


3rd European Conference on Supercritical CO₂ (sCO₂) Power Systems – September 19th & 20th

Conference address: Paris, EDF, 7 boulevard Gaspard Monge, 91120 Palaiseau



Thursday - September 19 th		
	Room: Large Auditorium	
09:00 – 09:15	Welcome and Introduction <i>Dieter Brillert¹ and Albannie Cagnac²</i> 1: University of Duisburg – Essen / UDE 2: Électricité de France / EDF	
09:15 – 09:45	EU commitment towards CO ₂ emissions <i>Carmine Marzano and Roberto Passalacqua, European Commission</i>	
09:45 – 10:15	Coffee break	
	Heat Exchanger and Transfer (Session 1) Room: Amphithéâtre 1 (AT1) Chairman: Martin Rohde, TU Delft	Turbomachines and Power Systems (Session 2) Room: Amphithéâtre 2 Chairman: Giuseppe Bianchi, Brunel University London
10:15 – 10:45	108 - Turbulence Modelling for Supercritical CO ₂ Flows in a Vertical Tube <i>Otero Rodriguez, Gustavo Jose (1); González Portillo, Luis F. (2); Pecnik, Rene (1)</i> 1: Delft University of Technology, the Netherlands; 2: Universidad Politécnica de Madrid, Spain	109 - Assessment of Performance and Costs of CO ₂ Based Next Level Geothermal Power (NLGP) Systems <i>Glos, Stefan; Hansper, Jil; Wechsung, Michael; Langer, Marcel</i> Siemens AG, Germany
10:45 – 11:15	110 - Direct-Numerical Simulation of Flow and Heat Transfer within Channels of a Supercritical-CO ₂ Cooler <i>Laurien, Eckart; Pandey, Sandeep</i> University of Stuttgart, Germany	114 - Hybridization of a Small Modular Reactor with a Solar Power Plant using a Supercritical Carbon Dioxide Brayton Cycle Tauveron, Nicolas; Pham, Quynh Trang; Alpy, Nicolas CEA, France
11:15 – 11:45	111 - Investigation of a Correlation Based Model for sCO ₂ Compact Heat Exchangers <i>Hofer, Markus; Buck, Michael; Strätz, Marcel; Starflinger, Jörg</i> Institute of Nuclear Technology and Energy Systems, University of Stuttgart, Germany	156 - Part-Load Operation of Coal Fired sCO ₂ Power Plants <i>Dario, Alfani; Astolfi, Marco; Binotti, Marco; Macchi, Ennio; Silva, Paolo</i> Politecnico di Milano
11:45 – 12:15	115 - A Review of the Criteria for the Onset of Heat Transfer Deterioration with Supercritical CO ₂ in Vertical Heated Single Circular Tubes <i>Theologou, Konstantinos; Mertz, Rainer; Laurien, Eckart; Starflinger, Jörg</i> Institute of Nuclear Technology and Energy Systems (IKE), University of Stuttgart, Germany	119 - Dynamic Modelling and Transient Analysis of a Molten Salt Heated Recompression Supercritical CO ₂ Brayton Cycle <i>Zhou, Pan; Zhang, Jinyi; Le Moullec, Yann</i> EDF R&D China, Beijing, China
12:15 – 13:15	Lunch	
	sCO₂ Experiments and Loops / Application of sCO₂ Usage (Session 3) Room: AT1 Chairman: Stefan Glos, Siemens AG	Turbomachines and Power Systems (Session 4) Room: AT2 Chairman: Dieter Brillert, University Duisburg-Essen
13:15 – 13:45	148 - Experimental Investigations and Simulations of the Control System in Supercritical CO ₂ Loop <i>Vojacek, Ales (1); Melichar, Tomas (1); Doubek, Frantisek (1); Hajek, Petr (1); Hoppe, Timm (2)</i> 1: Research Centre Řež, Czech Republic; 2: XRG Simulation GmbH, Germany	120 - Shouhang-EDF 10MWe Supercritical CO ₂ Cycle + CSP Demonstration Project <i>Le Moullec, Yann (1); Qi, Zhipeng (2); Zhang, Jinyi (1); Zhou, Pan (1); Yang, Zijiang (1); Wang, Xihua (2); Chen, Wenlong (2); Wang, Shuai (2)</i> 1: EDF R&D China, Beijing, China; 2: Shouhang, Beijing, China

