

DRAFT REPORT : 2nd CONFERENCE

CONSULTATION FORUM FOR SUSTAINABLE ENERGY IN THE DEFENCE AND SECURITY SECTOR (CF SEDSS)

EXECUTIVE SUMMARY

Around 130 experts from 27 EU Member States' national defence administrations and armed forces, together with industry, academia, and NATO representatives and colleagues from the staff of European Commission's Director General (DG) for ENERGY and the Executive Agency for Small and Medium-sized Enterprises (EASME), participated in the second of a series of five conferences of the Consultation Forum for Sustainable Energy in the Defence and Security Sector (CF SEDSS), in Dublin. CF SEDSS is a European Commission initiative managed and delivered by the European Defence Agency (EDA) in collaboration with DG ENERGY.

At the opening plenary, it was clear that there is scope for the Commission and the Defence sector to continue working collaboratively, facing the common challenges to move towards more sustainable energy policies and practices together, and realizing the benefits for Defence while contributing to broader EU objectives. In the follow-on parallel sessions, the three working groups focused on how to work collaboratively with a view to establishing sustainable energy projects, to build knowledge and to capture best practice.

The Consultation Forum also offered a useful opportunity to highlight broader EDA Energy and Environment Programme activities. At this event, an official announcement was made on the inception of the Smart Blue Water Camps project, which although centred on more sustainable management of water resources in military environments, will also deliver opportunities for improved energy management.

The main theme of the closing plenary was finance. Presentations from DG Energy's representatives explained the detail of European funding mechanisms covering the European Energy Efficiency Fund and European Local Energy Assistance. Although there were identifiable procedures to follow to gain access, the presenters acknowledged that Defence Infrastructure is a complex area requiring careful handling to follow the European Investment Bank's financing regulation regarding the military and, specifically, some treaty based restrictions for the use of European funding for defence purposes. Other presentations covered the H2020 and LIFE programmes and the specifics of their application processes. The key messages also served to underline what could be achievable for Defence through European Structural and Investment Funds.

Details of the proceedings of the three Working Group are contained within the attached annexes.

Keynote Speakers

The plenary session was opened by the Assistant Secretary General and Defence Policy Director at the Irish Department of Defence, Mr Ciaran MURPHY; the EDA Chief Executive, Mr Jorge DOMECCQ; and the Chief Executive Officer of the Sustainable Energy Authority of Ireland (SEAI), Mr Jim GANNON; with a video message presented from the Director General for Energy at the European Commission, Mr Dominique RISTORI. The closing address was given by EDA Director European Synergies and Innovation, Denis ROGER. A short extract from their speeches is included below.

Mr Ciaran Murphy, Assistant Secretary General (ASG) and Defence Policy Director at the Irish Department of Defence, delivered a speech on the behalf of the Minister with Responsibility for Defence, Mr Paul Kehoe T.D.. The ASG, introduced the Irish Defence Forces approach to energy management and the progress made. The Irish Defence Forces had achieved ISO 50001 certification (the International Energy Management Standard) in 2012, Mr Murphy highlighted the high priority that energy efficiency had enjoyed for a number of years to improve overall cost-effectiveness. The

Irish Defence Forces are committed to the Irish Government's approach to energy management, which sets ambitious targets and has also worked hard with key partners such as the Sustainable Energy Authority of Ireland.

The European Defence Agency Chief Executive, Mr Jorge DOMECCQ, explained that the Defence sector and the Commission were promoting dialogue and, where possible, building cooperation in areas of common interest: with its origins in the 2013 Commission communication "a New Deal for European Defence", the Consultation Forum is an example of this joint approach. He continued by highlighting that the European Defence Action Plan offered an additional opportunity to exploit wider EU policies and navigate the increasingly blurred divide between the civilian security and defence sector. With the need to promote efficiency and diversification of fuel sources to increase security of supply, Mr Domeccq pointed out that managing energy would be a key aspect of European Strategic Autonomy and that the Consultation Forum could be a catalyst for achieving the EU's wider energy and climate objectives.

The Chief Executive Officer of the Sustainable Energy Authority of Ireland, Mr Jim GANNON, set out the leading role which SEAI played in transforming Ireland to a society based on sustainable energy structures, technologies, and practices. He explained that the use of recognized standards in energy management provides a structured approach to improvement, including in design, and that the Irish Defence Forces have been an exemplar in the public sector. Mr GANNON concluded by emphasizing the central importance of national and international collaboration and knowledge-sharing to pursuing successfully the delivery of sustainable energy.

Mr Dominique RISTORI, Director General for Energy at the European Commission spoke of the major economic opportunity for the Defence sector that the energy transition represents. He encouraged delegates not to become complacent with any early success, but to continue the momentum alongside support provided by DG Energy staff and specialists including EASME. Mr RISTORI continued by reminding the audience that the scope of the Consultation Forum was limited to permanent military, and not military operations. He concluded by acknowledging that the lack of financial instruments presented an obstacle, but that staff were being made available through the Consultation Forum to help explore this and contribute to Europe's Armed Forces meeting their strategic objectives.

In his closing address, **EDA Director European Synergies and Innovation, Mr Denis Roger**, reminded delegates that the Consultation Forum was a detailed examination of the technical, monetary, and organizational aspects required to improve defence infrastructure thereby enhancing working conditions, reducing stretched budgets, and contributing to national energy action plans. Mr Roger explained that it provides a unique opportunity for Europe's armed forces to develop their resilience and autonomy in cooperation with national programmes and international partnerships.

THE WORKING GROUPS

In three parallel working groups, experts from the defence and energy sectors shared information and best practice on improving (1) energy management, (2) energy efficiency in buildings and (3) the use of renewable energy sources (RES) in defence. The objectives of the sessions was to explore the scope of possible cooperative opportunities for establishing sustainable energy projects and to increase overall knowledge within the Defence community of the possible benefits that could accrue through better energy efficiency and improved penetration of RES.

Working Group 1: Energy Management

For Working Group 1, there were a number of presentations on experiences of energy management systems and discussions on the practicalities of implementation. Delegates shared thoughts and challenges on the role of the defence sector on the implementation of the Energy Efficiency Directive (EED) and on Energy Management Systems.

It was acknowledged that, although it is unanimously accepted that energy efficiency is a military capability multiplier, Member States were at different stages of implementation of energy management practices. Some of the general findings were that Member States tend to have a reactive approach, and where there is high level commitment to improving performance that this is not always backed up by targeted action such as having dedicated energy managers. Also, in most cases, MODs rely on their own budgets and have not benefited from any extra funding for implementation of management systems.

