ISEC

2nd 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



Preface

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.

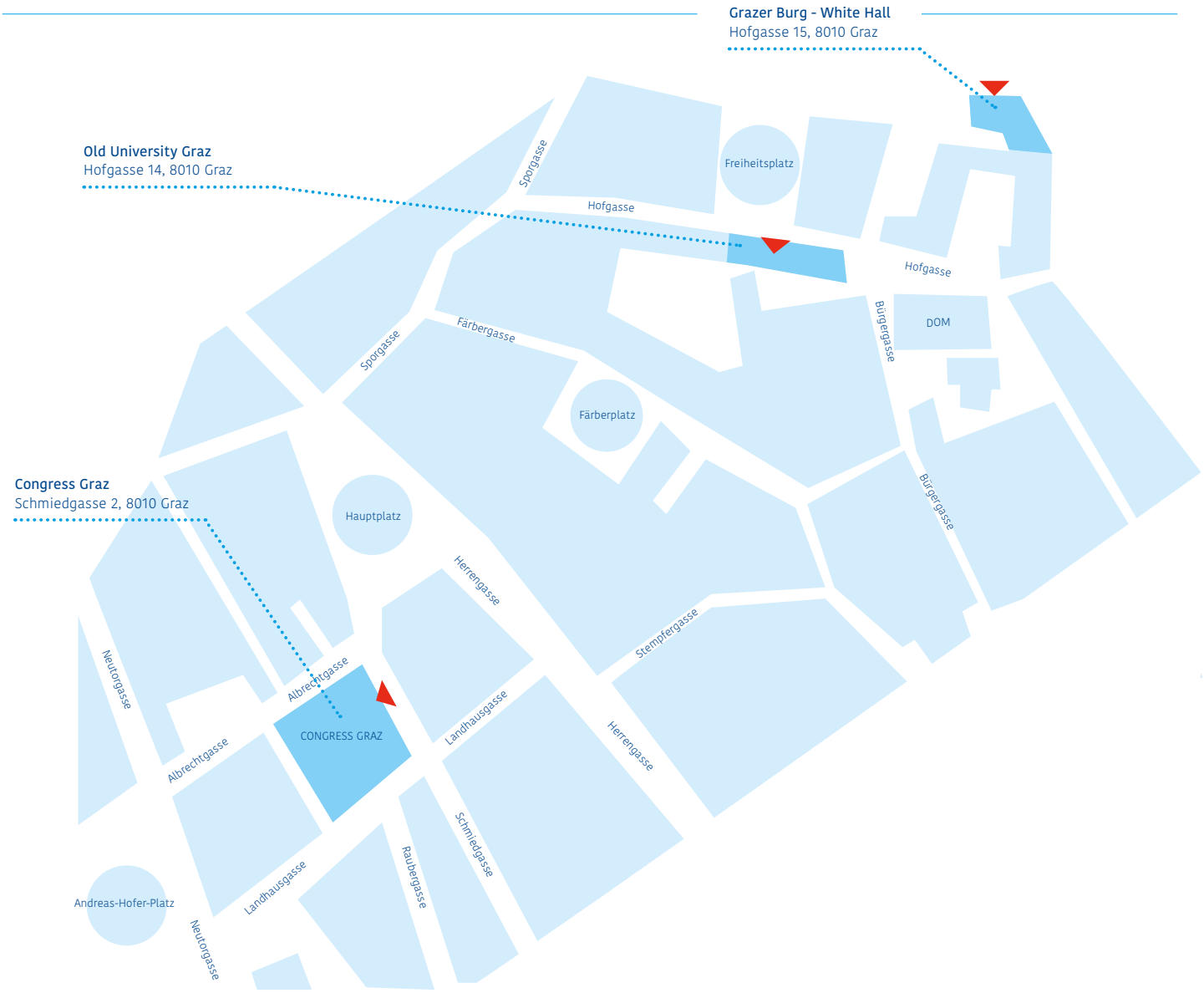
Werner Weiss
Conference Chair

Photo: Cajetan Perwein/BMK

I am very pleased that the 2nd 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



