

# ISEC

2<sup>nd</sup> INTERNATIONAL  
SUSTAINABLE ENERGY  
CONFERENCE 2022



05 - 07 April 2022  
Congress Graz, Austria

Conference for Renewable Heating  
and Cooling in Integrated Urban  
and Industrial Energy Systems

## Conference Program





Photo: AEE INTEC

If we want to make the goals set out in the UN Agenda 2030 with its 17 Sustainable Development Goals, and the political intention of the European „Green Deal“ to achieve climate neutrality by 2050 a reality, then the given short timeframe requires immediate and decisive worldwide action.

Efficient use of resources and energy as well as a rapid switch to renewable energies play a central role in this. The International Sustainable Energy Conference - ISEC 2022, organized by AEE INTEC in cooperation with the United Nations Industrial Development Organization UNIDO, aims to contribute to achieving the climate goals outlined above.

ISEC 2022 is a promoter of innovative ideas in the areas of renewable energy systems and resource efficiency as well as a forum for research, industry and energy policy. The organizing committee warmly welcomes you to ISEC 2022 in Graz. A special welcome to the international delegates who join us from across the globe either physically or online. Your presence and contributions to the conference enriches our gathering and ensures that ISEC 2022 is a meeting point for the international exchange of ideas.

We wish you an enjoyable visit to the city of Graz, inspiring and forward-looking keynote speeches and lectures as well as the establishment of new linkages with researchers, representatives from industry and energy policy.

### **Werner Weiss**

Conference Chair



Photo: Cajetan Perwein/BMK

I am very pleased that the 2<sup>nd</sup> International Sustainable Energy Conference will again provide a strong forum for innovative renewable heating and cooling solutions. As Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology I am happy to invite you to Graz for the opening of this year's ISEC conference on 6 April 2022.

### **Leonore Gewessler**

Minister, Federal Ministry Republic of Austria for Climate Action, Environment, Energy, Mobility, Innovation and Technology, AT

# Venue



Please register at our conference management system  
[www.conftool.com/isec2022](http://www.conftool.com/isec2022)

## Conference fees

ISEC 2022	REGULAR FEE	ONLINE
<b>Conference days 06 – 07 April, 2022</b>		
Speakers, Members of ACR & AEE	EUR 440,-	EUR 300,-
Non-members, Attendees	EUR 480,-	EUR 300,-
<b>Conference single day 06 or 07 April, 2022</b>		
Speakers, Members of ACR & AEE	EUR 330,-	EUR 300,-
Non-members, Attendees	EUR 350,-	EUR 300,-
Students	EUR 120,-	EUR 100,-
<b>Conference dinner 06 April, 2022</b> EUR 50,-		
<b>Welcome reception 05 April, 2022</b> Limited participation - Entry only with invitation		

**The conference registration fee includes:**  
 Admission to the conference, conference program, proceedings (USB-stick), lunch and coffee breaks. AEE members qualify for a special members discount. Information about AEE membership on <https://www.aee-intec.at>

**Covid preventive measures:**  
 For the participation in ISEC 2022 at the Congress Graz as well as in the evening events on April 5 and 6, we will ensure compliance with official regulations in connection with COVID-19 on site. We will inform you of the actual rules before the event starts.

## Committees

### Conference and Review Committee

Dr. Heidelinde Adensam, BMK, Austria  
 Rana Adib, REN 21, Austria  
 Greg Arrowsmith, EUREC, Belgium  
 Dr. Ludo Diels, VITO – Flemish Institute for Technological Research NV, Belgium  
 Dr. Iris Filzwieser, ACR – Austrian Cooperative Research, Austria  
 Susanne Formanek, IBO, Austria  
 Dr. Michael Fuchs, Wien Energie, Austria  
 Prof. Dr. Reinhard Haas, EEG TU Vienna, Austria  
 Dr. Andreas Häberle, SPF, Switzerland  
 Dr. Andreas Hauer, ZAE, Germany  
 Sebastian Herkel, Fraunhofer ISE, Germany  
 Prof. Dr. René Hofmann, Vienna University of Technology – IET, Austria  
 Michael Hübner, BMK, Austria  
 Dr. Heiko Huther, AGFW, Germany

Prof. Dr. Reinhold W. Lang, JKU Linz, Austria  
 Dr. Ingo Leusbrock, AEE INTEC, Austria  
 Martin Lugmayr, UNIDO, Austria  
 Franz Mauthner, AEE INTEC, Austria  
 Bettina Muster-Slawitsch, AEE INTEC, Austria  
 Angels Orduna Cao, SPIRE, Belgium  
 Prof. Dr. Alexander Passer, Graz University of Technology, Austria  
 Bernhard Puttinger, Green Tech Cluster Styria, Austria  
 Dr. Bernd Rießland, GBV, Austria  
 Prof. Dr. Hans Schnitzer, AEE INTEC, Austria  
 Dr. Stephan Schwarzer, Austria  
 Prof. Dr. Andrzej Stankiewicz, Delft University of Technology, Netherlands  
 Sonja Starnberger, Energy Institute for Businesses (EIW), Austria  
 Prof. Dr. Alexandra Troi, EURAC, Italy  
 Dr. Tobias Weiß, AEE INTEC, Austria

### Organizing Committee

Christoph Brunner, AEE INTEC  
 Christian Fink, AEE INTEC

### Conference secretariat

Manuela Eberl, AEE INTEC  
 e-mail: [isec2022@aee.at](mailto:isec2022@aee.at)  
[www.aee-intec-events.at](http://www.aee-intec-events.at)

## Program at a glance

	Tuesday, 05 April 2022	Wednesday, 06 April 2022				Thursday, 07 April 2022			
08:30 am		Registration & Networking coffee				Registration & Networking coffee			
09:00 am	Side Events	Welcome session				Key-Notes			
09:30 am		Key-Notes							
10:00 am									
10:30 am		Coffee break				Coffee break			
11:00 am		Flexibility and Stability of Energy Grids	Centres for Circularity and Process Intensification	IT Technologies, System Modelling and Artificial Intelligence	Renewable Energy and Circular Economy Applications towards a low Carbon Industry	Future District Heating and Cooling Technologies	Coupling of Energy Sectors	Digitalization for future Energy Systems	Sustainable Renovation
11:30 am		Lunch break				Lunch break			
12:00 pm									
12:30 pm		Lunch break				Lunch break			
01:00 pm		Lunch break				Lunch break			
01:30 pm		Policies for Renewable Heating and Cooling	Renewable Heating and Cooling including high temperature applications	Solutions for Energy Efficiency	Spatial Energy Planning with focus on Renewable Energies	Emerging Heat and Cold Storages	Energy and Resource Recovery from Low-grade Sources	Finance and Business Models, Smart Services and System Operation	SOLTRAIN Southern African Training and Demonstration Initiative
02:30 pm		Coffee break				Coffee break			
03:00 pm									
03:15 pm		Race to Zero Decarbonization of Industry! - But how?	The thermal side of sector coupling	More than just water - waste water and sewage as a valuable source	More flexibility in district heating: lessons from the ThermaFLEX project	Closing session, Best Poster Award Ceremony			
04:00 pm		B2B meetings				Poster session			
04:45 pm									
05:30 pm									
06:00 pm	Conference dinner				End of conference				
07:00 pm	Welcome reception	Conference dinner				End of conference			
07:30 pm		Conference dinner				End of conference			

