MINUTES OF THE PROJECT BOARD MEETING
OSLO, NORWAY, 19 JUNE 2013

Present:

Naser Sayma	City University London
John Oakey	Cranfield University
Peter Breuhaus	International Research Institute Stavanger
PeterJansohn	Paul Scherrer Institute
Heikki Oltedal	Statoil
Christer Björkqvist	ETN
Karen Geris	ETN
Apologies:	
André Zeijseink	-
Sauro Pasini	Enel

Agenda:

1. Welcome and approval of Minutes of the Brussels meeting
2. Restructuring of ETN Technology Committees
    a. Discussion on the name and key areas of the different TCs
    b. Updated Visions for the (new) TCs
3. Horizon 2020 programme status and ETN's R&D input to the EC
    a. Presentations by Peter Breuhaus (IRIS) and John Oakey (Cranfield University)
4. R&D recommendation report
5. ETN activities in 2013
6. Discussion set-up next Workshop
7. Next Meeting

1. Welcome and Approval of Minutes of the Brussels Meeting/Review of the action list

Peter Jansohn opened the meeting and welcomed the Project Board members.

Going through the minutes of the last Project Board meeting, Peter Jansohn clarified his statement in the Brussels Minutes (page 3) “Peter Jansohn suggested that a solution could be to decouple the gasification process from the CCS process” that the gasification could be decoupled from the rest of the process (the gas turbine) to stall the production of hydrogen (-rich syngas) during the gas turbine shutdown as the hydrogen would be difficult to store.

The Project Board approved the minutes of the Brussels meeting and discussed the action list.

The status of all actions is updated in the Annex I. The pending and on-going actions are detailed below with additional comments:

Christer Bjorkqvist updated the Project Board members on the cooperation between IEA and ETN, which consists out of the exchange of information. The IEA has already contacted ETN for technical input and have agreed to come to the next October Workshop to discuss the upcoming Energy Technology Perspectives report before it’s released to the public.
John Oakey suggested also cooperating with the IEA Greenhouse Gas Programme which is located in the UK as they have working groups in all CCS areas.

Karen Geris reported that there has been no response from Andre Zeijseink to emails. The Project Board agreed that ETN should discuss Andre’s involvement in the Project Board with him. If Andre indicates that he can no longer continue as Project Board member, a new Project Board member should be appointed by the ETN Board.

Christer Bjorkqvist proposed and the Project Board agreed it would be a good idea to, via student projects, set up a database defining the state-of-the-art on different topics related to gas turbines and power plant technology. Naser Sayma commented that it would be important to select students from universities that allow a longer time for students to write their thesis – at least 5-6 months. He proposed that the Project Board members could write an executive summary while referring to the reports of the student.

Action: ETN to follow up with IEA with regard to their presentation at the ETN October Workshop

Action: ETN to send the final version of the Terms of Reference to the Project Board Members and put them on the website.

Action: Heikki Oltedal to talk to Ken Tacon, rotating equipment advisor at BP about ETN Membership

2. Restructuring of ETN Technology Committees

A complete overview of the newly proposed five TC can be found in Annex II

John Oakey proposed to restructure TC1 and TC2 to include a TC which focuses on Low Carbon GT operation, as this would also present a stronger case towards the European Institutions. He volunteered to write the vision of this TC, after which the vision of TC2 “Operational and Fuel Flexibility” should also be rewritten.

Karen Geris reported that the chairmen for TC3-4-5 have indicated that they would like to continue to chair, however it would be necessary to find new chairmen for TC1-2. Naser Sayma indicated that it would be beneficial to have 2 chairs, preferably one from industry and one from a research industry or university. Karen Geris proposed to make a short list for possible chairmen which would then be discussed in the next Project Board Meeting.

Action: John Oakey to write a vision for TC1
Action: ETN to make a short list for new TC Chairmen for TC1 and TC2, preferably one chairman from industry and one co-chair from a research institute or university
Action: ETN to ask TC Chairmen to update their Vision/Research Areas

3. Horizon 2020 programme status and ETN’s R&D input to the EC

Christer Bjorkqvist updated the Project Board members on the status of the cooperation between ETN and EUTurbines. He stated that the European Commission had indicated that there would not be an opportunity for a Public Private Partnership (PPP) at this time but that there could be an opportunity in 2015.
Peter Jansohn indicated that he had heard that EUTurbines are currently reviewing which organisations could be responsible for the project management of their EC funded projects.

Christer Bjorkqvist shortly introduced the 3 proposals for calls which ETN submitted to their contacts at the European Commission. Christer Bjorkqvist also stated that EC would like to see more projects that address a certain problem, rather than focus on a specific technology.

