

ETN is a non-profit association bringing together the entire value chain of the gas turbine technology community in Europe and beyond. Through the cooperative efforts of our members, ETN facilitates gas turbine research and technology development, promoting environmentally friendly stationary gas turbine technology with reliable and low cost operation.

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Christer Björkqvist
Managing Director

ETN on global growth

The transformation of ETN from a European association to a global one is progressing smoothly: we see a high interest in our activities and receive new member applications. To facilitate the transformation and to enable a fast integration that will increase the benefits for our members, several initiatives are under development. We will further strengthen and widen our engine specific user groups as well as pave the way for further research opportunities. Another core task will be the launch of a new ETN website and collaboration platform, which is scheduled for the end of October.

It will be a more user-friendly website with a more direct access to information of relevance to your organisation. It will also be an important tool that will facilitate members' interaction, cooperation and exchange of experiences. A top objective during this transformation and growth progress is to increase the benefits and services to our members and continue to ensure that all available knowledge and resources is being processed.

We already have a system in place that prevents loss of valuable knowledge and experience through our ETN Emeritus Club, a programme of experts, which we will continue to use and which also will be available for your use. Parallel to this we are setting up a new scheme to integrate talented, promising engineers who are in an early stage of their career. This will be a group of open-minded, creative, and passionate top engineer students and young engineers who can help us to progress ETN activities and new initiatives, as well as provide boundless ideas on improving the functioning of ETN using the latest technology support.

It will be a busy start of October with our forthcoming workshop in Genoa, Italy and several side meetings, scheduled both before and after the workshop, including our: High Level User meeting; Conference Advisory Board meeting for our International Gas Turbine Conference in 2018, ETN and US Department of Energy cooperation meeting; MGT standardisation meeting, and Air Filtration WG meeting. I am grateful to Ansaldo Energia and the University of Genoa for making this possible by generously providing us with meeting rooms and facilities, which will reduce travel time and expenditures to our members. I look forward to productive meetings in Genoa and count on your active participation.

Finally I warmly congratulate the OMSOP project consortium for the completion of a successful development and demonstration of technical solutions for the use of state-of-the-art concentrated solar power system (CSP) coupled to micro-gas turbines (MGT) to produce electricity. The demonstration took place at ENEA's facilities outside Rome, where further testing will continue to explore the operational characteristics of the system.

ETN October Workshop starts this week!

ETN October Workshop is about to start! The Workshop takes place in Genoa, Italy, with the kind support of our sponsors Ansaldo Energia and University of Genoa. You can expect a full week of meetings scheduled over four days, reserved only for ETN members. At the Workshop, the gas turbine experts worldwide will gather together to discuss on the user community's needs and requirements, as well as future opportunities related to digitalisation, additive manufacturing and energy storage.



High Level User meeting

The High Level User meeting is an opportunity for users to contribute to and influence ETN's future strategy and activities, in particular the engine-specific User Groups and R&D projects. During this meeting, a decision of which engines ETN will focus on in the future will be made, but also more general needs and requirements regarding both operation and future development needs and interest will be reviewed. This meeting for users only will be held on 3 October at the University of Genoa.

Conference Advisory Board meeting

Conference Advisory Board (CAB) for the International Gas Turbine Conference 2018 held their first teleconference meeting in September. The CAB members will gather together in Genoa to continue discussions on the IGTC

2018 Call for Papers and the planning of next year's conference programme. The meeting takes place at Ansaldo Foundation in the morning of 4 October.

Micro Gas Turbine meeting

The objective of the Micro Gas Turbine meeting on 4 October is to discuss on the cooperation with the ISO TC 192 regarding the development of the standard ISO 19372 "Microturbines applications – Safety".

ETN and US Department of Energy cooperation meeting

A smaller meeting between ETN members, representatives of US Department of Energy and representatives of the Department of Energy and Climate Change (DECC) in the UK will be organised in Genoa on 5 October after the official closing of the Workshop. The aim is to discuss potential cooperation on

research and development programmes in the framework of the US-UK Collaboration Programme (see page 4).

