

MINUTES OF THE BOARD MEETING BRIGHTON, UK, 13-14 OCTOBER 2011

Present:

Bernard Quoix, President (BQ)	TOTAL
Catherine Goy, Vice President (CG)	E.ON UK
Herwart Hönen, Treasurer (HH)	RWTH Aachen
Andy Williams (AW)	Wood Group
Gary Lock (GL)	Frazer Nash Consultancy
Giovanni Cerri (GC)	University Roma TRE
Jacques Maunand (JM)	EDF
Jonathan Clarke (JC)	Shell
Christer Björkqvist (CB)	ETN
Julie Linde Kjeldsen (JK)	ETN

Invited Observers:

<i>Abdulnaser Sayma (AS)</i>	<i>University of Sussex</i>
<i>Chris Dagnall (CD)</i>	<i>Cogsys Limited</i>
<i>John Witton (JW)</i>	<i>University of Cranfield</i>
<i>Ron van Gestel (RG)</i>	<i>Chromalloy</i>
<i>André Mom, President Emeritus (AM)</i>	<i>ETN</i>

Apologies:

<i>Pericles Pilidis (PP)</i>	<i>Cranfield University</i>
<i>Uwe Kaltwasser (UK)</i>	<i>MTU</i>

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Annex: Review of Action list from previous Board meeting (Paris June 2011)

1. Welcome

B. Quoix opened the meeting and welcomed the Board members, as well as Invited Observers: Abdalnaser Sayma, Chris Dagnall, John Witton, Ron van Gestel and André Mom (President Emeritus). P. Pilidis and U. Kaltwasser sent their apologies for not being able to join the Board meeting.

2. Review and Approval of the MoM Paris June 2011

The Board unanimously approved the June 2011 Board Meeting minutes.

3. Review of Action List from the MoM Paris June 2011

See Annex.

4. Review of ETN Activities Update

The Board took note of the update on ETN activities circulated ahead of the meeting by the ETN Office, and discussed the following points further:

ETN Documents:

B. Quoix suggested that documents specifically for the Board members for meetings should have clearer titles. Moreover, he suggested that the ETN Monthly News Summaries and the ETN Quarterly Newsletters should have clearer headings.

Preparations for the IGTC-12:

A. Mom highlighted the writing and sending of an invitation to the Head of the International Energy Agency, to the High-Level User meeting and Dinner Debate in the European Parliament, as well as the Keynote Session of the IGTC-12. CB spoke to the IEA's Head's secretary, who sounded positive about the opportunity, and will reply at a later date.

B. Quoix inquired about the progress of organising the meeting at the European Parliament, and it was agreed that C. Björkqvist will approach selected MEPs, as well as enquire with the ITRE Committee about selected dates, to ensure a wide participation.

Action: CB to follow up with the Head of the IEA, and to discuss availability for the EP event with the ITRE Committee.

5. Evaluation of the ETN Annual Workshop, and Proposal for the new ETN Internal Structure

The Board reviewed the ETN Annual Workshop, which took place on 12-13 October 2011 in Brighton, UK, and suggestions for improvements were given. It was agreed that the ETN internal structure should be reorganised, to generate a more project-focused and goal-oriented approach. Firstly, the barriers to progress of the current set-up were examined, after which a new internal structure, designed to address those shortcomings, was suggested.

