

**Consultation Forum for Sustainable Energy in
the Defence and Security Sector
(CF SEDSS)**



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**FINAL REPORT
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EXECUTIVE SUMMARY

The European Union (EU) is moving towards a resilient Energy Union with a forward-looking climate change policy. The defence sector can, and must, be an enabler of this venture. The role of defence in this transition becomes critical as the EU Member States' Ministries of Defence (MODs) and Armed Forces are among the largest consumers of energy within the public sector. Improving energy management and increasing energy efficiency enhances resilience to challenges ranging from natural disasters, vulnerabilities and risks to asymmetrical and hybrid threats. Within the EU, the European Defence Agency (EDA) is well-placed to support MODs to tackle energy-related considerations. On 19 October 2015, an agreement was signed between the European Commission and the EDA to examine how energy efficiency measures and renewable energy sources might be better implemented within the European defence landscape. It was the first time that the Agency had been delegated budgetary responsibility by the Commission. The establishment of a Consultation Forum for Sustainable Energy in the Defence and Security Sector (CF SEDSS) from scratch in a domain where cooperation among the EU Member States' MODs hardly existed before is a remarkable achievement. Above all, it reflects the strong inter-institutional determination of the EU to support the MODs and Armed Forces to reduce the energy footprint and transit to a *cleaner, safer and more sustainable energy model*.

The Consultation Forum, funded by the European Commission and managed by the EDA, has created a network of professionals and experts across the defence and energy sector. This Consultation Forum established an exclusive setting that facilitated and encouraged the sharing of information and best practices on how to improve energy management as well as how to integrate energy efficiency measures and renewable energy sources within the European security and defence sector. Moving to a sustainable and efficient energy model is a potential economic opportunity for Europe's security and defence sector and it opens up operational advantages for the Armed Forces. The Forum consisted of three parallel working groups, each with a particular focus on a) Energy management, b) Energy efficiency and c) Renewable energy. Given that the Protection of Critical Energy Infrastructure (PCEI) was identified as a cross-dimensional domain, the Forum also set up a dedicated Experts Group to explore how PCEI contributes to securing Energy Strategic Autonomy for the European Defence and Security Sector. Likewise, appropriate financial instruments and procurement options were covered as cross-cutting themes and key enablers to deliver improved performance on energy.

This Final Report summarizes the work that has been accomplished by the Forum over the course of twenty-four months and through a series of five plenary meetings. It covers the scope and main outcomes of the Forum, including how the stakeholder community was built and strengthened by EDA throughout the project. The Report presents the key challenges that MODs are facing in adopting a sustainable energy policy in defence and outlines a number of observations for the way ahead. It reflects the efforts of the three working groups to assess the application of the Energy Efficiency Directive (EED), the Energy Performance of Buildings Directive (EPBD) and the Renewable Energy Directive (RED) on fixed infrastructure in the defence sector, and explored how different measures could be implemented in view of contributing to the on-going decarbonisation efforts. Furthermore, the Report includes key findings from the PCEI Conceptual Paper as well as the proposed steps for the way ahead for enhancing the resilience of defence related critical energy infrastructures through collaborative projects. As the Report concludes, the Forum enabled the participants to identify both projects of mutual interest in key areas as well as possible funding schemes. However, the need for amending policies and providing guidance to relevant stakeholders in relation to EU funding mechanisms for defence was also acknowledged.

Over the past two years, the Forum has covered a variety of topics ranging from energy strategy development, energy management systems and deep renovations of buildings to behavioural interventions and procurement. Additionally, a significant review of renewable energy-source

technologies (wind, solar, geothermal, biofuels and smart grids) and concepts were addressed, as well as the applicability of relevant energy legislation in helping to achieve performance improvement in defence. Perhaps most of all, the Forum has been successful in consolidating the outcomes of engagement with stakeholders and by creating for the first time a network of defence energy focal points and experts, and has effectively raised awareness of the subject across EDA participating Member States and beyond.

This report is complemented by a guidance document entitled “A Roadmap for Sustainable Energy Management in the Defence and Security Sector” which sets out the roadmap for achieving a sustainable energy future in the defence and security sector. Moreover, the exchange of information and the visibility of the project was facilitated by the development of a dedicated EDA web page containing publicly available information, while material available for government only use was stored on the “European Defence Energy Network” (EDEN), an EDA secured electronic platform. To raise awareness and increase visibility, a series of information sheets which cover specific relevant technologies and approaches, as well as examples of projects, have been developed.

The Forum was also successful in realising the benefits of adopting a sustainable energy approach to defence infrastructure through the development of documentation and encouraging national initiatives and collaborative projects. However, it also showed that integrating the complexities of sustainable energy into a sector as sensitive as defence is not straightforward and will require time to secure an approach which is part of business as usual. While it has highlighted some examples of success in the defence sector, some challenges, especially including a lack of access to national and EU-level funding opportunities, the wide variability on the approaches taken to energy by MODs as well as human factors were equally recognized. Nevertheless, the experts acknowledged that energy improvements would lead to reduced cost risks, to improvement of capability development, to mitigated vulnerabilities and to reduced environmental impact. It is therefore fundamental for MODs to develop and implement defence energy policy and strategies including securing high-level stakeholder buy-in. This should include embracing recognized approaches (Energy Management Systems and Environmental Management Systems), developing human factor elements, addressing procurement and financial processes and practices as well as working with suppliers. As the report points out, there is a need to improve the energy performance of defence infrastructure in the short, medium and long-term.

Certainly, the momentum gained from the Consultation Forum should be maintained and the work moved to a more implementation-focused phase linked to the objectives of relevant energy legislation. The vision of EDA is, with the support of the European Commission, to turn the Consultation Forum into a beacon platform in the defence sector for enabling the EU Member States MODs to ensure energy security through the diversification of energy supply, and a shift to renewable energy sources and technologies.

EDA has an important role to play in this endeavour as the EU transits to “*Clean Energy for All Europeans*”. EDA anticipates fulfilling its role as underlined in the *Long Term Review* of the Agency which was endorsed in May 2017 by the EU Defence Ministerial Steering Board. In particular, EDA’s unique role “*as facilitator towards the European Commission and EU Agencies, and as the interface upon Member States’ request, exploiting wider EU policies to the benefit of Defence and acting as a central operator with regard to EU funded defence-related activities*”, is catalytic to enable the inter-institutional, cross-national and cross-sectoral collaboration necessary to meet the European strategic objectives in the domain of energy. To this end, an agreement has already been signed in the form of a Grant Agreement between the European Commission (DG Energy) and EDA for the continuation of the CF SEDSS for 18 more months, and with an additional new ambition for identifying projects to support EU Member States in achieving the Energy Union’s goals.

With this Final Report, EDA acknowledges the contributions of the European Commission, the EU Member States' MODs, representatives from academia and industry, and wider stakeholders, including NATO and the NATO Energy Security Centre of Excellence, the working group volunteer moderators, as well as the Agency's staff.

1. INTRODUCTION

1.1 Background and establishment of the Requirement for the Consultation Forum for Sustainable Energy in the Defence and Security Sector

In the COM Communication of July 2013 on a more competitive and efficient defence sector (COM (2013) 542 final)¹, the Commission proposed to set up a dedicated Consultation Forum for regular meetings with Member States' experts from the defence and energy sectors. The proposal was to focus on energy efficiency, renewable energy and alternative fuels, as well as energy infrastructure. This was against the backdrop that within Europe's public sector, MODs and Armed Forces are generally amongst the largest land and real estate owners (some MODs estimate this to be around 1% of total land surface). In addition, MODs and Armed Forces are amongst the largest consumers of energy within the public sector, with the vast majority of that consumption being fossil fuels.

Where it can be quantified, it has been demonstrated by some Member States (MS) that a significant percentage of annual defence expenditure is spent on energy; although this percentage is generally greater within the defence equipment and support solutions envelope, infrastructure energy expenditure still accounts for a considerable proportion. The defence sector is increasingly expected to seek and deliver efficiency measures. Therefore it is in its interests to improve its approach to and performance management of energy demand, supply, and consumption.

Not only will this reduce cost risk and exposure to the effect of global energy price fluctuations and resources availability, but it will also improve operational effectiveness by contributing to enhancing mission endurance both at home and in overseas deployed scenarios. Cost control and potential savings can be used for other military tasks as well as being retained and redirected to improve capability development and support solutions including defence infrastructure. Ultimately, improved energy management can save lives through reduced logistic risk from requirements for fuel resupply to remote and hostile locations.

In addition, the European Commission has set out an aspiration that the defence and security sector can and should be contributing to the achievement of strategic EU and national objectives, for instance, on renewable energy and energy efficiency objectives for 2020. The European Commission has further explained that there is a significant potential for reducing energy demand in defence infrastructure, including the office and non-office estate such as barracks, as well as exploiting the potential for renewable energy generation on the land used by defence.

Of relevance to the Consultation Forum are specific EU Directives, namely the Energy Efficiency Directive (EED)², the Energy Performance of Buildings Directive (EPBD)³, Renewable Energy Directive (RED)⁴, as well as Protection of Critical Energy Infrastructure (PCEI)⁵. The European Commission, by drawing up the relevant tender specifications, established the framework design of a Consultation Forum that would *'help gain a better understanding among decision-makers in the defence sector on how, taking into account the specificities of the sector, the relevant EU*

¹ Towards a more competitive and efficient defence and security sector

See: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0542:FIN:EN:PDF>

² Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

³ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

⁴ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

⁵ Directive 2008/114/EC of 8 December 2008 on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection

energy legislation should be implemented to maximize positive impacts on the defence sector itself as well as the national economies and the EU energy sector’.

The European Commission launched the call for tender with the aim to establish the Consultation Forum for Sustainable Energy in the Defence and Security Sector, having as its main purpose to *‘facilitate sharing of good practices and expertise on improving capabilities of the defence sector, the implementation of EU legislation and the contribution to the EU and national strategic objectives on the following main core themes:*

- A. **Energy efficiency** *(in relation to buildings and camps, purchasing and use of energy efficient products, energy use in transport and logistics, behavioural aspects of energy use, financing energy efficiency investment in the defence sector, etc).*
- B. **Use of renewable sources of energy** *(on the land and infrastructure, that belongs to or administered by, the Armed Forces, production/use of solar energy, geothermal, wind, biomass, biofuels, etc., use of locally-available renewable sources in operations in and outside EU, etc). Key focus would be the implementation of Renewable Energy Directive (2009/27/EC).*

1.2 Contextual information on the European Defence Agency (EDA)

The EDA tendered for and was selected to implement the contract starting from 20 October 2015, for a period of 24 months. An overview of the EDA is set out below to provide some contextual information for this.

Set up in 2004 as an Agency of the Council of the European Union, the European Defence Agency supports its 27 Member States - all EU countries except Denmark - in the improvement of their defence capabilities through European cooperation. The incremental role of the Agency in defence was reconfirmed in December 2009 when the Lisbon Treaty was signed. Articles 42 and 45 of the Treaty of the EU (TEU) institutionalize the Agency’s role in the field of defence capabilities development, research, acquisition and armaments as well as in strengthening the industrial and technological base of the defence sector. The revised Council Decision⁶, which was approved by the Foreign Affairs Council in October 2015, further clarified the Agency’s tasks by formally including support to operations as well as the Agency’s position as an interface between the national Ministries of Defence and wider EU policies. Notably, the revised Decision includes some additional important changes, among which is the clause for the VAT exemption and that the Agency can administer contributions from the EU general budget for projects and programmes run within the Agency.

