaru Palomino Töfflinger, Pontificia Universidad Católica del Perú

10:30 Fire Protection Requirements and Solutions for the Implementation of BIPV on a High-Rise Residential Building in Frankfurt/Germany
Michael Krause, Fraunhofer Institute for Energy Economics and Energy Systems Technologie IEE

10:45 Prefabricated Renewable Energy Facades for Cost-effective Buildings (PREFAB)
Corry de Keizer, TNO

11:30 - 11:45 **Break**

11:45 - 13:00 **Keynote Talk + I-2 Solar Energy and Heat Pumps**
Hörsaal 4

Chair: Chris Bales, Dalarna University

11:45 **Keynote Talk:** Solar and Heat Pump Systems: From Thermal Integration to PV (Over)Consumption
Michel Y. Haller, SPF Institute for Solar Technology - Eastern Switzerland University of Applied Sciences (OST)

12:15 Modular Refurbishment of Multi-Family Houses with PVT-PCM Heat Pump Systems and Self-Learning Energy Management
Thomas Bernard, Fraunhofer IOSB

12:30 Numerical Study on the Effect of Hybrid Solar Collectors on the Performances of the System Combining PVT With Heat Pumps
Mohamad Ali Jaafar, DualSun

12:45 Solar-Thermal Activation of Rear-Ventilated Façades as a Source for Heat Pump Based Heat Supply Systems
Christoph Büttner, Institut für Solarenergieforschung GmbH

11:45 - 13:00 **M-3 Solar Thermal and PVT Collectors and Solar Loop Components**

Seminarraum 3

Chair: Tomas Matuska, Czech Technical University in Prague

11:45 Adapted Calculation Approach of the Heat Transfer in Inclined Insulating Gas Layers of Solar Collectors
Pascal Leibbrandt, Hochschule Nordhausen, Institute for Renewable Energy Technology (in.RET)

12:00 VO2:Ge Based Thermochromic Solar Absorber Coatings
Anna Krammer, EPFL

12:15 Solar Selective Absorbers Design for Evacuated Flat Plate Collectors
Eliana Gaudino, Università degli studi di Napoli Federico II

12:30 Performance Analysis of Glazed and Evacuated Tube Types of Solar Water Heaters: Part I: Technical
Shafiqur Rehman, IRC-REPS, King Fahd University of Petroleum and Minerals

12:45 Experimental Testing of a Bag Packaged Silica Aerogel with Honeycomb Plastic TIM Solar Thermal Collector
Jesús Castro, Universitat Politècnica de Catalunya

Presented by Deniz Kizildag, Universitat Politècnica de Catalunya

11:45 - 13:00 **A-2 Solar and Efficient Buildings**

Seminarraum 6

Chair: Harald Drück, IGTE, Stuttgart University

11:45 Monitoring Results of the Energy Consumption Behaviour of Two Highly Solar-Powered Apartment Buildings
Lukas Oppelt, TU Bergakademie Freiberg

12:00 Sustainable Housing Insulation for High-Altitude Kyrgyzstan: A Technical Guide
Kedar Mehta, Technische Hochschule Ingolstadt

12:15 Study and Simulation of Low Energy Solar Powered House in Libya
Nouri Alkishriwi, University of Tripoli

12:30 The Future of Solar Integration: Towards Efficiency in Solar Design through Aesthetics, Optimisation and Customisability
Karim Jaspers, Team VIRTUe

11:45 - 13:00 **J-1 Water Purification through Renewable**

Hörsaal 5

Chair: Christoph Brunner, AEE INTEC and Isabel Oller, CIEMAT

11:45 Solar Thermal and Photon Technology Selection Guidelines and Application Examples for Industrial Water Treatment: Updates from IEA Task 62 Subtask C
Mikel Duke, Victoria University

12:00 Nexus Energy and Water: Integration Concepts for Solar Energy in Industrial Water and Waste Water Management
Sarah Meitz, AEE INTEC

12:15 Pilot-Scale Photocatalytic Hydrogen Production, Decontamination and Disinfection Using TiO2 Mixed With Metal-Cocatalysts Under Natural Radiation
Alba Ruiz Aguirre, CIEMAT-Plataforma Solar de Almeria

12:30 Experimental Studies on Solar Multi - Effect Desalination System
Mani Annamalai, Indian Institute of Technology Madras

Presented by Thilagan Kannappan, Indian Institute of Technology Madras

13:00 - 13:45 **Lunch Break**

13:45 - 14:45 **ISES AGM**

Hörsaal 4

ISES members are welcome to join us for the Annual General Meeting (AGM) where the ISES Headquarters Staff and ISES Board of Directors will present on the latest activities of the Society. Members can also ask questions to and exchange with the Board and staff. All ISES members are welcome.