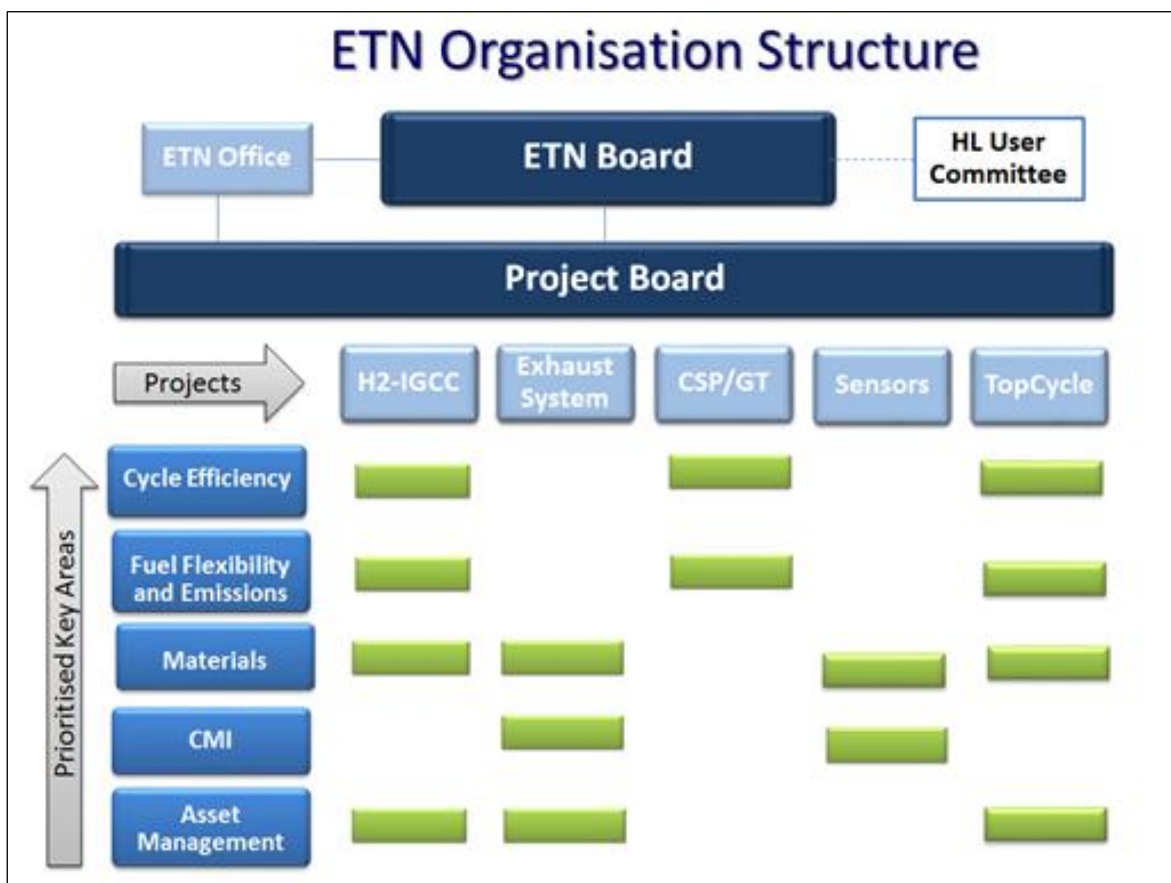
Barriers to progress:

- There is not sufficient participation from all the relevant stakeholders in the GT value chain. Moreover, it has been found that OEMs are often reluctant to share information, possibly due to confidentiality. It is crucial that participants to ETN meetings have background information on the issues that will be discussed, to ensure that the correct delegates attend, and so that they can get clearance from their organisation with regard to which information they can share.

- Themes discussed at Workshop are often not focused enough, and short presentations of initiatives lasting only 30 minutes cannot justify the participation of certain organisations for only that specific session. Moreover, parallel sessions obstruct the participation when two topics of interest are presented simultaneously.
- It is crucial that projects have a clear focus and goal, as well as a concrete roadmap with a timeline. This will enable participants to justify attendance to their management, as well as being able to present concrete results at the end of the meetings.

The proposed ETN internal structure:

To address the above issues the Board of ETN discussed the setup of a new internal ETN structure, which would lead to a more focused approach and more concrete results of successful projects. It was agreed that the selection process of projects has to be more structured and selective in order to ensure the quality and ultimate success of selected initiatives. The Board agreed that the best means of doing so is to setup a Project Board.



The proposed core new features and additions to the original ETN structures are:

- **The Project Board** will consist of Project Board members nominated by the ETN Board, from different interest groups in the GT value chain, in order to ensure sufficient expertise in all relevant fields. The Project Board will review proposed initiatives when initially submitted to ETN, in accordance with the requirements of the ETN Project Proposal template. They will suggest improvements and provide support for developing the initiative further, before it is evaluated by the ETN Board. The Project Board will also have the role of overlooking the progress of the individual projects, as well as

facilitating cooperation between the different projects, where there is an overlap of interest.

