



IGTC

International
Gas Turbine Conference

10-11 October 2023, Tangla Hotel Brussels, Belgium



11th IGTC: Dispatchable technology & innovations for a carbon-neutral society

Programme



www.etn.global/events/igtc-23

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Welcome



Christer Björkqvist
Managing Director

Dear IGTC-23 Attendee,

I am delighted to extend a warm and enthusiastic welcome to the 11th International Gas Turbine Conference (IGTC). ETN Global is immensely proud of this prestigious gathering, with a tradition of successful biennial conferences dating back to year 2000.

Over the next two days, we will embark on a journey of exploration and discovery, exploring the vast possibilities and groundbreaking innovations propelling us towards a more sustainable and environmentally responsible future. Our theme “Dispatchable technology & innovations for a carbon-neutral society” encapsulates the core focus of our discussions.

The IGTC is more than just a conference; it is a well-established and prestigious platform that brings together a broad spectrum of participants, including gas turbine users, industry leaders, researchers, experts, and policymakers from around the world. Our shared objective is to foster an open and constructive dialogue about the future role and contributions of turbomachinery in the energy transition and in a carbon-neutral society. Additionally, we aim to raise awareness of the latest technical advancements within our selected pathways and highlight global opportunities in key markets.

As global energy markets continue their transformation, gas turbine technology retains its central importance, offering adaptability, versatility, and decarbonisation capabilities. To expedite this adaptation, fostering an informed and coordinated voice within the gas turbine user community is imperative, guiding and stimulating market demand. ETN Global plays a pivotal role in coordinating such a voice, and the outcomes of ETN's High-Level User Meeting, titled “Efficient, flexible, and low-carbon pathways towards net-zero solutions” held on 9 October, will be summarised at the conference.

In the upcoming days, keynote speakers will shed light on net-zero pathways and technology development needs in our journey toward a net-zero energy transition. The vital role of a supportive regulatory framework to incentivise necessary investments will also be discussed. Our technical sessions will feature the latest R&D developments and achievements within the most promising pathways that will accelerate the transition to fully sustainable energy solutions.

I am also delighted to announce that IGTC will serve as the launch platform for ETN's new R&D report, which will be presented and available for download.

As we take in all this vital information and shared insights, let us not forget the importance of networking and forging new collaborations. I encourage you to connect with fellow participants to enrich our collective knowledge.

Our journey extends beyond the conference rooms, as we anticipate a memorable gala dinner at the historic “La Ferme de Mont-Saint-Jean”, beside the Memorial of 1815 Waterloo Battle.

Finally, I would like to express my gratitude to all the speakers, as well as the authors of the high-quality technical papers. A special thanks to our Conference Advisory Board and their hard work as paper reviewers, as well as our generous sponsors, whose support has made a high-quality conference possible. I am also thankful to each of you for your presence, expertise, and contributions. Together, we can shape a cleaner, brighter future for generations to come.

At the end of this conference, I hope you will leave with a clearer view of future pathways and opportunities that will inspire new ideas for innovation and cooperation.

Warmest regards,
Christer Björkqvist





Experts in gas turbine maintenance

It is our people who make the difference: MTU Power teams are passionate about gas turbines and dedicated to meeting customer needs. We combine hands-on experience with new approaches and never give up until an optimal solution has been found, as demonstrated by our track record of great customer relationships. In short, we are your engine experts.

As part of the MTU Aero Engines Group, we are at home in the aviation world, where the highest technological and quality standards are the norm. The MTU group has performed over 5,500 LM/CF6 shop visits in its history and carries out over 150 LM/CF6 shop visits per year. MTU Power and its field service team have over 200 customers and are on-site for more than 200 events annually, making us the largest independent provider for GE LM2500 and LM6000 series turbines. Of all licensed depots, MTU Power has the widest range of GE LM sub systems in its portfolio (49) and tests under real load conditions.

We understand that gas turbine operators expect cost-efficiency and fast response times - especially when it comes to MRO and package services. Additionally, we know that our customers in the oil, gas and power generation industries require high reliability to minimize cost-intensive and critical downtimes. Particularly in power generation, operators are under growing pressure to control costs and increase flexibility in the changing energy market.

MTU Power actively seeks out ways to be as flexible for our customers as possible. If shop visits are costly or unfeasible, we will come to you as part of our field service support. Additionally, we offer customized services for all ancillary equipment that comes with operating a gas turbine as part of our package solutions.



"MTU Power is excited to take part at the 11th International Gas Turbine Conference in Brussels in October! We can't wait to hear from industry experts on current developments in the gas turbine sector and understand how we at MTU can support our LM customers on their path to further improving efficiency and achieving their sustainability goals".

Gregor Stoecker, Vice-President Sales Industrial Gas Turbines.



