



ETN is a non-profit association bringing together the entire value chain of the gas turbine technology community globally. Through cooperative efforts and by initiating common activities and projects, ETN optimises turbomachinery research and technology development and promotes environmentally sound gas turbine technology with reliable and low cost operation.

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Christer Björkqvist
Managing Director

A proactive approach to the global energy transition

The energy transition to a low carbon economy is well on its way not only in Europe but in all industrialised countries. Energy companies are coming under increasing pressure to make sure their business activities are pursuing a low carbon trajectory and are aligned with international climate change goals. Nonetheless, a new report released from five international agencies (IEA, IRENA, UNSD, WHO and the World Bank) concludes that the world still is not on track to meet the 2030 global energy targets set as part of the Sustainable Development Goals. Even the EU, who has the reputation of being a global leader on climate policy, is not on track mainly due to the high amount of coal generation. In 2017 the CO₂ emissions from coal-fired power plants accounted for 66% of the EU power sector

emissions. However, as most of Europe's 280 coal power plants are over 30 years old, a phase out of these plants would be the fastest way to change this trend. After 2030 the focus will be on the even bigger challenge, the transition to a carbon neutral society by 2050.

Under these circumstances it is vital for our sector to take a proactive approach and clearly highlight technology development opportunities and contributions that the gas turbine community could provide in the energy transition to a low carbon and a carbon neutral society. The first step is to develop a common vision among the user community, the technology providers and R&D community of the most promising research and innovation ideas to focus on, and its place in a low carbon/ carbon neutral, secure and cost-efficient integrated energy system. This is the key objective of ETN's R&D recommendation report, which is currently being revised by the members of our newly nominated Technical Project Board. The 2019 version of this report is planned to be pre-released in conjunction with our International Gas Turbine Conference in October. The second step is to widely transfer this vision and recommendations in order to provide funding opportunities, which ETN is doing in Europe by an active participation in the European Technology and Innovation Platforms and by providing input to the Strategic Energy Technology (SET) Plan. We are also in discussion with US Department of Energy on research cooperation opportunities. For any new project initiative within or outside Europe, ETN is an ideal platform to identify and bring together the most suitable experts in an open innovation approach.

The drivers, needs and requirements of the gas turbine user community were recently highlighted at an ASME Turbo Expo session that ETN co-chaired with EPRI in mid of June in Oslo. In this session the key message to the R&D community was the importance to develop both flexible low carbon solutions with a high reliability and that are cost efficient, as well as gas turbine carbon neutral system solutions. You will find a summary hereof on page 6.

Parallel to providing opportunities for the most promising future technology developments, we also have to address operational problems and challenges of today and ensure implementation of the most cost efficient solutions. ETN's engine specific groups address this, where users of these engines, technical experts from the OEMs and invited service providers cooperate to increase the reliability of the specific engine by highlighting and addressing the top priorities, sharing experiences, best practices and data. I am very pleased of the positive overall feedback from the SGT-A35 and LM2500 meetings that were held in May and June. You will find a short report of both of them in this newsletter.

Finally make sure to secure your place at our International Gas Turbine Conference 10-11 October in Brussels by registering on our website.

International Gas Turbine Conference 2018

The Future of Gas Turbine Technology

We are pleased to invite you to the 9th edition of ETN's International Gas Turbine Conference – "The Future of Gas Turbine Technology", taking place on 10-11 October 2018 at Le Plaza Hotel in Brussels, Belgium. This biennially organised flagship conference brings together policymakers, high-level industry representatives from the power generation and oil & gas operators, turbomachinery manufacturers and suppliers, and experts from the R&D community. In the last edition in 2016, 170 participants from 27 different countries attended the conference.



IGTC
International
Gas Turbine Conference

10-11 October 2018 | Brussels | Belgium

**THE FUTURE OF
GAS TURBINE TECHNOLOGY**

9th International Gas Turbine Conference



This year's five keynote and panel sessions will highlight global energy & climate policy and market forecasts, addressing operational requirements of today, as well as technology development needs in the energy transition to a carbon neutral society. Keynote speakers will include high-level representatives from the European Commission, US Department of Energy and main players from the turbomachinery industry. In the parallel technical sessions, the latest technology developments and critical turbomachinery R&D activities necessary in future scenarios, from an operational, environmental and cost perspective, will be addressed. Over two days, 30 technical papers will be pre-

sented, with a focus on Operations and Maintenance, Manufacturing & Repair, New Component Developments and Next Generation Technologies.