- The **High Level User Committee** will consist of high-level delegates, who meet on a biennial basis, to discuss which issues and topics are most interesting to them, and where they consider R&D GT development to be most urgently required. The discussions and results of these meetings will guide the Project Board, as well as serve as a compass for project proposals.
- ETN's current Technology Committees will exist as **Prioritised Key Areas**, which highlight the most important areas for further development externally, as well as guide the ETN Project proposals. They will be fluid concepts, which do not continue as distinct Committees with general meetings. At the next Board meeting the prioritised keys areas will need to be reviewed.
- There will be several **parallel ETN Projects**. Once an initiative has been selected to progress by the ETN Board a Project meeting will be organised with the interested parties. There, a clearly defined goal and roadmap will be determined, after which the initiative will be regarded as an ETN Project. Each Project will have a group of highly committed members which hold individual meetings on that specific Project.
- There will be an **Annual ETN Projects Meeting** where progress reports and the future outlook of each of the Projects will be presented to the wider ETN community. This will also ensure a continuation of ETN's tradition of promoting stimulating and successful networking within the gas turbine community.

Action: CB to formulate and present a clear representation of the structure as discussed, so that the final ETN internal structure can be agreed on by the ETN Board, implemented through the ETN Office, and presented to the ETN Community at the upcoming ETN AGM.

Action: potential Project Board members should be identified and contacted to judge their interest and expertise.

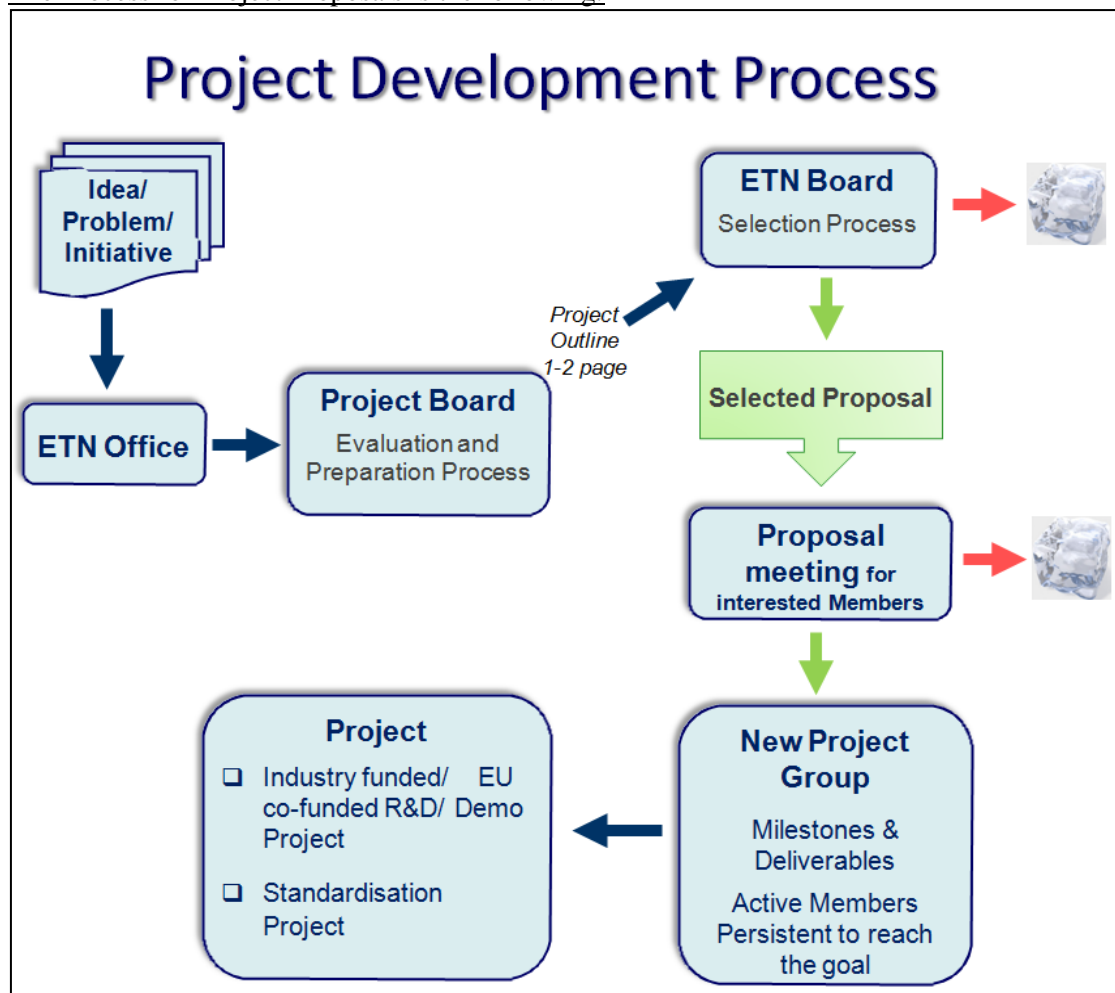
6. Review of the Evaluation Criteria and Process for Project Proposals

The evaluation criteria were discussed, and it was agreed that they should be used as broader guidelines for internal ETN initiatives, and as stricter conditions for ETN's EU-funded proposals. The Evaluation Process of Project Proposals has been amended to complement the new proposed internal structure of ETN.