Dispatchable CSP technologies through hybridisation with other power generation systems and thermal storage

Christer Bjorkqvist reported that a meeting is scheduled with representatives from the European Commission on 24 June. Representatives from Abengoa, GDF Suez and KTH will join ETN in the meeting.
Naser Sayma asked what research areas could be added to make this a larger project. Peter Jansohn proposed to add fuel flexibility to allow for market changes and changes in fuel which could be used for the co-firing. John Oakey suggested widening the scope of the project to include other renewables, however Karen Geris cautioned that the call should probably not become too wide as it would decrease the changes for the updated HYCOSOL proposal.

Action: ETN to ask previous HYCOSOL Consortium partners if they would still be interested in participating in a possible new hybridisation project.

Back-up power generation with flexible power generation systems maintaining low CO_2 emissions

Christer Bjorkqvist stated that any follow-up of the H2-IGCC project could fall under this call, focusing on flexibility.

John Oakey stated that it would be important to clarify that the technology would not back-up only in time of need, but would be a technology which complements the increased use of renewable through improved flexibility.

The following alternative title was suggested by the project board members: *Flexible power generation systems securing the electricity supply while maintaining low CO_2 emissions.*

CO_2 capture systems for Gas Turbine Power Generation

John Oakey stated that this is currently an important topic in the UK as it has become clear that to reach the 2050 targets, there should also be CCS on gas plants. The cost of capture would be relatively a lot higher as there is less CO_2 to capture from gas power plants but on the other hand there would be less CO_2 to store. Peter Breuhaus suggested that it would be possible to reduce the cost of CCS by building the power plants closer to the actual gas production site, if the CO2 could be stored in the Oil & Gas fielrds close to the end of their life, and thus the CO2 could be used for Enhanced Oil Recovery (EOH). Heikki Oltedal stated that there are better and less costly means for EOR and in addition, he stated that the technology to clean the carbon should be further improved first.

4. R&D recommendation report

The Project Board members agreed that the R&D Recommendation Report should be a living document in which the Project Board members describe recommended research under a certain amount of topics (see below). Each chapter should start with a 1-2 sentence introduction and be followed with a short description of general ideas and concepts that could result in future project proposals. As it is a living document, the Project Board members agreed that each ETN members should have the opportunity to comment and suggest additional topics or ideas.

The following topics were assigned to each Project Board member:

Heikki Oltedal	Reliability, Availabiliity and Maintenance
John Oakey	Materials and CCS
Naser Sayma	Operational flexibility and efficiency
Sauro Pasini	Sensors and instrumentation
Peter Breuhaus	Condition monitoring, advanced cycles
Peter Jansohn	Fuel flexibility and emissions

Action: Peter Jansohn to write short introduction to the R&D Recommendation Report by 1 September 2013

Action: All Project Board members to send their contribution to the R&D Recommendation Report to ETN by 1 September 2013

Action: Peter Jansohn to prepare a presentation for the upcoming ETN October Workshop in London.

5. ETN activities in 2013

The Project Board discussed the current on-going projects by going through the draft minutes of the ETN AGM and Workshop which was held in April 2013 in Pisa. Where applicable, one or two Project Board members were assigned per initiative and the initiative was *categorised* according to *the type of activity* that is performed in the initiative.

Combustion Instabilities – Peter Jansohn – *to be integrated in larger research project*
Peter Jansohn reported that he was contacted by Eugenio Giacomazzi and discussed the recommendation of the Project Board to include the topic in a larger, possibly EU funded project. The project could also be merged by the Fuel Flexibility Project as proposed by Ansaldo Energia at the April Workshop in Pisa.

Virtual Testing Project- Naser Sayma – *state-of-the-art-study*
Naser Sayma summarised the project group's request for financial support. David Sanchez (University of Sevilla) has offered to find a student to perform a state-of-the-art literature review for which minor expenses such as phone calls and possible travel would be covered by ETN. The Project Board agreed to grant the initiative €500.

Action: Karen Geris to contact David Sanchez to inform him about the Project Board's decision.

CFD Validation Study – Naser Sayma – *Research Project on hold*
The Project Board confirmed its decision that this initiative would be too theoretical for the ETN platform.

Shale Gas Study– Sauro Pasini and Andre Zeijseink – *Student Project*
The status of the Shale Gas Study was discussed under point 1.