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13:45 – 14:15	118 - A Systematic Comparison of Supercritical CO ₂ Brayton Cycle Layouts for Concentrated Solar Power with a Focus on Thermal Energy Storage Utilization <i>Zhang, Jinyi; Le Moullec, Yann</i> EDF R&D China, Beijing, China	123 - Machine Learning Based Design of a Supercritical CO ₂ Concentrating Solar Power Plant <i>Nabil, Tahar; Le Moullec, Yann; Le Coz, Adrien</i> EDF R&D China
14:15 – 14:45	125 - Development and Power Generating Operation of the Supercritical Carbon Dioxide Power Cycle Experimental Test Loop in KIER <i>Cho, Junhyun; Shin, Hyungki; Cho, Jongjae; Choi, Bongsu; Roh, Chulwoo; Lee, Beomjoon; Lee, Gilbong; Ra, Ho-Sang; Baik, Young-Jin</i> Korea Institute of Energy Research, Korea, Republic of South Korea	Blank by intention
14:45 – 15:15	132 - Operational Experiences and Design of the sCO ₂ -HeRo Loop <i>Hacks, Alexander Johannes (1); Freutel, Thomas (2); Strätz, Marcel (3); Vojacek, Ales (4); Hecker, Frieder (5); Starflinger, Jörg (3); Brillert, Dieter (1)</i> 1: University of Duisburg-Essen, Germany; 2: Kraftwerks-Simulator-Gesellschaft mbH (KSG); 3: University of Stuttgart; 4: Research Centre Řež; 5: Gesellschaft für Simulatorschulung mbH (GfS)	129 - Development of a Partial-admission Axial Turbine for a tens-kWe under Supercritical CO ₂ Condition <i>Cho, Jongjae; Shin, Hyungki; Cho, Junhyun; Choi, Bongsu; Baik, Young-Jin; Lee, Beomjoon; Roh, Chulwoo; Ra, Ho-Sang</i> Korea Institute of Energy Research, Korea, Republic of South Korea
15:15 – 15:45	Coffee break	
	Materials and sCO₂ Mixtures (Session 5) Room: AT1 Chairman: Uwe Gampe, TU Dresden	Turbomachines and Power Systems (Session 6) Room: AT2 Chairman: Alexander Hacks, University Duisburg-Essen
15:45 – 16:15	113 - Development and Application of INCONEL Alloy 740H in uSCO ₂ Power Systems <i>McCoy, Stephen A. (1); Baker, Brian A. (2); Gollihue, Ronald D. (2); deBarbadillo, John J. (2)</i> 1: PCC Special Metals, United Kingdom; 2: Special Metals Corporation, USA	138 - Modelling and Optimisation of Supercritical Carbon Dioxide Turbomachinery <i>Van Der Westhuizen, Ruan; Van Der Spuy, Johan; Groenwold, Albert; Dobson, Robert</i> Department of Mechanical and Mechatronic Engineering, Stellenbosch University, South Africa
16:15 – 16:45	150 - Highly Efficient Plate-Fin Heat Exchanger (PFHE) Technical Development for s-CO ₂ Power Cycles <i>Tioual-Demange, Sarah; Bergin, Gaëtan; Mazet, Thierry</i> Fives Cryo, France	155 - Transient Response of Supercritical CO ₂ Axial Turbine for KAIST MMR <i>Son, In Woo; Heo, Jin Young; Oh, Bong Seong; Lee, Jeong Ik</i> KAIST, Korea, Republic of South Korea
16:45 – 17:15	157 - Practical Challenges and Failure Modes during Fabrication of Haynes 230 Micro-Pin Solar Receivers for High Temperature Supercritical Carbon Dioxide Operation <i>McNeff, Patrick S. (1); Paul, Brian K. (1); Dogan, Omer (2); Rozman, Kyle (3); Kissick, Sean (1); Wang, Hailei (4); Drost, M. Kevin (1); Fronk, Brian M. (1)</i> 1: Oregon State University, Corvallis, USA; 2: National Energy Technology Lab., Albany, USA; 4: Utah State University, Logan, USA 3: Leidos Research Support Team, Pittsburgh, USA	116 - Development and Testing of Dry Gas Seals for Turbomachinery in multiphase CO ₂ Applications <i>Fesl, Andreas; Hellmig, Benjamin; Laxander, Armin</i> EagleBurgmann
19:00	Dinner @ La Coupole - 102, boulevard de Montparnasse, 75014 Paris	

