



## 24<sup>th</sup> Conference on Process Integration for Energy Saving and Pollution Reduction

31/10 - 3/11 2021 Brno, Czech Republic

### On-site Conference Schedule

#### 31<sup>st</sup> October 2021

13:00	16:00	Social program - City Tour – Best of Brno City Centre (optional, not included in conference fee)
18:00	21:00	Welcome Reception – Conference hotel International, underground floor

#### 1<sup>st</sup> November 2021

		Chair: Petr Stehlik; Ferenc Friedler	
9:30	10:00	<b>Presentation of VUT Brno</b>	
		<b>Plenary Lecture</b> <b>Jiří Jaromír Klemeš</b>	
10:00	10:40	PRES21.0015: Twenty-Four Years of PRES Conferences: Recent Past, Present and Future-Process Integration Towards Sustainability Authors: J.J. Klemeš*, P. Varbanov, Y.V. Fan, P. Seferlis, X.C. Wang, X. Jia	
10:40	11:00	<b>Coffee Break</b>	
		<b>Parallel sessions</b>	
		Chair: Ferenc Friedler; Co-Chair: Yee Van Fan	Chair: Jiří Jaromír Klemeš; Co-Chair: Xuexiu Jia
11:00	11:30	PRES21.0467: Sustainable process technology to extract biochemical from microalgae: A review Authors: M. Raeisi*, T.A. Huynh, M.B. Franke, E. Zondervan	PRES21.0027: Environmental Impacts of Plastic Materials Flow Minimisation using Data-driven Pinch Method Authors: P.S. Varbanov*, H.H. Chin, X. Jia, F. Sher, J.J. Klemeš
11:30	11:50	PRES21.0010: Hydrothermal Carbonization of Different Recycling Paper Mill Waste Streams Authors: E.I.N C.D. Assis*, E.M. N. Chirwa, S.M. Tichapondwa	PRES21.0058: Simultaneously Retrofit of Heat Exchanger Networks and Towers for a Natural Gas Purification Plant Authors: Y. Zhang, B. Wang*, Y. Liang, M. Yuan, J.J. Klemeš
11:50	12:10	PRES21.0453: Modelling a Calcium-Looping Fluidized Bed Calcination Reactor with Solar-Driven Heat Flux Authors: M. Rivero, D. Rodrigues, C.I. C. Pinheiro*, J.P. Cardoso, F. Mendes	PRES21.0016: A review of biodiesel production from renewable resources: chemical reactions Authors: L.F. Chuah, J.J. Klemeš*, A. Bokhari, S. Asif
12:10	12:30	PRES21.0002: Evaluation of Calcium Looping Cycle as a Time-flexible CO <sub>2</sub> Capture and Thermo-chemical Energy Storage System Authors: C.C. Cormos*, S. Dragan, A.M. Cormos, L. Petrescu, I.D. Dumbrava, V.C. Sandu	PRES21.0020: Water Consumption and Urban Wastewater Treatment during the COVID-19 Pandemics Authors: X. Jia*, P. Varbanov, J.J. Klemeš, X. Jia
12:30	13:30	<b>Lunch</b>	
13:30	14:30	<b>Poster presentations</b>	<b>Poster presentations</b>
		Chair: Jiří Jaromír Klemeš; Co-Chair: Zdravko Kravanja	
14:30	15:10	<b>Plenary Lecture</b> <b>Ignacio E. Grossmann</b> OPTIMAL SYNTHESIS AND PLANNING OF SUSTAINABLE CHEMICAL PROCESSES AND ENERGY SYSTEMS	
15:10	15:30	<b>Coffee Break</b>	

<b>Parallel sessions</b>			
		Chair: Petar Varbanov; Co-Chair: Bohong Wang	Chair: Jiří Jaromír Klemeš; Co-Chair: Hon Huin Chin
15:30	15:50	PRES21.0026 Development of a Nonlinear Model Predictive Controller of Flexible Structure f.. Authors: M. Gkionis*, A. Papadopoulos, W. Shen, P. Seferlis	PRES21.0043: COVID-19 shock: The necessity of rethinking strategic management for global energy Authors: A. Gholamzadeh Chofreh*, F.A. Goni, M. Zeinalnezhad, Z. Konecna, J.J. Klemeš
15:50	16:10	PRES21.0424: Biogas to Advanced Biofuels: a Feasibility Study for Dimethyl-ether (DME) Production, Authors: M. Fedeli, F. Manenti*	PRES21.0033: Relationship of Demographic and Socio-Economic Factors Including Sustainability Related Indices to Waste Generation Authors: Y.V. Fan*, J.J. Klemeš, C.T. Lee, R.R. Tan
16:10	16:30	PRES21.0040: Bioreduction of Cr(VI) Using Bacterial Consortia Isolated from a Municipal Wastewater Sludge Experiencing Cr(VI) Loading from an Abandoned Chrome Foundry Authors: B. Kholisa*, E.M. N. Chirwa	PRES21.0036: Optimising Segregated Resource Conservation Network with Cross-Zonal Transfer for Multiple Resources and Qualities Authors: S. Jain, H.H. Chin*, S. Bandyopadhyay, J.J. Klemeš
16:30	16:50	<b>Coffee Break</b>	
		Chair: Jiří Jaromír Klemeš; Co-Chair: Xuexiu Jia	
16:50	17:50	<b>Invited Lecture</b> <b>Guest Speaker of Honour, Donald Huisigh</b> DON'T WASTE A GOOD CRISIS	
17:50	19:00	<b>Free time</b>	
19:00	22:00	<b>Beer evening</b> (optional, not included in conference fee)	

