CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Core Theme Series Report:
Concerted Action Energy
Efficiency Directive

2

Public sector – public buildings and public purchasing

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Content

1 Introduction and context

The Concerted Action for the Energy Efficiency Directive (CA EED) supports implementation of the Directive 2012/27/EU by fostering the exchange of information and experiences among Member States with regards to the implementation of the Directive.

This report summarises work carried out by the CA EED Core Theme 2 Public sector – public buildings and public purchasing between January 2013 and October 2016. Core Theme 2 looks at the public sector (PS) – public buildings and public purchasing. The objective of the work was to survey, discuss and draw conclusions on some topics of importance related to the exemplary role of the PS as a leader in promoting energy efficiency.

The new Energy Efficiency Directive – like the Energy Services Directive before it – states explicitly that public bodies at national, regional and local level should fulfil an exemplary role as regards energy efficiency. It imposes on the public sector several concrete obligations to make the sector a real leader in energy efficiency improvements. Moreover, it sets very tight deadlines for several activities, making the EED even more challenging for Member States. This demand for exemplary initiative and efforts from the public sector falls mainly into two categories: the exemplary role of public bodies' buildings (art. 5) and purchasing by public bodies (art. 6).

The PS is directly addressed at least twice in the EED, namely in Art. 5 on the exemplary role of public bodies' buildings, and in Art. 6 on purchasing by public bodies.In the period covered by this report implementation of these articles has been discussed in the context of six topics which had received the greatest amount of interests from the MS.

The implementation of Art. 5 and Art. 6 has been discussed within the CA EED around the following themes:

1. "Default" approach - inventory of central government buildings.
2. "Alternative" approach to Art. 5 in practice.
3. Encouraging other bodies to follow central government's exemplary role in renovation of buildings (Art. 5(7).
4. Special exempted areas of the EED implementation in the Public Sector.
5. Implementing Art. 6 on public purchasing of products, services and building.
6. Public sector in energy efficient transport services.
7. Monitoring of Art. 5 implementation progress – cost effectiveness of measures.
8. Contribution of the public sector to the EED goals - achievements and perspectives.

The first issue was the "alternative" approach to Art. 5. In practice, this focused on issues related to the establishment of the inventory and on initial information concerning the two approaches foreseen in Art. 5.

The next concern was how to enlarge the circle of the bodies involved beyond the obliged central government. Although Art. 5 directly addresses central bodies the issue of mobilising public authorities at lower levels, regional and local, remains a challenge. Therefore, in Art. 5(7) the other bodies are encouraged to follow central government's exemplary role in renovation of buildings.

The third topic focused on the exemption of implementation of Art. 5(1) allowed by Art. 5(2). An attempt was made to find out whether and why MS used exemptions, and what their motives were in making such decisions.

The next issue of interest was to review whether and how MS apply Art. 6. An attempt to gather, enhance and deepen the knowledge and practice of implementation of Art. 6 was made. The topic of purchasing by public bodies was already analysed by the Concerted Action ESD at the Plenary Meeting (PM) in Copenhagen, March 2012, and is summarised in the report "How to boost energy efficient public procurement?" The current report builds on the previous findings.

The next topic undertaken was "Public sector in energy efficient transport services". Transport develops at tremendous speed across all MS. Its contribution to Green House Gas (GHG) emissions is steadily growing although it does not receive sufficient attention in EU climate and energy policy. Convincing people to use public transport remains crucial for the development of future cities. Investing in energy consuming transport infrastructure such as roads, whilst neglecting investments in railways, will have far reaching consequences for overall energy consumption and EU energy security.

The subject "Monitoring of Art. 5 implementation progress – cost effectiveness of measures" is of great importance in all activities aimed at improving the energy efficiency of public, private and commercial building stock. The ability to prove the cost effectiveness of retrofitting buildings plays a crucial role in financing. Therefore, the topic received much interest from MS.

