



**ETN – European Turbine Network**

# **Activity Update 2017-2018**

**Annual General Meeting – Bucharest, 14 March 2018**

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This **ETN Activity Update** presents the key activities that have taken place since the last Annual General Meeting held in Oberhausen in May 2017. This document is also available on the ETN website (AGM and Workshop webpage) for those ETN members who need to report on ETN activities for the past year.

# 1. ETN Board, Project Board and Team

The **Board of Directors** met 4 times since our 2017 AGM: on 6 July, 15 November 2016 and 21 February 2018. They will also meet on 14 March, just before the 2018 AGM and Workshop. The Board also held a teleconference call on 24 October 2017.



Bernard Quoix, TOTAL



Catherine Goy, Uniper



Niko Cornelis, Engie



Thomas Volks, MTU Maintenance



Andy Williams, Chromalloy



Gary Lock, Frazer-Nash Consultancy



Giovanni Cerri,  
University Roma TRE



Herwart Hoenen,  
RWTH Aachen University



Pericles Pilidis,  
Cranfield University

## The members of ETN Project Board



■ **Peter Jansohn** (chair)  
Paul Scherrer Institute (PSI)  
Switzerland

*Technical areas:*  
fuel flexibility, emissions



■ **Peter Breuhaus**  
International Research Institute  
Stavanger (IRIS)  
Norway

*Technical areas:*  
condition monitoring, advanced cycles



■ **Dominique Orhon**  
Total  
France

*Technical areas:*  
Turbomachinery, oil and gas  
operations



■ **John Oakey**  
Cranfield University  
UK

*Technical areas:*  
materials, CO<sub>2</sub> mitigation/CCS



■ **Nicola Rossi**  
Enel  
Italy

*Technical areas:*  
Power Plants efficiency and flexibility



■ **Abdulnaser Sayma**  
City, University of London  
UK

*Technical areas:*  
operational flexibility, efficiency



■ **Mark George**  
Cullum Detuners Limited  
UK

*Technical areas:*  
Turbomachinery, noise control,  
filtration, emissions reduction

## ETN Team

Christer Bjorkqvist, Managing Director



Ugo Simeoni, Research & Innovation Manager -  
Policy and Projects



Ilona Kolb, Financial and Administrative Officer



Noora Kilpinen, Communications Officer



Valentin Moëns, Technical Project Officer



## 2. ETN network

### New members

Since the last Annual General Meeting held in Oberhausen in May 2017, ETN has welcomed **12 new members**. ETN has now **110 members** from **23 countries**, covering Europe, Asia, Middle-East and North-America. Since May 2017, the following members have joined ETN:

- ACTE (Belgium)
- Ahlstrom-Munksjö (Finland)
- AkerBP (Norway)
- AST Turbo (Switzerland)
- Aurelia Turbines (Finland)
- BP (United Kingdom)
- Capstone Turbine (USA)
- CERTH (Greece)
- FAIST (Germany)
- HiETA Technologies (United Kingdom)
- Mälardalen University (Sweden)
- TNB (Malaysia)



## Modification of the Articles of Association

During the AGM 2017, the members of ETN had the opportunity to openly discuss and then vote on the modification of the Articles of Association (AoA) proposed by the Board, opening the network to turbomachinery and global service providers and suppliers. This resulted in the following outcome:

- 105 members entitled to vote
- 76 votes expressed
  - Blank: 2
  - No: 8
  - Yes: 66

In September 2017, the proposed amendment of ETN AoA received an approval from the Belgian authorities. The modified AoA has been published in the “Moniteur Belge”, the Belgian official journal. It is available on the [ETN website](#).

## ETN's main activities

The figure below is summarizing the main activities that ETN has focused on since the last AGM.

# ETN Activities





## 3. Projects and activities

### Technical Committees (TCs)

ETN Technical Committees met during the October Workshop in Genoa on 5 October to discuss the TC activities and projects, with the aim to start cooperation and further develop the ideas into new initiatives.