The main outcomes included agreement to establish a collaborative energy management improvement model which Member States would need to baseline, and to track and improve energy management principles in the Member States' Armed Forces. Action needs to be taken on training, communication, and the use of specific aspects of policy tools such as the continuous improvement cycle.

Working Group 2: Energy Efficiency

WG2 focused on two aspects of the Energy Performance of Buildings Directive; renovation of existing buildings, both low cost and deep renovations to NZEB standards, and heating, air conditioning and technical building systems requirements, and the applicability to the defence sector.

The variability in the interpretation of the NZEB concept across the EU was noted. Delegates generally agreed that a cluster approach to the NZEB concept is more appropriate for the Defence sector than a single building approach because of the configuration of Defence estates and the associated opportunities for energy efficiency gains. It was also identified that a comprehensive methodology and holistic approach to implementation of energy efficiency projects was part of a project's success criteria.

Building on potential collaborative initiatives identified during the first meeting of the Consultation Forum, two project proposals were presented and discussed: the creation of Defence specific reference building energy benchmarks, and the refurbishment of existing military buildings/sites with civil or dual use to NZEB standards.

Delegates supported the outcomes of the Concerted Action that EPBD provisions on building technical systems are not effective. The required inspection reports are too complex to prepare and then to understand, requiring a level of knowledge that users may not have; and there is no obligation to act on the recommendations.

A series of case studies were presented on low cost and deep renovations. It was generally accepted there are many potential applications of energy efficiency measures, both technical systems and building envelope, in the Defence sector although currently renovations take place on an opportunity basis.

Working Group 3: Renewable Energy Sources

The presentations and discussions covered all of the major RES technology areas identified in the first session, including: solar, wind, small-scale hydro, biomass, geothermal, energy storage, fuel cells and smart grids.

The importance of local business cases was a common theme especially since RES penetration in the deployed environment was more advanced than in 'at home' situations, and that to improve the position would require concerted action to persuade senior officials of the benefits for fixed military infrastructure.

The working group meeting offered some delegates their first exposure to aspects of RES technology and served as an important capacity building initiative to improve understanding and to generate collaborative activity. There was agreement to cover a further range of technical solutions to the renewable technologies options for MS armed forces transportation at the third meeting which could lead subsequently to the selection of topics that MS might pursue for collaborative projects.

The session concluded with a short review of outstanding items from the Programme of Work. Member States representatives would need to analyse and digest the material presented and associated discussions, and return to the group with agreed priorities, ideas, and proposals prior to the third event in Italy with the view to identify collaborative opportunities at the fourth and fifth meeting.

HORIZONTAL CONSIDERATIONS

This section of the report summarizes some of the main themes to emerge, alongside some observations and suggestions which could be developed further to inform the final deliverable.

National Contact Points

The active participation of National Contact Points (NCPs) was critical to the overall success of the Consultation. At a separate meeting with these designated focal points, it was explained that their role is to coordinate and lead each Member State's delegation. Of equal importance, the NCPs would be used to staff the final reports and deliverables of the Consultation Forum: it was therefore vital that each Member States designates a single NCP with which EDA can liaise so that the most suitable product can be developed for Member States.

Common themes and observations for the way ahead

A number of common themes emerged, notably:

There is **wide variability within the approaches** taken by MODs and the stages that have been reached in improving performance and delivering more sustainable approaches to energy. Also variability in interpretation of the requirements, standards and targets has led to different approaches being taken by different Member States, and sometimes within regions of Member States. This could affect the design of projects and may have implications for the sharing of knowledge and good practice; the challenge could be to do this in a way which is relevant across the Defence sector and may mean that national administrations adopt generic guidance and implement this according to their own national priorities and ways of working. However, another observation was that regional reference points and guidance could be more applicable for the Defence sector than those developed on a national level as this should aim to take account of environmental variation and operating conditions. Evidently, this will need to be addressed in the development of the final deliverable.

Action on energy can be reactive and not proactive: despite the majority of Member States having high level policies, it is not always built in to strategic planning. As such integration of energy improvements in Defence projects tend to take place on an opportunity basis in the absence of a specific responsible owner for energy management or a dedicated budget, with the problem subsequently compounded at military unit level.

Delegates also identified that there is **a lack of cultural awareness, expertise, and training opportunities**. This is apparent for instance in the lack of clear policy on the procurement of energy-efficient products which is a requirement on the public sector in the Energy Efficiency Directive. It is also apparent in the lack of available business cases for investment in renewable energy projects.

Finance was again raised as a core issue regarding the challenges and constraints of the complexity and inaccessibility faced by the Defence sector to EU funding mechanisms. For instance, different phases of a project may need to be funded through different mechanisms, and may not always realize 100% funding. As funding had been raised previously, presentations given in the closing plenary covered the European Energy Efficiency Fund (EEEF) which is a public-private partnership dedicated to mitigating climate change through market based financing; and the European Local Energy Assistance (ELENA) which can be used to co-finance any type of assistance necessary to prepare, implement and finance an investment programme, i.e., 'the brains and not the bricks'. Although Armed Forces infrastructure and equipment is a complex area, given the limitations of the European Investment Bank financing rules regarding the military. There was also an EDA presentation on European Structural and Investment Funds (ESIF) and what is achievable for Defence through dual-use technology applications. There was a final presentation covering Horizon 2020 which reflects the policy priorities of the Europe 2020 strategy through seven challenges including one on energy design to support transition to a reliable, sustainable and competitive energy system; and the LIFE programme which is the EU's funding instrument for the environment and climate action.

Finance and funding options are evidently areas which will need to be addressed comprehensively in the final deliverable. Through-life costing for projects should embrace all elements of energy related procurement, storage, distribution and management which should, through an evidence-based approach, help address the institutional challenges faced including lack of understanding and commitment throughout the management chain and different professional functions. This should drive changes including tapping in to cost savings made through investment in energy being translated in to capital for reinvestment in broader military requirements.

Protection of Critical Energy Infrastructure

Protection of Critical Energy Infrastructure (PCEI) was addressed during this second conference. Member States with an interest in this topic were invited to attend the next meeting of the PCEI Expert Working Group which was held on 17 October in Brussels. A conceptual paper will be drafted and further progress updates given at forthcoming Consultation Forum events.