The Evaluation Criteria are the following, marked out of a total 15 points:

- **R&D requirement:** Justification of GT technology development requirement (-/15)
- **Flexibility:** Progress of innovations towards more flexible GTs (-/15)
- **Efficiency:** Progress of innovations towards higher efficiency GTs (-/15)
- **Environment:** Progress of innovations towards environmentally friendly GTs (-/15)
- **International co-operation:** Stimulating increased international co-operation (-/15)
- **Clarity:** Clarity of project proposal (-/15)

The Process for Project Proposals is the following:



7. Review of the Progress of TC 3 and 4 Initiatives

C. Dagnall and R. van Gestel presented the progress of the various Project initiatives within their Technical Committees, and the next steps were discussed.

Sensors Activities:

It was discussed that the sensors initiative needs a more structured focus, and that a clearly defined roadmap should be developed. Ten people have shown initial interest, and now end-Users who have an interest are to be identified to bring the Project forward. A paper on the initiative is to be completed by December 2011, which can be circulated to provide information and identify members that can commit to work on the initiative. A conference call will be held in January 2012 with the committed group of partners to discuss the next steps.

Filtration paper:

The questionnaire which has been circulated was judged as being too long, hence it will be reviewed and redistributed, where after Antonio Munoz will call relevant ETN members to get feedback on it. It was discussed that this initiative has 'a push but not a pull', hence B. Quoix underlined the importance of clearly defining a roadmap, as well as the ultimate goal; namely: what is the best available technique?

B. Quoix mentioned that Total has already done a similar study which could contribute to the ETN initiative. Similarly, C. Goy (E.ON) and J. Clarke (Shell) said that they will explore the possibility of their organizations participating.

Thermal Barrier Coatings:

The next step is to generate and circulate a list of 15 topics of interest within this field to the ETN platform, which will then be condensed down to the three most popular. These topics will thereafter be discussed at a teleconference at the end of November 2011, to ascertain which has the best feedback and most interest from the wider ETN membership.

The Benefits of Emission Retrofits on the existing European gas turbine fleet.

VBR suggests looking into the alternatives for reducing emissions with low-cost solutions, as a means to complying with upcoming EC legislation. J. Clarke suggested broadening the scope of the study, so as to not only consider low-cost solutions, because, for example, Dry Low Emission is not an option on part-load. A literature study is to be performed by a university student, who can gathered further background information on future EC legislation, as well as do a state-of-the-art technology watch, including what developments are foreseen for the future.

8. Presentation and Review of ETN Educational Programme

The potential of an ETN Educational programme was previously discussed by the Board. J. Witton of Cranfield University presented a potential pilot programme for collaboration between ETN, Cranfield University and Total.

The course would run for two and a half days, with between 20-40 participants, for each individual course. The course would be largely based on discussion periods, with intense interaction between lecturers and participants. The courses centre on stationary, rather than aero engines, and can accommodate a very specific focus where requested, as well as incorporate industry case studies. The budget for the course has not yet been finalised, and would depend on provided facilities and logistics, however is expected to be approximately 1000 euro per person per course.

C. Björkqvist presented the course as an opportunity to offer tailor made courses to the benefit of ETN members, for professional development and to increase their level of technical knowledge. The Board agreed to proceed with the suggested collaboration.

Questions were raised with regard to the difference between this course, and similar courses offered by other institutions, for example at Leeds University and KTH.

Questions remain with regard to accreditation of the course through the relevant professional institution. A certificate will be offered to participants upon the successful completion of the course. Given successful running of the course accreditation may be an option in the future.

Action: Cranfield University is to progress with the organisation of the logistics of the course and to present the concrete modules which will be included in the course.

9. Presentation and Review of ETN Finances

H. Hönen presented the current state of the ETN finances, which are well in line with the budget. Due to the increase in membership it is expected that there will be a higher surplus than previously predicted for 2011.