#### TC1 - Low Carbon Gas Turbine Operation

Topics presented during the October Workshop within the TC1 were: OMSoP project; the role of mGT CHP in future Smart City; Supercritical-CO<sub>2</sub> cycles for gas turbines; Definition of standard mission profile for heavy duty gas turbines in EU. TC1 members drafted a position paper on the role of the gas turbine technology in the current energy scenario, which will be presented in the AGM 2018 and further discussed during the Workshop 2018 in the TC1 session.

#### TC2 - Operational and Fuel Flexibility

TC2 presentations in Genoa covered the following topics: Challenges and opportunities for GT combustion systems; Requirements from the gas turbine user community; Ammonia combustion in GT; Fuel and Operational Flexibility through the application of sequential combustion. “Ammonia interest group” was launched after the Workshop, within the framework of TC2 discussions in Genoa. The group members currently share information about projects, events and papers on NH<sub>3</sub> combustion on a regular basis.

#### TC3 - Material Degradation, Repair Technologies and Manufacturing

During October Workshop 2018, TC3 attendees discussed on Additive manufacturing; Hot Corrosion; Efficiency of water washing systems; Research activities on material in EU projects; OAG-IGD GT R1 Blades failure RCA analysis. After the TC3 discussions during the Workshop, ETN started a Working Group for Users to address hot corrosion, which held its first teleconference call at the end November. ETN office circulated a survey on hot corrosion, directed towards the user community, and the topic will be further addressed during the AGM and Workshop in Bucharest. Also a possibility to launch a Working Group on the Additive Manufacturing (AM) was discussed in Genoa.

#### TC4/5 - Condition Monitoring, Instrumentation and Asset Management

TC4 attendees in Genoa discussed the Asset Remnant Life Assessment and Digitalisation. ETN digital position paper, drafted by Chris Dagnall (DNV-GL, Chair of the ETN Technical Committee 4) and Pascal Decoussemaeker (GE Power, Chair of the ETN Technical Committee 5), based on the inputs of the TC4 and TC5 members, was circulated to the ETN members in the beginning of March, and will be presented at the AGM & Workshop 2018 in Bucharest. The objective of this paper is to provide support and guidance to the ETN members on Industry 4.0 and the Industrial Internet.

## R&D Recommendation Report

The ETN Project Board is currently reviewing the content of the R&D Recommendation Report. An updated revision of the report is planned to be published this year, aimed to be out prior to the IGTC-18.



## Air Filtration Working Group

The Air Filtration Working Group met in Oberhausen in May 2017, and the WG also held another meeting in Genoa in conjunction with the October Workshop. Regular teleconferences are currently being held among the WG members in order to draft a harmonised standard on the test activities to be carried out on the filters to simulate marine and offshore environment.

## Micro Gas Turbine Working Group

ETN Micro Gas Turbine Working Group met in Genoa in October 2017 in order to discuss a potential cooperation on the ISO 19372 – Microturbines application – Safety. The possibility to revise the standard in order to meet the safety requirements of the components was discussed during the meeting. ETN was in contact with the ISO/TC 192 and it was agreed that a revision of the standard could be made starting from the end of 2018. In the meanwhile the WG members will discuss the comments to be submitted to the ISO. Currently regular teleconferences are being held among the WG members. The Working Group also published the MGT Technology Summary in November 2017.



## LM2500 Bearing Project

The LM2500 Bearing Project Measure phase within the LM2500 User Group is now over and the data collected among participating Users will be analysed by BHGE and run through the model they develop. This model aims at acting on containment, long term mitigation, and monitoring & detection of engine issues. The data from Users will help in assessing the containment and mitigation efficiency, as well as identifying statistically significant parameters correlated to bearing failures. Next updates on this topic are scheduled to be presented at the next LM2500 User Group Meeting in Berlin, taking place on 20-21 June 2018.