Tuesday, 05 April 2022

07:00 pm

### Welcome Reception

The Burg in Graz, Hofgasse 15, 8010 Graz  
Welcome Governor **Hermann Schützenhöfer**, Province of Styria, AT  
Welcome - **Prof. Dr. Hans Schnitzer**, AEE INTEC, AT

Limited participation - Entry only with invitation

## Dinner Speech, Wednesday, 06 April 2022

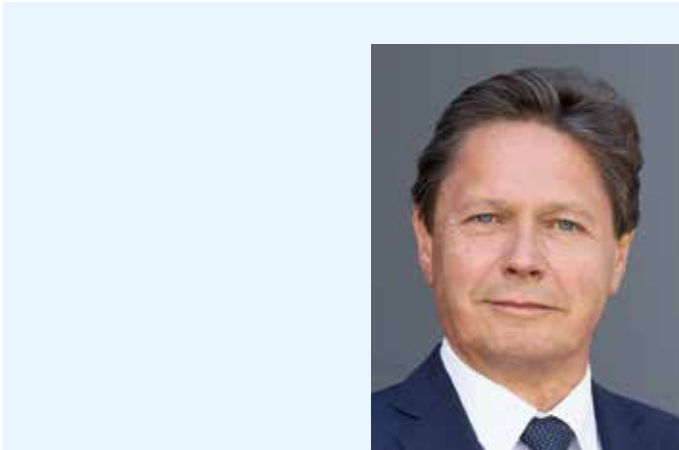


Photo: Verbund

**Wolfgang Anzengruber**  
CEOs FOR FUTURE, AT

**Wolfgang Anzengruber** was former chairman of the Managing Board of VERBUND AG.

After study of Mechanical Engineering, Business Management at the Vienna University of Technology he started his career in the industry sector. From 2009 – 2020 he was Chairman of the Managing Board of VERBUND AG. Since 2021 he is member of the Supervisory Board of SIEMENS Austria AG and member of the Investment Committee of ÖBAG. Furthermore, Member of the Board - Federation of Austrian Industries (IV), Member of the Advisory Board – Paris Lodron University Salzburg and Member of the Board – CEOs FOR FUTURE.

## Key-Note Speaker



Photo: Private

**Dr. Ludo Diels**  
VITO, BE

**Ludo Diels**, Dr. in chemistry & biotechnology, is professor emeritus at Antwerp University, former scientific advisor sustainable chemistry at VITO, the chair of the Advisory & Program Group of A. SPIRE. In that function he is chairing the preparation of research and development strategy and programs for the whole process industry in Europe towards climate neutrality, circularity and competitiveness (Processes4Planet). He is the chair of the advisory group of the shared research centre Biorizon on bio-based aromatics, and as such also strongly involved in the biobased economy in Europe.



## Key-Note Speaker

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Photo: IRENA

### Dr. Rabia Ferroukhi

International Renewable Energy Agency (IRENA),  
AE

**Rabia Ferroukhi** is an international economic development expert dedicated to sustainable energy and progressive socio-economic development. She is currently the Director of the Knowledge, Policy and Finance Centre at IRENA where she oversees the Agency's work on knowledge, policy and finance, including: authoritative renewable energy data and information; analysis of best practice in renewable energy policy and finance; quantitative and qualitative analysis of the socio-economics of the energy transition, including jobs, gender, just transition and related development, industrial and labor policy implication; and advice and technical support to countries, tailoring policy design and recommendation to their specific socio-economic conditions.

Dr. Ferroukhi holds a Masters in Applied Economics and a Ph.D. in Economics from the American University in Washington DC.



Photo: University Graz

### Prof. Dr. Gottfried Kirchengast

Wegener Center for Climate and Global Change,  
Graz University, AT

**Gottfried Kirchengast**, born 1965 in Austria, is professor of geophysics at University of Graz (Alfred Wegener's Chair), honorary professor at the Chinese Academy of Sciences, adjunct professor at the Royal Melbourne Institute of Technology in Australia, and member of the Austrian Academy of Sciences. He is founding director and second deputy head of the Wegener Center for Climate and Global Change ([www.wegcenter.at](http://www.wegcenter.at)), (co-) authored more than 300 publications, advised more than 35 PhD students, and made as well as continues to make pioneering research and international leadership contributions in the fields of Earth observation and climate science.



Photo: Private

### Lea Ranalder

REN 21, FR

**Lea Ranalder** leads the work stream on renewables in cities and policy at REN21, the Renewable Energy Policy Network for the 21st Century. She coordinates and lead authors the research for the Renewables in Cities Global Status Report and leads REN21's work on renewable energy policies for the Renewables Global Status Report. Prior, Lea co-authored reports on the status of renewable energy in South and East Africa and Latin America; she also worked on public support for energy planning, youth engagement in the energy transition and at a Swedish environmental NGO where she initiated divestment campaigns. She holds a M.Sc. in Environmental Science from Lund University.

## Key-Note Speaker

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Photo: Rhomberg

### Hubert Rhomberg

Rhomberg Holding, AT

**Hubert Rhomberg**, Master Builder & Civil Engineer, is Managing Director of Rhomberg Holding GmbH and - now in the fourth generation - in charge of the internationally active Rhomberg Group, which has its headquarters in Bregenz, Austria. The name Rhomberg stands for sustainable building as much as for sustainable mobility and resource productivity. Following his holistic approach, the three divisions Construction, Railway Technology and Resources have not only established sustainability as a principle but continue to set standards.

After graduating in engineering at Vienna Technical University Hubert Rhomberg worked for the construction company Strabag in Linz and Vienna for three years before, in 1998, joining his family's company in his role as Manager of the Civil Engineering department and in charge of developing the Railway Technology division.

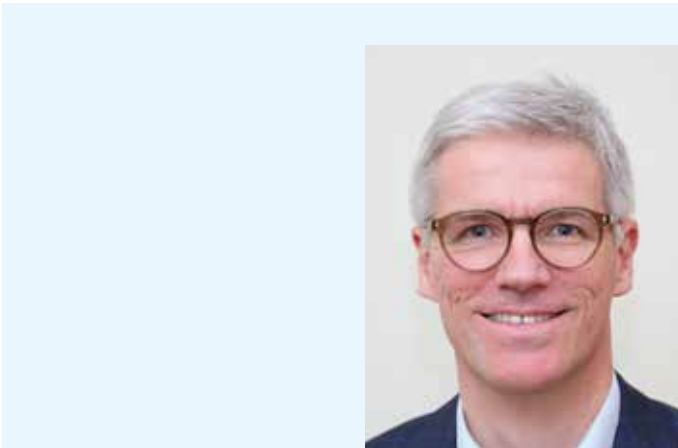


Photo: Wietersdorfer

### Stefan Schriebl

WIG Wietersdorfer Holding, AT

**Stefan Schriebl** studied ceramics and process engineering. He held various management positions in the glass, cement, building materials, refractory and concrete admixture industries before joining Wietersdorfer in the position of Corporate Head of Development.