An enabler and facilitator for MODs looking to engage in collaborative research and capability projects, the Agency has become the central hub for European defence cooperation. Its expertise and networks cover the whole spectrum of defence cooperation: from harmonizing requirements to delivering operational capabilities; from research and innovation to developing technology demonstrators; from training and exercises to maintenance and support to CSDP operations. The EDA also works towards strengthening the European defence industry, and acts as a facilitator and interface between Member States’ military stakeholders and wider EU policies which have an impact on defence. In May 2017, Member States agreed to further reinforce the Agency’s mission, by endorsing the conclusions and recommendations of EDA’s Long Term Review (LTR). Based in Brussels with some 160 staff, the EDA is headed by Federica Mogherini, High Representative of

⁶ COUNCIL DECISION (CFSP) 2015/1835 of 12 October 2015 defining the statute, seat and operational rules of the European Defence Agency (recast), see <https://www.eda.europa.eu/docs/default-source/finance-documents/eda-council-decision-2015-1835-dated-13-10-2015.pdf>

the Union for Foreign Affairs and Security Policy, who is also Vice-President of the European Commission. Jorge Domecq, a senior Spanish diplomat, has been the Agency's Chief Executive since February 2015.

1.3 EDA's Energy and Environment Programme

EDA has been involved in energy technology research since 2006 and has, over time, developed the required organizational structure to deal with the spectrum of energy and environmental issues that affect the Armed Forces of Europe. In addition, the Agency has mature links to NATO, the NATO Energy Security Centre of Excellence (ENSEC COE) and the Defence Environmental Network (DEFNET) which is an informal body of MODs from across the EU set up to discuss broad environmental topics. Furthermore, EDA, has also established contacts with the relevant actors in the European Commission, notably DG Energy and DG Environment.

The EDA's Energy and Environment Working Group (EnE WG) remains active in several areas related to the Consultation Forum, but with an operational focus. The establishment of the Consultation Forum offered an opportunity to explore important areas of energy policy implementation recognizing that Europe's Armed Forces are likely to be one of the biggest public consumers of energy in the EU. However, the work was designed to benefit also the Armed Forces themselves, by helping to inform improvements in their energy efficiency and contributing to energy security through a more active role in the diversification of energy supply through a shift to renewable energy sources and technologies.

The EDA is also very active in the defence research domain and works closely with the European Commission for the implementation of Preparatory Action on CSDP related research. Therefore, the Consultation Forum set out to seek a potential cross-cutting R&T dimension and to look for possible synergies between defence R&T activities and the work conducted under the Strategic Energy Technology Plan (SET-Plan). The work also sought to take into consideration and learn from the approach taken by the Concerted Actions for Energy Efficiency, Renewable Energy and Energy Performance in Buildings.

Building on EDA's experience in research, project management and consensus building, the CF SEDSS work was conducted under the overarching Energy and Environment (EnE) programme. The initial scope and work plan of the CF SEDSS was developed by the EnE WG, with progress updates given at the EnE WG meetings alongside other projects including the Smart Energy Camps Technical Demonstrator, Defence Energy Managers' Course, the development of energy within the EDA Overarching Strategic Research Agenda, and energy data collection and analysis.

1.5 EDA Tender Response to the CF SEDSS Central Requirement

The central requirement was to bring together experts in the format of a Consultation Forum in support of the European Commission's implementation of the Energy Efficiency Directive (EED), Renewable Energy Directive (RED), and Energy Performance of Buildings Directive (EPBD). The Consultation Forum was required to have two core themes covering energy efficiency and renewable energy, and to examine issues relating to the Protection of Critical Energy Infrastructure (PCEI).

Following both correspondence and a workshop on the Consultation Forum held in EDA premises on 18 June 2015, at which EDA participating Member States (pMS) discussed the proposals for the content, scope and structure of the working groups, it was decided that the work should be:

- divided up into three working groups covering energy management, energy efficiency, and renewable energy;
- delivered through conferences with plenary and parallel sessions.

The final deliverables required were a final report and a guidance document, covering the implementation of EU energy legislation, financing of defence energy projects, concepts and recommendations for Member States' actions on energy efficiency and renewable energy, as well as associated information sheets. The draft final report which was produced after the 22nd month as required by the relevant milestone was submitted for comments to the European Commission and all Member States. Comments received from DG Energy staff, Member States, and the working group moderators, both during the written consultation period and the exchange of views at the final event in September 2017, have been addressed within the final deliverables.

The commitment was for the initial event to take place in Brussels, plus four further events to be delivered in locations outside of Brussels in agreement with pMS. These events took place as follows:

- Event 1: 14-15 January 2016 – Belgium: Brussels (See Annex 1);
- Event 2: 8-9 June 2016 – Ireland: Dublin (See Annex 2);
- Event 3: 22-24 November 2016 – Italy: Rome (See Annex 3);
- Event 4: 16-18 May 2017 – Portugal: Lisbon (See Annex 4);
- Event 5: 19-21 September 2017 – Greece: Thessaloniki (See Annex 5).

Following the first CF SEDSS event in Brussels a separate Protection of Critical Energy Infrastructure Expert Group was established to enable this cross-cutting topic to be analysed in greater detail outside of the broader discussions on energy management. The task of this expert group was to develop a conceptual paper, and report back findings and recommendations to the main Consultation Forum. This group met separately from the main events.

The Consultation Forum in its entirety was designed to comprise more than a series of conferences with plenary and parallel working group sessions. It was an opportunity to:

- develop a network of professionals and experts across the defence sector building on existing structures while creating new relationships;
- draw up solutions for common challenges; and,
- identify and raise awareness with a greater number of MODs for the benefit of adopting a sustainable energy approach to defence infrastructure through the development of documentation and potential stimulation of national initiatives and/ or collaborative projects.

2. OVERVIEW AND ORGANIZATION OF CF SEDSS EVENTS

This section covers how the CF SEDSS was organized, how the work plan was developed, and of the approach followed towards stakeholder engagement.

The Consultation Forum was organized and run by a Management Team comprising EDA staff and volunteer moderators from a number of EDA pMS. The agenda for each CF SEDSS conference was developed by the CF SEDSS Management Team in accordance with the initial work plan (see figure 1), and in response to developments from previous CF SEDSS events. These could include any additional requirements set out by delegates either during the conferences or from questionnaires sent out to delegations in between CF SEDSS events, along with feedback received following specific CF SEDSS events. All input and feedback received was analysed by the CF SEDSS Management Team and discussed in detail during its preparatory meetings for the forthcoming events, which were taking place several weeks in advance of each event.

Each of the Consultation Forum event plenary sessions comprised keynote addresses delivered by a number of high profile individuals including Commissioners, representatives from the European Commission, senior officials and military staff from MODs, the EDA, as well as key individuals from the various host nations. In addition to demonstrating this high-level strategic leadership and commitment to increasing the momentum on delivering sustainable energy in the defence sector, there were also a number of academic and supplier presentations which contributed to the knowledge built up in the Consultation Forum.

During each of the parallel working group sessions, technical presentations were given by leading speakers from MODs, EDA, the European Commission, NATO, the supply base, and academia. Interactive discussions were encouraged to foster knowledge-sharing including good practices and challenges, identification of capability shortfalls where improvements could be made, and to inform the options for the way ahead.

Following discussions at the Consultation Forum, the Management Team altered the original work plan in order to reflect the following points: (see figure 2)

- Finance was considered to be a cross-cutting theme, therefore removed from WG1 and addressed during plenary sessions.
- PCEI was considered to be a cross-cutting theme deserving specific treatment and therefore removed from WG1 and addressed by a specialist expert group which was supported by EDA's Capability Armaments and Technology (CAT) Directorate and European Synergies and Innovation (ESI) Directorate.
- It was also decided that the scope of CF SEDSS should focus on fixed infrastructure; as such deployed military operations and military equipment capability was regarded as out of scope. Although information and lessons learnt would be shared between the fixed infrastructure communities, and the military equipment communities including deployed infrastructure.

The project was supported by the development of a multi-national website with both publicly available and government-use-only domains, associated administration, as well as analysis and dissemination of post-event reports. Summary reports, presentational material, and associated documents were uploaded to the EDA-dedicated secure electronic platform⁷ for the CF SEDSS: "European Defence Energy Network - EDEN" and in some cases circulated to delegates.

⁷ https://ecp.eda.europa.eu/R/European_Defence_Energy_Network_EDEN/Pages/Home.aspx