Gala dinner

The IGTC-18 Gala dinner with its exceptional networking opportunities will be organised in the evening of 10 October 2018 in an Art Nouveau style building in Brussels city centre, designed by the Belgian architect Victor Horta. The dinner venue is situated within a walking distance from the conference hotel.

Accommodation and transport

A special fare has been negotiated for the IGTC participants wishing to stay at the

conference hotel. You can book your accommodation by filling in the [reservation form](#) and sending it back to [Le Plaza](#). This offer is available until 8 September 2018 on a first come, first served basis. Brussels Airlines is the official carrier of IGTC-18 and offers a 10% discount on available return economy and business fares from a wide selection of destinations in Europe and Africa. Also Lufthansa Group Partner Airlines provide discounted travel for the conference participants. You can find more information about the discounted fares on [our website](#).

High-Level User meeting

ETN's next High-level User meeting will be held on 9 October 2018 in Brussels. This invitation-only meeting is arranged in conjunction with the IGTC-18. The discussions will address ETN's future strategy and activities, in particular operational and future technology developments, including the focus of ETN's engine-specific User Groups.

Registration and programme

Register now through our new [event registration platform](#) and secure your spot – spaces are limited! Preliminary programme and more information about the conference is available on our website: www.etn.global/events/igtc-18/

We look forward to seeing you in Brussels!

Launch of Additive Manufacturing Working Group



Following ETN's Technical Committee 3 discussions during our Annual General Meeting 2018 in Bucharest, the ETN members decided to launch a new Working Group on Additive Manufacturing (AM). The idea is to enable and optimise the use of AM technologies for turbomachinery components by exchanging knowledge and experiences and cooperating on AM practices. The group organised a successful kick-off

meeting in Finspång, Sweden, on 9 May 2018, where the participating companies introduced their ongoing activities on AM. The meeting was followed by two teleconference calls, held in June and July, to discuss the scope of the initiative and objectives of the newly established Working Group. The next meeting will be held in October in conjunction with the IGTC-18. For further details, please contact Ugo Simeoni at us@etn.global.

2 new members join ETN

We are delighted to welcome two new members, Fiatec Filter & Aerosol Technologie GmbH and Gastops, who have joined our network. Fiatec is a specialised laboratory for air filter performance testing based in Mainleus, Germany. Gastops is a supplier and service provider headquartered in Ottawa, Ontario.



Filter & Aerosol Technologie GmbH



ETN Project Board 2018-2020

ETN Board has selected the new Project Board for 2018-2020 among the proposed candidates. The Project Board is responsible for bringing in new initiatives and projects and ensuring the progress of the ongoing ETN activities, including all projects and Working Groups. The newly elected ETN Board and Project Board will hold their first face-to-face meeting in Brussels on 18 July.

The following ETN members will serve as Project Board members during the next two years:



ETN User Group meetings

This year's two ETN User Group meetings gathered participants from around the world, attending from four continents, following ETN's strategy to bring together the key players globally in a collaborative way. Since the very first User Group meeting, held in 2016, ETN's User events have been acknowledged as excellent independent platforms for a direct dialogue between the Users, OEMs and Independent Service Providers (ISPs).



ETN's SGT-A35 (former Industrial RB211) User Group meeting was held on 26-27 April 2018 in Sitges, Spain, where the Users, Siemens and ISPs Alba Power, Cullum Detuners, Liburdi, TransCanada Turbines and RWG met to discuss the main issues the Users encounter while operating or maintaining this specific type of gas turbine. The LM2500 User Group meeting took place on 20-21 June 2018 in Berlin where 11 User companies met with BHGE's technical experts. The ISPs Cullum Detuners, Gastops, MTU, TransCanada Turbines and VBR Turbine Partners were also invited to join the meeting and present their technology capabilities and service solutions.