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	Materials and sCO₂ Mixtures (Session 7) Room: AT1 Chairman: Sebastian Unger, Helmholtz-Zentrum Dresden-Rossendorf	Heat Exchanger and Transfer (Session 8) Room: AT2 Chairman: René Pecnik, TU Delft
09:00 – 09:30	141 - Supercritical Carbon Dioxide / Alternative Fluid Blends for Efficiency Upgrade of Solar Power Plant <i>Binotti, Marco (1); Di Marcoberardino, Gioele (2); Iora, Paolo (2); Invernizzi, Costante (2); Manzolini, Giampaolo (1)</i> 1: Politecnico di Milano, Milano, Italy; 2: University of Brescia, Brescia, Italy	122 - Heat Transfer Characteristics of sCO ₂ and Dynamic Analysis of Looping Conditions <i>Xiao, Gang (1); Xing, Kaixiang (1); Zhang, Jinyi (2); Le Moullec, Yann (2); Zhou, Pan (2); Yang, Tianfeng (1); Ni, Mingjiang (1); Cen, Kefa (1)</i> 1: Zhejiang University, China; 2: EDF R&D, China
09:30 – 10:00	126 - Accurate and Predictive Mixture Models Applied to Mixtures with CO ₂ <i>Jäger, Andreas; Mickoleit, Erik; Bretkopf, Cornelia</i> TU Dresden, Dresden, Germany	131 - Experimental Investigation of Heat Transfer and Pressure Drop in Tubes to Cool CO ₂ Near the Critical Point <i>Wahl, Andreas; Mertz, Rainer; Eckart, Laurien; Jörg, Starflinger</i> University Stuttgart, Germany
10:00 – 10:30	142 - Effect of Impurities on Supercritical CO ₂ Compatibility <i>Pint, Bruce A.; Unocic, Kinga A.; Keiser, James R.</i> Oak Ridge National Laboratory, Oak Ridge, USA	136 - Large Eddy Simulation of sCO ₂ Flow with a Discontinuous Galerkin Method <i>Hennink, Aldo; Lathouwers, Danny; Rohde, Martin; Kloosterman, Jan Leen</i> Delft University of Technology, Netherlands
10:30 – 11:00	Coffee break	
	Application of sCO₂ Usage (Session 9) Room: AT1 Chairman: Markus Haider, Technical University Vienna	sCO₂ Experiments and Loops (Session 10) Room: AT2 Chairman: Eckart Laurien, University Stuttgart
11:00 – 11:30	127 - Configuration of a Flexible and Efficient sCO ₂ Cycle for Fossil Power Plant <i>Mecheri, Mounir (1); Bedogni, Stefano (2); Cagnac, Albannie (1)</i> 1: EDF R&D, France; 2: Edison, Italy	140 - Experimental Testing of a 1MW sCO ₂ Turbo-Compressor <i>Rapp, Logan Madacey (1); Stapp, David (2)</i> 1: Sandia National Laboratories; 2: Peregrine Turbine Technologies
11:30 – 12:00	133 – Modelling and performance analysis of a supercritical CO ₂ system for high temperature industrial heat to power conversion <i>Marchionni, Matteo; Saravi, Samira Sayad; Bianchi, Giuseppe; Tassou, Savvas A</i> Brunel University London, United Kingdom	144 - Supercritical CO ₂ Power Cycle Projects at gti Macadam, Scott; <i>Kutin, Michael</i> GTI, United States of America
12:00 – 12:30	Short Lunch	

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	Application of sCO₂ Usage (Session 11) Room: AT1 Chairman: Andreas Werner , <i>Technical University Vienna</i>	sCO₂ Experiments and Loops (Session 12) Room: AT2 Chairman: Jörg Starflinger , <i>University Stuttgart</i>
12:30 – 13:00	139 - Thermo-economic Modeling and Analysis of sCO ₂ Brayton Cycles <i>Penkuhn, Mathias; Tsatsaronis, George</i> <i>Technische Universität Berlin, Germany</i>	145 - Study of Autonomous Control System for S-CO ₂ Power Cycle Oh, Bong-Seong; Lee, Jeong Ik KAIST, Korea, Republic of South Korea
13:00 – 13:30	147 - Probabilistic Technique for Solving Computational Problem: Application of Ant Colony Optimization (ACO) to find the best sCO ₂ Brayton Cycle Configuration <i>Mecheri, Mounir; Zhao, Qiao</i> <i>EDF R&D, France</i>	151 - Thermo-economic Heat Exchanger Optimization for Electro-Thermal Energy Storage based on Transcritical CO ₂ Cycles <i>Sanz Garcia, Luis; Jacquemoud, Emmanuel; Jenny, Philipp</i> <i>MAN Energy Solutions Zürich AG, Switzerland</i>
13:30 – 14:00	149 - Cooling System Cost and Performance Models for Economic sCO ₂ Plant Optimization of Cooling Technology and Cold sCO ₂ Temperature <i>Weiland, Nathan T. (1); Pidaparti, Sandeep R. (1,2); White, Charles W. (1,3)</i> 1: <i>National Energy Technology Laboratory, Pittsburgh, PA, U.S.A.;</i> 2: <i>KeyLogic, Pittsburgh, PA, U.S.A.;</i> 3: <i>KeyLogic, Fairfax, VA, U.S.A.</i>	Blank by intention
14:00 – 14:15	Closing Session - Best paper award - Announcement of the conference location and date for 2021	

Weblinks (also available on www.sCO2.eu)

- [Conference website](#)
- [Conference venue](#)
- [Dinner venue](#)
- [Hotel and transportation](#)
- Conference proceedings are available after presentation of the paper on the conference: www.sCO2.eu