## IGTC-18 Conference Advisory Board

During the Annual General Meeting in May 2017, Cath Goy, Vice President of ETN launched a call for interest to join the IGTC-18 Conference Advisory Board (CAB). The CAB members held a teleconference call in September and met in October 2017 in conjunction with the October Workshop in Genoa to decide the topics for the IGTC-18 Call for Papers. The CAB also held another teleconference call in December 2017 and held a meeting in Brussels 2018 to review the submitted abstracts for the IGTC.



**IGTC**  
International  
Gas Turbine Conference



The authors of selected abstracts were invited to submit a paper for the conference by the end of April 2018. The 9th International Gas Turbine Conference – “The Future of Gas Turbine Technology” will take place on 10 and 11 October 2018 at Le Plaza Hotel in Brussels.

### **ETN-US-UK Collaboration programme**

ETN has liaised with the representatives of the Department of Energy (DOE) in United States and representatives of the Department of Energy and Climate Change (DECC) in the UK regarding a potential cooperation between the ETN community and the US-UK collaboration programme on advanced materials. In conjunction with the October Workshop, the ETN-UK-US DoE collaboration meeting was held in Genoa on 5 October, where the representatives of the UK and US Department of Energy explained the objectives of the ongoing tasks. ETN Members were asked to provide a summary of topics of interest and potential contribution to the programme. Eight members raised their interest in the programme, with topics such as additive manufacturing and micro gas turbine. ETN is currently discussing about their participation in the meeting which will take place in Pittsburgh in April 2018.

### **Best Practice Award**

Last year ETN, together with the Combined Cycle Journal, launched the Best Practice Award at a global scale, with an objective to collect the practices that can benefit the gas turbine industry. Deadline for submitting the Best Practices was on 28 February 2018, and the submitted entries in two categories, “Workforce development/knowledge Management” and “EHS: Environment, Health and Safety”, will be awarded at the Annual General Meeting 2018 in Bucharest.

### **Exhaust Systems Project**

A “New Work Item” has been opened by the ISO/TC 192. An ETN representative is following the process and the ETN members will be informed when their input would be needed.

### **CEN Sector Forum Gas Working Group on Gas Quality**

ETN is monitoring the developments within the CEN Sector Forum Gas Working Group on Gas Quality (SFGas WG GQS). Cath Goy from Uniper represents ETN in this Working Group. Uniper’s reports from the meetings are available on the [ETN website](#) (under conference and event reports).

### **OMSoP project**

The Optimised Microturbine Solar Power system technology development within the OMSoP project came to an end in July 2017 after its 4.5 years of activities. The overall objective of this EU funded project was to provide and demonstrate technical solutions for the use of state-of-the-art CSP system coupled to micro gas turbines (MGT) to produce electricity, which was successfully achieved. As part of the



project consortium, ETN coordinated the production of two OMSoP videos. A longer video explaining the technology and project outcomes is available on the OMSoP website <http://www.omsop.eu> and a short video via [this link](#).

### **NEXTOWER project**

The goal of the NEXTOWER project is to demonstrate high-performance durable materials for the next generation of concentrated solar power (CSP) air-based tower systems. ETN is currently providing support in the modelling and market-analysis for the gas turbine sector.

### **PUMP-HEAT project**

The EU funded PUMP-HEAT project (Performance Untapped Modulation for Power and Heat via Energy Accumulation Technologies) was kicked off in September 2017. The objective of the project is to increase the flexibility of the Combined Cycle power plants and the operation of gas turbines. University of Genoa leads the PUMP-HEAT project consortium which consists of 14 participants coming from eight different countries.

### **Bio-HyPP project**

The Bio-HyPP project aims at developing a full scale technology demonstrator of a hybrid power plant fed by biogas blended with natural gas. A hybrid plant combines Solid Oxide Fuel Cells (SOFC) and a Micro Gas Turbine (MGT) and the target is the realisation of a best possible coupling of both sub-systems. ETN is a member of the Bio-HyPP project's Steering Committee to advice on potential future market applications.