The preparations for both events

started last year with the data collection process of the recurring issues from the SGT-A35 and LM2500 Users. In January 2018, ETN held a meeting for the User Group Steering Committee members in Florence to perform a review and prioritisation of reported

GT related issues on these engines, in preparation for the forthcoming meetings in April and June. The chosen issues were then shared with the OEMs and some selected service providers of the two specific engines, allowing them to appropriately address the issues and prepare answers to the Users' questions. The overall feedback from the participants was once again very good; the Users seized the opportunity to learn from each other's experience, and the open discussions were highly valued among the group.

Regular newsletters for the members of both SGT-A35 and LM2500 User Groups will be sent three times a year informing the Users about the latest updates and continuing discussions within those groups. If you are an operator and would like to be informed about the ETN User Group activities, please contact Valentin Moëns at vm@etn.global. ■



“ I had a great time during the 2nd ETN SGT-A35/RB211 User Meeting at Sitges, Spain. The meeting was excellent!”

Ramray Tudu, General Manager (O&M), GAIL (India) Limited, attended SGT-A35 User Group Meeting

“ This session was the best User meeting I had in years, both during the day and during the evening events. Looking forward to the next one.”

Piet Roovers, Technology Manager Aero, ENGIE, attended LM2500 User Group Meeting”

Middle East Rotating Machinery Conference

Middle East Rotating Machinery Technology & Innovation Conference will take place on 25-27 September 2018 in Dubai, United Arab Emirates. The conference gathers the user community, manufacturers, service providers and consultants to discuss the latest technologies related to rotating machinery and to better identify industry challenges in order to provide appropriate solutions. ETN members are entitled to a 15% discount for the registration fee and 20% discount for the exhibition stand through a dedicated [registration link](#). More information about the conference can be found on the website: www.roticmiddleeast.com ■

REGISTER TODAY!

2018



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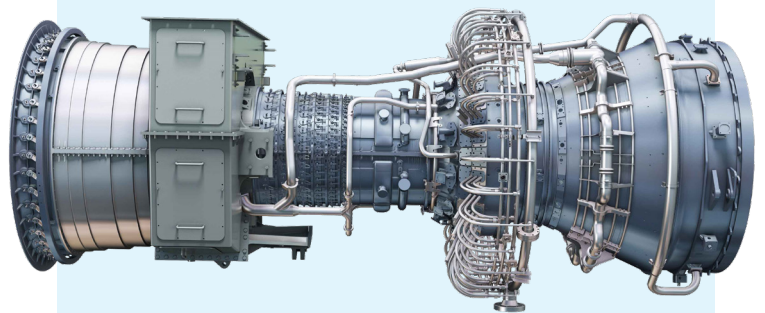
LM2500 Bearing Project

**LM2500
USER GROUP
2018 MEETING**



The Users involved in ETN's LM2500 Bearing Project held

a meeting with BHGE on 19 June, ahead of the User meeting in Berlin, to discuss the progress and outcomes of the project. The measure phase within the LM2500 User Group was completed earlier this year, and the data collected among participating Users was analysed by BHGE and run through the model they develop. This model aims at acting on containment, long term mitigation, and monitoring and detection of engine issues. The data from the Users helped in assessing the containment and mitigation efficiency, as well as identifying statistically significant parameters correlated to bearing failures. ETN's LM2500 Bearing Project was run in parallel to BHGE's Bearing Improvement Programme, which led to several developments and general enhancements that are either already providing promising results, or on track to be implemented in the near future. ■



Global Power & Energy Exhibition



GPEX2018

GLOBAL POWER & ENERGY EXHIBITION

ENHANCING THE GLOBAL ENERGY TRANSITION

17-20 SEPTEMBER 2018

FIRA GRAN VIA, BARCELONA, SPAIN

ETN is cooperating with the new Global Power & Energy Exhibition (GPEX),

which will be held in Barcelona, Spain, 17-20 September 2018. The confer-

ence is co-located with Gastech Conference & Exhibition, and will bring together the global power and energy communities, including government, commercial and industrial power users, gas operators, renewable generation companies, power producers and distributors. ETN members receive a 15% delegate discount for the registration fee – please access the registration page through the link on [ETN's website](#) and quote the promotional code: **ETNAssociation15** ■

ASME Turbo Expo 2018 - Combined Cycle Gas Turbine Asset Management Session: A Utility Industry Worldwide Perspective



clusion of intermittent renewable power generation in the energy mix in key markets worldwide, it is just a question of time before other key markets will have similar technology requirements as the User community in Europe.