ADDITIONAL BENEFITS

Smart Blue Water Camps

Consultation Forum outputs also inform decisions on the direction of the EDA's wider Energy and Environment (EnE) Programme. CF SEDSS serves to raise the profile of the EnE programme, including by being used as a platform to advertize broader EnE programme work. As such this second conference saw the announcement of the Smart Blue Water Camps ad hoc project which was launched in 2016 and seeks to examine water management on Defence land from hydro-informatics, conservation, sustainability and technological innovation perspectives.

This EDA supported and coordinated project is led by Greece with Cyprus, Italy, Ireland, Portugal, and Spain participating with technical contributions and the provision of sites in each of their national territories.

NEXT MEETING

The third conference takes place on 22 – 24 November 2016 in Rome, Italy. The event will build on the progress made in the previous two conferences. The event will incorporate the role of human factors – training and behaviours – in improving energy management and efficiency, as well as renewable energy in defence transportation. There will be an amendment to the format, with meetings beginning on lunchtime of day 1 and concluding at lunchtime of day 3 to facilitate ease of travel for participants.

Consultation Forum for Sustainable Energy in the Defence & Security Sector
2nd Conference, Dublin, 8th & 9th June 2016
Working Group 1 Report: Energy Management

Working Group Nr: 1

Names: Lt.Col. Nektarios ALEXANDRIS (EL MoD)
Dr. Gintaras LABUTIS (LT MoD)

No of Member States/Participants: 20 / 37

In a nutshell

During the second CFSEDSS meeting 29 delegates from 20 M-S MoDs, together with 7 participants from industry and a delegate from the NATO Energy Security Centre of Excellence (EnSec CoE) shared thoughts and challenges on the role of the defence sector on the implementation of the Energy Efficiency Directive (EED) and in particular on Energy Management Systems. It was acknowledged that, although it is unanimously accepted that energy efficiency is a military capability multiplier, there were different levels of progress of Energy Management among participating Member States (pMS).

Key content elements

- 1) Briefing on WG1 programme of work and progress so far (including the report on the 1st meeting as well as the key findings of the 1st questionnaire).
- 2) Briefing on WG1 Terms of Reference.
- 3) Discussions on elements of EED and how the MoDs are or will have be involved in the future: Energy Audits and Energy Management Systems (EnMS).
- 4) Presentations on the following topics were conducted:
 - a) “Energy Management and Energy Efficiency in Reduto Gomes Freire”, by Mr Natanael Cartaxo (PT MoD).
 - b) “EED Provisions on Energy Management Systems”, by Lt. Col. Nektarios Alexandris (EL MoD).
 - c) “Introduction to Energy Management Systems”, by Mr Liam McLaughlin (GEN Europe).
 - d) “Energy Management System – Existing Structures and Challenges in Irish Defence Forces”, by Capt. Adrian Quinn (IE Defence Forces).
 - e) “Implementing ISO 50001 EnMS on La Valbonne Camp Feedback”, by Mrs Delphine Labry (FR MoD).
 - f) “ISO 50001:2011 Implementation in the Hellenic MoD – LIFE11/ENV/GR/000938 Military Energy and Carbon Management Project”, by Mr Konstantinos Sioulas (EL Centre for Renewable Energy Sources and Savings).
 - g) “Energy Management Systems vs Environmental Management Systems”, by Lt. Col. Nektarios Alexandris (EL MoD).
 - h) “Benefits from the Implementation of EMAS at a Military Campus”, by Dr. Ioannis Glekas (Aeoliki Ltd – external consultant of CY MoD).
 - i) “Energy Efficiency Action Plan of FIN Defence”, by Mr Sami Heikkilä (FI MoD).

- j) “The concept of Energy Maturity”, by Dr Gintaras Labutis (LT MoD)

MS experiences/key Discussion points

- 1) The EED was further explored with respect to EnMS.
- 2) Generation of common knowledge and introduction on EnMS (key points and examples of implementation within the MoDs).
- 3) Comparison between Energy Management Systems (EnMSs) in accordance with EN ISO 50001:2011 and Environmental Management Systems (EMSs) in accordance with ISO 14001:2004 / 14001:2015 and Regulation (EC) 1221/2009 (EMAS III).
- 4) Examples of energy efficiency action plans within MoDs.
- 5) EDA Energy & Environment WG project on Energy Managers’ Course.
- 6) Discussions took place on:
 - a) The applicability, benefits and challenges of EnMSs in the defence sector. In detail, commitment on real energy improvements, energy strategy / policy, energy management audits, objectives, plans, monitoring, management reviews, organizational structure for supporting an efficient EnMS.
 - b) The differences and common ground between Energy and Environmental Management Systems.
 - c) Assessment tools and roadmaps to close the gap between EED requirements on EnMS and existing MoD energy strategies and programmes.

Main findings and achievements

Main Findings on Energy Management:

- 1) The most important finding is that pMS MoDs are at different stages in the application of Energy Management improvements. To have more specific discussions and conclusions during CF SEDSS, the pMS have to take this into consideration. There was a general understanding that Energy Management was referenced but not specifically identified in pMS Military and Defence Systems missions and key directions.
- 2) The majority of pMSs have existing Energy/Resource Policies, however their alignment with key Strategic Objectives was not always clear. The experts stated that in general there were reactive, the target-driven and reflective energy management strategies. It was also stated that for the future, real-time and proactive target-driven Energy Management will be required, with different roles of military management depending on where the energy is managed (single military base energy demand reduction vs high view monthly energy consumption reporting).
- 3) Energy efficiency in general has been mentioned only as a broad responsibility of "all commanders". In most cases, energy was identified as a responsibility in overall military and defence systems, but a specific leader/commander has not been assigned as the energy management owner.

- 4) The establishment of Energy Performance Indicators requires the involvement and commitment of senior level military management.
- 5) Energy efficiency improvement plans with broad objectives have been established at the top level. However, in most cases it was mentioned that there were no specific energy performance improvement plans with actions and targets assigned to every single military unit. Furthermore, it is expected that wide communication on energy-related issues among military units and military formations would lead to dissemination of good practice that has not been established yet.
- 6) There is a common understanding that the reduction of energy usage is important for military energy budgets as well as for reducing resource-spending and greenhouse gas emissions. Nevertheless, the above mentioned understanding has not led the defence sector to a relevant cultural energy management transformation/change. Moreover, there is still significant room for improving training on energy efficiency and determining core skills for energy management, a topic to which EDA and NATO will strive to address. There are still only a few but successful examples on energy efficiency training and Energy Management mind-setting.
- 7) In general, energy management review meetings as the tool for continuous improvement are not established. Annual progress supported with general Energy Performance Indicators is reported at the top commanders' level and in most cases only isolated energy management processes are in place. In a number of pilot project cases, the periodic energy efficiency meetings are held to review progress and capture actions towards stated objectives.