Energy Group

We make energy more efficient

NEM Energy Group makes energy more efficient through heat transfer technology and exhaust solutions. NEM Energy Group drives a carbon-neutral society in three directions: increasing energy efficiency, flexible operations of power and heat generation, and carbon-free heat transfer. Our diverse product portfolio includes heat recovery, heat exchangers, exhaust diverter solutions, and aftermarket services; from design to aftermarket services, for onshore and offshore installation.

Our heat recovery products increase efficiency of gas turbines in power and heat generation. Compared with an open-cycle GT, a Combined Cycle Power Plant (CCPP) with our Heat Recovery Steam Generator increases energy output by almost 50% and decrease emissions per energy produced by roughly 30%. Our goal is to install HRSGs behind every GT in the world.

To supplement with renewable energy in the grid, the future-ready CCPP should be flexible in operations, and our DrumPlus™ HRSG and T-RAC design support flexible operations of GTs in combined cycle. The DrumPlus™ HRSG design allows for an unrestricted gas turbine ramp up so that the operator can provide power as quickly as possible when being called upon by the grid. The T-RAC design solves the stress corrosion problem faced by many gas turbines applications and protects the cooler against excessive fatigue from thermal cycling, increasing the plant's availability.

NEM is keen on providing carbon-free solutions for accelerating the energy transition. For gas turbines we provide hydrogen-ready heat recovery solutions; in the wider energy landscape, we provide, for instance, heat transfer solutions in electrification and renewable energy storage. Check us out at www.nem-energy.com.



"NEM Energy Group looks forward to participating in the 11th International Gas Turbine Conference, collaborating with industry experts to empower Net-Zero goals through heat transfer technology. As the sector shifts towards cleaner energy, hydrogen-firing emerges as a key element. NEM Energy's hydrogen-ready Heat Recovery Solutions are primed to accelerate power and heat generation's hydrogen-readiness. We're thrilled to share our expertise and explore opportunities for collaborative progress across the entire value chain."

Sebastiaan Ruijgrok, Manager Marketing & Business Development, NEM Energy Group.

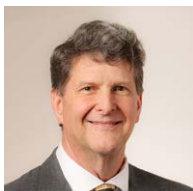


Keynote Speakers



Paul Verrill is a chartered mechanical engineer who started his career in chemical plant design moving into the power generation and gas processing industries, working in senior roles in asset management, project development

with ICI, Enron and px. Following this Paul moved into commercial and business development roles, and over the last 12 years has worked on the growth of the EnAppSys business to provide market leading decision support and advisory to energy traders, utilities, asset developers, banks, investors and equipment providers in the EU and GB markets. In January EnAppSys joined with Montel to provide a class leading news, data and insight platform to European energy stakeholders.



Bob Schrecengost has over 38 years of power industry experience in leading technology development programs, emissions reduction projects, and solving combustion and operational issues.

Bob is currently with the Department

of Energy's Office of Fossil Energy and Carbon Management, where he is Division Director of Hydrogen with Carbon Management and leads R&D programs in Advanced Turbines, Advanced Gasification, reversible Solid Oxide Fuel Cells, and Advanced Energy Materials. Prior to joining DOE in January 2020, Bob spent 12 years as the boiler R&D program manager for Alstom Power and GE Steam Power, managing an R&D portfolio that included both internally- and externally funded projects.



Tudor Constantinescu is Principal Adviser to the Director General for Energy in the European Commission. He works on energy priorities and initiatives related to hydrogen and to the financing of the energy transition, notably through

cohesion policy. Previously, he held different positions including founding Executive Director at BPI Europe and president of the Romanian Agency for Energy Conservation.

He has degrees in economics and engineering as well as a PhD on regulatory economics in the energy sector.



Sigrid Gijbels has worked in the power industry for more than 25 years. She started her career in 1996 at one of Engie's Research centres, Laborelec. There she worked several years in the Materials Technology department before becoming the

project manager for the R&D program on 'Combined Cycle Power Plants' & 'Combined Heat and Power'. After a period in the Electrabel Maintenance Competence department, she returned to Laborelec to take up a management position in the Thermal Generation department. Since 2022 she is working at the Engie BU 'Flexible Generation Europe', where she holds the position of Fleet Manager for the Thermal Power Plants in Belgium and the Netherlands, as well as for the First Hydro Pump Storage plants in the UK (Wales). Sigrid has been ETN's Board member since 2022.



Dr. Tim Lieuwen is a Regents' Professor, the David S. Lewis, Jr. Professor and the Executive Director of the Strategic Energy Institute at Georgia Tech. In this capacity, he manages Georgia Tech's overall strategy and external

relations. He is also founder and CTO of TurbineLogic, an analytics firm working in the energy industry. Prof. Lieuwen is an international authority on clean energy and propulsion, and his work has contributed to numerous commercialized innovations in the energy and aerospace sectors. He is an elected member of the National Academy of Engineering, a fellow of ASME, APS, and AIAA, and foreign fellow of the Indian National Academy of Engineering. Major awards include the ASME R. Tom Sawyer Award, AIAA Pendray Award, and ASME's George Westinghouse Gold Medal.