Although the financial outlook of ETN is positive, C. Björkqvist emphasised the importance of finding an additional project income, to replace the H₂-IGCC project funding (expires November 2013), by year 2013.

C. Björkqvist reported that, apart from Neste Oil, GTE Sweden and new ETN members that joined since September 2011, all membership fees have been completed for 2011. The organisations that have not paid their membership fee for 2011 have been sent several personal reminders, and according to the representatives payment is in the process of being completed.

Moreover, potential interested members for the key sponsorship packages and the Expo should be actively sought for the IGTC-12 to ensure that the conference generates enough income to cover its costs.

Action: CB to follow-up on remaining membership fee payments for 2011.

Action: CB to send targeted emails to potential IGTC-12 sponsors and Expos to encourage them to partake and ensure their visibility at the conference.

10. Review of ETN Project Groups

The progress of the various ongoing ETN Project Groups was discussed, and next steps were suggested.

Exhaust System Project Group:

H. Hönen presented the progress of the PG, including that a clear roadmap has been defined, and a co-Chairman has been elected: Ole Torp (Mjorud). Next actions include finalizing the review and compiling a standard. It was decided to focus first on the Waste Heat Recovery Unit standard, and then at a later stage add the already existing API code on Heat Recovery Steam Generators. In order to validate the CFD used in the design of the exhaust system, a benchmark test will be needed. After an ETN standard or guideline has been determined, a long-term goal could be to include an ISO standard expert to evaluate it, during the year 2013.

The need for more Users involvement was highlighted, especially from the Utilities, in order to steer the group in the direction of their needs. C. Björkqvist has been discussing a potential involvement by Vattenfall with J. Jacoby, who will seek to identify a potential participant. C. Goy will also try to identify a delegate from E.ON who could participate. A. Mom pointed to new ETN member E.ON Anlagenservice as a potential participant, as well as the potential ETN member NEM (The Netherlands), who may be interested in participating if they join.

Shell actively participated in the start-up of this Project Group, and, like Statoil, has already provided its internal standards, to be further developed. However, at the last two meetings no representative from Shell partook.

Action: HH, CB and AM to urge more Users involvement in the Exhaust System PG, especially from E.ON Anlagenservice, Vattenfall and possibly NEM.

Action: CG to identify an E.ON delegate that can participate in upcoming meetings.

Action: JC to identify a Shell delegate that can participate in upcoming meetings.

Concentrated Solar Power for Gas Turbines Project Group:

The Project Group is in the process of preparing a Project Proposal to be submitted to an upcoming EC FP7 Call. The estimated total budget will be approximately 10 million euro over the course of 3 years, with 15 partners. If approved ETN would act as the coordinator and disseminator, thus receiving approximately 7% of the EC contribution.

Action: CB to ensure the submission of the Project Proposal to the EC by the first deadline of 25 October 2011.

Action: AM to review the proposal before submission.

Micro-Turbines:

A. Sayma reported that he is preparing a proposal for the EC 25 October 2011 Call, for a concentrated solar power system (CSP) coupled to micro-gas turbines, capable of producing electricity in the order of 10kW, and with the option of being stacked. The project would have 7 partners, with 3 SMEs, and 4 Research Institutes, with an estimated total budget of 5 million euro, over the course of 3 years. ETN's role would be as the disseminator of the information.

Action: CB to give A. Naser required support in submission process.

TopCycle Project Group:

C. Björkqvist presented the status of the TopCycle initiative, and outlined a suggested way forward. The response from the wider GT community has been positive, but there is a sense that the trustworthiness of the potential benefits needs to be increased through an independent review process. In order to facilitate this EuroTurbine AB must share all information with the independent committee, in order for them to carry out an evaluation.

The Board recognized the interesting potential of this initiative; however, they emphasised that the technical feasibility should be ascertained, before investigating the commercial feasibility of the initiative.

Action: CB should ensure that EuroTurbine AB is prepared to share the necessary information to perform a two-step independent feasibility study, to determine the technical and economic viability of the initiative, as well as to initiate this study.

11. Review of the Natural Gas Briefing Paper

C. Björkqvist highlighted that the Paper will need to be updated after the official publication of the EU Energy Roadmap 2050, on 13 December 2011.

J. Clarke highlighted the importance of keeping the paper continually updated, so that it is not static. A. Williams suggested that it should be published in conjunction with the biennial International Gas Turbine Conference, as part of the meeting package, and as a means to informing the participants of the conference of ETN's perception of the current gas market.