Main Findings on Energy Management Systems:

- 1) EnMS is a strong tool to assist MoDs in increasing their energy performance.
- 2) The ultimate goal of EnMS application within the defence sector is the continual improvement of energy performance to increase military capabilities.
- 3) ISO 50001 is a generally acceptable EnMS and has an integrated approach based on life-cycle analysis.
- 4) Environmental Management Systems (EMSs), such as ISO 14001 and EMAS III, to the extent that they include energy aspects, may be suitable for energy management.
- 5) Although certification of EnMS / EMS is required by EED when stand-alone energy audits are not carried out and certification by itself can also enhance the public image of the defence sector, it should not be the ultimate goal when applying an EnMS / EMS.
- 6) In most cases, MoDs rely on their own budgets and have not benefited from any extra funding for implementation of EnMSs and/or EMSs.
- 7) On the application of EnMSs / EMSs:
 - a. Commitment of all levels of military management is required:
 - (1) Top – level managers initially agree on the necessity of improving energy efficiency, however, embracing the concept and support with required resources is not always sustained afterwards.
 - (2) Middle – level managers (i.e., commanders) play the most crucial role in the tactical – operational level.
 - b. Commanders' commitment is achieved in the cases where cost reduction and/or enhancement of operational capabilities is pursued / expected.

- c. The axiom of all types of management systems based on the statement that “only what is measured leads to a defined improvement” leads to the necessity of appropriate energy data collection and consequent analysis as the first step for a successful EnMS within the defence sector.
- d. Awareness and active participation of all military personnel (to the extent of one’s duties) is of paramount importance.
- e. Tailored (micro-) training is required to various personnel groups for implementation of EMSs – EnMSs.
- f. Energy managers at the operational / military camp level are in most cases appointed with other priority and time-consuming tasks.
- g. Energy management requires multi-tasking, it affects most professions and specialties within the defence sector and should not be restricted to engineers’ the programme of work . The key personal competence for the energy manager profile is enthusiasm for energy efficiency rather than technical knowledge / skills.
- h. Easy financial wins based on no/low cost actions can boost an EnMS / EMS at the beginning, however, in order not to lose the momentum, the commitment to allocate resources has to be pursued.
- i. The selection of appropriate Energy Performance Indicators is critical. Some “popular” EnPIs can be misleading.

The way ahead

- 1) There was a need to:
 - a. Have concurrence on the ToRs.
- 2) Prepare the Assessment of progress levels of energy management and EnMS within the MoDs. The data collection from M=S based on the assessment.
- 3) Prepare for the topic of Energy Awareness and Training for the next plenary meeting.

What else needs to be said:

- 1) Two M-S (NO, SK) attended WG1 session for the first time.
- 2) Due to the fact that some M-S did not appoint a delegate exclusively for WG1, occasionally delegates from WG2 / WG3 from such M-S also attended parts of discussions.

Consultation Forum for Sustainable Energy in the Defence & Security Sector
2nd Conference, Dublin, 8th & 9th June 2016
Working Group 2 Report: Energy Efficiency

Working Group Nr: 2

Names: Ray Dickinson
David Borreguerro

Nr of States/Participants:

41 participants:

- 21 EU MoDs
- 9 Industry representatives
- 8 Expert Speakers from 6 different EU MS,
- 1 representative from DG Energy,
- 1 representative from European Agencies,
- 1 representative from NATO,
- 2 representatives from Academia

In a nutshell

During the 1st meeting, WG2 set the context and work plan and gained an insight into MS concerns, priorities, interests, difficulties and challenges with regard to energy efficiency. This 2nd meeting provided the opportunity for WG2 to look into the topics of renovation of existing buildings, both low cost and deep renovations to NZEB standards, heating and air conditioning inspection schemes and technical building systems requirements, and their applicability to the defence sector.

Also, building on potential collaborative initiatives identified during the 1st meeting, two project proposals were presented and discussed among the WG2 participants. The two projects were: the creation of a defence building stock inventory and defence specific reference benchmarks, and the refurbishment of existing military buildings/sites with civil or dual use to NZEB standards. Both project proposals have received good positive feedback and informal expressions of interest from a number of WG2 participants. The action is on the WG2 moderators to develop further both proposals for the next meeting.

Key content elements

During the second of the five meetings that will take place throughout the 24-month period of the CF, WG2 strengthened and highlighted the purpose, context and direction of this concerted effort.

Through dedicated presentations from Industry, European Agencies and Defence experts, WG2 dealt in detail with the topics of:

- Refurbishment of existing buildings: providing evidence from real cases of extreme energy consumption reductions in existing buildings, through both low cost refurbishment interventions and deep renovations, as well as addressing the most common mistakes in the management of refurbishment projects, and how different drivers (energy saving, cost saving, green energy production, CO₂ reduction, societal benefits, etc.) lead to different types and scale of refurbishment projects and interventions.
- Deep renovations to NZEB standards: showing the variability in the interpretation of the NZEB concept across the EU, and discussing the applicability to the defence sector of the different parameters and standards adopted by different MS. Evidence on what can be achieved was

highlighted through the presentation of real case studies on renovations to NZEB standards including the transformation of old historic military pavilions into NZEB university buildings.

- Inspection of air conditioning and heating systems and retrofitting of technical building systems: assessing the adequacy of the EPBD requirements for inspections and inspection reports, as well as providing evidence of energy savings through simple and basic maintenance and cleaning tasks, system optimisation and continuous system monitoring.
- Benchmarking Collaborative Project Proposal: defining the framework, purpose and objectives of a potential collaborative project to create an adequate EU defence building stock inventory and defence specific reference benchmarks.
- NZEB Refurbishment Collaborative Project Proposal: defining the framework, purpose and objectives of a potential collaborative project to transform existing inefficient military buildings or complexes with dual or civil use into nearly zero energy buildings or complexes.
- Funding opportunities under H2020: providing legal clarifications on the eligibility of projects and showing real examples of funded projects.
- R&T Opportunities: discussion on the possibility to dedicate effort in the WG to explore them.

MS experiences/Discussion points

- Renovation of existing buildings and deep renovations to NZEB standards.