Supercritical CO2 Power Cycle – *Research Project on hold*

Molten Salt/Turbine Exhaust Gases Heat Recovery Systems – *Research Project on hold*

CSP Integration of Gas Turbine Cycles by Solar Fuel Upgrading – *Research Project on hold*

Development of a burner concept for solar hybrid gas turbines– *Research Project on hold*

The Project Board members concluded that the above topics could potentially be included in a proposal under the CSP Hybridisation Call.
Peter Breuhaus stated that the work suggested by the "development of a burner concept" project has already been performed in at least one previous project, with a Turbec T100 microgasturbine.

Action: ETN to discuss and monitor upcoming EC calls to see if these projects could fall under the call.
Action: Karen Geris to put Peter Breuhaus in contact with Lund University with regard to the burner concept for solar hybrid gas turbines project proposal.

Fuel Flexibility And Sensors Project – Sauro Pasini

The Project Board members discussed that both Projects suggested by Ansaldo Energia at the April Workshop are in fact the same project. Peter Jansohn stated that the project proposes a list with very diverse issues – he recommended that Ansaldo Energia would prioritise the topics and start with the top 1-2.

Karen Geris reported that she has put the advanced sensors group, as well as the combustion instabilities and Ansaldo Energia in contact but unfortunately there has been little activity since. She proposed to send another email outlining the recommendations made by the Project Board

Action: Karen Geris to email all parties involved in the fuel flexibility project, the sensors project and the combustion instabilities project to discuss possible cooperation and outlining the recommendations made by the Project Board.

Hot Borescoping Project – Peter Breuhaus and Sauro Pasini – *Research Project*

Karen Geris reported that there had been a teleconference in which interested partners discussed the need for hot borescoping. The utilities have indicated that the need for hot borescoping is reduced as the power plants are operating less and less hours. Heikki Oltedal stated that Siemens Westinghouse already developed and patented a technique for high temperature borescope inspection,

Heikki Oltedal confirmed that this topic would be of interest to the Oil & Gas industry but the imaging should take place as the gas turbine is running. A thermal imagine should be made of each rotor blade as it passes the boroscope/stroboscope to check if the blades are properly cooled.

Karen Geris reported that the group decided to survey all ETN members (targeting users and maintenance companies) to see if there would be a business case for any of the techniques suggested by Alstom.

Action: Karen Geris to contact ETN members to complete the hot borescoping survey
Action: Karen Geris to add Heikki Oltedal to the hot borescoping project group contact list.

TBC Literature Study – Heikki Oltedal – *Best Practices*

Karen Geris reported that Ron van Gestel (Chromalloy) and Mareike Schneider (Vattenfall) are cooperating to make a database of available TBC papers. The next step would be to make a technology paper on the basics and the best practise of using TBCs in GT. John Oakey mentioned that John Nicols has written a lot of material on TBC which could be used for this purpose.

Action: Karen Geris to put John Oakey in contact with Ron van Gestel.

Filtration Technology Project – Andre Zeijseink – *Best Practices*

Karen Geris reported that the 3 filtration companies have written an invitation for a filtration workshop which is planned to take place in the second half of September. The Project Board members agreed that the invitation should clearly state an agenda and a date before it can be distributed to the members.

Action: ETN to contact the filtration companies to rewrite the invitation and agenda for the Filtration Workshop

Advanced Sensors Project – Sauro Pasini – *Technology Watch*

Peter Jansohn recommended that the group should focus on one technology and perform a project related to that sensor technology. Karen Geris explained that the project group writes papers according to input received by users at the AGM and Workshop 2012 in Berlin. She also stated that the group currently does not have a chairman as Alex Winterburn has left Oxensis. Christer Bjorkqvist suggested asking a person from Meggit to chair the Project Group.

Risk Based Inspection – Peter Breuhaus – *Best Practice Guidelines*

Condition Based Maintenance – Peter Breuhaus – *Pilot Project*

Heikki Oltedal stated that Statoil currently has a project with their suppliers on condition predictive maintenance, using standard measurable parameters.

Heikki Oltedal also named two research priorities within Statoil:
- Noise Reduction for the entire process, including the GT
- Increased compressor efficiency: washing, filtration and slipper coating for off shore turbines

Action: Heikki Oltedal to write short paragraph on each possible Statoil project to be send around to all ETN members

6. Discussion Programme October Workshop 2013

Christer Bjorkqvist stated that it was originally the intention to discuss the projects in more details at upcoming October Workshop. However, due to the limited activity within the initiated projects, it would not be a sufficiently interesting agenda to fill the Workshop programme.

Peter Jansohn suggested that the first preparations for the Horizon2020 calls could be made at the October Workshop by having a separate session for each call. Interested members could propose and discuss possible project proposals under each call. Afterwards, the group would break out in the different TC sessions to discuss the on-going project.