Peter Jansohn has been for 10 years with ABB Corporate Research and Alstom Technology in various roles. He joined the Paul Scherrer Institute (PSI) in 2003 and has been heading there the Laboratory for Thermal Processes

and Combustion. In recent years he led the Technology Platform activities on "Energy System Integration (ESI)" at PSI, which comprise demonstration facilities for energy storage and Power-to-Gas technologies.

07:20-08:20 Registration at Tangla Brussels hotel in front of Imperial Ballroom

08:20-10:20 **Keynote session 1**

Navigating the energy transition to a global carbon-neutral society & beyond Imperial ballroom

In this session, our aim is to outline a practical roadmap for a successful transition to a global carbon-neutral society. You will gain valuable insights into the latest energy and climate policies of the European Union, tailored to accelerate the energy transition. Furthermore, we will delve into the United States' approach to promoting a hydrogen economy and implementing an efficient carbon management system.

Chair: Christer Björkqvist, Managing Director, ETN

Moderator: Pedro Lopez, COO, Uniper / ETN President

Speakers:

- **What does Gas Generation's current role in the energy mix look like and how could it evolve to be a long-term part of a Carbon Neutral Society**
Paul Verrill, Director, Montel
- **US Department of Energy efforts in decarbonizing dispatchable power generation assets**
Robert Schrecengost, Division Director, US Department of Energy
- **The energy transition - key for the climate objectives and industrialisation of Europe**
Tudor Constantinescu, Principal Adviser to the Director General for Energy, European Commission
- Panel discussion

10:20-11:00 Coffee break & expo Royal room 1

11:00-12:30 **Technical parallel sessions 1 & 2**

11:00-12:30 **Technical session 1: Low carbon solutions** Imperial ballroom

Chair: Peter Kutne, Head of Department, DLR

Papers:

- **Prerequisites for the use of low-carbon alternative fuels in gas turbine power generation**
ETN YEC members: Lorenzo Pilotti, Politecnico di Milano, Jon Runyon, Uniper Technologies, Stefano Mori, Cranfield University, Antonio Escamilla Perejón, University of Seville. **Presenter:** Lorenzo Pilotti, PhD Student Researcher, Politecnico di Milano.
- **Evaluation of the minimum NOx emission from ammonia combustion**
Georgia Institute of Technology & EPRI: Srujan Gubbi, Renee Cole, Ben Emerson, Wenting Sun, Tim Lieuwen, Georgia Institute of Technology & David Noble, Robert Steele, EPRI. **Presenter:** Ben Emerson, Senior Research Engineer, Georgia Institute of Technology.
- **Field Demonstrations of Hydrotreated Vegetable Oil as Biofuel for Gas Turbine Decarbonisation**
Uniper: Jon Runyon, Stuart James, David Graham, Catherine Goy, Susan Weatherstone, Sander Aukema. **Presenter:** Jon Runyon, Gas Turbine Combustion Engineer, Uniper.

11:00-12:30 **Technical session 2: Product sustainability, performance & reliability**

Royal rooms 2+3

Chair: Tom Kavanagh, Plant Manager, Uniper

Papers:

- **Assessing Gas Turbine Fleet Readiness for a Low-Carbon Future**
EPRI: Jim Harper, Bobby M. Webb, Robert C. Steele, David R. Noble.
Presenter: Jim Harper, Principal Technical Leader, EPRI
- **Hydrogen-fired gas turbines and the impacts on heat recovery steam generators**
NEM Energy: Gayathri Medha Hariharan, Sebastiaan Ruijgrok, Peter Rop, Francesco Perrone. *Presenter:* Gayathri Medha Hariharan, Technology Professional, NEM Energy
- **Additive Manufacturing Gas Turbine High Pressure Nozzles: Design and Validation**
Baker Hughes: Girolamo Tripoli, Piotr Wluka, Paolo Del Turco, Simone Colantoni, Filippo Ceccanti and Iacopo Giovannetti. *Presenter:* Paolo del Turco, Technology Leader, Baker Hughes

12:30-13:45 Lunch & expo **Royal room 1**

13:45-15:15 **Keynote session 2**

Exploring net-zero pathways **Imperial ballroom**

In this session, our goal is to present a portfolio of preferred pathways for achieving a sustainable transition. We will outline the necessary research and development efforts and emphasise market opportunities driven by technology, all backed by supportive policies to bring these pathways to its goals.