The delegates identified potential applications of energy efficiency measures, both applicable to technical systems and building envelope, in the defence sector. However, there are currently no concerted programmes of building renovation. Renovations take place on an opportunity basis.

The adoption of a solid 5-stage comprehensive methodology and holistic approach to implementation of energy efficiency projects (*preparation -> design -> pre-construction -> construction -> in use*) was identified as necessary for the success of such projects, with insufficient time and effort allocated to commissioning being one of the most common and critical mistakes that compromise the realization of the energy savings potential.

The adoption and implementation of different energy targets by different MS lead to different drivers (energy saving, cost saving, green energy production, CO2 reduction, societal benefits, etc.) that affect the approach to and design of the energy efficiency projects, and ultimately define and outline the type and scale of the refurbishment interventions.

The existing variability in the interpretations and requirements for NZEB standards established by different MS seems, at first sight, to act as a hindrance to the adoption of EU common approach and framework for an EU NZEB definition. Belgium, with three different interpretations in its three different regions varying from no requirements in one region, to very strict requirements in other region and adoption of passivhaus standards in the other region, was provided as a good example of this variability. However, considering the very different climatic conditions across the EU, it was questioned if a common definition of the NZEB concept would be practicable, or even possible. It may be better to keep the definition of NZEB open for MS to decide on it on the basis of their national specific conditions.

MoD delegates declared that, even though the defence sector has some exemptions from complying with the EPBD, there may be opportunities to act on accommodation units, offices, schools, etc.

Since defence sites are normally composed of multiple buildings with different uses and different characteristics and energy saving opportunities, a “cluster approach” to a NZEB concept that takes

into account the aggregate effect of a combination of different interventions and solutions is considered more appropriate and applicable to the defence sector, than a single building approach.

For example, within one military site, there may be one building that is apt for renovation and saving energy, another for installation of PV and producing energy, and another for any intervention. There may also be space on the site for installation of low carbon energy generation (e.g. CHP, mini wind turbines, or geothermal exploitation). It is the net zero, or nearly zero energy sum of the cluster that should be accounted for.

MoDs delegates identified the following obstacles, limitations and challenges to the implementation of a NZEB renovation programme:

- Finance: funding is not accessible to the defence sector.
- Cost savings attained in utilities are not translated into capital for reinvestment in additional energy efficiency measures.
- Lack of expertise/training.

By and large, deep NZEB renovations have not yet taken place in the defence sector.

▪ Inspection of air conditioning and heating systems and retrofitting of technical building systems.

Expert speakers outlined the variability of approaches adopted by different MS and described energy saving opportunities of regular inspection and optimization, and the benefits of continuous monitoring.

The delegates supported the outcomes of the Concerted Action that EPBD provisions on building technical systems are not effective, for example, the inspection reports are too complex to prepare and then to understand, requiring a level of knowledge that users may not have; in addition to that, there is no obligation to act on the recommendations for replacement or upgrading technical building systems.

Most MoDs declared that they do not act on the inspection report recommendations, and that replacements or upgrading take place on an opportunity basis. Those MoDs that act on the recommendations declared that they normally do it when calculations and payback periods are clearly given in the report.

Inspections of technical building systems normally take place within two wider inspection programs at MoDs:

- Inspections within maintenance plans
- Inspections through external service contractors.

Electronic monitoring and control systems in heating and a/c systems are normally implemented in buildings, although their implementation was not done to satisfy the provision for reduction of inspection frequencies in Articles 14 and 15 of the EPBD. Moreover, even if an electronic monitoring and control system is installed, it becomes very difficult to keep the systems optimised when inspections and maintenance are made through external service Contractors.

MoDs are unsure as about the definition and scope of “independent control systems” required by the EPBD.

Concerning the establishment of requirements for the procurement of new, replacement and upgrading of technical building systems (for new and renovated buildings), MoDs declared that some National guidelines exist, however, these guidelines are too general and need to be more precise and specific.

With regard to the requirement to purchase only products, services and buildings with high energy-efficiency performance, MoD's declared that the existing procurement plans provide only general guidelines that are open to different options.

It was also noted that in some MS, particularly in Nordic MS, the public sector has to act and lead by example for the private sector.

▪ Benchmarking Collaborative Project Proposal.

MS delegates agreed that more work is required to identify existing reference benchmarks that could be adapted by the defence sector. However, it was recommended **to create a EU defence specific building stock inventory and EU defence specific reference benchmarks based on climatic regions (rather than nationally), that allow the objective assessment and comparison of buildings across the EU, and the prioritisation of investment cases**, due to the following reasons:

- the defence building stock has very specific particularities,
- even when compared with equivalent commercial buildings (military housing vs civil housing, military canteen vs commercial restaurant, etc.), military buildings have different requirements and perform differently,
- different energy targets, requirements and calculation methodologies in different MS give different performance ratings for the same levels of energy consumption,

The approach to this project will have to be flexible enough to accommodate very different portfolios of buildings in different MS (from hundreds of buildings to thousands of buildings, of different types and with different uses).

Eligibility of this project for application to EU funds is complicated, since the project is defence specific, so it was envisaged that the Project would probably have to be financed through the EDA and/or National Contributions.

All in all, it was concluded that the Benchmarking Project Proposal is of interest to the WG2 participants, and that WG2 moderators would develop the proposal further for the next meeting.

▪ Mil-NZEB Refurbishment Collaborative Project Proposal.

MS delegates agreed that the approach to the Project is correct, but highlighted the importance to consider the following aspects:

- To consider remote buildings as focus for the Project.
- The particular portfolio of defence buildings, consisting of:
 - Large numbers of buildings
 - Dual use buildings
 - High energy intensity
 - Large numbers of old buildings with historic protection status
 - 24/7 functioning
 - High replicability potential
- For selection of buildings, the focus may be on those that are already in the pipe line for maintenance, for which there is planning and an allocated budget. Also those that have high visibility and frequent use by people (dual use civilian and military), in this way the EED requirement to 'lead by example' in public buildings is captured.
- The definition of a common framework for NZEB standards needs to be further discussed.
- The inclusion of training, awareness raising and education plans.
- The development of demonstrators before jumping into full implementation.