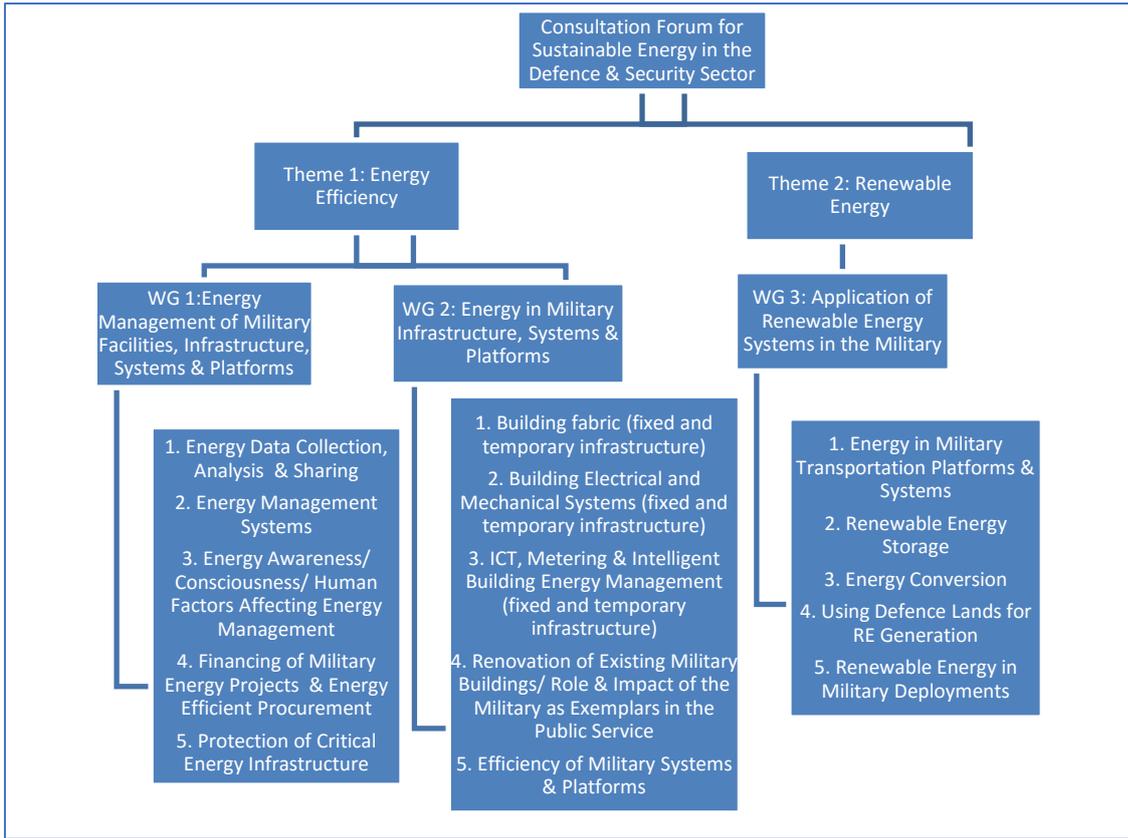


Figure 1. CF SEDSS Original Work Plan

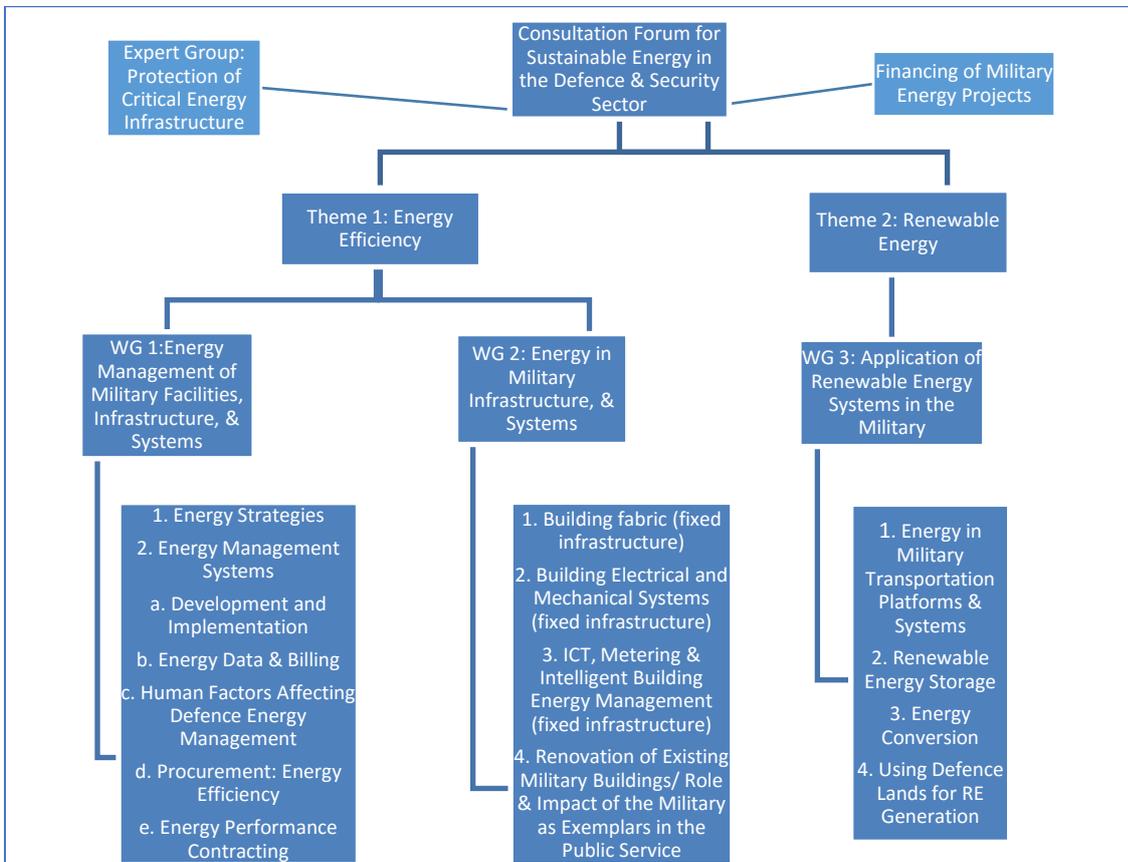


Figure 2. CF SEDSS Revised Work Plan

3. OUTCOMES

This section of the report covers the scope and main outcomes of the CF SEDSS including how the stakeholder community was built and strengthened by EDA throughout the project. It also provides an overview of each of the events held.

Regarding the final deliverables, the EDA CF SEDSS team drew on all of the evidence provided, presented, and discussed by Member States, working group Moderators, guest speakers, and EDA during and between CF SEDSS events, in order to ensure a consistent and inclusive final report and guidance document. The information sheets were developed using a combination of material provided by Member States, working group Moderators, and EDA such as the EDA's Defence Energy Managers Course, an energy efficiency behaviour change case study from the UK, the use of smart buildings by the Spanish MOD, the use of photovoltaic power by the Irish Defence Forces, and the EDA's Smart Energy Camps Technical Demonstrator. The Final Deliverables in addition to the review performed by the CF SEDSS Management Team were also put through a process of peer review by consulting Member States' MODs, and finally seeking the review and validation by the EDA senior management. In parallel, and prior to the final submission, the draft final documents were also sent to DG Energy for comments in order to further ensure the institutional coherency and consistency of the outcome.

3.1 Stakeholder engagement

Stakeholder engagement is always important, in particular in new activities that need to consolidate diverse input and interests on the same topics that stem from different starting origins. The level of success derived from following a structured approach to energy management using a recognized management system will be dependent on having the right level of buy-in and interaction at different levels of an organization. Therefore, stakeholder engagement is particularly important in the context of CF SEDSS to ensure that the initiative serves as a model of good practice in sustainable energy management. In this regard, stakeholders' engagement, enabled discussions and exchange of practices, identified gaps and opportunities and proposed recommendations for the way forward.

All Member States' national defence administrations and Armed Forces were invited to each of the events, with representatives from between 21 and 26 MODs attending the events (a more detailed analysis of the participation is provided in Annex 6).

Among the participating MS was also Denmark, which does not participate in EDA since it holds an opt-out from EU policies in relation to security and defence. Overall, the participants were from EU Member States' MODs as well as from MODs with which EDA has administrative arrangements. MODs made available speakers on a variety of topics ranging from behavioural considerations in energy, to providing experience on the challenges and benefits of using renewable energy systems in defence infrastructure capability. Moreover, staff members from the European Commission's DG Energy and the Executive Agency for Small and Medium-sized Enterprises (EASME) attended the events in both speaking and delegate capacities. This added a vital dynamic to CF SEDSS in terms of providing valuable insights into cross-cutting considerations, including financial matters around different funding mechanisms, as well as the future direction of EU energy considerations (such as the 'Clean Energy for All Europeans Package', which was adopted in November 2016 to keep the European Union competitive as the clean energy transition changes global energy markets and included a proposal for a 30% energy efficiency target to be achieved by 2030).

In terms of broader stakeholder engagement, representatives were invited to attend either as speakers or delegates from:

- **Industry:** including larger defence contractors, and small and medium sized enterprises with experience in delivering innovative energy projects in the defence sector; suppliers with experience in delivering energy projects in both on-grid and off-grid non-defence sector sites, but with an emphasis that similar approaches and associated energy benefits could be applied to the defence sector sites; and perspectives were also given on some challenges including wind turbine interference with defence radar systems.
- **Academia:** including university level experts who had developed innovative technical solutions such as on smart grids; energy and carbon management; the use of supercapacitors; and alternative fuels.
- **Organisations and Think Tanks:** Think Tanks (e.g. RAND Europe), NATO and the NATO accredited Energy Security Centre of Excellence (ENSEC COE) who participated in all of the events.

Stakeholder presentations at plenary sessions covered strategic and cross-cutting issues as well as specific technological considerations. Host nations, in supporting further the events, provided presentations from their MODs and their academic institutions on an array of relevant topics and at the parallel sessions, and presentations were provided on diverse subjects across all three working groups. Presentations on energy management included the relevant legal framework, energy data modelling, energy management systems, behavioural interventions, and procurement. The presentations on energy efficiency included specific elements of energy legislation, technological aspects of infrastructure management, as well as concepts for generating project ideas including the role of Energy Performance Contracting. Many elements and aspects of renewable energy-related matters were covered including the use of renewable energy on defence estates, renewable energy and the transportation sector, and detailed presentations on relevant aspects of renewable energy source (RES) technologies such as wind, solar, geothermal, biofuels, and smart grids.

The variety of topics presented contributed considerably to stakeholder engagement during the CF SEDSS events as well as stimulating discussions between events. Stakeholder engagement was deepened further through the use of questionnaires at the end of each event to seek overall feedback on the content and potential improvements for future events, but also through the use of targeted questionnaires sent out to the working group members on specific elements of the content. These two levels of stakeholder engagement enabled valuable input for the development of the CF SEDSS, and provided further evidence for the content of the final deliverable. The key results from the questionnaires have been set out in the CF SEDSS Guidance Document which accompanies this final report. This evidence will also be important to informing the development of the technical content and management of the second phase of the CF SEDSS.

In addition to the direct engagement at CF SEDSS events, and through correspondence with wider stakeholders outside of events, members of EDA and the CF SEDSS management team also attended some of the Concerted Action events delivered for DG Energy to gain some wider perspectives stemming from outside the defence sector. The Concerted Action involved the national authorities implementing the Energy Efficiency Directive, or those bodies appointed and entrusted by them to do so, and it was carried out under the coordination of the Netherlands Enterprise Agency (RVO). These events tended to focus on the detail of specific articles of legislation and were attended by experts from national energy ministries. There were some valuable lessons to be learnt from the working group facilitation approaches taken, such as the use of interactive ice-breaking techniques to encourage delegates to share their perspectives. Technical content included the importance of energy modelling to inform government level decision making, which was useful to relay back to the Management Team to explore the potential for energy modelling to be used by the defence sector. It was also useful to provide feedback to colleagues from the wider energy sector on the challenges encountered by defence in the domain with the expectation that such messages would be relayed to a wider audience to inform energy sector future developments.

3.2 Coverage and Scope of the CF SEDSS Events

Specific information on each of the CFSEDSS events is provided at annexes 1 to 5. These annexes cover an overview of each of the events including the level of attendance, some of the main themes as well as some high-level outputs from each of the three – energy management, energy efficiency, and renewable energy – working groups. Presentational material from the CF SEDSS events is available on EDA’s Electronic Collaborative Platform.

3.3 Cross-cutting topics

Cross-cutting topics inevitably developed from the CF SEDSS and were centred around enabling mechanisms such as financial instruments and procurement options. There was also the PCEI topic which, as described in a previous section of this report, was treated in a separate group but was nevertheless cross-cutting in nature.

3.3.1 Legislative analysis

During the meetings of the forum an analysis on the Energy Efficiency Directive (EED), Energy Performance of Buildings Directive (EPBD), and Renewable Energy Directive (RED) was conducted. The outcomes of the analysis per Directive and working group are presented in the accompanying guidance document. Nevertheless, some of the main points from the analysis are highlighted in this section of the report.

The second phase of the Consultation Forum should be used to support MS MODs in establishing a clearer way forward on the use of relevant legislation and continue with the analysis to improve further the understanding of:

- how the legislation can be applied by the defence sector,
- where MS MODs consider that legislative application could be improved, and
- where they consider that it is irrelevant or indeed detrimental.