Chair: Sigrid Gijbels, Thermal Fleet Manager, Engie

Moderator: Peter Jansohn, Head of Project, Paul Scherrer Institut (PSI)

Speakers:

- **Key messages from ETN's High-Level User Meeting 2023**
Sigrid Gijbels, Thermal Fleet Manager, Engie
- **ETN's portfolio of pathways and key R&D topics from ETN's R&D Recommendation Report 2023**
Peter Jansohn, Head of Project, PSI
- **Navigating US GT Market Opportunities Driven by Technology, Policy, and Economics**
Timothy Lieuwen, Executive Director, Georgia Institute of Technology
- Panel discussion

15:15-16:00 Coffee break & expo **Royal room 1**

16:00 -17:30 Technical parallel sessions 3 & 4

Technical session 3: Product sustainability, performance & reliability **Imperial ballroom**

Chair: Andy Williams, Senior Fellow, Chromalloy

Papers:

- **Rotor Lifetime Assessment: A Reference Report**
ETN GT Life Assessment and Extension Working Group: Rene Vijgen, ETN Global, Luc Gooren and Antoine Mochel, Engie, Torsten Neddemeyer, Siemens Energy, Stefan Reh, DLR, Agnes Jocher, Technical University of Munich, Annalisa Maragno, EthosEnergy, Mauro Filippini and Paolo Pennacchi, Politecnico di Milano), Siavash Pahlavanyali, RINA, Andrew Moffat, Solar Turbines. **Presenter:** Luca Forno, VP Operations, EthosEnergy
- **Validation of a lifing approach for a digital fleet of gas turbines**
Solar Turbines & Frazer-Nash Consultancy: Andrew J. Moffat, Richard Green, C. Meyer, Solar Turbines and Josh Maxted, Frazer-Nash Consultancy. **Presenter:** Andrew J. Moffat, Group Manager, Solar Turbines
- **Novel Laser Cladding Process for Local TBC Repair**
Jülich Research Centre & Ruhr-Universität Bochum: Daniel E. Mack, Christoph Domman, Olivier Guillon, and Robert Vaßen, Forschungszentrum Jülich, Olivier Guillon, Jülich Aachen Research Alliance, and Robert Vaßen, Ruhr-Universität Bochum. **Presenter:** Daniel E. Mack, Team Leader, Jülich Research Centre

Technical session 4: Energy efficiency improvements

Royal rooms 2+3

Chair: Olaf Brekke, Advisor Upstream Rotating Equipment, Equinor

Papers:

- **BTC-A new technology for high efficiency biopower in a decarbonised society**
Phoenix Biopower: Michael Bartlett, Felix Guethe, Jens Pålsson, Chunguang Zhou, Henrik Båge. **Presenter:** Felix Güthe, Chief Engineer Combustion, Phoenix Biopower
- **The potential of sCO₂ cycles as bottoming cycle for gas turbines**
University of Mons & Engie: Vincent Thielens and Ward De Paepe University of Mons, Frederiek Demeyer, Engie. **Presenter:** Vincent Thielens, PhD researcher, UMONS/Engie
- **Aspects of the GT inlet system that affect GT efficiency, including a focus on the correct application of power augmentation**
Parker Hannifin. **Presenter:** Steve Hiner, Chief Engineer, Parker Hannifin

18:00-19:00 Guests are transported by busses from Tangla hotel to Dinner event

19:00-23:00 Networking aperitif & Gala Dinner at Brasserie de Waterloo

Keynote Speakers



Rene Vijgen is a Senior Technical Manager at ETN Global, responsible for the management and coordination of ongoing and future ETN projects. Previously he worked as a Head of Sulzer's Gas Turbine Services EMEA and was involved in the business

growth in China and Russia. He started his career as R&D engineer in gas turbine component repair and gradually took over different management positions in the turbomachinery service business. Through technical innovations and product development he was able to grow the business significantly. Rene studied Mechanical Engineering and received a PhD degree at Eindhoven, University of Technology.



Hege Rognø has more than 30 years of experience from the energy industry, primarily from Equinor (former Statoil) in Norway and Canada and from Australian O&G operator Santos in the 1990ies. She has a degree in Petroleum Engineering from

the University of Science and Technology (NTNU), Norway and has had numerous management positions in the upstream O&G business. In the last decade her focus has been technology development and since 2016 she has taken an active role in Equinor's energy transition. Hege is now Senior Advisor within the CCS & Low carbon fuels value chains in Equinor's Technology Division where she is actively involved in Equinor's low carbon project portfolio. She holds several low carbon related board positions and since 2020 is Vice Chair of the ETN Board of Directors.



Landon Tessmer is a licensed Professional Mechanical Engineer in Ontario, Canada. He is the Vice President of Commercial Operations for PROENERGY Services – a global EPC and turbine services provider for aeroderivative gas turbine power

plants. Landon is focused on helping developers, utility providers, and independent power producers achieve their renewable energy targets by implementing cost-effective peaking power solutions to maximize grid reliability. Landon has 15 years of experience working in the gas turbine industry in project engineering, project management, and sales/commercial leadership. Landon also serves as the Chairperson for the Gas Turbines for Energy Networks (GTEN) committee in Canada.



