



sCO₂
europe

The European Conference on
SUPERCRITICAL CO₂
for Energy Systems

9-11 April, 2025
Delft University of Technology
Netherlands



Conference Agenda at a Glance

Full Agenda



Clickable QR

Wednesday April 9th

17:00	-	19:00	Reception & Registration Location: <i>Stadhuis (Delft City Hall), Markt 87, 2611GS, Delft</i>
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Thursday April 10th

			Lecture Hall A	Lecture Hall B
08:45	-	09:00	Registration	
09:00	-	09:15	Welcome	
09:15	-	10:00	Keynote I: <i>STEP Project</i> Speaker: <i>Jeff Moore, Southwest Research Institute (SwRI), US</i>	
10:00	-	10:30	Coffee Break	
10:30	-	12:30	Applications: General I Chair: <i>Marco Astolfi</i> Chair: <i>Andreas Werner</i>	Heat Transfer I Chair: <i>Joerg Starflinger</i> Chair: <i>Jurriaan Peeters</i>
12:30	-	13:50	Lunch + Group Picture	
13:50	-	14:40	Panel I - Heat Exchangers: <i>future developments, technological evolutions</i> Participants: <i>Fives Cryo, Parker FES & Temisth</i> Chair: <i>Albannie Cagnac</i>	
14:45	-	15:45	Applications: Waste Heat Recovery Chair: <i>Otakar Frybort</i>	Turbomachinery Chair: <i>Dieter Brillert</i>
15:45	-	16:15	Coffee Break	
16:15	-	17:15	Applications: Heat Pumps & Geothermal Chair: <i>Paolo Silva</i>	Experiments & Loops I Chair: <i>Uwe Gampe</i>
18:30	-	22:30	Gala Dinner Location: <i>Nieuwe Kerk (Delft New Church), Markt 80, 2611GX, Delft</i>	

Friday April 11th

			Lecture Hall A	Lecture Hall B
08:45	-	09:00	Registration	
09:00	-	09:45	Keynote II: <i>sCO₂-based cycle: from lab to field</i> Speaker: <i>Rafael Guedez, KTH Royal Institute of Technology, Sweden</i> Speaker: <i>Gioele Di Marcoberardino, Università Degli Studi Di Brescia, Italy</i>	
09:45	-	10:30	Poster Session + Coffee Break	
10:30	-	12:30	Applications: Nuclear & Solar Chair: <i>Vaclav Dostal</i> Chair: <i>Jurriaan Peeters</i>	Turbomachinery II Chair: <i>Teemu Turunen-Saaresti</i> Chair: <i>Giacomo Persico</i>
12:30	-	13:30	Lunch	
13:30	-	14:30	Panel II – Turbomachinery: <i>Technologies Adopted in Existing and Future Plants</i> Participants: <i>Baker Hughes, MAN Energy Solutions, Siemens Energy & Doosan Škoda Power</i>	
14:35	-	15:35	Applications: Energy Storage Chair: <i>Marco Astolfi</i>	Heat Transfer II Chair: <i>Renaud Le Pierres</i>
15:35	-	16:00	Coffee Break	
16:00	-	17:00	Applications: General II Chair: <i>Rene Pecnik</i>	Experiments & Loops II Chair: <i>Andreas Jaeger</i>
17:00	-	17:10	Closing Session	

The 6th European sCO₂ Conference for Energy Systems | April 9th - 11th

Faculty of Mechanical Engineering, Delft University of Technology | Mekelweg 2, 2628 CD Delft, The Netherlands

The European Conference on Supercritical CO₂

The *European Conference on Supercritical CO₂ for Energy Systems* series brings together experts from academia and industry to share and discuss the latest advancements in supercritical CO₂ energy conversion systems for

- Power Cycles,
- Heat Pumps,
- Energy Storage.

In particular, the detailed topics of interest include:

- Cycle Configurations,
- Turbomachinery,
- Heat Transfer & Heat Exchangers,
- sCO₂ Experiments & Facilities,
- Fluid Properties & Materials.

Beyond knowledge exchange, the conference serves as a platform for fostering new collaborations and research initiatives.

The European Conference on Supercritical CO₂ (sCO₂) was first initiated in Vienna in 2016 by a small, informal committee. In 2018, a formal conference committee was established, comprising a general committee and a local organizing team. Since then, the conference has been held in Essen, Germany (2018), Paris, France (2019), online in 2021 due to the COVID-19 pandemic, and most recently in Prague, Czech Republic (2023).