A. Mom suggested that Section 4.7 of the paper should be shortened to a summary, with the full text being referred to as an appendix. A. Mom is also to adjust conclusion of the briefing paper, to incorporate the positive role which gasified coal (and the results of the H₂-IGCC project) can play in the path to a future decarbonised Europe. C. Goy offered her help in reviewing it.

Action: AM and CG to edit Section 4.7, add an appendix and rewrite the conclusion of the paper as appropriate.

Action: CB to adjust the Briefing Paper where necessary following the publication of the EC's Energy Roadmap for 2050.

12. Upcoming ETN Activities 2011

TopCycle Meeting	November	Hosted by the University of Cranfield in the UK
H ₂ -IGCC Tour	7 December 2011	Alstom Research facilities
H ₂ -IGCC meeting	8-9 December 2011	Zurich, Switzerland, hosted by PSI
H ₂ -IGCC Tour	9 December 2011	PSI Research facilities
Board meeting	14-15 December 2011	Hosted by Total in Pau, France
Board meeting	8 February 2012	Hosted by Shell in The Hague
CAB 2012 meeting	30 January 2012	IMechI, London, UK
AGM & ETN Workshop	17/18/19 April 2012	Venue and date tbc
H ₂ -IGCC meeting	May 2012	Hosted by Enel in Venice, Italy

13. Closing of the Board meeting

B. Quoix thanked N. Sayma for hosting the ETN Board meeting at the University of Sussex, and closed the Board meeting.

ACTION LIST

No.	Action	Responsible
1	Review the proposed internal ETN structure, and prepare recommendations for improvements or alterations for the next Board meeting, in Pau, France.	ALL
2	The CNRS (Iskender Gokalp) ETN membership fee is still outstanding. CB to request payment for outstanding fee, interest rate and upcoming membership fee for CNRS. Once payment has been made BQ is to contact I. Gokalp to announce issue as closed.	BQ/CB
3	Collect short courses on GTs. Karen Geris to research courses on VGT's website, and make a summary to circulate to member and ask for similar courses.	CB
4	Investigate more cost-efficient WIKI hosting.	CB
5	Follow-up with EP and EC contacts for feedback on the position paper for renewables integration in the grid.	CB
6	Speak to Pennwell, organisers of the Powergen Conference, to discuss deeper collaboration with ETN.	AM
7	Follow-up with the Head of the IEA regarding participation in the EP HL User Meeting and Dinner Debate, and the Keynote Session of the IGTC-12.	CB
8	CB to inquire with the ITRE Committee about the availability for the EP event.	CB
9	Formulate a clear representation of the new internal ETN structure, to be approved by the ETN Board, implemented at the ETN Office, and presented to the ETN Community at the upcoming AGM.	CB
10	Potential Project Board members should be identified and presented to the Board.	CB
11	Progress with the organisation of the logistics of the Cranfield course and present the concrete modules which will be included in the course.	PP/JW
12	Send targeted emails to potential ETN member sponsors and Expos for the upcoming IGTC-12.	CB
13	Urge increased User involvement in the Exhaust System PG, especially from E.ON Anlagenservice, Vattenfall and possibly NEM.	HH/AM/CB
14	Identify an E.ON delegate that can participate in upcoming Exhaust System PG meetings.	CG
15	Identify a Shell delegate that can participate in upcoming Exhaust System PG meetings.	JC
16	Initiate an independent two-step feasibility study.	CB
17	Edit the Briefing Paper on Natural Gas by summarizing Section 4.7, adding an appendix and rewriting the conclusion of the paper.	AM/CG
18	Adjust the Briefing Paper where necessary following the publication of the EC's Energy Roadmap for 2050.	CB
19	Contact Siemens (Uwe Pagenkopf) regarding ETN membership.	CB
21	Contact MAN (Ulrich Orth and Sven Boye) regarding ETN membership, as a prerequisite to allowing them to participate in the ETN CSP-GT Project Proposal.	CB

22	Contact Volvo (Simon Raymond) regarding ETN membership.	UK
23	Contact Helsingin Energia (Sauri Makinen) regarding ETN membership.	CB
24	Contact Exxon Mobil regarding ETN membership. BQ to inquire through M. Pepper who is the appropriate European contact, and GL to visit their offices if situated in the UK.	BQ/GL
25	Contact Gasunie regarding ETN membership.	AM
26	Contact GE Energy (Emmanuel Kerrand and Yves Menat) regarding ETN membership.	BQ
27	Contact Tanque Poline regarding ETN membership.	UK
28	Contact Turbocare (Helge Reymann, Frits de Jong) regarding ETN membership, and the meeting their Italian and Dutch offices are having to discuss it.	CB/AM