Air Filtration WG meeting

The Air Filtration Working Group gathers together to discuss on the cooperation with the ISO TC 142 regarding the development of the standard ISO 29461 – "Air intake filter systems for rotary machinery – Part 5: Test methods for static filter systems in marine and offshore environments". The meeting is scheduled for Friday 6 October. ■



They are on Twitter:

@AnsaldoEnergia



They are on LinkedIn:

Ansaldo Energia

9 new members join ETN

ETN continues expanding its reach as we build new valuable relationships into the future.

Ahlstrom-Munksjö (Finland), ACTE (Belgium), AkerBP (Norway), Aurelia Turbines (Finland), CERTH (Greece), FAIST (Germany), HiETA Technologies (United Kingdom), Mälardalen University (Sweden) and TNB (Malaysia) are the new members of our network. ■

■ Ahlstrom-Munksjö



■ ACTE



■ AkerBP



■ Aurelia Turbines



■ CERTH/CPERI



■ FAIST Anlagenbau



■ HiETA Technologies



■ Mälardalen University



■ TNB



Launch of ETN Young Engineers Committee

The ETN Board has recently passed a vote to establish Young Engineers Committee.

"The aim of this initiative is to bring open-minded, creative, and passionate top students and young engineers to our network who can help us with their boundless ideas on improving functioning of ETN", says Member of the Board Andy Williams, Chromalloy.

The members of the Committee will get an insight into the needs and requirements of the industry and an opportunity to widen their network. The group will also benefit of a high visibility and the opportunity to work with like-minded engineers from other countries in an exclusive group. The group will review ongoing activities and new initiatives within ETN and offer support, as well as provide suggestions on how these ideas could potentially be improved and accelerated. The most prominent and innovative ideas will be presented to the ETN Board, who will regularly review the list of generated ideas, and select and implement the most promising ones. We believe this will have a positive impact on ETN long term growth strategy. For more information about the Committee, please contact Noora Kilpinen: nk@etn-gasturbine.eu. ■

IGTC 2018 Call for Papers to be published this month



The Conference Advisory Board (CAB) of the International Gas Turbine Conference 2018 (IGTC) has started preparing the next year's conference, which will take place in

Brussels on 10 and 11 October 2018. The CAB members are finalising the selection of topics for technical papers. They also provide advice with the programme and assist in finding interesting speakers for this biennial event. The Call for Papers will be published on 12 October, inviting for submission of abstracts prior to 4 December. Authors of the selected abstracts should submit their final papers by 29 April 2018. ■

US-UK-ETN 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. The US-UK collaboration programme is a result of the US-UK Memorandum of Understanding and the associated Implementing Arrangement for Fossil Energy Research and Technology Development. Currently biannual meetings are organised within the US-UK programme, and the main objective is to share and develop the partners' knowledge and expertise in the key area of high-temperature materials for advanced fossil energy power plant applications. This is achieved by sharing best practices and test facilities, developing common tools and cooperation projects, as well as with industrial secondments.

Participation in the programme is open to individuals from industry and academia dealing with the following topics:

- Oxidation in Supercritical Fluids – Steam and CO₂
- Advanced Turbines and Fuel Flexibility
- Gas Turbine Sensors and Condition-based Monitoring
- Micro-turbines and Heat Exchangers
- Advanced Manufacturing for Components and Repair
- Materials Modelling and Data Management

More information on the programme will be reported in the upcoming months. ■

Best Practice Award – submit your entry

One of the benefits provided by a network like ETN is the opportunity for members to improve their expertise through interaction with other peers. By sharing practices that have proven to be applicable and by comparing those to the activities of other peers often allow both sides to distinguish potential for improvement. In order to facilitate and moderate this learning process we have set up the Best Practice Award. ETN is collaborating with the Combined Cycle Journal to launch our award at a global scale. Topics for the submission are



“Workforce development/knowledge management” and “EHS: Environment, Health and Safety”. Practices offering the greatest benefit to our industry will be selected and awarded next spring. In addition, all entries will be granted recognition from the industry with the publication of a special ETN report circulated within the member community. All companies, members and non-ETN members, operating or supporting gas turbines operations can apply. More detailed rules and a template for submission can be found on our website www.etn-gasturbine.eu/bestpracticeaward/

Entries should be submitted by email to info@etn-gasturbine.eu by 28 February 2018.