Jason Rowan joined FM Global in 2016 where he was responsible for company-wide guidance for gas turbines, steam turbines, compressors, vibration analysis and operations. He was also responsible for new engineer training, maintaining

relationships with manufacturers and vendors, and advising industry groups such as EPRI and ASME. Additionally, as a Lead Engineer, he helped create and implement key corporate objectives associated with equipment analytics. Recently, he assumed the role of Principal Engineer of Power Generation, Thermal Energy, where he will continue to represent FM Global as an advocate of property loss prevention, supporter of thermal energy industries, and leader in engineering and research on behalf of FM Global's mutual clients. Jason has a Bachelor of Science in Facilities Engineering from Massachusetts Maritime Academy, as well as an MBA from Colorado State University.



John Oakey has over 30 years' experience in energy industries and has been progressing his career at Cranfield University since 1998. Prior to this, he was a senior Branch Manager in British Coal's Coal Technology Development Division

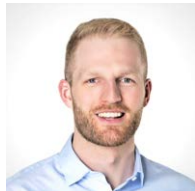
(CTDD), leading a range of clean coal technology research programmes. With this research background in energy technologies, in particular in materials and process troubleshooting, he has been at the forefront of many of the UK's clean coal projects in recent years. John has been an ETN Board member since 2018.



Jose Aguas is the Head of Sales for Mitsubishi Power across the European continent, driving business growth for new units of combined cycle gas turbines, services and advanced decarbonization technologies. As the leader of the sales power-generation

cycle, Jose manages the integration of new technologies that will contribute towards the ambitious European targets for reliable, efficient, sustainable and carbon-neutral power generation. Jose has held several senior roles at leading companies such as GE Power. He has deep expertise in the power generation sector, and his background spans both conventional and renewable energy, including expertise in nuclear and coal generation. Jose has worked across Europe, including in Spain, France and Italy, where he has spearheaded the growth of new units, long-term services and upgrades, consistently exceeding operational expectations.

Keynote Speakers



Craig Hodge is Hydrogen Technology Manager at SSE Thermal. He is a Chartered Mechanical Engineer with a Master's in Electrical and Mechanical Engineering from University of Edinburgh. He has experience in managing and

delivering a variety of energy related projects, including offshore oil and gas drilling and well activities, government and private funded hydrogen and carbon capture technology developments, industrial decarbonisation research projects, and FEED studies across the hydrogen value chain. At SSE, Craig is hydrogen technology responsible – which includes technology R&D, and managing the risks associated with the deployment of hydrogen technologies across all of SSE's hydrogen production, storage, and end use projects.



Martin Stiegler has over 20 years of experience in the Energy Business. He holds a Master of Business from Purdue University. Martin has worked on three different continents (Europe, Asia, North America) in roles including Strategy,

Sales and General Management. He and his teams have supported rotating equipment assets in various industries around the globe, including Utility, Oil & Gas, Petrochemicals, Chemicals, Pulp & Paper, Waste to Energy, Fertilizer, Steel, Sugar and many more. As Vice President at Siemens Energy he is currently helping Gas Turbine Operators on their way to becoming carbon neutral. Martin is deeply passionate about Health & Safety, his more than 1000 employees and to partner with his customers for a better future.



Aad den Elzen, Vice President, Power Generation and Strategic Growth at Solar Turbines, is responsible, is responsible for the sales, market development and project execution of the Power Generation Business, as well global

marketing, R&E and adjacent growth areas. Aad began his career in Switzerland at Turbomach SA in 1994 and has since taken on roles of increasing responsibility in the power generation sales organization, including leading power generation Sales and the PAE organization in Switzerland from 2006 until 2014. In 2014, Aad was appointed Global Sales Manager, Customer Services, and supported and developed the worldwide customer services sales team, addressing both the Power Generation and Oil & Gas markets. Previous to his current role, he served as Director, Power Generation Business Development. Aad has a bachelor's degree in Aeronautical Engineering from the Hogeschool Haarlem, The Netherlands, and completed the post graduate program Business Administration for engineering graduates at Nijenrode, The Netherlands School of Business in Breukelen.



Chris Barkey is Chief Technology Officer for the Industrial & Energy Technology business at Baker Hughes. He is also the Chairman of the Baker Hughes Technology Leadership Council. Prior to joining Baker Hughes, Chris enjoyed a

30-year career at Rolls-Royce where he covered a variety of engineering roles, reaching the Company Executive as Group Director, Engineering & Technology. In July 2018, Chris was appointed Interim Chief Executive Officer of the Henry Royce Institute, the UK national institute for advanced material science. Chris has an Honours degree in Mechanical Engineering and an MBA with Distinction. He is a Chartered Engineer and was elected to the Fellowship of the Royal Academy of Engineering in 2017, the Royal Aeronautical Society in 2016 and the Institute of Mechanical Engineers in 2000. Chris is also a Non-Executive Director for MDS Aero Support Corporation and ELE Advanced Technologies Ltd.