## 2<sup>nd</sup> November 2021

<b>Parallel sessions</b>			
		Chair: Panos Seferlis; Co-Chair: Xuexiu Jia	Chair: Petar Varbanov; Co-Chair: Hon Huin Chin
9:30	9:50	PRES21.0088: Modeling and Parametric Investigation of Rotating Packed Bed Processes for CO <sub>2</sub> Capture and Mineralization Authors: M. Dimoliani, A. Papadopoulos*, P. Seferlis	PRES21.0111: Control of the CO <sub>2</sub> Capture Using the Absorption and Stripping System for Improved Performance Authors: F. Ilea, V.M. Cristea, A.M. Cormos*
9:50	10:10	PRES21.0093: Influence of plastic content on synergistic effect and bio-oil quality from the co-pyrolysis of waste rigid polyurethane foam and sawdust mixture Authors: H. Stančin*, M. Šafář, J. Růžicková, H. Mikulčić, H. Raclavska, N. Duić	PRES21.0119: Robustness and Accuracy of the Particle Swarm Optimisation Method in the Solution of Inverse Heat Transfer Problems with Phase Change Authors: M. Zalesak*, P. Charvat, L. Klimes
10:10	10:30	PRES21.0096: Comparison of Equilibrium-Stage and Rate-Based Models of a H <sub>2</sub> S Scrubber for Purification of Coke Oven Gas Authors: N. Foty, A. Egedy*, L. Nagy, I. Hegedus	PRES21.0108: Heat Transfer and Water Consumption of Water-Spray Cooling of High-Temperature Surfaces: A Review on Empirical Correlations Authors: L. Klimes*, P. Charvat, J. Stetina
10:30	10:50	<b>Coffee Break</b>	
		Chair: Petar Varbanov; Co-Chair: Hon Huin Chin	
10:50	11:30	<b>Plenary Lecture</b> <b>Santanu Bandyopadhyay</b> Incorporating Uncertainties in Pinch Analysis	
11:30	12:00	<b>Coffee Break</b>	
<b>Parallel sessions</b>			
		Chair: Sandro Nizetic; Co-Chair: Yee Van Fan	Chair: Petar Varbanov; Co-Chair: Bohong Wang
12:00	12:20	PRES21.0145: Vehicle model for driving strategy optimization of energy efficient lightweight vehicle Authors: Z. Pusztai*, K. Péter, F. Friedler	PRES21.0163: Modeling and optimization of hydrogen production in an industrial cluster accounting for economic cost and environmental