13:45 - 14:45 **Poster Session 3: Applications | Components | Cross-Cutting**

Poster Area

All posters will be presented in this session again
Please see the poster sessions on Monday and Tuesday for details on posters.

13:45 - 14:45 **Viessmann Student Event: Team presentations**

Seminarraum 3

14:45 - 15:00 **Break**

15:00 - 16:15 **Keynote Talk + F-3 Innovative Industrial Process Heat**

Hörsaal 4

Chair: Felix Pag, University of Kassel

15:00 **Keynote Talk:** Solar Process Heat – Review and Outlook
Andreas Häberle, SPF Institute for Solar Technologies

15:30 Solar Industrial Heat: Markets, Technologies and Outlook
Bärbel Epp, solrico

15:45 About Common but Avoidable Faults During Planning and Operating of Solar Heating Plants in Industrial Applications
Yoann Louvet, University of Kassel

16:00 Solar Reactor: Applying a new Solar Collector Concept for the Photo-Electrochemical Conversion of Waste Water to alternative Fuels
Sarah Meitz, AEE INTEC

15:00 - 16:15 **Workshop: Scientists for Future**

Seminarraum 3

Speaker
Ulrike Jordan, University of Kassel

Speaker
Gregor Hagedorn, Museum for Natural Sciences

Speaker
Urban Weber, University of Applied Sciences Bingen

Speaker
Jens Clausen, Borderstep Institute

15:30 - 16:30 **Q-3 System Modelling, Artificial Intelligence, Digitalization**

Hörsaal 5

Chair: Bernd Hafner, Viessmann GmbH

15:30 Development of Models for Long-Term Simulations of District Heating Networks at High Temporal and Spatial Resolutions
Johannes Zipplies, University of Kassel, Institute for Thermal Engineering

15:45 Data-Based Modeling of High-Resolution Household Load Profiles
Harald Kirchsteiger, University of Applied Sciences Upper Austria, Energy Research Group ASIC

16:00 A TRNSYS Type for the Simulation of Temperature Limiting Heat Pipe Collectors
Julian Jensen, Institute for Solar Energy Research (ISFH)

16:15 Optimal Control Based on Deep Learning Techniques for a Hybrid Solar-Biomass System for Residential Buildings
Gabriel Zsembinszki, University of Lleida

Presented by Luisa F. Cabeza, University of Lleida

16:30 - 16:45 **Break**

16:45 - 17:45 **Closing Ceremony**
Hörsaal 1

Chair: Ulrike Jordan, Uni Kassel

Welcome

Presentation on new projects by Prof. Klaus Vajen

Wrap Up by Representatives from Theme Chairs

Best Poster Award

Masters Course Wrap Up Presentation

Introducing SWC 2023

Introducing EuroSun 2024

Farewell

18:00 - 18:30 **Happy Hour**
Foyer Campus Center

19:00 - 21:00 **Viessmann Student Event: Winner Announcement + Pizza and Drinks**
Seminarraum 3

EuroSun2022

Thursday, 29 September 2022

08:30 - 19:00 **Technical Tour 1**

Tour 1 will visit a cold local heating network, a sustainable living quarter with an innovative energy supply system, and a gas pressure regulating and metering plant for preheating natural gas. Learn more about Tour 1 here and register via the EuroSun 2022 registration portal.

08:30 - 18:30 **Technical Tour 2**

Tour 2 will visit the Lemgo Large Scale District Heating plant, the Institute for Solar Energy Research in Hamelin and PAW, a manufacturer of products for heating technology and solar thermal systems, as well as domestic hot water technology and flat stations.

18:30 **Farewell Party**

Foyer Campus Center