In the last years, the key area of focus for the utilities, as a result of the deregulation of the electricity markets, emissions regulation and the high amount of integration of renewable energy, has been on the switch from baseload to intermediate load operation. Rapidly there was a need for fast load ramps, two-shift operation resulting in require-

ASME Turbo Expo took place on 11-15 June 2018 in Lillestrøm, Norway. On the opening day, the Combined Cycle Gas Turbine Asset Management Session: A Utility Industry Worldwide Perspective, co-chaired by EPRI and ETN, was arranged by the Electric Power Committee in order to get a better insight to the drivers, the needs and the requirements of the gas turbine User community and for bridging the gap between the R&D community and the gas turbine Users. The objective with this session was to highlight problems and challenges related to operating and maintaining the worldwide gas turbine fleets, but also to get an insight to the research and technology developments that the User community would like to see in the future low carbon energy systems.



Senior experts from the User community were invited as speakers and panellists: Pedro Lopez, Uniper; Tomas Alvarez, Enel; and Henrik Andersen, Equinor (former Statoil). Bin Zhou from FM Global was also invited to present the view of an insurance company and to highlight the main technical issues that need to be addressed to increase the reliability of the gas turbines.

A panel session was then held to highlight and debate both the operational needs and requirements from the Users as well as required technical development advancements from the R&D community to realise this vision.

The session had a worldwide perspective, but as the conference this year was held in Europe, the focus was mostly on the European market. However, as the markets will be much more integrated in the future and with the accelerating in-

ments of improvements in part-load efficiency, but also shorter turndown and start-up times in order to provide grid stabilisation and balancing power. Tomas Alvarez (Enel) stated that “The safe integration of renewable energy remains one of the great challenges facing the operation of the electricity system. This integration poses great challenges and complexity in the Spanish electricity system, due to the limited capacity of interconnection and the shape of the demand curve. Thus, the demand for ancillary services such as provision of control reserves and frequency support, as well as tertiary and secondary control reserves, has increased significantly”.

Pedro Lopez (Uniper) stated that the gas generation fleet plays a key role by contributing, supporting and ena-

continued on page 7

ASME Turbo Expo 2018
continued from page 6

bling the energy transition to a low carbon society, but there is an urgency to improve the CCGT Levelised Cost of Energy (LCOE) by reducing capex and increasing efficiency, as well as optimising further O&M costs. Still, the energy transition faces unsolved challenges to grant security of supply, make an affordable transition while reaching the CO₂ targets in the given timeline. If the gas generation fleet wants to stay relevant in future low carbon systems, it has to embrace the potential of green gas and continue improving its LCOE, he stressed. New technologies like digitalisation, 3D printing and autonomous plants could be potential game changers for the LCOE according to Pedro Lopez. Further he conveyed the importance that the barriers for these technologies are identified and addressed in order to provide engineering solutions for the deployment of those technologies in the combined cycle fleets when ready. Interesting technology and system solutions that Uniper would like to see the R&D community to further investigate and develop for beyond 2030 are safe and reliable operations with green hydrogen, i.e. Power-to-gas (H₂) and blue hydrogen, i.e. Gas-to-Power with storage, as well as biomass-derived and other low carbon gases. He also mentioned that hybrid power plant and storage solutions are of interest.

Henrik Andersen, as the representative from an oil & gas company, stated that Equinor is committed to developing its business in support of the ambitions of the Paris agreement, and presented an overview of their new climate roadmap and its targets for CO₂ emission reductions and improved carbon intensity, energy efficiency as well as growth in renewables and low carbon solutions. The world needs affordable and reliable oil and gas for decades to come, but at the same time, we need to significantly reduce greenhouse gas emissions, Henrik Andersen stated. Converting



natural gas to hydrogen with capture and storage of the CO₂ represents an opportunity for Equinor to develop low carbon energy supply and transportation solutions. As an example Henrik Andersen shortly presented the feasibility study that Equinor, Vattenfall and Gasunie are currently performing to evaluate the possibility of converting Vattenfall's gas power plant Magnum in the Netherlands into a hydrogen-powered plant. This pioneering project is still at an early phase and there are many uncertainties that need to be addressed – but it has the potential to reduce CO₂ emissions by 4 million tonnes per year. This is equivalent to the

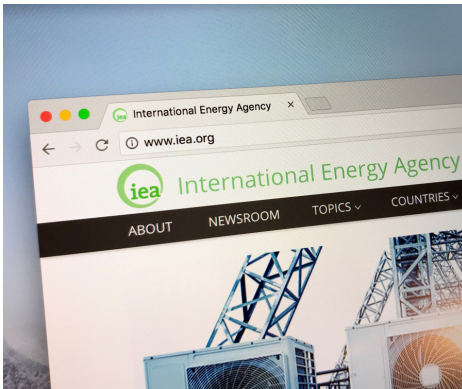
emissions from more than 2 million cars.