## 4. Events

### SGT-A35 (Industrial RB211) User Group meeting 2017

The first SGT-A35 User Group meeting (previous Industrial RB211) meeting took place in Milan on 3-4 May 2017, where operators, independent service providers and Siemens met to discuss the main issues that are affecting their operations and maintenance. The overall feedback from participants was overwhelmingly positive, and the preparations for the 2018 meeting started already shortly after the summer.

The SGT-A35 User Group meeting 2018 will be held on 26-27 April in Sitges (near Barcelona), Spain at Hotel Estela Barcelona. A draft agenda for the meeting is available on the [ETN website](#) with more details about the hotel room reservations with negotiated prices. Registrations for the event will be open soon.



### LM2500 User Group meeting 2017

On 14-15 June 2017, ETN's LM2500 User Group met in Brussels to exchange experiences and to interact in a close discussion with technical experts from General Electric. MTU, United Services Sweden, VBR Turbine Partners and Cullum Detuners were also invited to a section of the meeting to showcase the potential technical contributions they could propose as Independent Service Providers. Rich and valuable discussions took place between all the parties in this second LM2500 meeting, proving that the group is now well established with a

beneficial structure for all parties.

This year's LM2500 User Group meeting will take place 20-21 June 2018 in Berlin, Germany, at Radisson Blu Hotel. A detailed agenda and more information of the event will be available on the ETN website in the upcoming months.



### High Level User meeting

In the afternoon, the day before the October Workshop 2017 in Genoa, Italy, ETN held a High Level User Meeting at the premises of University of Genoa to review and discuss the current strategy of ETN. During this meeting the Users gave their feedback and suggestions for the Engine Specific User Groups, Technical Committees and Working Groups. The main topics covered in the meeting and the outcomes were highlighted in the opening plenary session of the October Workshop.



### **October Workshop 2017**

ETN held its biennial Autumn Workshop on 4-5 October 2017 at Ansaldo Energia Foundation in Genoa, Italy, where 120 participants joined to discuss the gas turbine community's needs and requirements and to plan future research activities. During the first day of the Workshop, high level speakers gave their review on opportunities related to digitalisation as a mean to optimise the operation of power plants, additive manufacturing for onsite components' repair, integration of energy storage in the power plants, the role of hydrogen in the EU energy scenario, and the future direction of gas turbine technology. On the second day, parallel sessions were held to discuss the activities and projects introduced within the ETN Technical Committees. Besides the Workshop presentations and Technical Committee sessions, several side meetings were also held in Genoa.

### **User Group Steering Committee meeting (SGT-A35 and LM2500)**

ETN held a meeting for the User Group Steering Committee members on 31 January in Florence, Italy, in conjunction with the BHGE Annual Meeting. The Steering Committee performed a review and prioritisation of reported GT related issues on these engines in preparation for the forthcoming meetings in May and June. A meeting among the partners of the LM2500 Bearing Project also took place on 1 February at BHGE facilities in Florence.

### **External events**

#### **Middle East Rotating Machinery Technology & Innovation Conference**

ETN participated in the Middle East Rotating Machinery Technology & Innovation conference on 10-12 October 2017 in Dubai, United Arab Emirates, where ETN President Bernard Quoix delivered a keynote opening speech. Bernard Quoix took this opportunity to raise the awareness of the importance and the criticality of rotating machinery in the Oil & Gas and power generation industry, and highlighted the main requirements in terms of technology and innovation. He also introduced ETN and our activities, and invited the local user community to join our Network.

#### **NexTurbine**

Christer Björkqvist delivered a keynote speech at NexTurbine 2017 conference, which took place in Wuxi, China, on 17-18 May 2017. ETN had also a stand at the conference in order to connect with the Chinese user community and to explain about ETN's activities.

## 5. EU Energy & R&D policies

### Energy Union - SET-Plan

In 2007, European Union launched a research and development strategy targeting the energy sector, the Strategic Energy Technology (SET) Plan, which was updated in September 2015 and integrated to be part of the five pillars of the EU's Energy Union, aiming at achieving the 2050 energy and climate targets: energy market, security of supply, energy efficiency, greater inclusion of renewables and research & innovation.