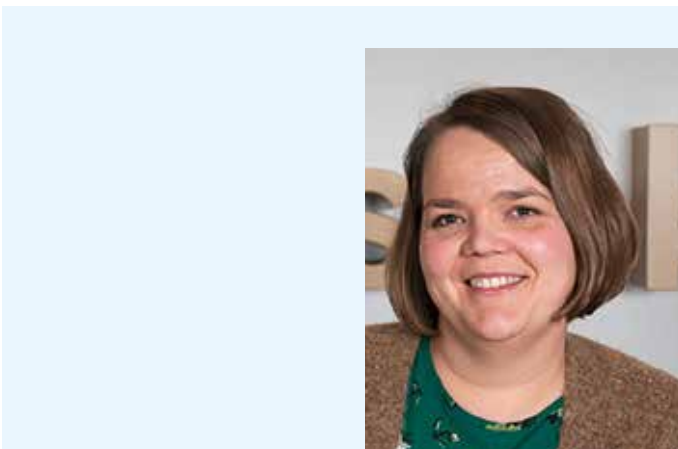


Photo: City of Helsinki

### Laura Uttu-Deschryvere

Head of International Affairs at City of Helsinki, FI

**Laura Uttu-Deschryvere** was a Project Director of the Helsinki Energy Challenge – the very ambitious project of the City of Helsinki to find future-proof urban heating solutions, to reach the city's ambitious 2030 carbon neutrality goal. The Helsinki Energy Challenge was organized in 2020-2021 and Laura was in charge of the whole process – including the planning and implementation as well as co-operation with several different stakeholders.

Currently Laura works as the Head of International Affairs at the City of Helsinki.

# Wednesday, 06 April 2022

08:30 am	Get together - Networking coffee			
WELCOME SESSION				
STEIERMARK HALL				
09:00 am	Session Chair: <b>Prof. Dr. Reinhold Lang</b> , Johannes Kepler University Linz, AT <b>Werner Weiss</b> , Conference Chair, AEE INTEC, AT <b>Leonore Gewessler</b> , Minister, Federal Ministry Republic of Austria for Climate Action, Environment, Energy, Mobility, Innovation and Technology, AT <b>Tareq Emtairah</b> , UNIDO, Director Department of Energy, AT <b>Theresia Vogel</b> , CEO, Climate and Energy Fund, AT			
KEY-NOTES				
09:30 am	Climate Crisis – Why reaching the Paris climate goals is essential <b>Prof. Dr. Gottfried Kirchengast</b> , Wegener Center for Climate and Global Change, Graz University, AT Renewable Energy Policies in a Time of Transition with a special focus on Heating and Cooling <b>Rabia Ferroukhi</b> , IRENA, AE Helsinki Energy Challenge – creating the future of urban heating <b>Laura Uuttu-Deschryvere</b> , City of Helsinki, FI			
11:00 am	Coffee break			
PARALLEL SESSIONS				
	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	<b>Flexibility and Stability of Energy Grids</b> Session Chair: <b>Dr. Lukas Kranzl</b> , Vienna University of Technology, AT	<b>Centres for Circularity and Process Intensification</b> Session Chair: <b>Susanne Formanek</b> , IBO, AT	<b>IT Technologies, System Modelling and Artificial Intelligence</b> Session Chair: <b>Prof. Dr. Rene Hofmann</b> , Vienna University of Technology, AT	<b>Renewable Energy and Circular Economy Applications towards a low Carbon Industry</b> Session Chair: <b>Martin Lugmayr</b> , UNIDO, AT
11:30 am	<b>Temporal Resolution for Capturing Buildings' Energy Flexibility</b> <b>Parvathy Sobha</b> , Luleå Technical University, SE	<b>Ammonia recovery from liquid waste streams by means of Vacuum-Membrane Distillation</b> <b>Dr. Bettina Muster-Slawitsch</b> , AEE INTEC, AT	<b>On the Track of Optimized Building Operation</b> <b>Daniel Ruepp</b> , EQUA Solutions, CH & Franz Hengel, AEE INTEC, AT	11:30 am <b>Bio-Resource Circularity Centre's for Small Island Developing States</b> <b>Joshua Forte</b> , Red Diamond Compost., BB
11:45 am	<b>Flexibility Potential of Buildings with Thermal Component Activation</b> <b>Walter Becke</b> , AEE INTEC, AT	<b>Agro-Industrial Zero Emissions Systems powered by renewable energies</b> <b>Prof. Dr. Hans Schnitzer</b> , StadtLABOR, AT	<b>Comparison of Smart Readiness Indicator (SRI) Methodologies</b> <b>Doris Österreicher</b> , University of Natural Resources and Life Sciences, AT	11:40 am <b>Pelagic Sargassum and food waste valorization using hydrothermal pretreatment and anaerobic co-digestion</b> <b>Dr. Terrell Thompson</b> , The University of Auckland, NZ
12:00 pm	<b>Short-term Stability of Dynamic Operations at a 5GDHC Substation - a case study</b> <b>Femke Janssen</b> , Delft University of Technology, NL	<b>Integration of Innovative Technologies to Different Energy Intensive Industries</b> <b>Mads Willemoes Nordby</b> , TNO, NL	<b>Improving the Computational Performance of District Heating Network Simulation</b> <b>Basak Falay</b> , AEE INTEC, AT	12:00 pm <b>How to Support Solar Thermal Market through Innovative Policy Guidelines in Sica Countries?</b> <b>Alexandra Arias Alvarado</b> , SICREEE, CR
12:15 pm	<b>Electricity Market Participation of Heat Pumps and Combined Heat and Power Plants</b> <b>Dr. Ralf-Roman Schmidt</b> , AIT, AT	<b>Potential of Membrane Processes in the Concept of Lignocellulose Biorefineries</b> <b>Prof. Dr. Frank Lipnizki</b> , Lund University, SE	<b>Estimation of Gas Network Length and Associated Costs for EU-27 + UK at NUTS3-Level Based on Open-Source Data</b> <b>Bernhard Mayr</b> , Vienna University of Technology, AT	12:10 pm <b>Solar Thermal: Case Study in Palm Oil Refining and Oleochemical Industry</b> <b>Mohamed Kassim</b> , UNIDO-MAEESTA, MY 12:20 pm <b>From waste to green energy for industrial uses</b> <b>Reinhard Wenninger &amp; Christian Everts</b> , VARIODIN Weissenschirmbach, AT
12:30 pm	Lunch break			