The key message conveyed by Bin Zhou (FM Global) was the importance to understand all the contributing factors that have an impact on the risk of turbine breakdowns through fleet issues, environmental factors, operation profiles, loss prevention devices, inspection and maintenance practices, as well as plant procedures and human elements. He also highlighted that flexible operations have an impact on the reliability of combined cycle gas turbines and steam turbines, with further implications of cost increases that should be further addressed. ■

Conclusions about the role, needs and technology developments for gas turbine operations in the new power generation scenario:

- Balancing the grid for managing variable Renewable Energy Sources (RES)
- Sources for provisioning auxiliary services (control reserves)
- Unmanned and remote control OCGTs and CCGTs
- Advanced Predictive Maintenance and Data Analytics
- Online Performance Monitoring and Optimisation
- Ultra-low NO_x and CO emission gas turbines
- GTs hybridisation with batteries and fuel cells
- Fuel flexibility (High-H₂ Content fuels HHC, Non-traditional gas turbine fuels and renewable liquids – bio fuels)
- Being part of the deployment of new Distributed Energy Resources (DER)

IEA report: bright short-term future for gas industry



The International Energy Agency (IEA) published its annual gas market report, Gas 2018, with predictions for the gas industry over the next five years. According to IEA's report, global demand

for natural gas will strongly increase during the next five years, with China leading the growth, partly due to the country's extensive efforts to improve the air quality. IEA predicts that LNG trade will expand by 30% by 2023, and the US will become a leading player in LNG markets. The industry and buildings are displacing power generation as the drivers of gas demand. The report also states that the prices would need to stay competitive in emerging markets and the industry would need to continue improving its environmental footprint for the bright future also in the long-term. A summary of the IEA's Gas 2018 report is available [here](#). ■

Horizon Europe programme

The European Commission introduced its proposal for the new framework programme for research and innovation (FP9) as part of the next EU long-term budget for 2021-2027. This €100 billion programme called Horizon Europe will be the biggest ever research and innovation funding programme, succeeding the current Horizon 2020 programme that had a budget of €78 billion. If the Council and European Parliament accept the proposal, there will be more money for fewer countries due to UK's departure, which has been one of the biggest beneficiary countries of Horizon 2020 funds. ■

Cooperation Workshop of SET-Plan Action 6

The Strategic Energy Technology Plan (SET-Plan) Working Group 6 on Energy Efficiency in Industry organised a workshop "Continuing efforts to make EU industry less energy intensive and more competitive" on 27-28 June 2018 in Brussels, which gathered together the representatives from the EU member states and European Commission, as well as the stakeholders from the industry and research community. The objective of the workshop was to contribute to the realisation of the Action 6 [Implementation Plan](#) by enhancing cooperation between different countries and their national programmes, and further developing the ideas into concrete projects. Stakeholders were called for submitting their project ideas for the workshop, and the selected stakeholders were invited to present their ideas during this two-day event. The participants were then divided in different sessions according to the Implementation Plan topics.

ETN, together with EUTurbines, co-organised the Heat & Cold session, which included three different activities and where several ETN members presented their project ideas. The first part of the session combined Heat & Cool Upgrade and Poly-generation activities, with two round table discussions: Waste Heat Recovery into energy and Polygeneration with multiple energy sources. The second session addressed the Heat-to-Power activity, and the presented project ideas included for example Supercritical CO₂ and Organic Rankine Cycles. Also some potential ways forward for cooperation between the EU member state representatives were discussed. One possibility would be the adoption of a modified "Berlin model",

which has been implemented by Germany in recent years and would include bilateral or trilateral agreements among the EU countries on specific projects. ETN is inviting our members to express their interest on this topic and to cooperate with the project ideas. If you would be interested in knowing more about the next steps, please contact [Ugo Simeoni](#). ■