The complete October Workshop Programme as suggested by the Project Board can be found in Annex III.

7. Next Meeting

The Next Project Board meeting will be a teleconference to discuss the finalisation of the R&D Recommendation Report. Karen Geris agreed to send out a doodle?

NEW ACTION LIST

No	Responsible	Action	Deadline
1.	ETN	follow up with IEA with regard to their presentation at the ETN October Workshop	1 August 2013
2.	ETN	send the final version of the Terms of Reference to the Project Board Members and put them on the website.	1 August 2013
3.	Heikki Oltedal	talk to Ken Tacon, rotating equipment advisor at BP about ETN Membership	1 August 2013
4.	John Oakey	write a vision for TC1	1 August 2013
5.	ETN	make a short list for new TC Chairmen for TC1 and TC2, preferably one chairman from industry and one co-chair from a research institute or university	15 August 2013
6.	ETN	ask TC Chairmen to update their Vision/Research Areas	15 August 2013
7.	ETN	ask previous HYCOSOL Consortium partners if they would still be interested in participating in a possible new hybridisation project.	1 August 2013
8.	Peter Jansohn	write short introduction to the R&D Recommendation Report	1 September 2013
9.	All Project Board members	send their contribution to the R&D Recommendation Report to ETN by 1 September 2013	1 September 2013
10.	ETN	send R&D Recommendation Report to all ETN members	15 September 2013
11.	Peter Jansohn	prepare a presentation for the upcoming ETN October Workshop in London.	1 October 2013
12.	ETN	contact David Sanchez to inform him about the Project Board's decision on granting €500 for Virtual Testing Project	1 August 2013
13.	ETN	discuss and monitor upcoming EC calls for hybridisation projects	On-going
14.	ETN	put Peter Breuhaus in contact with Lund University with regard to the burner concept for solar hybrid gas turbines project proposal.	1 August 2013
15.	ETN	email all parties involved in the fuel flexibility project, the sensors project and the combustion instabilities project to discuss possible cooperation and outlining the recommendations made by the Project Board.	1 August 2013
16.	ETN	contact ETN members to complete the hot borescoping survey	22 July 2013
17.	ETN	add Heikki Oltedal to the hot borescoping project group contact list	1 August 2013
18.	ETN	put John Oakey in contact with Ron van Gestel.	1 August 2013
19.	ETN	contact the filtration companies to rewrite the invitation and agenda for the Filtration Workshop	15 July 2013
20.	Heikki Oltedal	write short paragraph on each possible Statoil project to be send around to all ETN members	1 August 2013

Annex I: ACTION LIST from MOM January 2013, Brussels, Belgium

No	Responsible	Action	Status
21.	ETN	Remind Project Board members of their actions at regular intervals.	Done
22.	ETN	Implement the discussed changes in the Terms of Reference and send the final draft to the Project Board members	Done
23.	ETN	Send the draft to the ETN Board for final approval and implementation at the upcoming board meeting.	Done
24.	Heikki Oltedal	Specify the priorities for Oil & Gas operators	Done
25.	Christer Bjorkqvist	Forward the IEA chapter to the Project Board for review.	Done
26.	Christer Bjorkqvist	Discuss the input from the ETN Project Board with Franco Rosatelli after the Project Board meeting.	Done
27.	Christer Bjorkqvist	Arrange a meeting between EUTurbines and ETN to discuss and agree on the final proposal to be sent to the EC	Done
28.	Karen Geris	Contact more Oil & Gas users (British Gas, BP, etc.) to join the ETN Exhaust Systems Project group.	On-going
29.	Andre Zeijseink	Put Karen Geris in contact with colleagues that have experience with ISO standards.	Follow-up
30.	Andre Zeijseink	Check with Desertec if funding would be available for the HYCOSOL Project	Follow-up
31.	Peter Jansohn	Contact Eugenio Giacommazzi to discuss the redrafting of the Combustion Instabilities paper.	Done
32.	ETN	Request ETN Members to complete their online company profile and clearly show their capabilities by linking to public reports	Follow-up
33.	ETN	confirm with the web administrator the possibility to include a search function of keywords for the organisation profiles	Follow-up
34.	Naser Sayma	Write a student project work plan and cost justification for the Virtual Testing student project	Done
35.	Christer Bjorkqvist	Send the IED input document to the Project Board.	Done
36.	Karen Geris	Send Andre Zeijseink the Shale Gas Study report	Follow-up
37.	Andre Zeijseink	Review the Shale Gas Study report	Follow-up
38.	Karen Geris	Monitor results from the gas Harmonisation Project	Follow-up
39.	Christer Bjorkqvist	Contact Ian McAfee to generate more specific questions to send to Sauro Pasini.	Done
40.	Karen Geris	Send the Filtration Paper to Andre Zeijseink	Done
41.	Andre Zeijseink	Review the Filtration Paper	Follow-up
42.	ETN	Confirm with Andre the possibility to give a presentation at the upcoming AGM and Workshop.	Done
43.	Peter Breuhaus	Contact Alstom to discuss their possible involvement in the Hot Borescoping Project.	Done
44.	Sauro Pasini	Contact Franco Rosatelli to discuss Ansaldo's possible involvement in the Hot Borescoping Project.	Done
45.	Karen Geris	Send the final report of the Risk-Based Decision Making Study to Peter Breuhaus for review.	Follow-up
46.	Karen Geris	Communicate the recommendations for the Condition Monitoring Project of the Project Board to Pascal Decoussemaeker and to include	Done