# Wednesday, 06 April 2022

	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	<b>Policies for Renewable Heating and Cooling</b> Session Chair: <b>Rana Adib</b> , REN21, FR	<b>Renewable Heating and Cooling including high temperature applications</b> Session Chair: <b>Dr. Heidelinde Adensam</b> , BMK, AT	<b>Solutions for Energy Efficiency</b> Session Chair: <b>Roger Hackstock</b> , Austria Solar, AT	<b>Spatial Energy Planning with focus on Renewable Energies</b> Session Chair: <b>Prof. Dr. Alexandra Troi</b> , EURAC, IT
01:30 pm	<b>Renewable Energy Policies in a Time of Transition: Heating and Cooling</b> <b>Duncan Gibb</b> , REN21, FR	<b>Sustainable Off-Grid Space and Water Heating for Difficult to Decarbonize Buildings</b> <b>Dr. Keith Simons</b> , SHV Energy, NL	<b>Impact of Integral Day- and Artificial Lighting Solutions on Energy Demand and User Comfort</b> <b>Dr. Martin Hauer</b> , Bartenbach, AT	<b>Bottum-Up Heat Demand Model</b> <b>Lukas Goetzlich</b> , Research Studios Austria, AT
01:45 pm	<b>Review of the Regulatory Framework of District Heating</b> <b>Anna Billerbeck</b> , Fraunhofer ISE, DE	<b>Development of an Air-Source Mini-Split Heat Pump for Domestic Hot Water</b> <b>William Monteleone</b> , University of Innsbruck, AT	<b>RadiCal – A Radically New Approach for Modelling the Impact of Solar Radiation</b> <b>Daniel Rüdissler</b> , AEE INTEC, AT	<b>Energy Master Planning for Net-Zero Energy Resilient Public communities</b> <b>Dr. Alexander Zhivov</b> , ERDC-CERL, US
02:00 pm	<b>No-Regret Strategies for Decarbonizing Space and Water Heating</b> <b>Dr. Lukas Kranzl</b> , Vienna University of Technology, AT	<b>Potentials of Solar Heating in Europe</b> <b>Hannes Poier</b> , SOLID, AT	<b>Case Study of a Passive House with Façade Integrated Photovoltaic System</b> <b>Elisa Venturi</b> , University of Innsbruck, AT	<b>Holistic Support in Early Decision Phase for Positive-Energy-Districts</b> <b>Gerhard Hofer</b> , e7 energy innovation & engineering, AT
02:15 pm	<b>Renewables versus Waste Heat? Legal Provisions on the Original Energy Source</b> <b>Marie Holzleitner</b> , Energy institute at JKU Linz, AT	<b>Solar Fractions for Solar Process Heat Plants taking into Account Load Profile and Available Roof Area</b> <b>Felix Pag</b> , University of Kassel, DE	<b>Advanced Cogeneration/Trigeneration Using Absorption Machines</b> <b>Harald Blazek</b> , StepsAhead Energiesysteme, AT	<b>A Python Pipeline for Modelica based District and Urban Scale Energy Simulation</b> <b>Theresa Boiger</b> , Graz University of Technology, AT
02:30 pm	<b>The Heating Strategy of the City of Graz</b> <b>Boris Papousek</b> , Energie Graz, AT	<b>Two-Stage Biomass-Fired Absorption Heating and Cooling System</b> <b>Manuel Kausche</b> , ZAE Bayern, DE	<b>High Temperature Heat Pumps for Industrial Drying: Operation Experience and Replicability</b> <b>Dr. Veronika Wilk</b> , AIT, AT	<b>Integrated Optimization of Hybrid Energy Networks</b> <b>Wiet Mazairac</b> , Ecovat, NL
03:00 pm	<b>Coffee break</b>			
<b>THEMATIC WORKSHOPS</b>				
03:15 pm - 04:45 pm	<b>Race to Zero Decarbonization of industry! - But how?</b> Moderator: <b>Dr. Dr. Gabriela Maria Straka</b> , Member of Management Board BrauUnion Austria, AT	<b>The thermal side of sector coupling</b> Moderator: <b>Dr. Wim van Helden</b> , AEE INTEC, AT	<b>More than just water - waste water and sewage as a valuable source</b> Moderator: <b>Jürgen Fluch</b> , AEE INTEC, AT	<b>More flexibility in district heating: lessons from the ThermaFLEX project</b> Moderator: <b>Joachim Kelz &amp; Dr. Ingo Leusbrock</b> , AEE INTEC, AT
<b>B2B MEETINGS</b>		<b>POSTER SESSION</b>		
05:00 pm - 06:00 pm	STEIERMARK HALL  B2B Meetings organized by EEN	HALL 4, HALL 5, HALL 6, HALL 7, HALL 8  <b>Poster session – Virtual:</b> Poster presentations will be held virtually (a registration link will be available before the conference starts). For all on-site participants: Additional, please visit the posters in the exhibition hall. All poster presenters are there for you to get in contact.		
07:30 pm	<b>Conference Dinner</b>  Welcome by <b>Werner Weiss</b> , Conference Chair, AEE INTEC, AT Welcome by the City of Graz, AT Dinner speech: How sustainability leads to transformation of economy and society <b>Wolfgang Anzengruber</b> , CEOs FOR FUTURE, AT <b>Venue:</b> Old University, Hofgasse 14, 8010 Graz			