3.3.1.1 Energy Efficiency Directive (EED) and Energy Performance of Buildings Directive (EPBD)

Thorough discussions have been held around EED and EPBD relevant articles, in particular:

- a) Reviewing EED key articles:
 - i) EED Article 4: Building Renovation Strategies and Plans
 - ii) EED Article 5: Exemplar role of public bodies buildings
 - iii) EED Article 20: Energy efficiency national fund, financing and technical support

- b) Revision of EPBD key articles:
 - i) EPBD Article 3: Methodology for calculating the energy performance of buildings
 - ii) EPBD Article 4: Setting of minimum energy performance requirements
 - iii) EPBD Article 5: Cost-optimal methodology
 - iv) EPBD Article 6 and 7: New and Existing buildings
 - v) EPBD Article 8: Technical building systems
 - vi) EPBD Article 9: Nearly zero energy buildings

- vii) EPBD Articles 11,12 and 13: Energy performance certificates
- viii) EPBD Articles 14, 15 and 16: Inspection of heating and a/c systems

The following common features and positions were found during the discussions concerning energy efficiency and renovation strategies and plans:

- a) Most MODs have an energy efficiency plan and building renovation strategy plan.
- b) Generally, there is uncertainty about how much MODs are contributing to their National targets. The 3% renovation rate National target (EED Art. 5) is allocated to each MS Public Administration building stock as a whole; each MOD can negotiate a lower/higher rate of renovation with its Central Government. Also, MS may choose to implement alternative measures providing equivalent energy savings and not follow the 3% renovation rate.
- c) MSs have a clear definition of what a NZEB is, although it differs among MSs and standards have not been set up.
- d) MSs have minimum energy performance requirements for new and renovated buildings, and for technical building systems that MODs follow.

Obstacles or difficulties that MODs find in the implementation of EU Energy Efficiency legislation, are common to almost all MODs and can be summarized as follows:

- a) Disconnection between energy procurement, energy efficiency, energy consumption awareness and maintenance plans, leading to no drivers for energy efficiency measures.
- b) Disconnection between duty holder and budget holder, leading to a lack of incentive to save energy.
- c) Lack of a single senior MOD energy management point of accountability.
- d) Need to prioritize buildings on the basis of adequate building stock inventory and benchmarks.
- e) Building stock inventories are inadequate.
- f) Difficulties to create and update an adequate building stock inventory register: too many buildings, mixed or unknown use, property issues, lack of individualized metering, lack of resources, difficulties to collect data (externalisation of maintenance), lack of human resources to collect data and monitor energy consumption.
- g) Too long payback periods for cost benefits to be realized.
- h) Lack of funds for implementation of energy efficiency improvement measures.
- i) Complete lack of knowledge/awareness about financing mechanisms and available funds.

3.3.1.2 Renewable Energy Directive (RED)

On the application of the articles of RED, MODs were asked whether:

- there was a common understanding that there was no applicability of the text of the legislation to the Defence and security sector,
- it is a useful area that could be further developed,
- it is detrimental to the sector as it either excludes or omits some critical element.

Seven MODs from Working Group 3 responded providing their insights for the RED. The paragraphs below are presenting per article their inputs:

For RED Articles 1-29, there was more of a tendency for responding MODs to state that there no applicability of the text of the legislation to defence matters. For the rest some of the statements made by MODs included:

- Article 3 (Mandatory national overall targets and measures for the use of energy from renewable sources): MOD could contribute to the national level target through on-site renewable energy generation where this is compatible with defence activities.
- Article 13 (Administrative procedures, regulations, and codes): positive but detrimental in some cases.
- Article 14 (Information and training): although marked as a useful area that could be explored further by three of the seven MODs, one commented that the requirements of this article should be clarified in defence procurement procedures.
- Article 17 (Sustainability criteria for biofuels and bioliquids): one of the MODs marked this as detrimental and that the requirements of this article should be clarified in defence procurement procedures.
- Article 18 (Verification of the compliance with the sustainability criteria for biofuels and bioliquids): one of the MODs marked this as detrimental and that the requirements of this article should be clarified in defence procurement procedures.
- Article 24 (Transparency platform): six of seven responding marked this as not applicable, with one MOD commenting that this was about national level and not sector level information.

3.3.1.2.1 RED Recitals

The same set of questions were asked for the RED 'recitals'. Ten MODs responded for recitals 1-25, and eleven MODs responded to recitals 26-97. There was a mixed response across the recitals with a slightly greater tendency for being not applicable to defence, although there were also a large number of positive responses across the recitals, and a small number of negative comments.

Of all those MODs that responded, 100% felt that the following recitals were not applicable:

R 21: The indicative trajectory should take 2005 as its starting point because that is the latest year for which reliable data on national shares of energy from renewable sources are available.

R 30: In calculating the contribution of hydropower and wind power for the purposes of this Directive, the effects of climatic variation should be smoothed through the use of a normalisation rule. Further, electricity produced in pumped storage units from water that has previously been pumped uphill should not be considered to be electricity produced from renewable energy sources.

R 31: Heat pumps enabling the use of aerothermal, geothermal or hydrothermal heat at a useful temperature level need electricity or other auxiliary energy to function. The energy used to drive heat pumps should therefore be deducted from the total usable heat. Only heat pumps with an output that significantly exceeds the primary energy needed to drive it should be taken into account.

R 36: To create opportunities for reducing the cost of achieving the targets laid down in this Directive, it is appropriate both to facilitate the consumption in Member States of energy produced from renewable sources in other Member States, and to enable Member States to count energy from renewable sources consumed in other Member States towards their own national targets. For this reason, flexibility measures are required, but they remain under Member States' control in order not to affect their ability to reach their national targets. Those flexibility measures take the form of statistical transfers, joint projects between Member States or joint support schemes.

R 37: It should be possible for imported electricity, produced from renewable energy sources outside the Community, to count towards Member States' targets. However, to avoid a net increase in greenhouse gas emissions through the diversion of existing renewable sources and their complete or partial replacement by conventional energy sources, only electricity produced by renewable energy installations that become operational after the entry into force of this Directive or by the increased capacity of an installation that was refurbished after that date should be eligible to be counted. In order to guarantee an adequate effect of energy from renewable sources replacing

conventional energy in the Community as well as in third countries it is appropriate to ensure that such imports can be tracked and accounted for in a reliable way. Agreements with third countries concerning the organisation of such trade in electricity from renewable energy sources will be considered. If, by virtue of a decision taken under the Energy Community Treaty (12) to that effect, the contracting parties to that treaty become bound by the relevant provisions of this Directive, the measures of cooperation between Member States provided for in this Directive will be applicable to them.

R 39: Noting that projects of high European interest in third countries, such as the Mediterranean Solar Plan, may need a long lead-time before being fully interconnected to the territory of the Community, it is appropriate to facilitate their development by allowing Member States to take into account in their national targets a limited amount of electricity produced by such projects during the construction of the interconnection.

Some of the positive comments included that there are opportunities for the civilian and military sectors to cooperate on local renewable energy generation. On R10, it was suggested by one MOD that targets should be set on a case by case basis for countries. On R46, with regard district heating and cooling, it was stated that this could be appropriate for military facilities including for large scale sites.

Of the MODs responding negatively to the recitals, this was predominantly single MODs stating that the recital was detrimental unless otherwise indicated; these were:

Recitals 4, 5, 6, 7, 8 (2 MODs), 9 (2 MODs), 24, 25, 28 (2 MODs), 33, 41, 43, 76.

Examples of comments were, on R 9 for biofuels, it was felt by one MOD that there should not be binding targets for the defence sector and another that the target of 10% biofuels for transport by 2020 could be challenging.

3.3.2 Finance

Throughout the CF SEDSS, finance was raised as perhaps the main cross-cutting core issue. A number of presentations were given during the CF SEDSS plenary events. Section 5 “Finance Considerations” of the guidance document “A Roadmap for Sustainable Energy Management in the Defence and Security Sector” presents in detail the potential sources of funding and helps with the identification of financing mechanisms for energy efficiency and renewable energy in defence.

These included:

- the **European Energy Efficiency Fund (EEEF)** which is a public-private partnership dedicated to mitigating climate change through market based financing;
- 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’;
- **European Structural and Investment Funds (ESIF)** and what is achievable for Defence through dual-use technology applications;
- material on **Horizon 2020** reflecting the policy priorities of the Europe 2020 strategy through seven challenges including one on energy design to support the transition to reliable, sustainable and competitive energy systems; and,
- the **LIFE programme**: the EU’s funding instrument for the environment and climate action.

3.3.3 Procurement

As a key enabler of energy projects, procurement was also a cross-cutting theme in the CF SEDSS. Presentations were given on Energy Performance Contracting (EPC) and Energy Service Companies (ESCOs). EPC is an alternative solution to upgrade the energy efficiency of certain types of MODs' and Armed Forces' buildings through energy performance guaranteed by the private sector. EPC is a contractual arrangement between the beneficiary (i.e. the MOD) and the provider of an energy efficiency improvement measure (the ESCO), which is verified and monitored during the whole term of the contract. Investments (works, supplies or services) are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings.

During the CF SEDSS, there were discussions on whether there could be a way of seeking EU funding of defence energy projects through an EPC arrangement, which would otherwise not be possible if MODs were to apply directly for funding because of the constraints imposed by the European Investment Bank (EIB) on military projects. This is because EIB⁸ excludes funding activities for ammunition and weapons, military/ police equipment or infrastructure.

In addition to EPC, other procurement related information was also provided on the role which energy efficient consuming and energy efficient enabling products can contribute to overall energy performance improvement. This is set out in further detail in the CF SEDSS guidance document.

3.3.4 Protection of Critical Energy Infrastructure (PCEI)

For the Protection of Critical Energy Infrastructure (PCEI) sub-theme, as set out in section 1, a PCEI Experts Group was established to run separately to the main CF SEDSS with the purpose of developing a Conceptual Paper on PCEI, with a focus on the European Defence landscape; overarching progress was presented periodically to both the CF SEDSS in plenary format and the EnE WG. The PCEI Experts Group met on five occasions and held a workshop dedicated to developing relevant case studies.

It was chaired by the Hellenic MOD with the Centre for Research and Technology Hellas (CERTH) providing the deputy chairman. Six MS participated with Cyprus, Greece and Bulgaria to be lead nations and Estonia, France, and Ireland to be members of the Experts Group. The European Commission provided policy and scientific expertise from DG Energy and the Joint Research Centre (JRC) throughout the development of the work. The lead academic and research centres supporting the work of the PCEI Experts Group were: Centre for Research & Technology Hellas (CERTH), Cyprus University of Technology, European University Cyprus, KIOS Research Centre - University of Cyprus, and the National Technical University of Athens (NTUA). NATO ENSEC COE also shared its experience and expertise from its work on Critical Energy Infrastructure Protection.