Energy Union <i>Research, Innovation and Competitiveness Priorities</i>		SET-Plan 10 Key Actions
No1 in Renewables		1 Performant renewable technologies integrated in the system 2 Reduce costs of technologies
Consumers in the Energy System		3 New technologies & services for consumers 4 Resilience & security of energy system
Efficient Energy Systems		5 New materials & technologies for buildings 6 Energy efficiency for industry
Sustainable Transport		7 Competitive in global battery sector and e-mobility 8 Renewable fuels and bioenergy
Carbon Capture Utilisation and Storage		9 Carbon Capture Storage / Use
Nuclear Safety		10 Nuclear safety

ETIP SNET Vision 2050



During the past few years, ETN has been actively involved in the European Technology and Innovation Platform – Smart Networks for Energy Transition (ETIP SNET), which specifies the long term R&D targets for the evolution of the European energy system and brings together the stakeholders and experts from the energy sector. ETN participated in the “Vision 2050” launch event on 27 June 2018 in Brussels where the ETIP SNET Executive Committee and European Commission representatives introduced the new ETIP SNET Vision 2050 publication, for: “a low-carbon, secure, reliable, resilient, accessible, cost-efficient, and market-based pan-European integrated energy system supplying the entire society and paving the way for a fully carbon-neutral

circular economy by the year 2050, while maintaining and extending global industrial leadership in energy systems during the energy transition”.

The report presents ETIP SNET stakeholders’ views for the energy systems of 2050 and provides recommendations for the RD&I framework, focusing on the integration needs of low-carbon energy systems. The publication is in line with European Union’s energy policy

The report does not state which energy systems would be the most suitable, but instead it presents the stakeholders’ long-term vision towards the energy transition and a wider selection of options for 2050 energy systems. You can download the full ETIP SNET Vision 2050 report [here](#). ■



Progress with Clean Energy Package

In June 2018, the European Parliament, Council and Commission reached agreements on three Clean Energy Package files. The legally-binding 32% target for the [share of renewables](#) for 2030 was set, with an upwards revision clause by 2023. The deal also included a 14% target for renewable energy in transport, and phasing out of palm oil by 2030. A non-binding 32.5% target for the updated [Energy Efficiency Directive](#) also included a clause for 2023 review. Lastly agreed deal on the [Governance of the Energy Union](#) sets deadlines for national energy and climate plans and progress reports, and introduces

control mechanisms to ensure that the targets are met. Previously adopted [Energy Performance in Buildings Directive](#) entered into force already in the beginning of July, but four out of eight legislative proposals in the Clean Energy Package will still need to be completed. Austria will chair the ministerial meetings at the EU level during the rotating presidency of the Council of the European Union. According to the Austrian [work programme](#), their objective is to finalise the rest of the Clean Energy Package files in the next six months. ■

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 @Energy4Europe
 @MarosSefcovic
 @MAC_europa
 @JerzyBuzek

Upcoming meetings and events

Meeting/Event	Date	Location
ETN Project Board meeting	17-18 July 2018	Brussels, Belgium
ETN Board meeting	18-19 July 2018	Brussels, Belgium
Global Power & Energy Exhibition*	17-20 September 2018	Barcelona, Spain
ETN Air Filtration Working Group meeting	25-26 September 2018	Brussels, Belgium
Middle East Rotating Machinery Technology and Innovation Conference*	25-27 September 2018	Dubai, United Arab Emirates
ETN High-Level User meeting**	9 October 2018	Brussels, Belgium
International Gas Turbine Conference 2018*	10-11 October 2018	Brussels, Belgium

* ETN members are entitled to a discounted registration fee | ** Only for ETN members

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ETN at a Glance!

Download the ETN Brochure, featuring:

- ETN Mission & Objectives
- ETN Technical Committees
- ETN Projects
- ETN Events & Activities
- ETN Membership Benefits
- And more!



Are you a gas turbine user located outside the EU? [Download the Brochure](#) showcasing the benefits of being part of ETN's global gas turbine user community.



Keep in contact and updated with ETN's most recent news. Follow ETN on Twitter: [@etngasturbine](#) and on LinkedIn!



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