# Thursday, 07 April 2022

08:30 am	Get together - Networking coffee			
KEY-NOTES				
09:00 am	<p>Session Chair: <b>Theodor Zillner</b>, BMK, AT</p> <p>Transforming cities with renewable energy <b>Lea Ranalder</b>, REN 21, FR</p> <p>Process Industry towards climate neutrality and circularity in a competitive way <b>Dr. Ludo Diels</b>, VITO, BE</p> <p>Decarbonization as a differentiator in the building materials industry <b>Stefan Schriebl</b>, WIG Wietersdorfer Holding, AT</p> <p>Digitalization of the Construction Industry <b>Hubert Rhomberg</b>, Rhomberg Holding, AT</p>			
10:45 am	Coffee break			
PARALLEL SESSIONS				
	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	<p><b>Future District Heating and Cooling Technologies</b></p> <p>Session Chair: <b>Dr. Heiko Huther</b>, AGFW, DE</p>	<p><b>Coupling of Energy Sectors</b></p> <p>Session Chair: <b>Sonja Starnberger</b>, Energy Institute for Businesses, AT</p>	<p><b>Digitalization for future Energy Systems</b></p> <p>Session Chair: <b>Dr. Iris Filzwieser</b>, ACR, AT</p>	<p><b>Sustainable Renovation</b></p> <p>Session Chair: <b>Prof. Dr. Alexander Passer</b>, Graz University of Technology, AT</p>
11:00 am	<p><b>Existing District Heating Networks in Context of German Climate Goals: Potentials for "UrbanTurn"</b></p> <p><b>Stefan Hay</b>, AGFW, DE</p>	<p><b>Multi-Purpose Pit Thermal Energy Storage in Combination with Heat Pumps</b></p> <p><b>Morten Vang Bobach</b>, Aalborg CSP, DK</p>	<p><b>Quantification of Heat Demand Forecast Accuracy Improvements by localized Weather Forecast</b></p> <p><b>Hjörleifur G. Bergsteinnsson</b>, Technical University of Denmark, DK</p>	<p><b>Vacuum Glass as Alternative for Window Retrofit</b></p> <p><b>Dr. Ulrich J. Pont</b>, Vienna University of Technology, AT</p>
11:15 am	<p><b>Non-Linear Model Predictive Control of a Small-Scale 4th Generation District Heating Network with on/off Heat Pumps</b></p> <p><b>Jelger Jansen</b>, KU Leuven, BE</p>	<p><b>Recoupled a Simulation Tool for Renewable Energy Communities Coupling Electric and Thermal Energies</b></p> <p><b>Prof. Maurizio Repetto</b>, Politecnico di Torino, IT</p>	<p><b>A Data Driven Approach for Load Management of District Heating Networks</b></p> <p><b>Philip Ohnewein</b>, AEE INTEC, AT &amp; <b>Florian Wenig</b>, Forschung Burgenland, AT</p>	<p><b>Inspiring good practices: a database to trigger energy efficient renovations of historic buildings</b></p> <p><b>Prof. Dr. Alexandra Troi</b>, EURAC, IT</p>
11:30 am	<p><b>On The Design of 5GDHC Control Systems</b></p> <p><b>Dr. Ivo Pothof</b>, TU Delft, NL</p>	<p><b>A Mixed-Integer Linear Optimization Approach for Power-To-X Technologies in a District Heating System</b></p> <p><b>Dr. Lukas Gnam</b>, Forschung Burgenland, AT</p>	<p><b>Virtual Reality Applications in Digital Energy Twin Domain</b></p> <p><b>Saeed Safikhani</b>, Graz University of Technology, AT</p>	<p><b>Flexibility potentials of prefabricated facade elements with integrated active layer</b></p> <p><b>Michael Gumhalter</b>, AEE INTEC, AT</p>
11:45 am	<p><b>Potential of using absorption heat exchangers in districting heating grids</b></p> <p><b>Gerald Zotter</b>, AEE INTEC, AT</p>	<p><b>Renewable Gasfield - A holistic power-to-gas approach with PEM electrolysis and catalytic methanation</b></p> <p><b>Dr. Bernhard Mayr</b>, EnviCare Engineering, AT</p>	<p><b>Automatic thermal model identification and distributed optimization for load shifting in city quarters</b></p> <p><b>Andreas Moser</b>, BEST - Bioenergy and Sustainable Technologies, AT</p>	<p><b>Conceptualization and evaluation of renovation packages for multi-family houses</b></p> <p><b>Mara Magni</b>, Innsbruck University, AT</p>
12:00 pm	<p><b>District cooling distribution network optimizer</b></p> <p><b>Laura Zabala Urrutia</b>, Tekniker, ES</p>	<p><b>Batteries from E-Mobility: Second Life in large Energy Storages</b></p> <p><b>Reinhard Ungerböck</b>, Grazer Energieagentur, AT</p>	<p><b>Smart Energy Systems Modelling - Component exchange during simulation</b></p> <p><b>Sandra Wilfling</b>, Graz University of Technology, AT</p>	<p><b>Sinfonia - Experiences in Large-Scale Step-By-Step Retrofits in Innsbruck</b></p> <p><b>Laszlo Lepp</b>, Passive House Institute, Innsbruck, AT</p>
12:30 pm	Lunch break			

# Thursday, 07 April 2022

	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	<b>Emerging Heat and Cold Storages</b>  Session Chair: <b>Dr. Andreas Hauer</b> , ZAE Bayern, DE	<b>Energy and Resource Recovery from Low-grade Sources</b>  Session Chair: <b>Dr. Michael Fuchs</b> , Wien Energie, AT	<b>Finance and Business Models, Smart Services and System Operation</b>  Session Chair: <b>Bernhard Puttinger</b> , Green Tech Cluster Styria, AT	<b>SOLTRAIN Southern African Training and Demonstration Initiative</b>  Session Chair: <b>Kuda Ndhlukula</b> , SACREEE, NA
01:30 pm	<b>Rock Bed Thermal Energy Storage for Medium-Temperature Applications</b>  <b>Kai Knobloch</b> , Technical University of Denmark, DK	<b>Data Centers and Energy Systems: An On-Site Integration</b>  <b>Dr. Dominik Franjo Dominković</b> , Technical University of Denmark, DK	<b>Sharing Knowledge about Sustainable and Renewable Concepts in Building</b>  <b>Barbara Mayr</b> , OeAD student housing, AT	<b>Mitigating South African Fossil Fuel Power Plants – The Impact on District Solar Process Heating</b>  <b>Wally Weber</b> , BlackDot Energy, ZA
01:45 pm	<b>Giga-Scale Thermal Energy Storage for Renewable Districts; Results of the gigaTES Project</b>  <b>Dr. Wim van Helden</b> , AEE INTEC, AT	<b>Industrial Water Treatment Technologies Driven by Renewable or Waste Energy Sources</b>  <b>Prof. Mikel Duke</b> , Victoria University, AU	<b>Financial Instruments for Energy Efficiency Interventions in Buildings: a European Comprehensive Overview</b>  <b>Giulia Conforto</b> , e-think, AT	<b>Solar Thermal Roadmap and Implementation Plan: From start to current</b>  <b>Samson Mhlanga</b> , National University of Science and Technology, ZW
02:00 pm	<b>Development and Verification of a Thermochemical Heat Storage in a District Heating Network</b>  <b>Dr. Henner Kerskes</b> , University of Stuttgart, DE	<b>Excess Heat Cadaster Styria</b>  <b>Wolfgang Gruber- Glatzl</b> , AEE INTEC, AT	<b>A Platform to Connect Industrial Efficiency and Renewable Energy Projects with the Capital Markets</b>  <b>Juergen Fluch</b> , AEE INTEC, AT	<b>The Potential of Solar Thermal Technologies in the Namibian Health Sector</b>  <b>Helvi Ileka</b> , Namibia University of Science and Technology, NA
02:15 pm	<b>Development and Demonstration of a Thermochemical Heat Storage for Low-Temperature Application</b>  <b>Jan Straatmann</b> , ZeoSys Energy, DE	<b>Modelling of a Novel Zeolite-Water Direct Contact Adsorption Heat Pump for Waste Heat Recovery</b>  <b>Fulvio Paolo Buzzi</b> , University of Pisa, IT	<b>Cost Trends for Commercial and Industrial Solar Heat</b>  <b>Bärbel Epp</b> , Solrico, DE	<b>Solar Thermal Training Initiatives in Botswana – The Case of Soltrain Project</b>  <b>Prof. Kevin N. Nwaigwe</b> , University of Botswana, BW
02:30 pm	<b>PCM cold storage for flexible room cooling</b>  <b>Gerald Englmaier</b> , Technical University of Denmark, DK	<b>Renewable Heating and Cooling with Energy from Wastewater- Contribution to Decarbonization</b>  <b>Dr. Rainer Wiedemann</b> , Rabmer GreenTech, AT	<b>Carbon-Free Sustainable Energy Supply at Market Costs</b>  <b>Herbert Hetzel</b> , BCE Beyond Carbon Energy Holding, AT	<b>Solar Thermal Performance Evaluation of a Residential Building</b>  <b>Dr. Richmore Kaseke</b> , Stellenbosch University, ZA
03:00 pm	<b>Coffee break</b>			
03:15 pm	<b>Closing session</b>  <b>Best Poster Award Ceremony</b> Moderated by <b>Prof. Dr. Hans Schnitzer</b> , Chair of the poster award committee  <b>Highlights, Feedback and Outlook ISEC 2024</b> Moderated by <b>Christoph Brunner</b> and <b>Christian Fink</b> , AEE INTEC, AT			
04:00 pm	<b>End of conference</b>			

### Workshop 1 - Steiermark Hall

#### Race to Zero. Decarbonization of industry! - But how?

The decarbonization of industry poses an economic and technological challenge for every single company, regardless location, size or sector. In this context, awareness raising and knowledge transfer play a crucial

role in the multiplication of technical solutions. With „Race to Zero,“ the United Nations has launched a new initiative for more climate protection in the fight against global warming. The goal is the same for everyone: to reduce emissions of climate-damaging greenhouse gases to net zero by 2050 the latest. Therefore, ISEC 2022 will discuss feasible solutions through an intensive exchange of experiences between pioneers and decision makers from the industry.