The first meeting of the PCEI Expert Group was held in Brussels where the initial scope and expectations were set out. The second meeting also took place in Brussels where the main topics for inclusion in and the structure of the PCEI Conceptual Paper was developed. The third meeting was held in Nicosia, hosted by the University of Cyprus, where the scope and boundaries of the work were defined in terms of direct applicability to the defence sector. The fourth event was held in Thessaloniki and was hosted by CERTH. At this meeting, the Conceptual Paper was matured further. The workshop held in Limassol – hosted by the European University Cyprus - focused on refining the Paper and working towards agreement and development of case studies. The results of the Conceptual Paper were presented at the fifth CF SEDSS event in Thessaloniki. Hence, the final meeting of the PCEI Experts Group was held in Brussels to finalize the paper by incorporating comments received from MOD stakeholders. The Group also agreed on the content of the PCEI fact

⁸ http://www.eib.org/attachments/documents/excluded_activities_2013_en.pdf

sheet which aims at both raising awareness of the significance of PCEI in the EU Defence and Security sector and contributing to the enhancement of Critical Energy Infrastructure (CEI) protection and resilience.

The PCEI Experts Group explored options for protecting defence-related CEI⁹ from existing and emerging risks and threats, including hybrid and asymmetrical warfare, climate change, and natural hazards. To help to maintain the European defence sector at the required levels of effectiveness and readiness, the aim was to identify both common capabilities (synergies) and research shortfalls and to develop plans for addressing collectively the challenges arising from the nexus of defence, energy infrastructure, resources, the future operating environment, and defence capabilities.

The PCEI Conceptual Paper concluded that there is a need to ensure the resilience of defence and security sectors in times of crisis and one of the aspects of resilience is the continued availability of secure and sustainable energy supplies. It aimed at providing the framework which could lead to the identification of best management practices, including an EU policy, based on Sustainable Energy and Environmental Security priorities, to support Member States further in strengthening the protection of all defence-related CEI from any kind of failures, risks, hazards, disasters and threats including terrorist or cyber-attacks.

The Paper set out the intention to lead to concrete actions for developing appropriate methodologies and tools which it concluded that the most cost-efficient way to implement these objectives is through cooperative projects of mutual interest with the support of the EU. In addition, it explained that Member States need to foster an EU culture in protection and resilience of PCEI in European defence through, for instance, joint training or exercises. The PCEI Conceptual Paper stated that Member States, supported by EU institutions (the European Commission) and Agencies (EDA), could move to a broad consensus on how to improve the resilience of defence-related CEI and thus protect common interests.

The PCEI Conceptual Paper identified that a Member State by itself cannot ensure autonomy based on national capacities only, but has to consider interactions within its network of strategic partners. In essence, it needs to realize that strategic autonomy does not imply having access to infinite domestic resources but having a diversity of options and choices within the nexus of the European Defence eco-system. In this respect, the EU needs to support Member States further in strengthening the protection of all defence-related CEI. To address these challenges the PCEI Group proposes to Secure Energy Strategic Autonomy for European Defence (SESAED) through cooperation and practical assistance among Member States and in particular the MS most vulnerable to severe energy supply disruptions and infrastructure failures.

The PCEI Experts Group agreed on the following recommendations:

- Address identified shortfalls in critical energy infrastructure protection and resilience by developing projects of mutual interest for the defence and security sector.
- Develop the Short-, Medium- and Long-term strategy for the PCEI Initiative.
- Establish a network of experts as a platform for enabling broader collaboration across EU MS MODs and relevant civil sectors.

⁹ Defence related critical energy Infrastructure are those critical energy infrastructure owned by the public or private sectors, that is essential to the functioning and the operations of the defence sector.

4. CONCLUSIONS AND OBSERVATIONS FOR THE WAY AHEAD

It was clear from the CF SEDSS that there is an added value for the European Commission and the European Defence Agency to continue working collaboratively in the defence sector, realizing the benefits for Member States and defence while contributing to broader EU objectives.

Moving to a sustainable and efficient energy model is both a potential economic opportunity for Europe's defence sector and an enabler for operational advantages for the Armed Forces. While there are some circumstances where special considerations need to be given to the defence sector on account of its specific ways of working and required outputs, the defence sector sees the value of relevant energy legislation, and shows willingness to commit to it when possible and feasible.

The main conclusions of this first phase of work are:

- i. The CF SEDSS has succeeded in developing a network of defence energy focal points and experts in EU Member States and beyond. It has demonstrated the importance of energy in general, and of sustainable energy in particular, as an enabler of military capability to the wider defence sector on a scale which did not exist previously. In so doing, it has both confirmed pre-conceived ideas and helped to develop new concepts on the challenges and opportunities of achieving a sustainable energy future for the defence sector.
- ii. Amongst the challenges and constraints which have been raised and discussed during the CF SEDSS events, there were the following:
 - a. At a national level, improvements to defence infrastructure capability such as those related to energy efficiency or investment in renewable energy technologies, that usually have to compete with national and core defence spending priorities. This means that energy-related improvements often do not take place as the funding may well have been prioritized for spend elsewhere.
 - b. At an EU level, financing with regard to Armed Forces' infrastructure and equipment has certain constraints given, for instance, the limitations of the European Investment Bank (EIB) financing rules regarding the military. The complexity of and inaccessibility to EU funding mechanisms and national level resources faced by the defence sector is seen a barrier and this uncertainty could be a possible reason why the sector does not generally invest time and resources in applying for the various funds.
 - c. There was limited understanding and expertise in the defence sector on how to access EU funding for sustainable energy projects in the defence sector.
 - d. There is a lack of clarity around accounting rules. For instance, in general using private sector funding adds to national debt, therefore, there needs to be greater exploration and assessment of novel mechanisms such as the Energy Performance Contracts and whether such funding also constitutes national debt. In the second phase of the Consultation Forum, the Eurostat rules should therefore be analysed in this context and conclusions should be drawn.
 - e. While a large variety of topics were covered during the 24 month period, **further work is required to put the entire defence sector on a strong trajectory towards a sustainable energy future.** A number of reasons advocating towards this direction include:
 - **Complexity:** the overarching scale, diversity and peculiarity of the defence sector.
 - **Variability:** there is wide variability on the approaches taken to energy by MODs. Although it is unanimously accepted that moving towards a sustainable energy future in the defence sector is a military capability multiplier, Member States have

different priorities and as such were at different phases of implementing sustainable energy management improvement practices.

- **Human factors and energy consciousness:** The need for the defence sector as a whole to undergo a cultural shift, embracing sustainable energy as a capability enabler. While some evidence suggested that this could be happening in specific areas/ defence projects, it was not yet universal. There are two levels to this – individual and institutional, but where the key elements of knowledge, motivation, and opportunity are common to both. At an individual level, there is little if perhaps no difference between defence personnel and wider society. At an institutional level, it is important to have the right information for individuals to make the business case for sustainable energy. Of equal importance is having the mechanisms and policies in place to enable energy to be directly linked with military operational capabilities and to be assessed as part of value for money decision making by balancing cost and capability support, with energy considerations. As such, having a ‘low carbon’ energy supply will become more valid if this were to reduce the overall cost to defence, taking in to account all factors (e.g., political, policy, legislation, financial mechanisms, etc.)
 - **Technology:** There is generally little difference in the implementation of energy management, energy efficiency and energy generation technologies in the defence sector to the private and wider public sector for fixed infrastructure. There are, however, a number of additional constraints on defence sites due to defence activities. Access is required to knowledge on commercially available technologies, the opportunities, costs, benefits and risks to make the most of the technologies. This would enable the defence sector to evaluate the variety of existing and emerging technologies for defence needs and to guide decisions on the most suitable candidates for integration into legacy and new infrastructure according to particular needs.
 - **Enabling tools:** There is a further need for appropriate enabling frameworks such as policy and decision-making tools that will be including cost/benefit analysis, management systems incorporating Environmental Management Systems and Energy Management Systems based on recognized standards.
 - **Access to Funding:** A more thorough understanding of how to resolve financing issues including access to funding mechanisms is needed; either internal to defence, at a national level, or coming from EU funding instruments.
- iii. The project has also resulted in the production of a guidance document and information sheets, capturing the present status elements which will need to be refined further as knowledge and experience develops. As such, these should be treated as living documents and updated with the latest information.
- iv. To facilitate the CF SEDSS, the EDA has created the European Defence Energy Network (EDEN) website. This has been done to provide information on upcoming events, as well as for the scope and the main objectives of the CF SEDSS. There is also a restricted website for government users which is hosted on the EDA’s Electronic Collaborative Platform.

The CF SEDSS has also demonstrated the applicability and relevance of some elements of EU energy legislation to the defence sector, but has also highlighted some specific

challenges, for instance, on the applicability of elements of the Renewable Energy Directive and Energy Performance of Buildings Directive to the defence sector.

4.1 Finance

Finance within MODs was acknowledged as one of the key enabling mechanisms to deliver improved performance on energy. Much greater clarity and support is still needed on what can be realistically achieved with National and EU financial instruments in the defence sector as well as what are some of the various scenarios which might arise and how to address them. Conversely where a solid business case can be demonstrated, funding from private investors could be accessed, as public funds are in any case not sufficient for the actions needed to reach the 2030 targets. For instance, different phases of a project may need to be funded through different mechanisms, and may not always realize 100% funding, which adds another layer of complexity.

The development of agreed frameworks which provide a comprehensive overview of which financial instruments are appropriate (and which are inappropriate) for the defence sector would be of significant benefit to MODs achieving the shared aims of the European Commission and the defence sector on sustainable energy. It is suggested that a military domain oriented generic model is developed that considers the anticipated change in energy cost as well as the cost for energy system change, with the purpose to aid in the process of evaluating the merits of new initiatives for sustainable energy.

4.2 Procurement

The role which the procurement process could play should be more clearly defined: for instance, service contracts, including Energy Service Companies (ESCOs), can be used as a mechanism to access National and EU funds, as well as private investors, in a way which could not otherwise be realized through direct application from an MOD. In parallel, the development of procurement standards for energy saving products (e.g., construction materials) and energy efficient consuming products (e.g., electrical and electronic equipment) could usefully be pursued further. Market tested products should be routinely used in defence contracts and a mechanism for adopting standard specifications should be explored as part of this.

4.3 Recommendations

As the future direction is developed, it is important to keep in sight that the aim of the EU Member States MODs/ Armed Forces is to preserve the sovereignty of their countries. While energy efficiency and the use of renewable energy is not a primary defence objective, it can serve as a capability multiplier. In relation to this, there was also an explicit view from MODs that the existing defence exemptions within the EU legal framework on energy efficiency may have to be maintained at a certain level.

MODs can play a leading role within the public sector on energy improvements, and this would require the availability of both private and public funds as well as a strong political will. MS MOD experts agreed that energy improvements will lead to reduced cost risks and to improvement of capability development and delivery. Additionally, the military expectations included that sustainable energy transition will lead to cost-control through technologies and behavioural change, to reduced vulnerability, and reduced environmental impact.