			impact Authors:Y. Ibrahim*, D. Al-Mohannadi, P. Linke
12:20	12:40	PRES21.0146: Hybrid Fault Detection Method for a Distillation Unit Authors:B.L. Tarcsay*, S. Nemeth, T. Chován, Á. Bárkányi	PRES21.0188: Effects of Variable Thermal Properties on Convective Heat Transfer of Nanofluids Authors:D. Zheng, L. Chen, P.S. Varbanov, J.J. Klemeš, J. Wang*
12:40	13:00	PRES21.0293: Optimization of Corrosion Removal of Metal-framed Industrial Infrastructure by Taking Into Account Sustainability Authors:B. Eisinger Balassa*, P. Eisinger	PRES21.0433: P-Graph Approach for the Optimisation of Biomass Supply Network of Agricultural and Industrial Residues and By-products -Case Studies of Rural Areas Authors:A. Lovrak*, T. Pukšec, N. Duić
13:00	14:00	<b>Lunch</b>	
		Chair: Panos Seferlis, Co-Chair: Petar Varbanov	
14:00	14:50	<b>Invited Lecture</b> <b>Guest Speaker of Honour, André Bardow</b> Systems Engineering Makes the Carbon Go Round – from Molecular Design to Net-Zero Plastics	
14:50	15:10	<b>Coffee Break</b>	
		Chair: Petar Varbanov; Co-Chair: Pawel Oclon	
15:10	15:50	<b>Plenary Lecture</b> <b>Raf Dewil</b> Energy Positive Wastewater Treatment: Creating Value from an Underexploited Resource	
15:50	16:10	<b>Coffee Break</b>	
		<b>Parallel sessions</b>	
		Chair: Zdravko Kravanja; Co-Chair: Yee Van Fan	Chair: Petr Stehlik; Co-Chair: Bohong Wang
16:10	16:30	PRES21.0208: Analysis of the Transition to a Carbon-Free Heat Supply in the Residential Sector: Case Study on Shift from Natural Gas to Heat Pumps in the Conditions of the Czech Republic Authors:M. Špiláček*, J. Pospisil	PRES21.0511: Predicting Renewable Energy Mixes via an ICA and PLS Approach Authors: Sin Yong Teng*, Jan Maarten Van Doorn, Jeroen Jansen
16:30	16:50	PRES21.0408: Techno-economic assessment of oxygen production routes for oxy-fuel combustion processes Authors:S. García-Luna, C. Ortiz*, A. Carro, R. Chacartegui, L.A. Pérez Maqueda	PRES21.0425: Synthesis of Multiperiod Heat Exchanger Networks: Minimum Utility in Each Period Authors:R. Lakner*, Á. Orosz, F. Friedler
16:50	17:10	PRES21.0022: Numerical Targeting of Total Site Mass Integration with Multiple Fresh Resources Authors:L. Gai*, P.S. Varbanov, Y.V. Fan, S. Jain, S. Bandyopadhyay, J.J. Klemeš	PRES21.0019: Numerical investigation and design of smart cooling system for photovoltaic panel Authors: M. Jurčević*, S. Nižetić, D. Čoko, M. Arici, E. Giama, A.M. Papadopoulos
17:10	17:30	PRES21.0292: Systematic Design and Evaluation of Energy-Efficient Alternatives of Heterogeneous Azeotropic Distillation: Furfural Case Study Authors:J. Pimentel, F. Friedler*	PRES21.0018: Smart approach for investigation of personal thermal comfort: A case study from office buildings Authors:A. Culic*, S. Nižetić, P. Solic, T. Perkovic, V. Congradac
17:30	17:50	<b>Coffee Break</b>	
		Chair: Jiří Jaromír Klemeš; Co-Chair: Hon Huin Chin	
17:50	18:30	<b>Invited Lecture</b> <b>Guest Speaker of Honour, Stratos Pistikopoulos</b> Towards a Circular Economy Systems Engineering Framework	
18:30	18:50	PRES21.0168: Optimal Operational Profiles in an Electrodialysis Unit for Ion Recovery A. Latinis, A. Papadopoulos, P. Seferlis*	
18:50	19:10	PRES21.0376: A combined approach to identifying economic gains through the incorporation of retrofitable enhancement technology with pinch studies Authors: M. Gough*, T. Higley, R. Smith, P. Droegemüller	