- Is an allocation of different renewable energy sources (solar thermal, heat pumps, biomass, biogas, geothermal) to different sectors and processes applicable?
- What is the short- and mid-term perspective and role of new energy vectors (hydrogen, ammonia, green methane) in hybrid energy supply systems?
- Best practice examples from industry – achievements and implementation strategies on the pathway towards a circular economy?



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### Workshop 2 - Hall 1

#### The thermal side of sector coupling

Both, the electricity sector and the thermal sector are moving towards 100% renewable. With a growing share of renewable electricity sources, the electricity grid is touching its capacity boundaries more often and more severe. Coupling the two sectors is of advantage in two ways; the thermal sector operates as a buffer for the electricity sector and the thermal sector can further increase its pace of becoming 100% renewable. However, the sector coupling is only possible with technology advancements and with non-technological adaptations of legal and regulatory frameworks. The workshop will discuss the challenges that have to be overcome, on the basis of a keynote introduction on sector coupling and four short incentive presentations on thermal technology options as enabler for sector coupling. We will then discuss the challenges seen from different angles in small discussion groups.



Photo: Wien Energie/Ian Ehm



## Workshop 3 - Hall 2

### More than just water - waste water and sewage as a valuable source

Water is of great importance for all of us. Both, security of high-quality water supply for private and industrial production relies on the long-term availability of clean water. Having further potential resource scarcities next to water in mind such as nutrients and energy, waste water and sewage has to be seen as source for these and potential starting points for value products. Nevertheless, waste water treatment of industry and municipalities is frequently only considered a necessity in compliance with discharge limits and thus as a significant energy consumer and cost factor,

yet represent huge potential for transformation and innovation. To evaluate this potential of waste water and sewage as vital part of a future circular economy, we will present, discuss and develop within this workshop:

- European and international perspective/strategy of water supply and treatment
- Upcoming challenges for industrial and municipal waste water treatment
- Pathways of innovative recovery of valuables based on identified potentials
- Waste water treatment plants as energy hubs of the future
- Findings, pitfalls and solutions from industrial use
- Business models making waste water and sewage a recognised source
- Real experiences and wish list of industrial and municipal operators
- Relevant stakeholders to raise and implement identified potentials
- Business models for real use cases



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## Workshop 4 - Hall 3

### More flexibility in district heating: lessons from the ThermaFLEX project

District heating is one of the cornerstones of our energy transition. Yet, to accelerate the implementation of / modernization to flexible and sustainable district heating systems, research and demonstration is needed for flexibility measures such as thermal storage, heat pumps, smart control, sector coupling with electricity and wastewater infrastructure in combination with increased share of renewable heat and holistic system and planning approaches. Within Thermaflex, these research needs were addressed on base of more than 10 demonstrators, which provide the background for developing, implementing and optimizing innovative district heating concepts and technical solutions.

In this workshop, we will provide insights to the implementation steps, show results from the operational phase of the demonstrators and put the findings and conclusions from our project to the wider discussion.

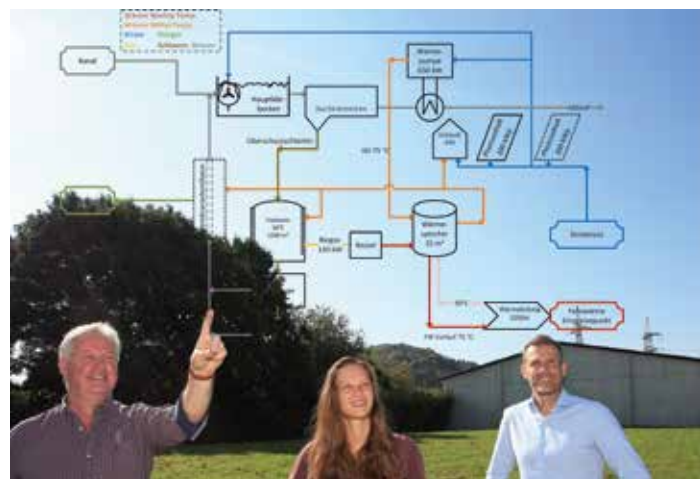


Photo: KlimaFonds/Krobath



## Poster session

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### Hall 4

Water Audit Methodology for Wastewater Optimization in Industry

**Dr. Bettina Muster-Slawitsch**, AEE INTEC, AT

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Investigation on Sector Coupling Potentials of Cold District Heating & Cooling Networks

**Dr. Hermann Edtmayer**, Graz University of Technology, AT

---

Success Factors and Barriers for Integrated District Heating Networks

**Dr. Ralf-Roman Schmidt**, AIT Austrian Institute of Technology GmbH, AT

---

Can Electricity Load Profiles Increase the Accuracy of Heat Demand Prediction in Industry?

**Mateo Jesper**, University of Kassel, DE

---

Digital Twins in Industrial Energy Systems

**Dr. Felix Birkelbach**, Vienna University of Technology, AT

---

Investigation of Salt-Mixtures for Thermochemical Material Development

**Dr. Bernhard Zettl**, University of Applied Sciences Upper Austria, AT

---

Novel PP liner material for giga-scale storages - Long-term performance and life time assessment

**Lukas Peham**, Institute of Polymeric Materials and Testing, AT

---

Novel Modeling Toolkit for Optimized Design and Integration of Large-Scale Underground Hot-Water Thermal Energy Storages

**Michael Reisenbichler**, AEE INTEC, AT

---

A durable Pit Thermal Energy Storage Lid made from Cellular Glass and Stainless Steel

**Dr. Hans Strauven**, Glapor Werk Mitterteich GmbH, DE

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Structural Challenges and Innovative Concepts for Large-Scale Underground Thermal Energy Storages

**Thomas Riegler**, AEE INTEC, AT

---

Giga-scale Thermal Energy Storages - Methodology for durability assessment of polymeric foams

**Lukas Peham**, Institute of Polymeric Materials and Testing, AT

---

Performance Modelling of a Thermochemical Energy Storage System for use across Canada

**Christopher McNevin**, QSBRI, CA

---

Analysis of Sensible and Thermochemical Seasonal Energy Storage

**Urška Mlakar**, University of Ljubljana, SV

---

Compact Thermal Energy Storage Materials within Components within Systems

**Dr. Wim van Helden**, AEE INTEC, AT

---

Harvesting Urban Summer Heat for Cool City Summers and Warm Houses in Winter

**Dr. Edith Haslinger**, AIT Austrian Institute of Technology, AT

---

Evaluation of Canal Water and Groundwater as Low Temperature Heat Sources for Heat Pumps