Within the above context the following recommendations are being put forward:

- a) **EU MS MODs/ Armed Forces** should proceed with implementing the following actions, without any compromise to military operational objectives and capabilities:
- i. Develop, promulgate and support through relevant resources (human and economic) an Energy Policy and an Energy Strategy, to initiate and sustain action plans for a more energy efficient and less fossil fuel dependent and consuming defence sector with a greater diversity of energy sources.
 - ii. Engage more with industry in terms of Research and Technology for the provision of sustainable and energy efficient solutions, either by the incorporation of off-the-shelf products to the military environment or by the development of tailor-made, new products.
 - iii. Develop and implement Energy Management Systems or Environmental Management Systems, which should include energy as one of the significant environmental aspects, to pursue the continual improvement of energy performance in a way which benefits military capabilities.
 - iv. Establish a mechanism to gather and analyse energy data systematically to:
 - Forecast energy consumption for budgetary purposes (billing and planning).
 - Plan more accurately new interventions to address future energy trends.
 - Launch action plans for increasing energy efficiency and renewable energy and reducing fossil fuel consumption / costs while supporting or even enhancing military operational capabilities and requirements.
 - v. Trigger human factors which are related to energy efficiency improvement and renewable energy sources and technologies penetration focused on building commitment, raising awareness, nurturing motivation, maintaining internal and external communication, and providing appropriate training. This is important to help gain commitment at a high level to invest in energy efficiency and renewable energy.
 - vi. Create new and/ or amend existing procurement procedures and practice to enable the selection of energy efficient and renewable energy products / equipment, services and buildings in accordance with relevant EU and national legal frameworks, but not to the detriment of military operational capabilities which is in line with Article 6(2) of EED 2012/27/EC on Purchasing by Public Bodies. This specifically states that the high energy-efficiency performance purchasing obligation shall apply to the contracts of the armed forces only to the extent that its application does not cause any conflict with the nature and primary aim of the activities of the armed forces. The obligation shall not apply to contracts for the supply of military equipment as defined by Directive 2009/81/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts by contracting authorities or entities in the fields of defence and security.
 - vii. Explore further the feasibility of the EPC funding mechanism, taking into account the specificities of the defence sector.

b) MS national Competent Authorities on Energy should:

- i. Remove the barriers that exist in some MS with respect to the involvement of civil servants (MOD personnel included) in energy auditing schemes and at the same time strengthen the procedures that safeguard impartiality.
- ii. Include competent MOD personnel in the national training schemes on energy auditing.
- iii. Not discriminate against MODs when funding for energy efficiency and renewable energy upgrades are available for the public sector (through the National Energy Efficiency

Action Plans-NEEAPs, the European Structural and Investment Funds (ESIF) as well as all national funding mechanisms), to enable MODs to contribute to national energy efficiency and renewable energy sources targets.

c) The European Commission and the MS should:

- i. Provide guidance to the national Competent Authorities on Energy to acknowledge the defence sector as a significant stakeholder in terms of energy usage. This is expected to facilitate MODs to gain access to national funding and technical assistance.
- ii. Assist EDA and MODs in capacity building so as to facilitate the realization of projects related to energy efficiency and renewable energy.
- iii. Look for synergies with other energy efficiency- and renewable energy related EC activities and bring relevant communities together to exchange good practices.

d) EDA should:

- i. Promote further cooperation in the regime of energy efficiency and renewable energy.
- ii. Act as an interface towards the EC on energy efficiency and renewable energy (framework, funding instruments, etc.).
- iii. Provide capacity building on energy efficiency and renewable energy.

4.4 Lessons learned and observations for future work

The CF SEDSS has provided a unique and significant opportunity to increase the momentum on developing a sustainable energy pathway for the defence sector. Even though other sectors of society may be at a more advanced stage of this endeavour, through the CF SEDSS, the defence sector has demonstrated its willingness to contribute to the overall and greater objective of the decarbonisation of the EU economy by 2050 and to foster **EU's transition towards a clean and sustainable energy economy**. Although progress on improving energy performance is evident, it can be concluded that the CF SEDSS initiative has highlighted that more can be done across the sector and that there are specific bottlenecks for the defence sector that need to be tackled.

As such, there is a strong business case for the Consultation Forum to continue its work. EDA welcomes the opportunity to continue to work with the European Commission on a further phase of the Consultation Forum and facilitate the expanding needs of the comprehensive network of stakeholders which has been a result of this initiative.

To further support a continuation of the CF SEDSS, it would be useful to take into account some lessons learned, stakeholder perspectives, observations, and proposals regarding the format and organization which include:

A. Format and organizational aspects

- The balance between the number, duration, and format of meetings of CF SEDSS was correct.
- An enhanced level of stakeholder engagement with participants (for instance, through questionnaires or sharing of other documentation) in between meetings which could facilitate stakeholder-led research and preparation of the meeting.
- A request for a broadening of stakeholder engagement to include:
 - other government departments, specifically Ministries of Energy, Industry, or Economy and Tax Revenue representatives;

- other National and EU relevant Authorities;
- Institutions key to defence;
- key suppliers coming from all levels of the supply chain (from academia and RTOs to industrial stakeholders).
- Enhanced collaboration between WG1 (Energy Management) and WG2 (Energy Efficiency) may help tap and leverage on each WG's outcomes and results, as already set out in the structure of the second phase of the Consultation Forum.

B. Proposed topics

Following the agreement of the Member States on the scope of the CFII, which took place during the fifth plenary meeting of the Consultation Forum in Thessaloniki, the following topics have been proposed to be further investigated during the CFII:

- Empowering MODs to identify, develop and implement collaborative projects of mutual interest through the exploration and provision of knowledge and training on financial tools and mechanisms; rather than being on financial support to specific projects, this would assist with the identification of suitable financial instruments and a greater understanding of how such mechanisms work in practice.
- Striving towards the identification of tools and instruments that would help Member States/ Ministries of Defence to develop tangible projects which are linked to objectives of the relevant energy directives.
- Financing of Defence Energy Projects through the new European Defence Research Programme or through the next EU Multiannual Financial Framework (MFF) 2021-2027.
- Further exploration of financing dual use defence energy projects through EU Structural Funds as well as national investment programmes..
- Interpretation of and compliance with EU Public Sector Procurement Rules
- Capacity building towards the development and implementation of: Energy Performance Contracting; Energy Management Systems, including appropriate Energy Performance Indicators; setting energy targets, energy monitoring and modelling which could incorporate exploring the scope for defining separate targets for energy consumption (owing to lower use) and for energy efficiency (owing to more efficiency).
- Through-life cost approaches regarding specific issues such as technical building systems.
- Using evidence to build energy considerations into budget cycle planning in public administrations.

In addition and more broadly, Member States expressed their wish to be supported in the development of energy policies and strategies at a high level in MOD/Armed Forces organizations.

C. Reflections from the Plenary meetings

- The wide disparity in Renewable Energy Sources (RES) approaches across EU MS demonstrates a need for greater sharing of information in this field. There is a need to examine further and to quantify potentially how RES can contribute to a lowering of the carbon footprint of the defence and security sector as well as for a closer focus on the obstacles to major RES projects and how these might be overcome (e.g. planning constraints, excess production, storage and coordination with other public bodies and the private sector). Building the business case for RES and technologies, together with their integration within defence infrastructure management activities should also be a main factor to be addressed.

- A second phase of the Consultation Forum should be developed in a way which both identifies specific bottlenecks of the defence sector and offers possible solutions to address them and anticipates future needs by balancing defined stakeholder requirements with the joint leadership of the EDA and DG Energy. Specific concepts could be factored in any agreements upfront while recognizing the need to be flexible with the content as the second phase matures. In this way concepts could be discounted should these be determined to have limited scope for improving a sustainable energy future for the defence sector, and those which show the greatest potential could be developed further including any which were neither articulated nor known during the initiation of the second phase.

4.5 Implementation of a second phase of the CF SEDSS

While the current phase of the Consultation Forum has served to establish firmly a network of defence energy experts at the practitioner and strategic levels, the EDA and participating Member States strongly believed that there would be scope to achieve more progress in the context of a follow-on action. This can and should be delivered through the continuation of the Consultation Forum, building on the success achieved, but also finding tangible solutions to the gaps in knowledge and practice.

A second phase of work should be far more implementation focused and designed in a way which identifies and addresses specific and wider defence needs in relation to sustainable energy while meeting strategic European objectives on energy.

This should include a few key elements:

- **continuing** to work in both plenary and parallel session formats at CF SEDSS events covering specifically energy efficiency including energy management, renewable energy, and the protection of critical energy infrastructure;
- **exploring** further the role of relevant current and forthcoming legislation;
- **identifying** tools which would help/ lead Member States to more precise development and implementation of defence energy projects including addressing the points directly above on complexity, variability, human factors and energy consciousness, technology, and enabling tools; and,
- **exploiting** procurement and finance frameworks in relation to defence energy projects (cross-cutting considerations).

4.6 Project development and implementation

The EDA is a capability driven and project orientated organization. Member States have an expectation of tangible outcomes from engagement with the EDA, and the direction is clear that an EDA top priority is on the delivery of defence projects. A recurring theme is the need for the CF SEDSS to help stimulate project development in defence energy infrastructure capability. There have been some proposals for projects (for example, on Near Zero Energy Buildings (NZEB) in the defence sector) although innovative space to develop requirements into functioning projects needs to be found.

Any **tangible projects** developed should ensure that the outputs would be linked to the objectives of relevant energy legislation. The following **potential areas** could lead to **projects** that can be further explored in the second phase of the Forum:

1. **Policy tools.** Development of high-level energy decision-making frameworks for strategic corporate and business planning. This could investigate how existing standards used for operational and tactical energy management could be fully integrated into high-level business planning thereby ensuring that energy is managed alongside other key defence priorities.
2. **District energy solutions.** An investigation of the feasibility of a Combined Heat and Power (CHP) plant to meet the needs of a military camp and the local civilian community. Depending on the outcome, this could move to actual installation of the equipment.
3. **Refurbishment of buildings to Nearly Zero Energy Buildings – or NZEB – standards.** This would work towards the refurbishment of existing buildings through the development of dual use NZEB standards. It could be run in two interdependent phases. A feasibility study which would help with the identification of suitable locations; it would also conduct an analysis, assessment, and proposal of suitable dual-use NZEB standards – including how to identify and select appropriate materials and fittings, together with retrofitting options – which would be geared towards their use in a second implementation phase of the project.
4. **Renewable energy technologies investment assessment.** Assessment of where investment could be focused on aspects of renewable energy technologies which commercial producers might not usually address such as ruggedization, integration into existing and complex power systems, and testing. The research could ultimately help with the business case for the increased up-take of renewable energy technologies in defence infrastructure.
5. **Smart buildings.** Development of smart buildings using monitoring and data collection technologies. The study would be to highlight how to select the most suitable buildings for maximum return on investment, and appropriate technology selection and installation.
6. **Development of more readily deployable Smart Grids.** Such systems could meet the dual purposes of rapid deployment of power systems to support civil emergencies and fast installation in military camps to ensure mission continuity. Research could investigate different equipment configurations for variable climatic scenarios, as well as different base and peak loads.
7. **Energy awareness raising and training.** This would look at developing education around the relevant legislation on energy efficiency, energy performance of buildings, energy management systems, energy modelling, energy auditing, energy evaluation, measurement & verification, renewable energy, and protection of energy infrastructure. It could be developed in different strands, for instance, a high-level awareness online course for senior management, and work-shop style training course for working level delegates.
8. **Protection of Critical Energy Infrastructure informatics.** Development of an energy infrastructure vulnerability database and online tool. This would take into account a range of infrastructure and associated supply chains risks including natural hazards, climate change, and security threats.
9. **Energy data reporting framework.** Development of a data reporting and analytical framework to assist with trends and capability shortfall analyses, and ultimately investment prioritization decisions and option selection. This would need to be done on an unclassified basis.
10. **Technology selection tool.** Using data based on climate conditions, topography, and return on investment, an interactive electronic tool which would analyse variables for optimum technology, material, and design selection for energy performance.