The new wider strategy of ETN implemented and officially published

In September 2017, the proposed amendment of ETN's Articles of Association has received an approval by Belgian authorities and has officially been published, which seals the newly adopted strategy. As reported in the last newsletter, ETN members voted in favour of widening of the organisation to turbomachinery at its Annual General Meeting on 10 May 2017 in Oberhausen. The adopted amendment opens up membership to the global user community but also to OEMs and established service providers of gas turbine technology from outside Europe.

This historic move in the life of ETN will embrace the global integration of the GT markets, with promising dynamics outside Europe, the international commitment to low-carbon economy altogether demanding further and

wider cooperation for the GT community.

“Widening the scope of ETN to turbomachinery will help us to adopt a more integrated approach in line with the reality of the technology and the markets. Steam turbines, compressors and generators are already part of rotating equipment of CCGT systems or O&G and LNG facilities, states ETN's Managing Director Christer Björkqvist. It will also provide the possibility to launch more system-related research projects, increasing the portfolio of opportunities”.

ETN has received an overwhelmingly positive response to the new strategy, and we are proud to welcome both new European and Global members who have joined us since the historic move was made. ETN network counts now 118 members from 24 countries. ■

Successful completion of OMSoP project

A successful demonstration of the Optimised Microturbine Solar Power system technology development carried out within the OMSOP project has been completed at the facilities of ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) in Casaccia, Rome.



The European Commission has recognised the potential role of concentrated solar power (CSP) in Europe's low carbon energy goals, also acknowledging the challenges associated with the technology, such as the necessary improvements in predictability and dispatchability of CSP plants. These challenges were addressed in the OMSoP project, with a system aimed at making the CSP more robust, reliable, cost effective and more suitable for hybridisation.

The overall objective of the OMSoP 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. The system was designed with

a modular approach, capable of producing electricity up to 30kW per unit for domestic and small commercial applications. For larger energy needs, the units can be stacked by virtue of their modular nature.

The market study, which also took place within the project, has shown that the market for the OMSoP technology is extremely wide due to the adaptability and versatility of the system, which is able to produce heat and power assisted by biofuel or conventional fuels if needed. The OMSoP technology will be a new player in the market, which is competitive, flexible and can offer features that other direct competitors do not have. It covers a gap in the market where CSP

for large system is not economic in the small scale.

The main challenge to overcome during the project was the development of the system components and overall system design and integration. A new micro gas turbine with a novel control strategy has been designed and built in order to operate with a wide variation of solar irradiation during the day and in different weather conditions around the year. A new solar receiver has been developed, being able to operate with a temperature up to 800°C. Other challenges to overcome were related both to the mechanical and electrical integration.

The OMSoP project was funded under the EU's 7th Framework Programme for Research and Development, and its consortium, coordinated by the City, University of London, brought together 8 organisations from 5 European countries, representing a well-balanced mix of industry and academic institutions. The participants were City, University of London (UK), Roma TRE University (Italy), ENEA (Italy), KTH (Sweden), Compower AB (Sweden), INNOVA (Italy), University of Seville (Spain) and ETN (Belgium). ■

OMSOP

Call:

FP7-ENERGY-2012-1-2STAGE

Duration:

1 February 2013 - 31 July 2017

Budget:

5.8M euros
(EU contribution 4.2M euros)

New EU project proposal submitted

In September, ETN coordinating a consortium of 16 partners, submitted the SOLAR HUB project proposal under the call “Competitive Low-Carbon Energy” (H2020-LCE-2016-2017). The call is part of the Horizon 2020 funding programme’s “Secure, Clean and Efficient Energy” challenge, which is designed to support the transition to a reliable, sustainable and competitive energy system.



The PROTEAS Facility in Limassol, Cyprus

SOLAR HUB is a “demonstration-to-market” project of a Concentrating Solar Power (CSP) concept, and it provides heat and power within the 100 kW – 10 MW capacity range. The concept is well suited for isolated and local energy intensive contexts, such as rural areas, villages, resorts and factories, and it targets a niche but a huge market at size. It benefits from the most positive advantages of CSP technologies while avoiding the main drawbacks of state-of-the-art commercial CSP technologies. The concept has the possibility of hybridisation with other sources of thermal energy and of incorporating thermal energy storage, being fully dispatchable. Contrary to mainstream commercial CSP plants, it scales down well, and is therefore suitable for the use in distributed generation schemes. In addition, it scarcely consumes water making it suitable for desert environments.