Conference fees

ISEC 2022	REGULAR FEE	ONLINE
Conference days 06 – 07 April, 2022		
Speakers, Members of ACR & AEE	EUR 440,-	EUR 300,-
Non-members, Attendees	EUR 480,-	EUR 300,-
Conference single day 06 or 07 April, 2022		
Speakers, Members of ACR & AEE	EUR 330,-	EUR 300,-
Non-members, Attendees	EUR 350,-	EUR 300,-
Students	EUR 120,-	EUR 100,-
Conference dinner 06 April, 2022 EUR 50,-		
Welcome reception 05 April, 2022 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 participation in ISEC 2022 at the Congress Graz as well as in the evening events, the 3G (vaccinated, recovered, or tested) rule applies. Access is therefore only permitted to those persons who provide an official proof of 3G. This proof must be presented before entering the premises.

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
www.aee-intec-events.at

Program at a glance

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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

Photo: IRENA

Dr. Ute Collier

(IRENA), AE

Ute Collier is Deputy Director of the Knowledge, Policy and Finance Centre at the International Renewable Agency (IRENA) in Abu Dhabi. She is responsible for IRENA's work on policy and renewable energy markets, covering issues such as end-use decarbonisation, green hydrogen, power sector policies, and energy access. She also co-leads IRENA's annual flagship publication, the World Energy Transition Outlook. Prior to joining IRENA in May 2021, she was Head of Energy for the development organisation Practical Action, focusing on renewable energy solutions in energy access settings. Previously, she worked at the International Energy Agency and the UK's Climate Change Committee, as well as several public sector and non-governmental organisations earlier in her career. She has a PhD in energy policy from the University of Sussex.

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), (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

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 Uuttu-Deschryvere
Head of International Affairs at City of Helsinki, FI

Laura Uuttu-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: **Prof. Dr. Reinhold W. Lang,** Johannes Kepler University Linz, AT **Werner Weiss,** Conference Chair, AEE INTEC, AT **Leonore Gewessler,** Minister, Federal Ministry Republic of Austria for Climate Action, Environment, Energy, Mobility, Innovation and Technology, AT **Petra Schwager,** UNIDO, Chief of the Energy Technologies and Industrial Applications (ETI) Division, AT **Theresia Vogel,** CEO, Climate and Energy Fund, AT			
	KEY-NOTES			
09:30 am	Climate Crisis – Why reaching the Paris climate goals is essential **Prof. Dr. Gottfried Kirchengast,** Wegener Center for Climate and Global Change, Graz University, AT Transforming cities with renewable energy **Lea Ranalder,** REN 21, FR Helsinki Energy Challenge – creating the future of urban heating **Laura Uuttu-Deschryvere,** City of Helsinki, FI			
10:45 am	**Coffee break**			
	PARALLEL SESSIONS			
	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	Flexibility and Stability of Energy Grids Session Chair: **Dr. Lukas Kranzl**, Vienna University of Technology, AT	**Centres for Circularity and Process Intensification** Session Chair: **Susanne Formanek**, IBO, AT	**IT Technologies, System Modelling and Artificial Intelligence** Session Chair: **Prof. Dr. Rene Hofmann**, Vienna University of Technology, AT	**Renewable Energy and Circular Economy Applications towards a low Carbon Industry** Session Chair: **Martin Lugmayr**, UNIDO, AT
11:15 am	**Temporal Resolution for Capturing Buildings' Energy Flexibility** **Parvathy Sobha**, Luleå Technical University, SE	**Ammonia recovery from liquid waste streams by means of Vacuum-Membrane Distillation** **Dr. Bettina Muster-Slawitsch**, AEE INTEC, AT	**On the Track of Optimized Building Operation** **Daniel Ruepp**, EQUA Solutions, CH & **Franz Hengel**, AEE INTEC, AT	11:15 am **Bio-Resource Circularity Centre's for Small Island Developing States** **Joshua Forte**, Red Diamond Compost., BB
11:30 am	**Flexibility Potential of Buildings with Thermal Component Activation** **Christoph Rohringer**, AEE INTEC, AT	**Agro-Industrial Zero Emissions Systems powered by renewable energies** **Prof. Dr. Hans Schnitzer**, StadtLABOR, AT	**Comparison of Smart Readiness Indicator (SRI) Methodologies** **Doris Österreicher**, University of Natural Resources and Life Sciences, AT	11:25 am **Pelagic Sargassum and food waste valorization using hydrothermal pretreatment and anaerobic co-digestion** **Dr. Terrell Thompson**, The University of Auckland, NZ
11:45 am	**Short-term Stability of Dynamic Operations at a 5GDHC Substation - a case study** **Femke Janssen**, Delft University of Technology, NL	**Integration of Innovative Technologies to Different Energy Intensive Industries** **Mads Willemoes Nordby**, TNO, NL	**Improving the Computational Performance of District Heating Network Simulation** **Basak Falay**, AEE INTEC, AT	11:45 pm **How to Support Solar Thermal Market through Innovative Policy Guidelines in Sica Countries?** **Alexandra Arias Alvarado**, SICREEE, CR
12:00 pm	**Electricity Market Participation of Heat Pumps and Combined Heat and Power Plants** **Dr. Ralf-Roman Schmidt**, AIT, AT	**Potential of Membrane Processes in the Concept of Lignocellulose Biorefineries** **Prof. Dr. Frank Lipnizki**, Lund University, SE	**Estimation of Gas Network Length and Associated Costs for EU-27 + UK at NUTS3-Level Based on Open-Source Data** **Bernhard Mayr**, Vienna University of Technology, AT	11:55 pm **Solar Thermal: Case Study in Palm Oil Refining and Oleochemical Industry** **Mohamed Kassim**, UNIDO-MAEESTA, MY 12:05 pm **From waste to green energy for industrial uses** **Reinhard Wenninger & Christian Everts,** VARIODIN Weissenschirmbach, AT
12:30 pm	**Lunch break**			