It should be noted that this list is not exhaustive and that further ideas generated in the working groups have been included in the guidance document.

4.7 Closing Remarks

The first phase of the Consultation Forum succeeded to establish the European Defence Energy Network, something which did not previously exist. This has enabled the defence sector to analyse collectively the challenges and opportunities of moving towards a sustainable energy future for the defence sector, including the benefit of applying energy legislation to defence infrastructure capability and the challenge of integrating energy into business cases for investment decisions.

The second phase of the work will evidently capitalize on what has been accomplished during the first phase and will foster actions and results focused on implementation. This should include the identification of tangible defence energy projects and how to deploy the appropriate funding instruments which are available. In this challenging endeavour it is critical to ensure that all involved actors realize that they are key stakeholders and catalytic to the effort of taking this successful outcome to the next level.

The continuation of the Consultation Forum for Sustainable Energy in the Defence and Security Sector presents the defence sector with an economic and strategic opportunity in an area of work which continues to grow in importance while mobilizing an important sector which can significantly contribute to the objectives towards the establishment of an Energy Union.

List of Abbreviations

CAT	Capability, Armament & Technology Directorate
CBRN	Chemical, Biological, Radiological and Nuclear
CDI	Critical Defence Infrastructure
CEI	Critical Energy Infrastructure
CERTH	Centre for Research & Technology Hellas
CF	Consultation Forum
CHP	Combined Heat and Power
CI	Critical Infrastructure
CII	Critical Information Infrastructure
CIIP	Critical Information Infrastructure Protection
CIP	Critical Infrastructure Protection
CIR	Critical Infrastructure Resilience
CSDP	Common Security and Defence Policy
DEFNET	Defence Environmental Network
DG	Director General
EC	European Commission
ECI	European Critical Infrastructure
EDA	European Defence Agency
EDEN	European Defence Energy Network
EDTIB	European Defence Technological and Industrial Base
EED	Energy Efficiency Directive
EEEF	European Energy Efficiency Fund
EIB	European Investment Bank
ELENA	European Local Energy Assistance
ENS	Energy Management Systems
EMS	Environmental Management Systems
ENSEC	Energy Security Centre of Excellence
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Contracting
ESA	European Space Agency
ESCOs	Energy Service Companies
ESI	European Synergies & Innovation Directorate
ESIF	European Structural and Investment Funds
EU	European Union
EUGS	European Union Global Strategy
ICT	Information and Communication Technology
JRC	Joint Research Centre
LTR	Long Term Review
MOD	Ministries of Defence
MS	Member States
NATO	North Atlantic Treaty Organization
NZEB	Nearly Zero Energy Buildings
NEEAPs	National Energy Efficiency Action Plans

PCEI	Protection of Critical Energy Infrastructure
pMS	Participating Member States
RED	Renewable Energy Directive
RES	Renewable Energy Sources
RTO	Research and Technology Organizations
SATCEN	Satellite Centre
SDU	Security and Defence Union
SEDSS	Sustainable Energy in the Defence and Security Sector
SESAED	Securing Energy Strategic Autonomy for European Defence
TEU	Treaty of the European Union

CF SEDSS Event 1 – January 2016, Brussels

At the inaugural event, the scope of the Consultation Forum was discussed: including identifying the goal as well as the role of participants within the working groups. The level of attendance was 89 individuals from 24 EU Member States and one MOD with which EDA has an administrative arrangement, as well as the European Commission.

All three working groups discussed opportunities, challenges faced by MODs, and possible solutions. They reviewed energy legislation and applicability to the defence sector, in particular the Energy Efficiency Directive (EED), the Energy Performance of Buildings Directive (EPBD) and the Renewable Energy Directive (RED), to understand how measures relevant to defence could be implemented.

A number of common themes emerged including:

- the need for development of defence specific online tools and guidance documents to assist Member States MODs;
- the importance of incorporating energy within strategic planning;
- the need to identify energy champions in defence organizations;
- budgetary constraints and division of roles and responsibilities across a department leading to a lack of both understanding and incentive to act;
- identifying the best pathway for funding and financial support;
- the impact of technology and the impact of behavioural change for improvement;
- the desire to identify synergies and collaborative opportunities between MS MODs.

On renewable energy these included:

- Some MS focus on the use of RES on deployed operations rather than within their national territory;
- The lack of energy awareness and energy management structures in many MS MODs;
- Some MS felt that RES was not 'Defence' business and should be left to Energy Ministries and energy companies;
- A recognition that a "Top-Down-Bottom Up" approach was required. Political and strategic leadership is required in addition to initiatives such as CF SEDSS and national pilot projects.

Working Group 1: Energy Management

The first meeting was attended by 31 participants from MODs, academia and industry. At the beginning, the participants identified their expectations, the scope of work for WG1 and their respective roles.

Furthermore, through a targeted questionnaire (distributed and completed prior to the meeting) and relevant roundtable discussions, an assessment was carried out on specific articles of the EED in a defence context with respect to National Energy Efficiency Action Plans (NEEAPs), alternative policy measures, energy strategy, smart metering and energy modelling.

Working Group 2: Energy Efficiency

Working Group 2 examined energy efficiency with a focus on the technology side of energy in buildings and fixed infrastructure as well as suitable financing mechanisms. 30 participants from 20 Member States reviewed the key articles of the EED and EPBD. Specific topics included Nearly Zero Energy Buildings (NZEB) and energy benchmarks for defence buildings. Specific challenges on the implementation of minimum energy requirements in the defence sector's building stock were identified and seemed to be shared across the majority of MODs.

Areas of common interest included energy efficiency and renovation strategy development, a pilot NZEB project, and a defence building stock benchmarking project. WG2 discussed in detail the objectives and work plan, and gained a first insight into MS priorities, interests, difficulties, challenges, and areas of concern.

Working Group 3: Renewable Energy

Working Group 3 dealt with the application of Renewable Energy Systems (RES) in the defence and security sector. 28 participants representing 22 Member States analysed the requirements of the Consultation Forum, and discussed in detail the objectives, work plan, and terms of reference (ToRs) to gain a first insight into MS priorities with respect to RES. It emerged that MS understanding of RES varied widely.

The importance of National RES Action Plans was highlighted as critical to understanding the potential for increased RES penetration into the defence and security sector. As a first step, a need was identified for a software tool to help participants to track and analyse the Renewable Energy Directive. Participants agreed to explore further the relevant aspects of RES including energy storage, fuel cells, smart grids, the use of defence land (and buildings) for RES including Combined Heat and Power (CHP) and District Heating Schemes; and the potential for biofuels to be used in military applications.

CF SEDSS Event 2 – June 2016, Dublin

At the second event, further strategic context was identified in both the plenary and the parallel sessions, and technical details started to deepen. The objectives of the sessions were 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.

In total 150 delegates from governments representing 26 EU Member States and one with which EDA has an administrative arrangement, the European Commission, academia, industry, NATO, and NATO Energy Security Centre of Excellence (ENSEC COE) attended this second event. While not all of these attended the parallel working groups, this figure represented attendance for the main plenary sessions. Senior Irish MOD representation set out the Irish Defence Forces approach to energy.

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 (EEEF) 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 (ESIF).

Working Group 1: Energy Management

During the second CFSEDSS meeting 29 delegates from 20 MS MODs, together with 7 participants from industry and a delegate from NATO ENSEC COE shared thoughts and challenges on the role of the defence sector on the implementation of the EED and in particular on Energy Management Systems (EnMS).

A number of presentations and discussions were carried out on the practicalities of implementation of EnMS as well as on Environmental Management Systems (EMS) which acknowledges energy as a key environmental aspect and impact. Delegates shared thoughts and challenges on the role of the defence sector on the implementation of the relevant Articles of the EED.

It was acknowledged that, although it is unanimously accepted that energy is a military capability multiplier, Member States are at different stages of implementation of energy management practices and structured EnMS, which are key enablers for achieving and maintaining energy efficiency. Some of the general findings were that MS tend to have a reactive approach, and there were cases where high level commitment to improve energy performance was not always backed-up by targeted actions. On the way to increase energy efficiency, assistance from the national competent authorities to the MODs in terms of resources and expertise is critical.

Working Group 2: Energy Efficiency

WG2, with 41 participants from 21 MODS, focused on two aspects of the EPBD; 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 the 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 references for 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 were not effective. The required inspection reports are too complex to prepare and to understand, requiring a level of knowledge which 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 that there were many potential applications of energy efficiency measures, both for technical systems and building envelopes, although in the defence sector currently renovations take place on an opportunity basis.

Working Group 3: Renewable Energy Sources

30 participants from 17 MODs attended this working group. The presentations and discussions covered all of the major RES technology areas identified in the first session, including: solar photovoltaic, 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 in some Member States, 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 which 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 meetings.

CF SEDSS Event 3 – November 2016, Rome

At the third event, there were further plenary sessions including senior Italian MOD representatives setting out their work on the Energy Task Force, an update from DG Energy colleagues on energy efficiency indicators, reporting, and the legislative review process. There was also an update on progress regarding the PCEI, and an academic presentation including on micro-grids. A meeting was also held with the National Contact Points (NCP) to reinforce the importance of the NCP role to the success of CF SEDSS. The three parallel working groups continued with their programme of work including a focus on human factors and renewable energy in transportation. 115 individuals from 21 Member States, the European Commission, industry, academia, and NATO ENSEC COE attended this third event.

Working Group 1: Energy Management

During the third CF SEDSS meeting 22 delegates from 19 MS MODs, together with 3 participants from industry, 2 from academia, 1 from another governmental agency and a delegate from NATO ENSEC COE shared thoughts and challenges on the role of the defence sector on the implementation of the EED and in particular on Human Factors affecting energy efficiency, namely commitment, awareness, motivation, communication, training and momentum building.

Through a targeted questionnaire (distributed and completed prior to the meeting) and relevant roundtable discussions:

- an assessment of the articles of the EED referring to training on energy auditing and awareness-raising in a defence context was carried out.
- differences between military energy awareness / training and the civil counterparts were clarified.
- common knowledge on aspects related to the aforementioned human factors and energy efficiency were set out and relevant examples / good practice within MODs and EDA were shared among MS.
- the existing challenges and barriers related to resources, organizational specificities and the nature of defence were identified and proposals to overcome them were generated.