Federico Bonzani has more than 25 years of experience in the power generation business. He joined Ansaldo Energia in 1995 dealing first with Combustion Technology and supporting the development of combustor solution

for Low NO_x natural gas burner and syngas burner. In 2008 he joined the newly formed Product Development Unit where he has covered many positions leading engineering and program managers team. Since 2020 he is the Director of Product and Technology Unit. The scope of the Unit is related to the development, engineering and execution of gas turbine, steam turbine and generator for new units and service business (retrofit and upgrades). He is also responsible for all R&D product programs along with the overall portfolio management of the R&D budget of the company.



Bobby Noble is the Program Manager for the Gas Turbine R&D at EPRI. He is responsible for the gas turbine research area, where he and his team work on topics involving all aspects of the gas turbine system.

His primary gas turbine expertise is in gas turbine combustion research, with focus on combustion dynamics, high-hydrogen and other alternative fuels, and other next-generation, low-NO_x combustor architectures. He is also instrumental in gas turbine health and performance analytics, including digital twins. Bobby is an ASME Fellow with more than 20 years of experience in the gas turbine and power industry. He holds four patents, co-edited Renewable Fuels: Sources, Conversion, and Utilization, and has authored/co-authored 15+ journal publications along with 50+ conference publications. He holds a BS in mechanical engineering from Clemson University and a MS in aerospace engineering from the Georgia Institute of Technology.

07:30-08:00 Registration at Tangla Brussels hotel in front of Imperial Ballroom

08:00-09:15 **Keynote session 3**

Global gas turbine markets: opportunities and challenges towards low-carbon economy Imperial ballroom

In this session, we will explore critical areas in the energy transition, specifically focusing on gaps and market opportunities for gas turbines. We will examine the increasing importance of peaking-facility resilience and backup power and provide insights into market opportunities related to sustainable desalination and power.

Chair: Martin Stiegler, Global Vice President Industrial Gas Turbine Service, Siemens Energy

Moderator: Timothy Lieuwen, Executive Director, Georgia Institute of Technology

Speakers:

- **Ten Year Development Plan and country strategies**
Rene Vijgen, Senior Technical Manager, ETN Global
- **Progressing the energy transition and grid resilience with low-cost peaking power**
Landon Tessmer, VP Commercial Operations, PROENERGY
- **Decarbonization goals may look similar but pathways vary – what can we learn from Asia?**
Bobby Noble, Program Manager Gas Turbine R&D, EPRI
- Panel discussion

09:15-10:30 **Keynote session 4**

Enablers for the energy transition (production, infrastructure & cross-sectoral integration) Imperial ballroom

In this session, we will focus on factors that facilitate the energy transition, aiming to mitigate uncertainties and enhance interest in new investment opportunities for demonstration projects, which will be necessary to accelerate the transition of gas turbines to the hydrogen economy.

Chair: John Oakey, Professor of Energy Technology, Cranfield University

Moderator: Geert Laagland, Director of Engineering, Vattenfall

Speakers:

- **Overview of on-going hydrogen and CCS projects**
John Oakey, Professor of Energy Technology, Cranfield University
- **Production of blue Hydrogen & CCUS**
Hege Rognø, Senior Advisor CCS & Low Carbon Solutions, Equinor
- **Insights and experience from starting up hydrogen projects**
Craig Hodge, Hydrogen Technology Manager, SSE
- **Resiliency today, carbon-neutrality tomorrow**
Jason Rowan, Staff VP & Principal Engineer Power Generation, Thermal Energy, FM Global
- Panel discussion

10:30-11:15 Coffee break & expo Royal room 1

11:15-13:15 Technical parallel sessions 5 & 6

Technical session 5: Low carbon solutions **Imperial ballroom**

Chair: Craig Hodge, Engineering Manager, Hydrogen Technology, SSE Thermal

Papers:

- **HYFLEXPOWER: Demonstration project of power-to-H2-to-power advanced plant concept**
Siemens Energy, Engie, Centrax & National Technical University of Athens: Ertan Yilmaz, Ian Amos, Benjamin Witzel, Siemens Energy, Gael Carayon, Engie, Peter McCaig, Centrax, Nikolaos Skordoulis, Sotirios Karellas, National Technical University of Athens. **Presenter:** Ertan Yilmaz, Portfolio Manager, Siemens Energy
- **Hydrogen and Hydrogen Blended Jet and Recirculation Stabilized Combustion in a Turbec T100 Micro Gas Turbine Combustor**
DLR & University of Stavanger (UiS): Felix Grimm, Timo Lingstädt, Trupti Kathrotia, Andreas Huber, Peter Kutne, DLR, Reyhaneh Banihabib and Mohsen Assadi, University of Stavanger (UiS). **Presenter:** Felix Grimm, Group Lead, DLR
- **Decarbonisation of Gas Turbines with the H2R®**
Crosstown Power: Franklin Génin, Alexander Zagorskiy, Jaan Hellat, Wolfgang Kappis. **Presenter:** Franklin Génin, Head of Combustion, Crosstown Power
- **Design and cost optimization of Carbon Capture for H-class Gas Turbine**
Engie: Vida Sang Sefidi, Hélène Lepaumier, Marten Kooistra, Frederiek Demeyer, Ngoc Han Huynh Thi, Samuel Saysset, Pascal Bourdeaux, and Nick Lemmens. **Presenter:** Vida Sang Sefidi, Research Engineer, Engie