Wednesday, 06 April 2022

	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	Policies for Renewable Heating and Cooling Session Chair: **Rana Adib**, REN21, FR	**Renewable Heating and Cooling including high temperature applications** Session Chair: **Dr. Heidelinde Adensam**, BMK, AT	**Solutions for Energy Efficiency** Session Chair: **Roger Hackstock**, Austria Solar, AT	**Spatial Energy Planning with focus on Renewable Energies** Session Chair: **Prof. Dr. Alexandra Troi**, EURAC, IT
01:30 pm	**Renewable Energy Policies in a Time of Transition: Heating and Cooling** **Lea Ranalder**, REN21, FR	**Sustainable Off-Grid Space and Water Heating for Difficult to Decarbonize Buildings** **Dr. Keith Simons**, SHV Energy, NL	**Impact of Integral Day- and Artificial Lighting Solutions on Energy Demand and User Comfort** **Dr. Martin Hauer**, Bartenbach, AT	**Bottum-Up Heat Demand Model** **Lukas Goetzlich**, Research Studios Austria, AT
01:45 pm	**Review of the Regulatory Framework of District Heating** **Anna Billerbeck**, Fraunhofer ISE, DE	**Development of an Air-Source Mini-Split Heat Pump for Domestic Hot Water** **William Monteleone**, University of Innsbruck, AT	**RadiCal – A Radically New Approach for Modelling the Impact of Solar Radiation** **Daniel Rüdisser**, AEE INTEC, AT	**Energy Master Planning for Net-Zero Energy Resilient Public ommunities** **Dr. Alexander Zhivov**, ERDC-CERL, US
02:00 pm	**No-Regret Strategies for Decarbonizing Space and Water Heating** **Dr. Lukas Kranzl**, Vienna University of Technology, AT	**Potentials of Solar Heating in Europe** **Dr. Christian Holter & Patrick Reiter**, SOLID, AT	**Case Study of a Passive House with Façade Integrated Photovoltaic System** **Elisa Venturi**, University of Innsbruck, AT	**Holistic Support in Early Decision Phase for Positive-Energy-Districts** **Gerhard Hofer**, e7 energy innovation & engineering, AT
02:15 pm	**Renewables versus Waste Heat? Legal Provisions on the Original Energy Source** **Marie Holzleitner**, Energy institute at JKU Linz, AT	**Solar Fractions for Solar Process Heat Plants taking into Account Load Profile and Available Roof Area** **Felix Pag**, University of Kassel, DE	**Advanced Cogeneration/ Trigeneration Using Absorption Machines** **Harald Blazek**, StepsAhead Energiesysteme, AT	**A Python Pipeline for Modelica based District and Urban Scale Energy Simulation** **Theresa Boiger**, Graz University of Technology, AT
02:30 pm	**The Heating Strategy of the City of Graz** **Boris Papousek**, Energie Graz, AT	**Two-Stage Biomass-Fired Absorption Heating and Cooling System** **Manuel Kausche**, ZAE Bayern, DE	**High Temperature Heat Pumps for Industrial Drying: Operation Experience and Replicability** **Dr. Veronika Wilk**, AIT, AT	**Integrated Optimization of Hybrid Energy Networks** **Wiet Mazairac**, Ecovat, NL
03:00 pm	**Coffee break**			
	THEMATIC WORKSHOPS			
03:15 pm - 04:45 pm	**Race to Zero Decarbonization of industry! - But how?** Moderator: **Dr. Dr. Gabriela Maria Straka**, Member of Management Board BrauUnion Austria, AT	**The thermal side of sector coupling** Moderator: **Dr. Wim van Helden**, AEE INTEC, AT	**More than just water - waste water and sewage as a valuable source** Moderator: **Jürgen Fluch**, AEE INTEC, AT	**More flexibility in district heating: lessons from the ThermaFLEX project** Moderator: **Joachim Kelz** & **Dr. Ingo Leusbrock**, AEE INTEC, AT