The upcoming edition of the conference is held at the Delft University of Technology in The Netherlands. We look forward to welcoming you in Delft, to exchange insights for the advancement of supercritical CO₂ technologies for future energy systems.

Sincerely,

The Organizing Committee

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Committees

Conference Committee

Rene Pecnik (chair)	Delft University of Technology, <i>Department of Process & Energy</i>
Dieter Brillert	Universität Duisburg-Essen, <i>Chair of Turbomachinery</i>
Albannie Cagnac	EDF R&D, <i>Power Generation & Environment Department</i>
Václav Dostál	Czech Technical University
Otakar Frýbort	Research Centre Řež, <i>Energy Technology Department</i>
Uwe Gampe	Technische Universität Dresden, <i>Chair of Thermal Power Machinery and Plants</i>
Markus Haider	Technical University of Vienna, <i>Institute for Energy Systems and Thermodynamics</i>
Andreas Jäger	Technische Universität Dresden, <i>Chair of Thermal Power Machinery and Plants</i>
Jörg Starflinger	University of Stuttgart, <i>Institute of Nuclear Technology and Energy Systems (IKE)</i>
Teemu Turunen-Saaresti	LUT University, <i>School of Energy Systems</i>
Andreas Werner	Technical University of Vienna, <i>Institute for Energy Systems and Thermodynamics</i>
Marco Astolfi	Politecnico di Milano, <i>Energy Department</i>
Paolo Silva	Politecnico di Milano, <i>Energy Department</i>

Local Organizing Committee 2025

Rene Pecnik	Delft University of Technology, <i>Department of Process & Energy</i>
Jurriaan Peeters	Delft University of Technology, <i>Department of Process & Energy</i>
Marko Draskic	Delft University of Technology, <i>Department of Process & Energy</i>
Nele Herting	Delft University of Technology, <i>Department of Process & Energy</i>

Keynote Speeches

STEP - Development, Commissioning, and Testing of a 10 MWe sCO₂ Power Cycle

Thursday April 10th, 09:15 | Lecture hall A



Jeff Moore, PhD

Southwest Research Institute (SwRI), US

Abstract: 10 MWe sCO₂ turbine was developed and tested for the Supercritical Transformational Electric Power (STEP) demo pilot plant, which is a supercritical carbon dioxide (sCO₂) test facility located at Southwest Research Institute (SwRI) in San Antonio. The plant was assembled and commissioned for simple cycle operation, and the initial testing of the turbine was performed, including electric power generation. The project was developed in partnership between Southwest Research Institute, GTI Energy, and GE Vernova Advanced Research and is sponsored by the U.S. Department of Energy (DOE) as part of the \$169 million STEP Demo project. The goal of the program is to demonstrate mechanical qualification and cycle efficiency in both the simple and recompression recuperated Brayton cycle. Initial testing in the simple cycle configuration was performed with turbine inlet temperatures up to 500°C. This talk provides mechanical and performance test results for the turbine, which provided over 8 MW of gross shaft power. Synchronization to the grid permitted almost 4 MWe of net electric power output of the plant, achieving the goals for the simple cycle configuration. Other mechanical test data will be presented, including radial vibration and bearing temperatures, along with the operating conditions of the test loop. The plant is undergoing reconfiguration into the RCBC configuration by adding a second (bypass) compressor and a second recuperator with the goal of achieving 10 MWe net electric power output and plant thermal efficiency approaching 50%.