Technical session 6: Integrated energy systems solutions

Royal rooms 2 + 3

Chair: David Sánchez Martínez, Full Professor, University of Sevilla

Papers:

- **The evolving transformation of gas-fired power plants toward a sustainable and profitable generation system**
Ansaldo Energia: Marco Cioffi. **Presenter:** Marco Cioffi, Service Marketing, Ansaldo Energia
- **The Role of Combined Cycle Gas Turbines as an Energy Storage Solution in a Hydrogen Economy**
KTH Royal Institute of Technology: Jose Garcia, Rafael Guédez and Björn Laumert. **Presenter:** Björn Laumert, Head of the Energy Department, KTH Royal Institute of Technology
- **Optimization of fully renewable and dispatchable green-hydrogen power-to-power plants with seasonal storages**
POLIMI: Cristina G. Tampalini, Alessandro F. Castelli, Lorenzo Pilotti, Emanuele Martelli. **Presenter:** Emanuele Martelli, Associate Professor, POLIMI
- **Optimization of gas turbine-based microgrids: an airport case study**
POLIMI & Baker Hughes: Andrea Zelaschi, Lorenzo Pilotti, Alessandro F. Castelli, Emanuele Martelli, POLIMI, Maria M. Gambini, Giovanni Tonno, Giulio Betti, Baker Hughes. **Presenter:** Giulio Betti, Lead Control Engineer, Baker Hughes

13:15-14:30 Lunch & expo **Royal room 1**

14:30-16:15 **Keynote session 5****Technology development pathways for a carbon-neutral society
(OEM session)** Imperial ballroom

The Chair will kickstart this session by highlighting vital technology development needs and timelines emphasised by the gas turbine user communities. These insights will set the stage for presentations by OEM representatives, offering valuable insights into development pathways and targets essential for a successful roadmap to net-zero solutions. Following the presentations, we invite you to actively participate in an interactive panel session with the OEMs by asking questions to gain further understanding.

Chair: Christer Björkqvist, Managing Director, ETN Global**Moderator:** Pascal Bourdeaux, Head of Decarbonisation, ENGIE**Speakers:**

- **Looking to Hydrogen for Long-Term Storage**
Jose Aguas, Vice President CCGT, Mitsubishi Power
- **A pathway to clean power generation**
Martin Stiegler, Global Vice President Industrial Gas Turbine Service, Siemens Energy
- **Enabling the Path to a Low-Carbon Future**
Aad den Elzen, Vice President Power Generation & Strategic Growth, Solar Turbines
- **Gas turbines in the context of energy transition**
Chris Barkey, Chief Technology Officer, Baker Hughes
- **Ansaldo Energia Technology Updates & Roadmaps to Net-Zero**
Federico Bonzani, Product & Technology Director, Ansaldo Energia
- Panel discussion

16:15-16:30 **Closing remarks: ETN Vice President** Imperial ballroom



ROBINSON: Smart integration of local energy sources and innovative storage for flexible, secure and cost-efficient energy supply on industrialized islands.

ROBINSON project aims to develop an integrated energy system to help decarbonise (industrialised) islands. To this end, the project will develop and deploy an integrated, smart and cost-efficient energy system that couples thermal, electrical and gas networks, which will optimise the utilisation of local renewable energy sources. This integrated system will ensure a reliable, cost-efficient and resilient energy supply contributing to the decarbonisation of the European islands by helping to decrease CO₂ emissions.

The system will be demonstrated on the island of Eigerøy (Norway) and lab-scale level replication studies will be conducted for the island of Crete (Greece) and the Western Isles (Scotland). The user-friendliness and high modularity of the system ensure a great potential for replication on other islands, as well as in remote areas in Europe and beyond, with the potential to contribute to their decarbonisation by helping to decrease CO₂ emissions.

ROBINSON project consortium members are:



ETN is project coordinator and leader for dissemination, communication and exploitation activities.