Annex

Actions (from Board meeting, Paris June 2011)	Outcome / Next action	Responsible
The outstanding CNRS (Iskender Gokalp) ETN membership fee is still pending.	<i>Ongoing:</i> BQ sent three emails, and only received an answer to the first. CNRS works with EDF and JM also urged for the closure of the issue. CNRS now wishes to re-join ETN, and has been sent an invoice for the outstanding fee, including interest, together with their upcoming membership fee, which is now pending. It is a different department within CNRS, so BQ will write to I. Gokalp once issue has been settled.	BQ/CB
Werner Krebs to speak to Uwe Pagenkopf (Siemens) about ETN membership. CB to follow up.	<i>Ongoing:</i> W. Krebs has apologised for delays, and U. Pagenkopf has agreed to membership. CB to identify who is to receive the membership fee invoice and send it.	CB
Contact Linz AG regarding 2012 membership.	<i>Ongoing:</i> Alexander Hess (?) is interested in ETN membership in 2012, and asked to be contacted in March, in time to attend the ETN AGM taking place in April 2012.	AM
Contact Ulrich Orth and Sven Boye from MAN, regarding ETN membership, to allow them to participate in the CSP-GT group.	<i>Ongoing:</i> CB to get final confirmation prior to submitting the GT-CSP proposal with MAN included.	HH/CB
Follow up with the new boss of Simon Raymond at Volvo later this year regarding ETN membership.		UK
Follow up with Mike Pepper and Richard Huttington (through David Griffith) at Exxon Mobil on membership. Once the October Workshop agenda is finalized, it should be sent to both.	<i>Ongoing:</i> Invitation to the ETN Annual Workshop was sent, but no one attended. BQ to ask M. Pepper who is the appropriate European contact. GL possibly to visit their offices, if in the UK.	BQ/GL
Send Gasunie the new Briefing Paper on the Role of Natural Gas.	<i>Ongoing:</i> AM held meeting to discuss briefing paper and membership. AM to contact appropriate person within Gasunie to progress on ETN membership.	AM
Follow up with GE Energy (Emmanuel Kerrand, Yves Menat) on potential membership.	<i>Ongoing:</i> GE Energy is currently reorganising and has cut research activity. BQ will follow up to inquire what the current status is on the prospect of them joining ETN.	BQ
Ask TC leaders to collect short courses within their TCs ahead of the Workshop.	<i>Ongoing:</i> CB to follow up and combine with educational courses. Karen Geris to research courses on VGT's website, make a summary and circulate it, to ask for similar courses.	CB/KG

Contact ETN user members to provide a list of their GT fleet in Europe and globally.	<i>Suspend.</i> The benefit of this list was questioned, given the availability of other similar guides, as well as the amount of time which would have to be invested to keep it up-to-date.	CB
Follow up with key contacts who have already received the position paper on renewables integration in order to collect feedback.	<i>Ongoing:</i> feedback received so far has been positive. CB to follow up with EP and EC contacts for further comments.	CB
The Board Members were asked to copy in the ETN office when forwarding the ETN position paper, in order to monitor who has received it.	<i>No action.</i> EC support is needed to incentivize R&D, as it is not commercially interesting for the GT market to fill the gap caused by intermittent renewables.	All
Discuss with K. Broichhausen the exchange of services for ETN membership.	<i>Suspend.</i> K. Broichhausen has accepted ETN's offer, and will discuss it further with Schuh Group's Board to get final approval. The Board recognizes it as an interesting opportunity for ETN, however believes it should be postponed until after the current restructuring.	CB
Provide feedback from Board to the Advanced Sensors Initiative group.	<i>Ongoing.</i> A good discussion during the ETN Annual Workshop, but the Initiative is missing a clearly defined structure and more input from Users and OEMs. Discussed further during Brighton Board meeting in Section 7 of the Brighton MoM.	CB
Speak to Pennwell, organizers of the Powergen Conference, who are interested in more collaboration with ETN.	<i>Ongoing.</i>	AM
Contact Linz AG in March 2012, regarding 2012 membership.	<i>Ongoing.</i>	AM