- Technology approach vs building approach: assess what available technologies could be applied to selected buildings that would assure a quick and inexpensive implementation Start from existing available technologies for NZEB renovation, including state of the art in industrialised prefabricated modules for façade and roof renovation, include on-site or nearby (campus) renewable technologies, storage, smart metering and energy use monitoring. This can be done with an inventory of most appropriate technologies for military type buildings: education/schools, hospitals, offices, accommodation. Test appropriateness / suitability in selected case studies in different climatic zones of MOD owned buildings, create clear roadmaps/plans for scaling up (replicability at a wider scale) across Europe. Results could be publications as MIL NZEB guidelines, training schemes, visiting and exchange programme to the case studies, etc.
- Replicability and scalability criteria.
- Building approach vs “cluster approach”, as explained before in this report.

MoDs delegates identified the following obstacles, limitations and challenges to the successful application for EU funds:

- There is already a wide variety of similar NZEB refurbishment EU funded projects going on and this may represent a challenge to secure funding for the project.
- Any proposal will have to identify unique aspects of defence use of buildings.
- Attaining 100% funding could be difficult.
- Application for different funds for different projects phases (H2020 PDA funds for Initial Phase and Life funds for Implementation Phase, for example) may add complexity to the Project and be challenging.

All in all, it was concluded that the NZEB Refurbishment Collaborative Project Proposal is of interest to the WG2 participants, and that WG2 moderators would develop the proposal further for next meeting.

▪ Funding opportunities under H2020.

There has been a legal clarification on the defence sector eligibility for funding under H2020 that the decision will be based on whether there is an equivalent civilian use: accommodation, health (hospitals) and education.

▪ R&T Opportunities.

A series of innovative and emerging technologies that have entered the market more recently were shown, and their applicability to energy efficiency projects in the defence sector discussed and demonstrated. In particular, the potential of prefabricated modular panels and architecture to renovate existing buildings, or build brand new buildings, in record times and at lower costs than traditional interventions or construction methods. The need for specialised personnel for successful utilisation of these technologies is critical.

MoDs delegates expressed their interest in exploring R&T innovative solutions that may be of application to the defence sector, in particular, those that combine energy efficiency and energy management possibilities. The exploitation of synergies between different technologies was identified as an opportunity.

R&T exploration is not a priority for them though.

Main findings and achievements

- Renovation of existing buildings and deep renovations to NZEB standards.

There are potential applications of energy efficiency measures, both technical systems and building envelope, in the defence sector. However, at present there are no concerted programs of building renovation and renovations take place on an opportunity basis.

A “cluster approach” to a NZEB concept is more appropriate for the defence sector than a single building approach as Defence sites are normally composed of multiple buildings with different levels of energy saving opportunities and low carbon energy generation.

- Inspection of air conditioning and heating systems and retrofitting of technical building systems

The delegates supported the outcomes of the Concerted Action that EPBD provisions on building technical systems are not effective.

- Benchmarking Collaborative Project Proposal.

The Benchmarking Project Proposal is of interest to the WG2 participants. Options should be considered to approach this from a regional operating environment perspective.

- Mil-NZEB Refurbishment Collaborative Project Proposal

The NZEB Refurbishment Collaborative Project Proposal is of interest to the WG2 participants.

- Funding opportunities under H2020.

Defence sector eligibility for funding under H2020 will require assessment of whether there is an equivalent civilian use: accommodation, health (hospitals) and education.

- R&T Opportunities

R&T exploration is not a priority for participating MS.

The way ahead

- To develop Benchmarking Collaborative Project Proposal for the next meeting.
- To develop Mil-NZEB Refurbishment Collaborative Project Proposal for next meeting.
- To modify topics for next meeting as follows:

Meeting 3 – Building Management Technical Systems and Behavioural Aspects.

- Behavioural aspects of energy efficiency (human factors) and operational control.
- Building Management Systems technologies (automation, monitoring , metering and control).
- Review of WG2 progress.

- To revisit future work plan at Meeting 3 in accordance with WG progress.

What else needs to be said:

A presentation on a proposal for a real time energy Data Collection Project and creation of a defence specific building stock inventory and reference benchmarks by the IT MoD demonstrated the need for a significant amount of resources and effort to create and maintain the site and building inventory and input and verify metered energy consumption data. This was supported by the UK MoD delegate. The value of accurate data collection, robust building stock inventories and benchmarks can't be underestimated and without them it makes it difficult to construct compelling business cases.

The topic was of great interest to participants. The experience of Norway with smart metering and metrics is a potential case study. Metering has been included as one of the topics to be covered at the 3rd meeting. The Austrian Armed Forces have offered to deliver a presentation on metering and control systems at the next meeting.

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The representative from NATO and US Army Corps of Engineers, as Co-chair made people aware of the open invitation to the forthcoming forum on “*Deep Energy Retrofit of Buildings. Technical and Business Strategies*” Forum to be held in Washington on 15-16 Sep 2016.

Consultation Forum for Sustainable Energy in the Defence & Security Sector
2nd Conference, Dublin, 8th & 9th June 2016
Working Group 3 Report – Renewable Energy Sources (RES)

Working Group Nr: 3

Moderator Names:

Tom Bennington
Lt Col Dirk Wauman

Nr of States/Participants: 24MS/46 participants (Govt, Industry and Academia)

In a nutshell

Working Group 3, covering Renewable Energy Sources (RES), explored an ambitious programme of presentations and discussion covering all of the major RES technology areas identified in the first session: solar, wind, small-scale hydro, biomass, geothermal, energy storage, fuel cells and smart grids. The discussion ranged across several layers: from a geostrategic perspective of energy security and social responsibility, utility of RES for the public sector and specific examples of RES on Defence land, to a much more technical slant, covering fuel cell technology, storage and smart grid applications and the detrimental effect of wind turbines on defence radars. The presentations were focussed on identifying the benefits of deploying RES on defence estate (land and buildings) and offered a starting point for Member State representatives to examine the technologies from their own national perspectives and to attempt to identify opportunities for collaboration, or to adopt RES within the defence sector as a viable and cost effective alternative. The importance of local business cases was an enduring theme and there was some discussion on how they might be constructed. The session concluded with a short review of outstanding items from the Programme of Work arising from the first meeting in Brussels and the plan for the next 6 months to both complete the residual tasks and provide expert support to the next session, which would look at RES in Defence related transportation. Overall, the session was energetic and enjoyable with positive feedback about the approach. Several industry delegations provided useful support and there were some observers from NATO HQ and the Energy Security Centre of Excellence in Lithuania.