The SOLAR HUB project draws upon the technological findings and outcomes of previous EU-funded projects, such as SOLHYCO, SOLGATE, OMSOP and NEXTOWER, and the expertise of its

consortium, which involves many of the most important European industrial and research partners in their respective fields of expertise. The project aims to demonstrate at TRL7 the full solar operability of a small scale micro-gas turbine based solar tower plant, overcoming technological barriers, such as low cost receiver up to 1000°C, high temperature

storage up to 800°C, mGT control and insulated piping, as well as non-technological barriers including social acceptance, grid compatibility and mirror washing water needs. The demonstration will be carried out in two real-size solar tower plants, one to be constructed in Turkey (hybrid configuration) and the other in Cyprus (solar-only configuration). ■



Greenway CSP Plant in Mersin, Turkey

INTERVIEW:

Alberto Traverso, PUMP-HEAT project coordinator

The EU funded PUMP-HEAT project (Performance Untapped Modulation for Power and Heat via Energy Accumulation Technologies) was kicked off in September. The objective of the project is to increase the flexibility of the Combined Cycle power plants and the operation of gas turbines. We interviewed the project coordinator Alberto Traverso, Professor of Energy Systems at University of Genoa, who leads the consortium consisting of 14 participants from 8 countries.



What is the background of the PUMP-HEAT project?

Natural gas fired Combined Cycle (CC) power plants are currently the backbone of EU electrical grid, providing most of regulation services necessary to increase the share of non-programmable renewable sources into the electrical grid. As a consequence, Original Equipment Manufacturers (OEMs) and Utilities are investigating new strategies and technologies for power flexibility. Current research activities for CCs flexibility enhancement (e.g. power ramp augmentation, Minimum Electrical Load - MEL - reduction) focus mainly on the GT and extend the operational envelop of this component, which is primarily constrained by emissions (typically, CO at low load and NO_x formation at full load). On the other hand, existing cogenerative CCs are usually constrained by thermal user demand, and hence they can provide limited services to the grid. At the same time, CHP plants are highly promoted for their high rate of energy efficiency (> 90%) and combined with district heating network they are a pillar of the EU energy strategy. PUMP-HEAT aims at an innovative approach to enhance CC flexibility through bottoming cycle innovations, applicable also to cogenerative CCs.

Why is the project relevant in the context of energy transition scenario and in achieving the EU 2030 Climate and Energy targets?

PUMP-HEAT proposes a solution that enables synergies between different energy networks, in order to provide more flexibility, more resilience and to allow a larger penetration of variable renewables.

Gas fired power plants will be affected by a slower retirement rate in terms of capacity (12%) compared with other types of power plants, therefore innovative solutions are needed in the already existing power plants to face the challenges of the current and future electrical markets. New investments and plants are foreseen particularly in Eastern Europe where the turn-over of such plants is already ongoing. New investments

and plans are also expected to cover the doubling of gas fired generation expected within 2035. According to all these issues, the foreseen NG based power capacity in 2030 will be around 230 GW starting from the current capacity of 191 GW.

What are the main objectives of the project?

To un-tap the unexploited reserve of flexibility in cogenerative CCs, and to further enhance turn-down ratio and power ramp capabilities of power oriented CCs, PUMP-HEAT project proposes the demonstration of an innovative concept based on the coupling of a fast-cycling highly efficient heat pump (HP) with CCs. The integrated system features thermal storage and advanced control concept for smart scheduling.

Can you tell us more about the technology to be used in this project?

In the PUMP-HEAT integrated concept, the following advantages are obtained:

- the HP is controlled to modulate power in order to cope with the CC primary reserve market constraints;
- the high temperature heat can be exploited in the district heating network, when available; low temperature cooling power can be used for gas turbine inlet cooling or for steam condenser cooling, thus reducing the water consumption;
- in both options, the original CC operational envelope is significantly expanded and additional power flexibility is achieved.
- the HP will include an innovative expander to increase the overall efficiency.

What do you hope to achieve with PUMP-HEAT?