**Saeed Ranjbar**, Concordia University, CA

---

Hydrothermal Processing of Wet Biomass Using Concentrated Solar Energy

**Dr. Manuel I. Peña-Cruz**, Conacyt - Centro De Investigaciones En Optica, ME

---

Solar Energy in Industrial Water and Wastewater Management

**Dr. Bettina Muster-Slawitsch**, AEE INTEC, AT

---

Public Participation Models for Solar District Heating

**Roger Hackstock**, Association Austria Solar, AT

---

Business Models for The Decarbonation of Districts

**Prof. Matthias Haase**, ZHAW, DE

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Effectiveness of Inhibitors in Reducing the Corrosion Impact of CaCl<sub>2</sub>-Based Composites on Copper

**Prof. Dr. Asnakech Lass-Seyoum**, University of Applied Sciences Berlin, DE

---

Xylitol-Erythritol Eutectic Mixture. A Comparison between Mixture and Pure Components

**Ana Lazaro**, Universidad de Zaragoza, ES

## Poster session

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### Hall 5

Standardized Economic Evaluation Criteria of Solar Process Heat in Hybrid Systems

**Jürgen Fluch**, AEE INTEC, AT

---

Project Development of the Netherlands Largest Solar District Heating Plant

**Jes Donneborg**, Aalborg CSP, DK

---

Techno-Economic Analysis of Building Integrated Photovoltaics with and without Storage on Building Level

**Dr. Fabian Ochs**, University of Innsbruck, AT

---

Dynamic Thermo-Hydraulic Models for the Investigation of Flexibility of District Heating Networks

**Johannes Ziplies**, University of Kassel, DE

---

Modelling heat pumps as flexibility option in Austria's electricity system in 2030

**Franziska Schöniger**, Vienna University of Technology, AT

---

A Modelling Approach for optimizing Energy Flexibility in Districts and Communities

**Ben Polly**, NREL, US

---

Synthetic Price Signals for Evaluation of Building Energy Flexibility

**Dr. Vojtech Zavrel**, CTU, CZ

---

Large Thermal Energy Storage for District Heating

**Dr. Wim van Helden**, AEE INTEC, AT

---

Performance of Large Solar Thermal Plants - What Matters?

**Stefan Abrecht**, Solar Heating Initiative/Solar-Experience, DE

---

Control Strategies for Thermo Active Building Systems on Residential Buildings in Combination with Heat Pumps

**Michael Moltinger**, Salzburg University of Applied Sciences, AT

---

Energy balance of solar collector assisted heat pump in 5th generation DHC system in Northern Europe

**Raimonds Bogdanovics**, Riga Technical University, LV

---

Non-linear model predictive control of a small-scale fully-renewables-based 4th generation district heating network

**Jelger Jansen**, KU Leuven, BE

---

The opportunities offered by Supra-Regional District Heating Networks

**Dr. Simon Moser**, Energieinstitut an der JKU Linz, AT

---

Heat Pump coupled with large Thermal Energy Storage in Low- and High- Temperature District Heating

**Alice Tosatto**, University of Innsbruck, AT

---

Efficient Solar District Heating Systems

**Dr. Viktor Unterberger**, BEST, AT

---

Optimizing Efficiency of District Heating Supply with Intelligent Solar and Heat Pump Integration

**Jes Donneborg**, Aalborg CSP, DK

---

Simulation-Based Feasibility Study for Low-Temperature Supply Concepts for Urban Districts

**Jakob Binder**, AEE INTEC, AT

---

A Sorption-Based Thermochemical Storage and Cooling System for Cold Chain Transportation

**Dr. Abdalqader Ahmad**, University of Birmingham, GB

---

Preliminary Results for Automatic Fault Detection for Solar-Thermal Systems

**Lukas Feierl**, SOLID Solar Energy Systems, AT

---

Implementing a Software System for Machine Learning based Thermal Load Forecasting

**Fabian Behrens**, Kempten University of Applied Sciences, DE

---

EDDY – Enhanced Drying

**Abdulrahman Dahash**, AIT, AT

---

Analysis and Performance Mapping of “Component to System” for a Parabolic trough Collector

**Puneet Kumar Saini**, Dalarna University, SE

## Poster session

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### Hall 6

Optimization approaches implemented within digital twins

**Thomas Kurz**, Montanuniversität Leoben, AT

---

Resilience Analysis of Thermal and Electric Energy Systems in Cold Climates

**Brianna Karen Morton**, Engineering Research and Development Center, US

---

Real-Time Simulation of a Cooling System

**Barbara Beigelböck**, VASKO+Partner Ingenieure, AT

---

Digital Energy Twins: A Comparison of Techniques for Combining Physical and Machine Learning Models

**Thorsten Mattausch**, Graz University of Technology, AT

---

Comparison of Building Stock Related Data Sources and Indicators

**Ece Özer**, Vienna University of Technology, AT

---

Economic Analysis of Resilient Energy Infrastructure in Continental Climates

**Bjorn Oberg**, USACE ERDC CERL, US

---

Life Cycle Inventories and Life Cycle Assessment of Solar Thermal Collectors

**Dr. Karl-Anders Weiß**, Fraunhofer ISE, DE

---

Cravezero - Lessons Learned from 18 nearly Zero Energy Buildings

**Dr. Tobias Weiss**, AEE INTEC, AT

---

Cost Optimal Nearly Zero Energy Buildings (Nzeb) in the Residential Sector

**Thomas Stefan Roßkopf**, Energieinstitut Vorarlberg, AT

---

Making Heating and Cooling more Efficient, Economically Resilient, Clean and Climate-Friendly

**Herbert Tretter**, Austrian Energy Agency, AT

---

Review of Solar Thermal Installations in Botswana – Issues and Trends

**Okatoseng Tsametse Masoso**, University of Botswana, BW

---

How will Renewable Cooling affect the RES Target Achievement in EU-Member States

**Philipp Mascherbauer**, Vienna University of Technology, AT

---

SOLTRAIN Project in Lesotho

**Ivan Yaholnitsky**, Bethel Business and Community Dev Centre, LS

---

Solar Thermal in South Africa: Now!