B2B MEETINGS		POSTER SESSION
05:00 pm - 06:00 pm	STEIERMARK HALL	HALL 4, HALL 5, HALL 6, HALL 7, HALL 8
	B2B Meetings organized by EEN	**Poster session – Virtual:** 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	**Conference Dinner**	
	Welcome by **Werner Weiss**, Conference Chair, AEE INTEC, AT Welcome by the City of Graz, AT Dinner speech: How sustainability leads to transformation of economy and society **Wolfgang Anzengruber**, CEOs FOR FUTURE, AT **Venue:** Old University, Hofgasse 14, 8010 Graz	

Thursday, 07 April 2022

08:30 am	**Get together - Networking coffee**			
	KEY-NOTES			
09:00 am	Session Chair: **Theodor Zillner**, BMK, AT Heating and cooling in the energy transition: the path to 1.5°C **Dr. Ute Collier,** IRENA, AE Process Industry towards climate neutrality and circularity in a competitive way **Dr. Ludo Diels**, VITO, BE Decarbonization as a differentiator in the building materials industry **Stefan Schriebl**, WIG Wietersdorfer Holding, AT Digitalization of the Construction Industry **Hubert Rhomberg**, Rhomberg Holding, AT			
10:45 am	**Coffee break**			
	PARALLEL SESSIONS			
	STEIERMARK HALL	HALL 1	HALL 2	HALL 3
	Future District Heating and Cooling Technologies Session Chair: **Dr. Ingo Leusbrock**, AEE INTEC, AT	**Coupling of Energy Sectors** Session Chair: **Sonja Starnberger**, Energy Institute for Businesses, AT	**Digitalization for future Energy Systems** Session Chair: **Dr. Iris Filzwieser**, ACR, AT	**Sustainable Renovation** Session Chair: **Prof. Dr. Alexander Passer**, Graz University of Technology, AT
11:00 am	**Existing District Heating Networks in Context of German Climate Goals: Potentials for "UrbanTurn"** **Stefan Hay**, AGFW, DE	**Multi-Purpose Pit Thermal Energy Storage in Combination with Heat Pumps** **Morten Vang Bobach**, Aalborg CSP, DK	**Quantification of Heat Demand Forecast Accuracy Improvements by localized Weather Forecast** **Hjörleifur G. Bergsteinsson**, Technical University of Denmark, DK	**Vacuum Glass as Alternative for Window Retrofit** **Dr. Ulrich J. Pont**, Vienna University of Technology, AT
11:15 am	**Non-Linear Model Predictive Control of a Small-Scale 4th Generation District Heating Network with on/off Heat Pumps** **Jelger Jansen**, KU Leuven, BE	**Recoupled a Simulation Tool for Renewable Energy Communities Coupling Electric and Thermal Energies** **Prof. Maurizio Repetto**, Politecnico di Torino, IT	**A Data Driven Approach for Load Management of District Heating Networks** **Philip Ohnewein**, AEE INTEC, AT & **Florian Wenig**, Forschung Burgenland, AT	**Inspiring good practices: a database to trigger energy efficient renovations of historic buildings** **Prof. Dr. Alexandra Troi**, EURAC, IT
11:30 am	**On The Design of 5GDHC Control Systems** **Dr. Ivo Pothof**, Deltares, NL	**A Mixed-Integer Linear Optimization Approach for Power-To-X Technologies in a District Heating System** **Dr. Lukas Gnam**, Forschung Burgenland, AT	**Virtual Reality Applications in Digital Energy Twin Domain** **Saeed Safikhani**, Graz University of Technology, AT	**Flexibility potentials of prefabricated facade elements with integrated active layer** **Michael Gumhalter**, AEE INTEC, AT
11:45 am	**Potential of using absorption heat exchangers in districting heating grids** **Gerald Zotter**, AEE INTEC, AT	**Renewable Gasfield - A holistic power-to-gas approach with PEM electrolysis and catalytic methanation** **Dr. Bernhard Mayr**, EnviCare Engineering, AT	**Automatic thermal model identification and distributed optimization for load shifting in city quarters** **Andreas Moser**, BEST - Bioenergy and Sustainable Technologies, AT	**Conceptualization and evaluation of renovation packages for multi-family houses** **Mara Magni**, Innsbruck University, AT
12:00 pm	**District cooling distribution network optimizer** **Laura Zabala Urrutia**, Tekniker, ES	**Batteries from E-Mobility: Second Life in large Energy Storages** **Reinhard Ungerböck**, Grazer Energieagentur, AT	**Smart Energy Systems Modelling - Component exchange during simulation** **Sandra Wilfling**, Graz University of Technology, AT	**Sinfonia – Experiences in Large-Scale Step-By-Step Retrofits in Innsbruck** **Laszlo Lepp**, Passive House Institute, Innsbruck, AT
12:30 pm	**Lunch break**			