In general, the CC integration with an HP and a cold/hot thermal storage brings to a reduction of the Minimum Electrical

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Load and to an increase in power ramp rates, while enabling power augmentation at full load and increasing electrical grid resilience and flexibility. The PUMP-HEAT concept could stop the mothballing of EU Combined Cycles, pushing new installations and the retrofitting of already existing power plants giving a second chance to such these crucial energy systems in the current and future energy scenario. The PUMP-HEAT technology will be able also to have technological impacts on the CC and GT power plants increasing the annual and seasonal efficiency up to 5%, reducing OPEX of 3%, increasing the possibility for such plants to sell more electricity on the Regulation and Ancillary Services Electrical Market, thanks to their increased flexibility and fast responsiveness (about a 30% of the generation could be sold on these markets at a 50% higher revenue) and reducing the number of start-ups of 5-10% and the related extra costs, equivalent operating hours (EOH) and wear. The PUMP-HEAT Com-

bined Cycle aims to become a new paradigm for GT and CC power plants recognised in both the technical and academic panoramas. ■



Project details

Total cost: EUR 5 904 426,25

EU contribution: EUR 5 904 426,25

Coordinated in: Italy

ETN comments on ETIP SNET Implementation Plan



ETIP SNET PLAN. INNOVATE. ENGAGE.

In July, 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. ETN is represented in the ETIP-SNET governing board by Sigrid Gijbels, Thermal Lab Manager (ENGIE – Laborelec), as a stakeholder of the Thermal Power Generation sector, both for centralised and decentralised power generation.

In order to properly represent the wide spectrum of ETN members, teleconferences were set up at the beginning of June within the Technical Committees TC1 – Low Carbon Gas Turbine Operation and TC2 – Operational and Fuel Flex-

ibility. Regarding the centralised thermal power generation, the ETN members agreed that the topics in the Implementation Plan give a very good overview of the R&D strategies of the sector. However the following complementary items could be taken in consideration:

- Large scale demonstration (TRL7) of hyperflexibilisation of existing CCGT plants through local integration of optimised combination of Thermal & Electrical storage.
- Development of new families of small size integrated hyper-flexible (open cycle) thermal power plants for better integration into local needs. The challenge is to break the paradigm size & temperature <-> efficiency.

- Investigate routes for retrofitting of (ex-service) shaft-lines into valuable rotating inertial reserve for valorisation on ancillary.

- Desalination (south of Europe).

With regards to the decentralised thermal power generation, ETN members highlighted that the issues described in the Implementation Plan are not taking properly into consideration the future research activities of the sector. Issues regarding micro gas turbines are mainly related to the stability of local grid, while for big gas turbines the discussed issues are related to the connection with the transmission grid. It was also emphasised during the discussions that the design of micro gas turbines is different from the big GTs, and therefore was proposed to add this as an additional topic in the Implementation Plan.

The draft Implementation Plan 2017-2020 can be found on the [ETN website](#) under the “SET-Plan Updates Action 4”. ■



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#CleanEnergy4All

#EnergyUnion

Dominique Ristori

DG Energy

Andreea Strachinescu

SETPlan official account

Upcoming meetings and events

Meeting/Event	Date	Location
ETN High Level User meeting*	3 October 2017	Genoa, Italy
ETN Workshop*	4-5 October 2017	Genoa, Italy
IGTC 2018 Conference Advisory Board meeting*	4 October 2017	Genoa, Italy
ETN Micro Gas Turbine meeting*	4 October 2017	Genoa, Italy
US-UK-ETN Collaboration meeting*	5 October 2017	Genoa, Italy
ETN Air Filtration WG meeting*	6 October 2017	Genoa, Italy
ME RoTIC 2017	10-12 October 2017	Dubai, United Arab Emirates
SGT5-4000F (GTUsers.com)	17 October 2017	Madrid, Spain
IAGT Symposium**	23-25 October 2017	Banff (Alberta), Canada
International Gas Turbine Conference 2018	10-11 October 2018	Brussels, Belgium

* Only for ETN members | ** 10% discount granted to ETN members

ETN Team



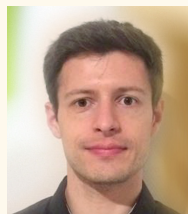
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ETN at a Glance!

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.



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