Key content elements

Session 1 – Rationale for RES on Defence Land. The keynote presentation was given by Professor Athanasios Konstandopoulos who introduced the nexus of energy, together with water and food and other natural resources, as a key challenge for future generations and perhaps a cause of conflict. In cyclical terms, he felt that the next modern epoch would perhaps be dominated by environmental, energy and health issues as scarce resources became more contested across an interconnected world. This global trajectory would significantly boost the need for RES solutions for overall, sustainability and to mitigate climate change. This analysis was then overlaid on the functions of the military and a strong case was made for the military to act as a lead agency in RES deployment, first, as a public sector body with existing structures dealing with research and technology, economics, threat reduction and, secondly, because of its natural familiarity of building relationships and joint approaches with dissimilar entities. The presented theoretical backdrop was then coloured with a case study called PROMETHEUS, which focussed on key technologies such as low carbon and renewable energy carriers, materials for clean energy and sustainable mobility as the basis for a holistic `Generalised Energy/Sustainability` corridor. At a global level, it would be possible to deliver a true cyclic economy based on reversible chemical reactions moving carbon dioxide and water into usable (and storable) hydrogen using solar energy plants. The implications of this and other technologies would be profound

and would further shift society (and the military it reflects) into ever more sustainable approaches to energy usage.

The decentralisation theme was introduced by Mr Pierre-Antoine Berthold of AKUO Energy, who explained his company's approach to RES generation in Africa at both on and off-grid (islanded) sites with emphasis on similar benefits that could apply to the defence sector when assessing improved affordability realised through micro grid and storage solutions. Importantly, his presentation highlighted the problems of RES intermittency (wind and solar) and how they can be resolved through novel storage solutions. Hybrid systems including RES, storage and conventional power generation elements could significantly reduce operational energy consumption, but similar approaches in fixed military sites should not be excluded, especially if RES were in plentiful year round supply. A case study of Gao military camp was analysed and included impressive economic data of the benefits of hybrid over diesel-only systems, especially when consumption data was accurately collected and used to predict future usage. It would of course be possible to outsource the energy provision task to industry and various financial and commercial models were available. Subsequent discussion offered a useful introduction to the Energy Service Company (ESCO) model, which should be of interest to Defence forces at both fixed and deployed installations.

Session 2 – Solar. The second session dealt specifically with solar PV and included a case study on a small-scale deployment of PV at an Irish military site (the self-consumption approach) from Colonel Jim Burke; a rapidly deployed, energy autonomous, multi-purpose Health Care Clinic from Dr Ioannis Glekas from Cyprus (deployable Hybrid system) and a review of lessons learned from the European Armed Forces GO GREEN pilot project (an hybrid ESCo model that aims to examine the possibility of producing a revenue stream for defence over and above normal efficiency savings) from Tom Bennington of EDA.

Colonel Burke's presentation covered the basic theory of solar PV, highlighting the geographic, environmental and technical considerations of deploying PV and an excellent analysis of the business case they had developed including initial site survey, planning, construction and the reality of performance with lessons learned so far. Of note, was the simple positive economic reality even for PV in such northern latitude and the additional benefits that could accrue when balanced against the risk. The simple self-consumption model would likely be valid for most European sites although all local factors would need to be examined to ensure business case viability especially if the system was up scaled.

Dr Glekas's presentation built on the AKUO energy presentation with a detailed explanation of a containerised Mobile Energy Hub (MEH) – essentially a modular hybrid system, with a detailed look at its advanced energy management system and how the various system-of-systems operated together, the factors involved and the benefits that could be achieved. Again, empirical data was provided to show economic viability together with a very interesting description of the system used as a component of a full medical facility with ancillary services such as lighting, Wi-Fi, water pumping and purification.

Tom Bennington's presentation reviewed the lessons learned from the GO GREEN pilot project, which underlined the absolute necessity of sound business case planning and the difficulties encountered in doing so within a rapidly changing energy market. As a pilot activity it had been hugely successful in uncovering the complexity of the sector, including Feed in Tariffs, Green Certificates, the Competitive Dialogue procurement model and the challenges of accurate benchmarking to test the viability of Power Purchase Agreements, which were also hugely variable in both form and function from country to country. The new European energy market rules were still in development and would not be fully

implemented until 2018-19. Careful consideration of the new market rules would be needed before the next variation of a business case could be developed.

Session 3 – Wind. This session covered industry perspectives from Lagosolar on vertical and horizontal axis wind turbines and a case study from ARPA relating to a remote, off grid telecommunications centre that transformed its energy requirement from a ‘diesel heavy’ to a RES-based configuration, with redundant safety capacity to guarantee 24\365 capability. The session closed with a very though provoking presentation from Maurice Dixon on the effect of wind turbines on air defence radars and possible mitigation measures.

The Lagosolar presentation covered a highly aesthetic series of both vertical and horizontal axis turbines and offered some novel approaches to integrating them into buildings and the wider environment. The optimum solution of integration into a hybrid power grid as touched on; however, additional empirical data would need to be provided to enable a cost benefit analysis for military users.

The ARPA presentation examined the planning and deployment of RES as an alternative solution to diesel generation at a remote, off-grid site and gave a very detailed breakdown of factors involved, design features, performance achieved and money saved for a PV/wind/storage hybrid configuration that had immediate read across to defence sites.

Group Captain (retd) Maurice Dixon’s Radar presentation gave a detailed explanation of the degradation modes of radar systems due to wind turbine interference and suggested ‘fixes’ using operational, procedural and technical mitigation methods. In addition, he gave a short summary of his own experiences of wind technology usage at military sites including the south Atlantic and the UK Power FOB technical demonstrator.

Session 4 – Biomass, Geothermal and Small-scale Hydro. This session examined an innovative biomass project, presented by Major Christos Papageorgiou from the Hellenic Armed Forces, a review of geothermal possibilities to power the built environment from Professor José Marques (Portugal) and the applicability of small hydro installations to augment power provision from Mr Andrej Rajh of HSE Invest (Slovenia).

Major Papageorgiou’s Biomass presentation covered an award winning 2014 study which examined in detail how biomass (wild artichoke produced on Defence land) could be used to co-generate (CHP) both electricity and heat for a district heating scheme. The brief offered detailed insight into the benefits, risks, economic and technical aspects of the concept and emphasised the validity of the approach in other geographic areas of Europe with vastly different climatic and environmental conditions than Greece.

Professor José Marques’ presentation covered the background to geothermal energy from deep reservoirs to generate electricity and provide hot water for district heating, albeit with geographic restrictions, and the widespread availability of residential and commercial heating and cooling through ground looping. The brief also included detail of case studies at US and European military sites, which were striving to develop benchmarks, business cases and cost/benefit analyses.