Working Group 2: Energy Efficiency

During the third of the five meetings that took place throughout the 24-month period of the CF SEDSS, 36 people participated in WG2, including representation from 20 MS MODs, to strengthen and highlight the purpose, context and direction of this concerted effort. Through dedicated presentations from MS MODs, Industry and Academic experts, WG2 dealt in detail with the topics of:

- Behavioural aspects of energy efficiency (human factors) and operational control, as an alternative measure to obtain equivalent energy savings to those required by Article 5 of the EED through the 3% building renovation rate, and their impact on the reduction of energy consumption and improvement of energy performance of buildings. The focus was on the users' operational control over technical building systems and research into the best methodologies for changing users' habits and cultural norms. The behavioural aspects were addressed from a different perspective than those addressed by Working Group 1, i.e., more practical and implementation focused versus revision of legislation and theoretical discussions.

- Building Management Systems technologies, in relation to the installation of active control systems such as automation, control and monitoring systems, aiming to save energy, as required by Article 8 of the EPBD, and their impact on the reduction of energy consumption and improvement of energy performance of buildings. Different levels of sophistication of control were discussed along with two case studies on the use of control and monitoring systems, one in the defence sector and one in the commercial sector.
- NZEB Refurbishment Collaborative Project Proposal. A revised project proposal was presented and MOD/Armed Forces delegates to WG2 agreed to explore funding options through the EDA.

Working Group 3: Renewable Energy Sources

At this meeting the 35 individuals in the group, including representation from 17 MS MODs, looked at the applicability of the RED to the European Defence sector and focused on RES in Defence transportation with a specific view of Biofuels. The meeting included a mix of government, academia and industry. In addition to Biofuels the meeting also discussed additional technologies such as high level wind harvesting, ocean waves, waste to energy and some technical aspects including superconductors and eco cars. The session also included a useful session on the cultural and normative challenges of RES deployment within the Defence sector and the need for alignment of national MOD and RES objectives.

The final session allowed a summary of the discussion and highlighted the significant challenges that remained with biofuel sourcing, production, logistics and operation in a military context. There was a wide disparity between MS on the use of biofuels and many delegates shared the view there would be little utility in an EU alternative fuels group working in parallel to the longstanding arrangements already in place within NATO. The session had delved into the technological, cultural and operational challenges of biofuels and was expected to provide sufficient material for MS experts to complete their entries in the RES matrix tool on the biofuel aspects. The additional presentation on waste to energy, eco cars, supercapacitors and high level wind and ocean wave energy harvesting added to the discussions on RES technologies at event 2.

CF SEDDS event 4 – May 2017, Lisbon

At this fourth plenary meeting, presentations were received from senior Portuguese MOD representatives on their experience, and further updates were received from DG Energy. Delegates were encouraged to start focusing on the content of the final deliverables, and the future direction of CF SEDSS including what might happen beyond the current phase of work. It was attended by 89 experts from governments representing 25 Member States, industry, academia, and NATO ENSEC COE, as well as European Commission representatives.

Working Group 1: Energy Management

During the fourth CF SEDSS WG1 meeting 23 delegates from 19 Member States' Ministries of Defence (MS MODs), together with one participant from industry and a delegate from the NATO ENSEC COE explored the EED articles dealing with Energy Strategies; EnMS and public procurement (including Energy Performance Contracting (EPC)) in a defence context.

Through two targeted questionnaires (one distributed and completed prior to the meeting and the other after the meeting) and relevant roundtable discussions, MS:

- acknowledged the necessity of an Energy Strategy as a significant enabler for increasing energy efficiency and reducing energy consumption within the defence sector;
- elaborated more on the topic of EnMS/ EMS, which was also discussed during the 2nd plenary meeting;
- shared experiences and lessons learnt from the implementation of the EU framework with respect to public procurement of energy efficient products, services and buildings;
- explored the potential benefits of pursuing EPC with Energy Services Companies (ESCOs), although the experience of the defence sector on this topic so far was limited; and,
- identified the challenges and barriers on the aforementioned topics and developed generic roadmaps to assist MODs on more productive utilization of these enablers towards their journey for a more efficient defence sector.

Working Group 2: Energy Efficiency

This meeting helped the 28 delegates, with 22 EU MODs represented, to become acquainted with the new framework for clean energy transition and the proposed changes to the EED and EPBD from the European Commission; review the progress made by WG2 against EC and pMS requirements to identify those topics and themes which had not been covered in preparation for the next and last meeting of the CF SEDSS; discuss the content and structure for any subsequent continuation of the CF SEDSS WG2; explored differences and commonalities between the defence and civil sectors; and addressed the topic of ESCOs from a defence perspective and with a different focus to the other two WGs.

During this event, it became apparent that WG2 had strengthened and highlighted the purpose, context and direction of this concerted effort.

Through dedicated presentations from the WG2 moderators, EC, MS MOD's, Industry and Academia experts, WG2 dealt in detail with the topics of:

- the European Commission's proposals on new rules for clean energy transition and proposed changes to EED and EPBD;

- differences between defence and civil sectors, as a way to identify which cases and solutions from the civil sector could be fully applicable to and replicable in the defence sector, and what needs to be addressed differently within the defence sector;
- considerations regarding the final deliverable, to obtain concurrence on the proposed time schedule for the dissemination to and review of the draft final report by MS, and to invite MS to contribute to the final report with the preparation of Information Sheets on exemplar projects;
- challenges and difficulties, as well as opportunities, in Energy Performance Contracting (EPC) through Energy Service Companies (ESCOs);
- WG2 Gap Analysis, as a means to identify which relevant pieces of legislation and topics had not been covered within WG2's work, and define the way forward for the next and last CF meeting and the structure and content for the continuation of the CF SEDSS.

Working Group 3: Renewable Energy Sources

This was the 4th meeting of the WG to look at the applicability of the RED to the European Defence and Security Sector. There was a structured discussion with the 23 members of the working group, which included representatives from 16 EU MODs, on the key elements of RES Heating and Cooling (H&C), RES Electricity (E) and RES Transport (T) as they are applied within the RES directive and their specific applicability to the defence sector. The WG's aim at CF4 (Lisbon) was to review and consolidate work done at previous meetings and focus on the final deliverables. The meeting was enriched by a number of additional presentations. Time was allocated to review the approach to the required information sheets: use of Defence Land, Solar Energy, Energy Storage and Smart Grids. WG3 continued their consideration of RES options in the defence and security sector. Twenty participants from fifteen MS participated in the meeting and there were seven additional presentations. Although the presentations were interesting and useful, they reduced the time available for discussion.

In the discussion phase all participants were asked to brief on the status of implementation of RES options within their respective defence and security sectors. Similarly, each participant was asked to brief on the overall approach to energy in the defence sector. The meeting also reviewed the work done to date including the matrix on the RES Directive, responses to the initial questionnaire and the various available RES technologies in Electricity, Heating and Cooling and Transportation. Approximately one third of MS have implemented significant pilot RES projects on their national territory. Another third were engaged in work on RES but primarily from the perspective of overseas deployed operations. The Group prepared and agreed a template for Information Sheets, and agreed a short list of RES topics on which to prepare such sheets. The Group also discussed a possible generic Road Map for the implementation of RES technologies in the defence and security sectors. A draft end-state and a draft road map were agreed as a basis for further work.

Event 5 – September 2017, Thessaloniki

At the 5th and final meeting of the first phase of CF SEDSS, keynote addresses were given by the Hellenic Republic's Minister for National Defence and the Chief Executive of EDA. There was also an important video message from the European Commission by the Director General for Energy. This all reinforced the message that it was time to take the progress made and turn it into results.

Following a speech by the chairman of CERTH, delegates were asked to review the final deliverable documents circulated during the summer and to present final proposed amendments. After which they were advised that the documents would be finalized.

The delegations were also advised to look to the future and make proposals for next steps including the content of the second phase of CF SEDSS. The timeline and process for this was set out by the CF SEDSS project manager. There was also a presentation from Protection of Critical Energy Infrastructure (PCEI) Experts Group on an overview of the PCEI Conceptual Paper. There were 101 individuals, with 23 Member States represented, at this event. There was also again representation from industry, academia, and NATO ENSEC COE, as well as the European Commission.

Working Group 1: Energy Management

During CF SEDSS WG1 meeting, 22 delegates from 19 EU Member States' Ministries of Defence (MODs), together with 2 participants from industry and a delegate from the NATO Energy Security Centre of Excellence (ENSEC COE):

1. Reviewed the whole WG1 portfolio, which was explored between CF 1 in January 2016 and CF 5 in September 2017, to:
 - Reach a common position on the findings and recommendations to be reflected in the Guidance Document that will be submitted to DG Energy at the end of this phase of the Consultation Forum;
 - Finalize the draft Factsheets on Energy Management Systems, Energy Performance Contracting, Energy Data Collection & Sharing, Energy Efficiency Awareness & Training;
 - Make proposals on the delivery of the next round of the CF SEDSS, including potential collaborative projects for implementation.
2. Carried out table top exercises/ discussions on:
 - A military energy collaborative future vision;
 - Strategic Strengths – Weaknesses – Opportunities – Threats (SWOT) analysis on military energy considerations.

Working Group 2: Energy Efficiency

Through dedicated presentations from WG2 moderators, the EC's DG Energy, and ES MOD's Agency, 23 members of WG2 representing 18 MODs, dealt in detail with reviewing the impact of the EPBD on the defence sector, addressed the topic of the "Smartness Indicator" proposed for inclusion in the new issue of the EPBC, discussed the applicability and effectiveness of the Energy Performance Certificates in the defence sector, and studied the example of a deep renovation in the ES MOD's Agency headquarters. Considerations and concurrence on the overall high level conclusions from the CF were also addressed.

Working Group 3: Renewable Energy Sources

During CF SEDSS event 5, 26 members of WG3, representing 19 MODs, focused on creating a road map to assist states in increasing the use of RES in the Defence and Security Sector throughout EDA member states. There were also two relevant presentations by the University of Genoa on Power Storage in fuels and from Swedish FMB sharing some 'food for thought' on the nature of RES. The main work of the WG was preparation of a road map for future work. The road map was based on three simple elements namely where we are now, where we want to get and how we will get there, and was supported by recommendations on future work topics and on the method of work within the WG.

Attendance statistics across the five CF SEDSS events

In the table below, a detailed view of the participation in the 5 CF SEDSS events is provided, broken down to each event and type of stakeholder. The average attendance was approximately 110 participants per event, with an analogy of approximately 75% coming from MODs and approximately 25 % coming from Industry and Academia.

Event	Number of participants	Number of EU Member States represented	EDA administrative arrangement MODs	Industry	Academia	External Organizations (e.g., NATO / NATO ENSEC COE, 'Think Tanks')
Brussels	89	24	1	5	2	1
Dublin	150	26	2	29	5	9
Rome	115	21	0	18	10	3
Lisbon	89	25	0	6	2	1
Thessaloniki	101	23	0	4	5	3

Apart from EU Member States (which includes attendance by Denmark which is an EU MS but not an EDA pMS), numbers shown are of individuals and not the numbers of organizations represented.