Thursday, 07 April 2022

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

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.

Photo: iStock

- 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?

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:

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- 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

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.

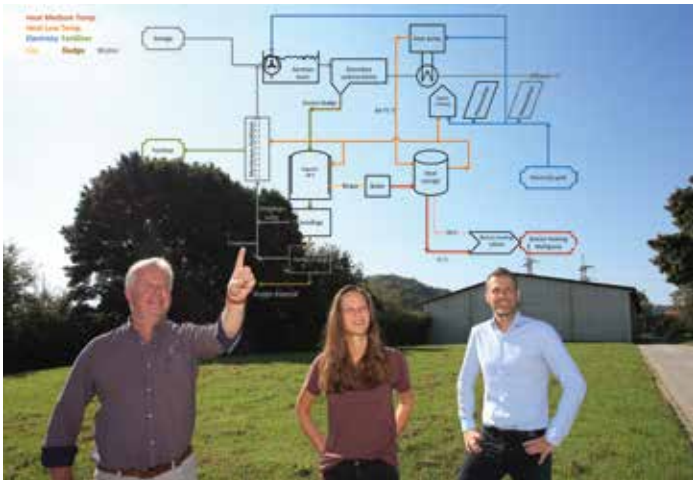

Photo: Klimafonds/Krobath

Poster session

Hall 4

Water Audit Methodology for Wastewater Optimization in Industry
Christian Platzer, AEE INTEC, AT

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

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
Sarah Meitz, 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

Effectiveness of Inhibitors in Reducing the Corrosion Impact of CaCl2-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

Hall 5

Standardized Economic Evaluation Criteria of Solar Process Heat in Hybrid Systems
Jürgen Fluch, AEE INTEC, AT

Characterization of microfiltration membranes by in situ wetting in the ESEM, FT-IR mapping and 3D reconstruction
Manfred Nachtnebel, Graz Centre for Electron Microscopy, AT

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 Zipplies, 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
Andreas Zourrelis, 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

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

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_2 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 Martenity 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

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_2 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

Hall 8

Flexibility Classification for Smart Buildings
Dr. Monika Hall, University of Applied Sciences Northwestern Switzerland, CH

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 Nhumaio, Eduardo Mondlane University, MZ

Solar Thermal District Heating in Austria
Veronika Hierzer, 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

A Multi-Layer Phase Change Material Packed Bed for Enhancing Liquid Air Energy Storage Efficiency
Dr. Abdalqader Ahmad, University of Birmingham, GB

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 Efficency
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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