Progress in sCO₂ Energy Systems Projects Across Europe

Friday April 11th, 09:00 | Lecture hall A

Rafael Guedez Mata, PhD

KTH Royal Institute of Technology, SE



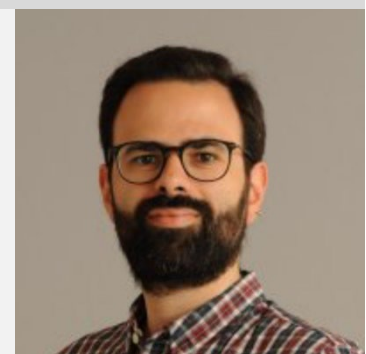
Abstract: This talk will guide through the main progress and achievements of multiple on-going EU-funded projects addressing innovations in relation to supercritical CO₂ technology, from component design, prototyping and testing to system integration analyses and demonstration at pilot scale. Focus will be placed only in those in which KTH Energy Department is involved. Firstly, progress on two high-temperature heat pump projects will be presented, namely the SCO2OP-TES and COMHP TES projects. The SCO2OP-TES (sCO₂ Operating Pumped Thermal Energy Storage for grid/industry cooperation) project aims at demonstrating at pilot-scale an integrated sCO₂-based Carnot battery system that combines turbomachinery-based high temperature sCO₂ heat pump and power cycles together with a molten-salt based thermal energy storage system in order to provide long duration energy storage. The COMHP TES project on the other hand aims at investigating and demonstrating a supercritical CO₂ system comprising modular reciprocating compressor/expander machines, as well as heat and cold thermal energy storage units. Secondly, the talk will go briefly through the projects HybridPLUS (Advanced hybrid solar plant with PCM storage solutions in sCO₂ cycles) and Powder2Power (MW-scale fluidized particle-driven CSP prototype demonstration), both of which assess numerically the optimal design and integration of sCO₂ power cycles when coupled to innovative concentrating solar thermal and energy storage technologies deploying phase change materials and particles as energy storage media, respectively. Lastly, advancements on the 2 MW scale SOLARSCO2OL demonstration project will be provided, with the main turbomachinery and heat exchangers now completing manufacturing, and initiation of civil works and installation expected within the summer. This first-of-a-kind demonstration project combines molten salt solar thermal technologies to drive and indirectly heated sCO₂ cycle. The goal of the consortium is to commission by end of 2025, and start operations at the beginning of 2026.

sCO₂-based cycle: from lab to field

Friday April 11th, 09:00 | Lecture hall A

Gioele Di Marcoberardino, PhD | UNIBS, IT

Friday April 11th, 09:00 | Lecture hall A



Abstract: The talk provides the main results, issues and achievements, together with the ongoing activities, of two European H2020 funded projects on supercritical CO₂-based cycles for Concentrated Solar Power Applications. The two projects SCARABEUS and DESOLINATION are coordinated by Politecnico di Milano and their consortiums comprise several partners amongst leading universities, research centres and industries. The SCARABEUS was completed on January 31st 2024, after 58 months of activities: the primary objective was the development of an advanced power block designed to improve heat conversion into electricity, while reducing associated costs. This demonstration have been carried out selecting CO₂-blends and testing the innovative working fluid in a test-rig that includes a recuperative heat exchanger and an air-cooled condenser specifically developed for the innovative working fluid. The DESOLINATION project, started in June 2021, aims at developing an innovative desalination system coupling concentrated solar power and forward osmosis, for a simultaneous production of green electricity and low-impact fresh water. Focusing on the Gulf Cooperation Council region, the project will test the developed technology at the existing CSP plant of King Saud University in Riyadh. The desalination technology will first be coupled with an existing solar air Brayton cycle and then to a new power block operating with CO₂ blends with a net power output of around 1.7 MW.

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Panel Discussions

Panel I - Heat exchangers

“future developments, technological evolutions”

Thursday April 10th, 13:50 | Lecture hall A

Sarah Tioual-Demange	Fives Cryo, France
Renaud Le Pierres	Parker FES, Heatric Division of Meggitt Limited, United Kingdom
Damien Serret	Temisth, France

Panel II - Turbomachinery

“Technologies Adopted in Existing and Future Plants”