If you are interested to learn more, please visit our [webpage](#) and follow us on [in](#) and [X](#)



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FLEXnCONFU: FLExibilize combined cycle power plant through power-to-**X** solutions using non-**CON**ventional **FU**els

FLEXnCONFU project aims to demonstrate at TRL7 in Ribatejo (Portugal) EDPP Combined Cycle Power Plant a Power-to-gas-to-power (P2G2P) solution that will enhance CC flexibility (thus enabling them to provide grid flexibility services and getting higher revenues), reduce their NG consumption and therefore their related emission. FLEXnCONFU will be a demonstration to market project. The project will also aim at convert surplus electricity to hydrogen or ammonia via P2X application, with the option to use these fuels to generate power in times of demand (P2X2P).

The potential of NH_3 combustion will be exploited to reduce CO_2 emissions, by performing combustion tests injecting up to 100% Ammonia in a heavy-duty Gas Turbine (GT) combustion system. This test will be carried out at Cardiff University combustion laboratory.

FLEXnCONFU project consortium members are:



ETN oversees dissemination, communication and exploitation activities.

If you are interested to learn more, please visit our [webpage](#) and follow us on  and .



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 884157.



CO2OLHEAT: Supercritical **CO₂** power cycles demonstration in **O**perational environment **L**ocally valorising industrial waste **H**EAT

CO2OLHEAT is an EU's H2020 funded project aiming at unlocking the potential of industrial waste heat and its transformation into electricity via supercritical CO₂ (sCO₂) cycles at TRL 7. It addresses the energy efficiency challenge and decarbonisation of the European REIIs – Resource and Energy Intensive Industries. It focuses on their unused waste heat and its transformation into electricity in an efficient and cost-effective way. The cutting-edge sCO₂ technologies will be employed to design and demonstrate the EU's first-of-its kind sCO₂ plant in a real industrial environment.

This pioneer power plant will generate completely clean energy while saving significant amounts of primary energy and thus also CO₂ emissions.

The project has one demonstration site (cement plant) and six virtual replication sites (glass, aluminium, steel industries, as well as waste incineration and power generation – CCGT, CSP).

CO2OLHEAT project consortium members are:



ETN is project coordinator and leader for dissemination, communication and exploitation activities.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 101022831.

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FLEX4H2: Flexibility for Hydrogen.

FLEX4H2 project aims to develop a fuel-flexible combustion system and will contribute to the EU Green Deal towards decarbonisation of the electric power sector.

This goal translates into the project's main objective – to design, develop and validate a safe, efficient and highly fuel-flexible combustion system capable of operating with any concentration of hydrogen blend up to 100% H₂. Crucially, this objective will be pursued at the most challenging hydrogen combustion conditions, i.e., at H-Class operating temperatures, required for highest cycle efficiency, while still meeting emission targets without any use of diluents. The design of the combustor will be based on Ansaldo Energia's Constant Pressure Sequential Combustion technology (CPSC) and will be demonstrated in a stepwise approach, at full gas turbine operating conditions (TRL6).

This ambitious design goal addresses the typical technical challenges when considering the switch from natural gas to hydrogen fuel, including (i) avoiding flashback; (ii) controlling NO_x emissions; (iii) maintaining flame stability; and (iv) broadening fuel flexibility. The intent is for the improved CPSC combustor design approach to be retrofittable to existing gas turbines, providing significant opportunities for upgrading existing generation assets.

FLEX4H2 consortium members are:



ETN is a communication and dissemination partner in this project.

If you are interested to learn more, please visit our [webpage](#) and follow us on  and .



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ASTERIX-CAESAR: Air-based Solar Thermal Electricity for Efficient Renewable Energy Integration & Compressed Air Energy Storage

ASTERIX-CAESAR project focuses on the development of a novel high-efficiency solar thermal power plant concept with an integrated electricity storage solution. The project combines air-based central receiver Concentrated Solar Power (CSP) and Compressed Air Energy Storage (CAES) to maximize conversion efficiency and power grid energy management, enabling a new operation strategy and business model.

The hybrid concept initiates a futuristic era with adaptive renewable power plants, producing both electrical and thermal energy, including process heat supply and reverse osmosis desalination. As cheap off-peak electricity is used to provide the air compression work of the topping Brayton cycle, the overall peak solar-to-electric energy conversion efficiency of the proposed power plant may reach up to 40% efficiency, which doubles the peak efficiency with respect to state-of-the-art CSP technology.

The main development will cover: (i) an advanced high-efficiency solar receiver, (ii) optical sensors and AI-based solar flux control, (iii) optimized CAES with heat exchangers and compressor/expander detailed designs and (iv) innovative integration of desalination. The proposed technology is set forth by an interdisciplinary partnership spanning the entire CSP value chain. Targeting a TRL of 6-7, the ASTERIX-CAESAR concept will be validated with a demonstration scale prototype of 480 kWth.

ASTERIX-CAESAR project consortium members are:



ETN is a communication and dissemination partner in this project.

If you are interested to learn more, please visit our [website](#) and follow us on



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