### 3<sup>rd</sup> November 2021

<b>Parallel sessions</b>			
		Chair: Jiří Jaromír Klemeš; Co-Chair: Xuexiu Jia	Chair: Petar Varbanov; Co-Chair: Hon Huin Chin
9:30	9:50	PRES21.0294: Fouling Simulations of a Passive Part of the Testing Combustion Facility Authors: J. Strouhal*, T. Jurena, Z. Jegla	PRES21.0456: Re-Thinking the Fuel Production Puzzle – Synthetic Ethanol Production From Carbon Dioxide Authors: T. Koiranen*, H. Nieminen, D. Klûh, A. Laari, K. Melin
9:50	10:10	PRES21.0330: Calculations of CO <sub>2</sub> Production and Combustion Efficiency for Various Fuels Authors: R. Šulc, P. Dítl*	PRES21.0478: Long-Distance Hydrogen Delivery Using a Dibenzyltoluene-based Liquid Organic Hydrogen Carrier System Authors: M.C.s. Carvalho, C.G. Braz, J. Marques, H.A. Matos, J.F.o. Granjo*
10:10	10:30	PRES21.0262: Railway Integration Possibilities in Waste Freight Transportation Authors: V. Nevrlý*, D. Poul, R. Šomplák, M. Pavlas, Y. Redutskiy	PRES21.0339: Numerical and Experimental Investigation of Zero-Gravity Distillation Units Authors: M. Wende, F. Fischer, E. Kenig*
10:30	10:50	<b>Coffee Break</b>	
		Chair: Jiří Jaromír Klemeš; Co-Chair: Bohong Wang	
10:50	11:40	<b>Invited Lecture</b> <b>Guest Speaker of Honour, Qiuwang Wang</b> Heat Transfer Optimisation Based on a New Space Thermal Resistance Network Method	
11:40	12:10	<b>Coffee Break</b>	
<b>Parallel sessions</b>			
		Chair: Jiří Jaromír Klemeš; Co-Chair: Bohong Wang	Chair: Petar Varbanov; Co-Chair: Hon Huin Chin
12:10	12:30	PRES21.0428: The Role of Mathematical Programming in the Synthesis of Sustainable Systems Authors: Z. Kravanja*	PRES21.0242: Finding Optimized Process Conditions to Minimize Precipitations in an SO <sub>2</sub> Absorption Process Using Thermodynamic Process Simulation Authors: B. Weiß*, W. Fuchs, M. Harasek
12:30	12:50	PRES21.0202: Transmission Enhancement and Energy Optimised Integration of Heat Exchangers in Petrochemical Industry Waste Heat Utilisation (Bilateral Collaborative Project) Authors: M. Zeng, J.J. Klemeš, Q. Wang, P.S. Varbanov, N. Li, B. Wang, Z. Guo, H.H. Chin, M. Hemzal*	PRES21.0282: Waste Transport and Circular Economy Authors: M. Pavlas*, J. Gregor, D. Poul
12:50	13:10	PRES21.0446: Numerical analysis of ammonia/methane/air combustion on emission characteristics under elevated pressure Authors: J. Baleta, H. Mikulčić*, T. Novak, J. Wang, X. Wang, F. Qi, F. Wang, C. Zheng	PRES21.0324: MODELING OF RENEWABLE ENERGY SYSTEM FOR RESIDENTIAL BUILDING HEATING AND ELECTRICITY PRODUCTION (RESHEAT) Authors: P. Ocloň*, P. Cisek, J. Taler, J.J. Klemeš, P. Varbanov, A. Vallati, M. Czamara, E. Kozak-Jagiela
13:10	14:10	<b>Lunch</b>	
		Chair: Jiří Jaromír Klemeš; Co-Chair: Xuexiu Jia	
14:10	15:10	<b>Invited Lecture</b> <b>Guest Speaker of Honour, Pen-Chi Chiang</b> Implementing Green Chemistry Principles for Circular Economy Towards Sustainable Development Goals	
		Chair: Pawel Oclon; Co-Chair: Xuexiu Jia	

15:10	15:50	<p style="text-align: center;"><b>Invited Lecture</b> <b>Farooq Sher</b></p> <p style="text-align: center;">PRES21.0231 Flexible operation through cofiring coal and biomass for commercial-scale coal-fired power plant integrated with CO<sub>2</sub> capture and compression system Authors: Usman Ali*, Farooq Sher, Muhammad Asif Akhtar</p>	
15:50	16:20	<p><b>Coffee Break</b></p> <p><b>Parallel sessions</b></p>	
		Chair: Sandro Nizetic; Co-Chair: Bohong Wang	Chair: Petar Varbanov; Co-Chair: Hon Huin Chin
16:20	16:40	<p>PRES21.0466: Novel Dynamic Cleaning Model for Cyclic Operation of the Biodiesel Membrane Reactor Authors: T.A. Huynh*, M. Raeisi, M.B. Franke, E. Zondervan</p>	<p>PRES21.0340: Examination of hazardous situations in industrial closed-loop processes using dynamic simulations Authors: M. Bothe, N. Lutters, E. Kenig*</p>
16:40	17:00	<p>PRES21.0499: Process Intensification of TEG Dehydration Units with Respect to Rated Energy Consumption, Emissions and Product Quality Authors: V. Miklas, I. Abdulrahman, V. Máša*</p>	<p>PRES21.0508: Practical Integration of Heat Pumps with Thermal Energy Storage in Non-Continuous Processes Authors: R. Agner*, B.H.Y. Ong, J.A. Stampfli, P. Krummenacher, B. Wellig</p>
17:00	17:20	<p>PRES21.0414: In Silico Development of Plastic Waste to Methanol Industrial-Scale Process' Authors: K. Prifti, F. Manenti</p>	<p>PRES21.0484: InnCapPlant (part 1): Mathematical Model of a Power Boiler Operation Under Rapid Load Changes. Autors: M. Rerak*, W. Zima, S. Grądziel, A. Cebula, E. Kozak-Jagiela, L. Nord, V.T. Skjervold, M. Pilarczyk, R. Blom, G. Mondino</p>
17:20	17:40	<p><b>Coffee Break</b></p> <p>Chair: Petar Varbanov; Co-Chair: Xuexiu Jia</p>	
17:40	18:20	<p><b>Invited Lecture</b> <b>Guest Speaker of Honour, Soteris Kalogirou</b> Renewable Energy Systems: World Status and Prospects</p>	
18:20	19:00	<p><b>Free time</b></p>	
19:00	22:00	<p><b>Gala Awards Dinner/Closing Ceremony</b></p>	