Friday April 11th, 13:30 | Lecture hall A

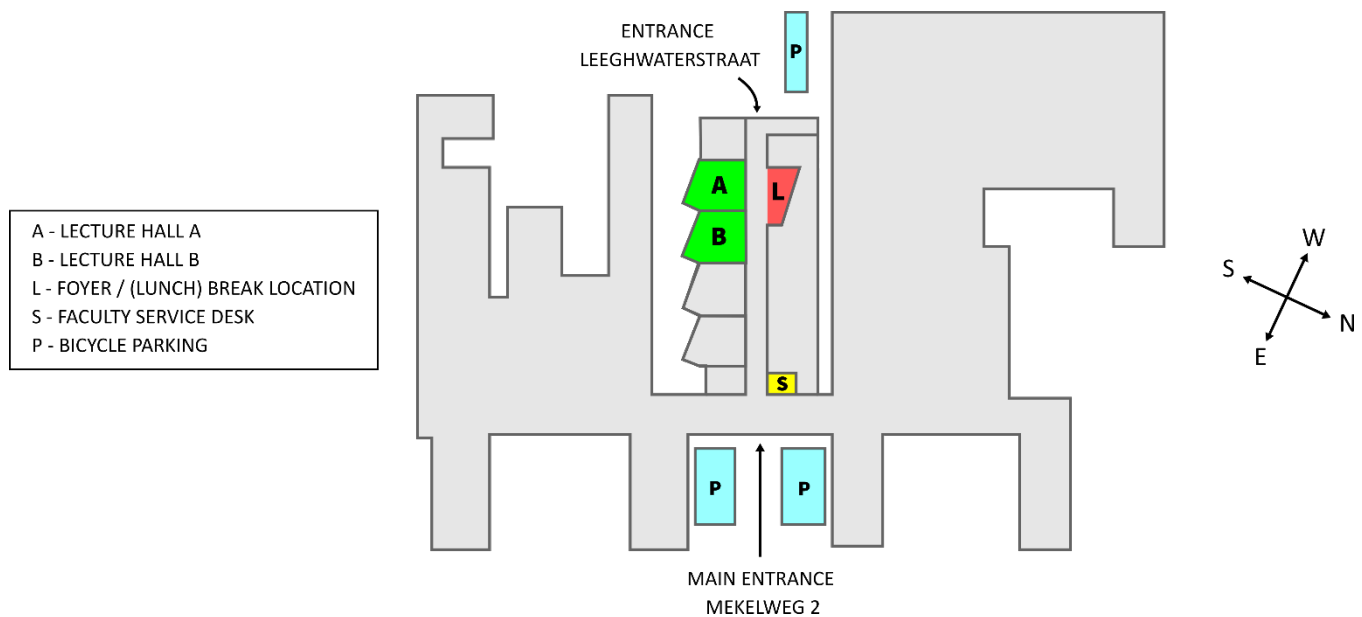
Andrea Paggini	Baker Hughes-Nuovo Pignone, Italy
Sebastiano Mauri	MAN Energy Solutions, Switzerland
Stefan Glos	Siemens Energy, Germany
Štěpán Šmida	Doosan Škoda Power, Czechia

Practical Information

Conference Venue

The conference will be held at the Faculty of Mechanical Engineering (ME) of the Delft University of Technology, located at Mekelweg 2, 2628 CD Delft, The Netherlands. Technical sessions will take place in lecture halls A – *Leonardo da Vinci* and B – *Isaac Newton*. All plenary sessions will be held in lecture hall A. The poster session will take place in the lunchroom in front of lecture hall A.

A simplified map of the faculty’s ground floor, indicating the location of the lecture halls, is provided below.



How to Reach Conference Venue from Delft’s City Center

On foot	The conference venue is a 25-minute walk from the city center of Delft.
By public transport	The following bus lines take you to the campus from the train station of Delft: <ul style="list-style-type: none"> • Bus 69 to <i>TU Campus</i> stop <i>Christiaan Huygensweg</i> • Bus 455 to <i>Zoetermeer</i> stop <i>Christiaan Huygensweg</i> • Bus 174 to <i>Rotterdam Noord</i> stop <i>Christiaan Huygensweg</i> • Bus 40 to <i>Rotterdam Centraal</i> stops <i>Jaffalaan</i> or <i>Cornelis Drebbelweg</i> <p>Up-to-date public transportation information for routes within the Netherlands can be found by visiting 9292.nl, or by downloading the “9292 reisplanner OV” app.</p>
By bicycle	The conference venue is an 8-minute bicycle ride from the city center of Delft. You can rent a bicycle from Bike Totaal Wijtman Delft, from Dena Bike, or from most hotels. Bicycles can be left in designated areas at any of the entrances to the faculty.
By car	To reach the faculty, please park your car at car park P5 at Cornelis Drebbelweg 1, Delft. All parking on the TU Delft campus is paid, a day pass is 10 Euro.

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Other Venues

Both the welcome reception, and the festive dinner will be held in the city center of Delft.

Welcome Reception & Registration

Wednesday April 9th

Location: Stadhuis Delft (Delft City Hall)

Markt 87, 2611 GS Delft

The "Stadhuis" is the city's iconic town hall, located on the central square. The building is deeply rooted in Delft's long and eventful history. Its 12th-century tower once served as a prison, famously holding Balthasar Gerards — the assassin of William of Orange. Today, the building opens its doors to visitors only on special occasions, making each visit a unique glimpse into the city's rich past.



Gala Dinner

Thursday April 10th

Location: Nieuwe Kerk (New Church of Delft) | Markt 80, 2611 GW Delft

The new church in Delft towers over the city's central square, offering breathtaking views from its iconic bell tower. It is most famously known as the final resting place of Willem van Oranje and the Dutch Royal Family, making it a place of great national significance. With its stunning architecture, rich history, and serene atmosphere, the church offers a powerful connection to the Netherlands' royal and cultural heritage.