**Henning Holm**, Holms and Friends, ZA

---

Design of a Solar Thermal Driven Air Conditioning System for a Local Hospital in Zimbabwe

**Blessed Sarema**, National University of Science and Technology, ZW

---

A Journey with SOLTRAIN – A Private Industry Member Perspective

**Henning Holm**, Holms and Friends, ZA

---

Unexpected Solar Thermal Partnership Catalyzes Government Collaboration, Skills, Investment and Emissions Targets

**Dr. Angela Karen SurrIDGE**, SANEDI, ZA

---

Cost Reduction of Solar Thermal by Standardized Components and Interfaces

**Dr. Stephan Fischer**, IGTE University Stuttgart, DE

---

Solar Cooling for The Sunbelt Regions

**Dr. Daniel Neyer**, Neyer Brainworks, AT

---

Monitoring Results of Installed Solar Thermal Systems in the Southern African Region

**Rudolf Moschik**, AEE INTEC, AT

---

Solar Thermal Demonstration Systems in Namibia

**Fenni Shidhika**, Namibia University of Science and Technology, NA

---

First results of an impact analysis

**Dr. Christian Kurz**, Green Energy Lab, AT

## Poster session

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### Hall 7

Solar Thermal Technology in the Botswana Energy Mix – Issues and Prospects  
**Kago Rabasoma Rabasoma**, University of Botswana, BW

---

Accelerated aging Test and Service Life Estimation for Solar Thermal Collectors  
**Dr. Stephan Fischer**, IGTE University Stuttgart, DE

---

Evaluation of using absorption chillers for industrial applications under irradiation conditions of the Atacama Desert  
**Andrés Fabricio Villarruel Jaramillo**, Universidad Católica de Chile, CL

---

Design of a 3-dimensional solar concentrator with different directional acceptance angles  
**Aissatou Mboup**, Tokyo University of agriculture and technology, JP

---

Reduction of CO<sub>2</sub> Emissions through Integration of Scalable and Cost-Effective Modular Solar Process Heat Units  
**David Theiler**, OST – SPF, CH

---

Integration Design and Control Strategy of Supercritical Carbon Dioxide Brayton Cycles  
**Feng Hu**, Chinese Academy of Sciences, CN

---

Design of a Solar Heating System for a Hospital Marternity Ward in Zimbabwe  
**Blessed Sarema**, National University of Science and Technology ZW

---

Solar Thermal Training and Awareness for South African Government Institutes  
**Khothatso Mpheqeke**, SANEDI, ZA

---

Study of a Hybrid Solar Cooling System in Burkina Faso  
**Ouo Adeline Ouattara**, Laboratoire LOCIE UMR 5271, FR

---

Passive House and Solar Cooling in Hot and Humid Climate  
**Dr. Daniel Neyer**, Neyer Brainworks, AT

---

Energy and Exergy Analysis of a Flat Plate Collector using a Pumped Solar Water Heating System  
**Prof. Kevin Nnanye Nwaigwe**, University of Botswana, BW

---

Experience and Optimization in the Building Operation with the Help of Simulations  
**Dr. Tobias Hatt**, Energieinstitut Vorarlberg, AT

---

Thermally Activated Building Systems for Low Energy Dwellings  
**Tillman Gauer**, TU Kaiserslautern, DE

---

Active Flue Gas Condensation in Biomass Heating Plants with Absorption Heat Pumps  
**Harald Blazek**, StepsAhead Energiesysteme, AT

---

Pyrolysis Oil Burner Adoption for Operation with Lean Motor Exhaust Gases within a Smart CHP Plant  
**Sergej Warkentin**, OWI Science for Fuels, DE

---

Capacity Building for Renewable Energy Technologies in Mozambique – A Bachelor Program for Renewable Energy  
**Prof. Christof Sumereder**, FH Joanneum, AT

---

How Post-Occupancy Evaluations List the Relevance of a Combination of Lighting and IoT  
**Sascha Hammes**, Bartenbach GmbH, AT

---

Reentry Versus CO<sub>2</sub> Sustainability Measure  
**Prof. Bernhard Heiden**, Carinthia University of Applied Sciences, AT

---

A Review on the Eva Project  
**Dr. Ulrich J. Pont**, Vienna University of Technology, AT

---

Increasing the Energy Efficiency and the Share of Renewables in a Local District Heating System  
**Anna Vannahme**, Technische Hochschule Ingolstadt, DE

---

Process analysis concept for a drying process with solarthermal- and biomass-based heat supply  
**Dr. Özge Mutlu**, DBFZ, DE

---

Life Cycle Assessment (LCA) of an innovative solar-biomass energy system in continental climate  
**Dr. Emiliano Borri**, University of Lleida, ES

## Poster session

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### Hall 8

Flexibility Classification for Smart Buildings

**Dr. Monika Hall**, University of Applied Sciences Northwestern Switzerland, CH

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Industrial Process Heat Supply through the Combination of Renewable and Efficiency-Enhancing Technologies

**Stephan Kling**, AIT, AT

---

Simulation of BIPV/T facade systems in office buildings for utilization of the thermal potential

**Nermeen Abdelnour**, HFT-Stuttgart, DE

---

Proposal of a Cluster of Solar Thermal Technology in Mozambique

**Dr. Geraldo da Conceição Nhumai**, Eduardo Mondlane University, MZ

---

Solar Thermal District Heating in Austria

**Walter Becke**, AEE INTEC, AT

---

Passive House and Solar Cooling in Hot and Humid Climate

**Laszlo Lepp**, Passive House Institute Innsbruck, AT

---

Comparative analysis of three Generations of District Heating in Positive Energy Districts

**Luca Casamassima**, Vienna University of Technology, AT

---

Simulation and Production of Metal Design of a Concentrating Photovoltaic Cell

**Elsen Aydin**, ODTÜ – GÜNAM, TR

---

Costs and potentials for heat savings in buildings

**Marcus Hummel**, e-think energy research, AT

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A Multi-Layer Phase Change Material Packed Bed for Enhancing Liquid Air Energy Storage Efficiency

**Dr. Abdalqader Ahmad**, University of Birmingham, GB

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Evaluation of a Plate-Based LHTES Prototype: Compressed Expanded Graphite Versus Bulk Pcm Plates

**Lourdes Bouzas Vila**, University of the Basque Country, ES

---

Design of a Pumped Solar Water Heating System – A Case Study

**Prof. Kevin Nnanye Nwaigwe**, University of Botswana, BW

---

Optimization of the Anti-Insulation Phenomenon in Building Energy Use

**Okatoseng Tsametse Masoso**, University of Botswana, BW

---

Comparative Study on Bubbling and Shearing Techniques for the Crystallization of Xylitol

**Dr. Gonzalo Diarce**, University of the Basque Country, ES

---

Large scale solar thermal hot water heating systems in senior secondary schools in Botswana

**Prof. Andrew Obok Opok**, Artemis Engineering, BW

---

Positive Energy Districts in Norway and Switzerland

**Prof. Matthias Haase**, ZHAW, DE

---

Industrial-Urban Heat Network Implementation Method

**G.J. Harmsen**, Harmsen Consultancy BV, NL

---

Recent Progress in The Spider Project

**Dr. Ulrich J. Pont**, Vienna University of Technology, AT

---

HARP – Heating Appliances Retrofit Planning

**Leopoldo Micò**, Solar Heat Europe/ESTIF, BE

---

New Impulses for Climate Neutral Building Renovation

**Armin Knotzer**, AEE INTEC, AT

---

The Potential for Solar Thermal Technologies in The South African Tanning Industry

**Lavhelesani Maluleke**, Centre for Renewable and Sustainable Energy Studies, ZA

---

Robotizing Solar Farms in Vietnam - An Optimal Solution to reduce Maintenance Cost and Increase Efficiency

**Surender Rangaraju**, Snetel Technologies, VN

---

Creating an Energy Storage Ecosystem at European Level. The main challenge of stories project

**Dr. Rocío Bayón**, CIEMAT, ES





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