SET-Plan identifies 10 focused research and innovation actions. ETN has provided comments for 4 actions:

- Action 4: Increase the resilience, security and smartness of the energy system
- Action 5: Develop new materials and technologies for, and the market uptake of, energy efficiency solutions for buildings
- Action 6: Continue efforts to make EU industry less energy intensive and more competitive
- Action 9: Step up research and innovation capacities on the application on carbon capture and storage (CCS) and the commercial viability of carbon capture and use (CCU)

### Action 4: Increase the resilience, security and smartness of the energy system

In July 2017, ETN submitted comments on the draft Implementation Plan 2017-2020 of the European Technology and Innovation Platform (ETIP) – Smart Networks for Energy Transition, which specifies the long term Research & Innovation targets for the evolution of the European energy system. The comments were based on the teleconference calls in June 2017 within the Technical Committees TC1 and TC2. ETN is represented in the ETIP-SNET governing board by Sigrid Gijbels, (ENGIE – Laborelec), as a stakeholder of the Thermal Power Generation sector, both for centralised and decentralised power generation.

Following the approval of the Implementation Plan by the EU Member States, it was decided to create a temporary working group part of the ETIP SNET called “Flexible generation”. As an association, ETN cannot join the working group, but receives updates from our representatives Peter Jansohn, PSI, Peter Breuhaus, IRIS, and Iarno Brunetti, ENEL.



### Action 5: Develop new materials and technologies for, and the market uptake of, energy efficiency solutions for buildings

The objective of the temporary working group is to define an Implementation Plan for research activities needed to increase the energy efficiency in buildings. ETN has collected inputs from the members regarding micro-CHP/CCHP technologies under development and presented potential research activities that could be done both at National and International level. ETN attended the Working Group meeting in Brussels in January 2018 and presented the main research topics of micro-CHP technologies for buildings, according to the inputs received by the ETN members.

### Action 6: Continue efforts to make EU industry less energy intensive and more competitive

A Working Group has been set up by the European Commission with representatives of the stakeholders and the Member States. The aim of the Working Group is to revise periodically the implementation plan approved in September 2017 and to organise workshops in order to identify cooperation activities funded by the Member States. ETN has presented two proposals aimed to reduce the CO<sub>2</sub> emissions and to increase the primary energy savings.

### Action 9: Step up research and innovation capacities on the application on carbon capture and storage (CCS) and the commercial viability of carbon capture and use (CCU)

The Implementation Plan was approved by the EU Member States in September 2017. Following the inputs provided by ETN, supercritical CO<sub>2</sub> has been added amongst the Research and Innovation activities.

### Renewable Heating and Cooling (RHC) Platform

ETN has been represented in the Biomass Panel Steering Committee by DLR. Currently the activities in the RHC Platform are focusing on providing comments on the Implementation Plans of the SET-Plan Action 5 - "New materials and technologies for buildings" and Action 8 - "Renewable fuels and bioenergy".





## 6. ETN communication channels

### Publications

ETN Quarterly Newsletter is sent four times a year to more than 1500 contacts (members of ETN and external contacts).

ETN Monthly News Summary is distributed only to our members. It is a way to summarize the latest news items and activity updates that have taken place during the last month. This includes new developments within the network, event information, project updates and calls for interest. The Monthly News Summary is sent to over 700 contacts at the end of each month.



### New website

The Launch of the new website will take place during the AGM in Bucharest, together with a short demonstration of the new features. ETN office is also working on digitalisation of the database in order to optimise the time and improve the tools that are used for contacting our members. The ETN website is the prime location for all publications, communication and news.

### Social networks

ETN accounts on Twitter ([@etngasturbine](https://twitter.com/etngasturbine)) and LinkedIn ([ETN – European Turbine Network](https://www.linkedin.com/company/etn-european-turbine-network/)) are regularly fed and used as a way to engage more directly with our members and with the industry stakeholders – make sure to follow us