		the topic in the agenda at the upcoming Workshop.	
47.	Peter Jansohn	Compile outline of the yearly R&D recommendation report and send it to the Project Board	Done
48.	Karen Geris	Set up a teleconference to discuss the outline of the yearly R&D recommendation report.	Done
49.	Karen Geris	Send around a doodle to identify the date which is most suitable to hold the meeting.	Done

Annex II: ETN Technical Committees as proposed by the ETN Project Board June 2013

TC1: Low Carbon GT operation
Chair: TBD
Vision: to be written by John Oakey

TC2: Operational and Fuel Flexibility
Chair: TBD
Vision: Improved performance of gas turbine components and intelligent system integration will enhance fuel efficiency and environmental performance of future power generation units.

To have gas turbines capable of operating in an efficient, safe and reliable manner utilising a wide range of fuels for a broad operational range whilst minimising polluting emission such as NOx and aiming at zero CO2 emissions.

Research areas include:

- Increased plant flexibility and efficiency, including retrofit solutions;
- Optimisation of the gas turbine efficiency over a wide operating range;
- Development of hybrid gas turbine cycles (solar gas turbines, fuel cells, etc.).
- Faster start-up, power ramping times;
- Increased operational range, turn-down ratio with emissions below current levels
- Development of new combustion concepts (e.g. catalytic combustion, flameless oxidation, wet combustion,….
- Increased fuel flexibility for the use of broader Wobbe Index range fuels, such as Shale Gas, LNG Syngas, Hydrogen,….;
- Development of combustion processes in the “zero (CO2) emissions” environment, i.e. carbon capture and storage technologies.

TC3: Material Degradation and Repair Technologies
Chairman: Ron van Gestel, Chromalloy
Vision: To extend the ultimate life and repair interval for key hot section components by 30%.

Research areas include:

- Identification of the life limiting degradation models of the key gas turbine engine components;
- Extension of the predictability of the key degradation mechanisms;
- Extension of the limits of reparability;
- Consequences of repair processes on lifetime predictability.

TC4: Condition Monitoring and Instrumentation
Chairman: Chris Dagnall, GL Noble Denton
Vision: Beyond 25000 hours of continuous gas turbine operation. Optimisation of the overall gas turbine power plant equipment effectiveness, by a systematic coordination of all activities and an optimum use of the knowledge embedded in the organisation.

Research areas include:

- Replacement of boroscope inspection (such as pyrometer);
- Control and measurement of emissions;
- Damage detection and monitoring of components;
- Risk Based Decision Making.

TC5: Asset Management
Chairman: Pascal Decoussemaeker
Vision: The main objective of the TC is to further investigate and develop a specific GT related management approach that can be easily adopted by the user's organisations.

Research areas include:

- Risk Based Decision Making/ Risk Based inspection;
- Condition Monitoring;
- Condition Based Maintenance.

Annex III: October Workshop Agenda as proposed by the ETN Project Board June 2013

Wednesday 9 October 2013	
morning	**PLENARY SESSION** – Presentation from IEA – Inspiring Presentation about Open Innovation – R&D recommendation Report: • Reliability, Availability and Maintenance • Materials • Sensors and instrumentation • Condition Monitoring • Advanced Cycles and CCS • Fuel Flexibility and Emissions • Operation Efficiency and Flexibility – Short Presentation on the Proposed Horizon2020 calls
LUNCH	
afternoon	**2 PARALLEL SESSIONS:** – Hybridisation Call – Flexible Power Generation in Low Carbon Fuel Mix
Thursday 10 October 2013	
morning	**2 PARALLEL SESSIONS:** – TC1 & TC2 – TC3 & TC4 & TC5
LATE LUNCH	