Mr Rajh’s presentation covered the main benefits of small-Hydro plants from a technical and economic perspective, emphasised wide, untapped availability of moving water on defence sites and a fascinating view of emerging technology. Of special note, however, was an excellent supporting paper which offered a very detailed analysis of the defence applicability of the wider RES topics and additional information on small hydro, which will be of great interest to MS unfamiliar with this topic.

Session 5 – Energy Storage, Fuel Cells and Smart Grids. This session built on the work, which began in the 1st plenary and offered a fully technical review of energy storage and fuel cells (Dr Maria Wesselmark of Intertek and Mr Erik Prisell of FMV) to support fact sheet production in these priority areas. The closing presentation, from Professor Luca Cedola of Italy, offered a macro view of smart grid concepts, explored utility of micro, mobile, military energy systems, solid recovered fuels (SRF), waste-to-energy and, very effectively, brought together all of the previous discussions to provide a vision of a decarbonised, RES-rich future, encompassing sustainability, economics, policy and technology components.

Dr Wesselmark’s presentations, on both energy storage and fuel cells covered market considerations and technologies and introduced the background principles building quickly to an expert explanation of the various options and related standards in both areas.

Mr Prisell’s presentation explained FMV’s mobile power system technology programme, which was directly focussed on military applications ranging from the dismounted soldier (25W) to 1.5 KW applications in deployed hybrid configurations.

Professor Cedola’s presentation gave a detailed resume of European energy policy, global consumption and RES penetration statistics by country. Benefits were highlighted and the overarching quest for decarbonisation moving along the 2050 roadmap highlighted areas of both risk and opportunity for the public sector. Solar, offshore wind and hydropower were the dominating areas but there was great opportunity to exploit the other clean energy sources. Electrical demand was outpacing all other energy carriers and RES-E had an important part to play especially when coupled with storage and smart grid in decentralised and ‘reverse flow’ schemes. A holistic view to scavenge heat, recycle waste (into energy), employ RES, Smart grids and improve water management should be the aiming point and defence could take a lead role.

MS experiences/Discussion points

The second meeting was characterised by a very lively debate on each of the topics presented and covered a range of technical, operational and conceptual issues in great detail as delegates sought to improve their understanding and challenge differing approaches to optimise agreement over best practice. Overall, the MS had differing perspectives of the utility of RES to defence and, although a significant body of work had been completed on deployed hybrid systems, there was generally less activity at home where limited budgets, understanding of opportunity and a lack of objective data (both benchmarking and within business cases) blocked progress on RES penetration. Again, with a few exceptions, MODs did not see RES as core business, but were increasingly keen to develop understanding and to explore cost effective options both autonomously or in collaboration. For the keynote discussions, the idea of a holistic approach to sustainability was compelling and the more global ideas were worthy of consideration by DG Energy for inclusion within the Energy Union work, especially as cost would reduce significantly at larger scale. Energy service companies offered a viable opportunity to decrease cost and transfer risk, but some cultural barriers still existed with the military’s predisposition to the use of diesel as the first energy option. The additional costs of force protection and logistic overhead should also be included in any proposed business case. Little work had been done to explore the use of the deployed energy concepts at home and a service based approach to both was seen as both viable and cost effective. The solar session demonstrated the dominance of the self-consumption model, the extensive use of the technology by ESCo and noted many MS had local experience and ground truth data, which could benefit others especially for areas of low intensity insolation. For wind, the newer technologies, at small scale, could be integrated into military sites in a pleasingly aesthetic and functional way to augment main supply, but would always require either a

grid-based or local storage solution as back-up. Additional empirical data was needed on performance versus cost. The use of hybrid systems with integral RES at remote military sites in the European mainland was a realistic alternative and could offer high degrees of resilience to critical systems. Many MS have an understanding of the problems of wind turbine and radar interference and this might be a good area for collaboration accepting that national vulnerabilities would exist in the classified domain. The Biomass study was worthy of real consideration to move ahead to the next stage and the district heating benefits would need to be further refined to improve on an already compelling approach. Geothermal applications enabled through ground loops should be an attractive proposition for defence and sharing of data/business cases in this area would be beneficial to all to improve benchmarking and confidence. Small hydro was definitely an underexplored area in a readily exploitable field and was therefore attractive as a possible collaborative opportunity for MS to consider. The work on fuel cells and energy storage was largely complete and it would be captured in fact sheets and the final report. Smart grids would require some additional, albeit limited, discussion to resolve the macro and micro view so an agreed position could be established. Waste to energy was an important area worthy of further consideration and may feature again in future meetings.

Main findings and achievements

The second meeting, covering RES on defence land and buildings, with a focus on RES-E and RES-H&C, is the starting point for the second work package and its main findings and achievements will be better reflected over the coming months as the presentations and discussions are analysed from a national perspective. The delegate group were enthusiastic and energised to build on the knowledge base and to exploit each other's experience. However, improved penetration of RES into the Defence sector will not occur naturally as a consequence of the either sustainability or energy policy considerations and will require a sustained effort to educate and convince senior commanders, policy directors and infrastructure managers of the benefits that might accrue and to offer complete and convincing business cases that generate confidence in the overall approach. Measurement of current consumption, understanding of system based whole life costs are all important aspects that will feature in future meetings and with read across to the other working groups. For many delegates, the meeting offered their first exposure to aspects of RES technology and therefore serves as an important capacity building initiative to improve understanding and to seed collaborative activity.

The way ahead

The way ahead will require MS to analyse and digest the material presented and to come back to the group with their priorities, ideas and proposals before the third meeting in Italy. The results of their deliberations will be carried forward into meeting four in Lisbon with the objective of capturing best practice and identifying opportunities to develop collaborative opportunities. Over the next period, the MS will also be canvassed on their thoughts on RES in Transportation (RES-T) and expert speakers selected to give a full account of biofuels and related topics (such as hybrid vehicles etc.). Similarly, their thoughts on RES-T will be carried into meeting four again with the intent of capturing best practice and identifying collaborative opportunities. At the end of meeting four, we hope to have several viable business cases that will be examined against the various funding opportunities arising from H2020, Intereg and the other European financial instruments.

What else needs to be said:

The moderators would like to offer our thanks for the excellent meeting in Dublin and will publish this draft report on EDEN for additional comment by the national delegations.