"Contribution of the public sector to the EED goals achievements and perspectives" was designed to make a retrospective assessment of all CT2 activities and provide new areas for future works. It was an attempt to build the future firmly based on past achievements. This report also covers an interdisciplinary topic "Model contract and guidelines for energy performance contracts in the public sector" tackled jointly by CT2 and CT5. Financing remains a weak point of all energy efficiency investments: seeking novel mechanisms of financing therefore remains a challenge. The markets for Energy Saving Companies (ESCOs) and Energy Contract Performance (ECP) are developing but there is still a large potential for improvement.

This report aims to inform and support the work of people within the public sector and national bodies involved in the implementation of EED, especially those from public authorities directly involved in dealing with Art. 5 and Art. 6 implementation and practice. Alongside central government representatives, stakeholders from regional and local levels should also be able to benefit from this report. It should also serve as a database for model examples to inspire the readers.

2 'Default' approach — inventory of central government buildings

Article 5 of the EED permits two approaches - the "default" and the "alternative" - and various flexibility mechanisms. The approach chosen by each Member State (MS) will determine their way of meeting their target, but both approaches should lead to an equivalent improvement in the energy performance of buildings. It was therefore interesting to find out how many MS have chosen each approach and the reasons for their decision.

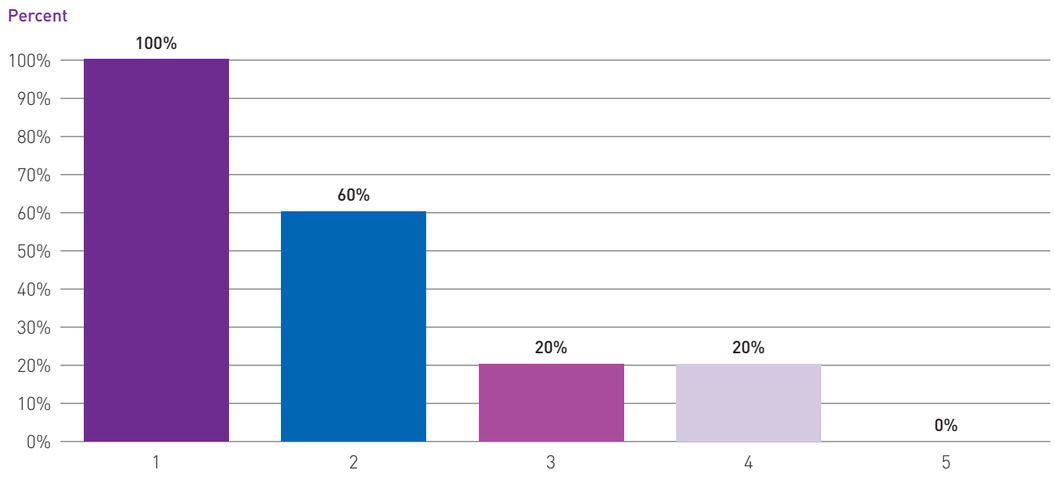
The "default" approach is laid out in art. 5(1). It stipulates that each MS shall ensure that, as from 1 January 2014, 3% of the total floor area of heated and/or cooled buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements set by Directive 2010/31/EU (EPBD). For the purposes of this, by 31 December 2013, MS shall establish and make publicly available an inventory of heated and/or cooled central government buildings with a total useful floor area over 500 m2 and, as of 9 July 2015, over 250 m2, excluding some exempted buildings. The inventory shall contain the following data: (a) the floor area in m2; and (b) the energy performance of each building or relevant energy data.

Under the "alternative" approach, which is described in art. 5(6), MS may decide to take other cost-effective measures, including deep renovations and measures for behavioural change of occupants, to achieve, by 2020, an amount of energy savings in eligible buildings owned and occupied by their central government that is at least equivalent to that required in art. 5(1), reported on an annual basis.

The obligation to renovate central government buildings in the EED complements the requirements in the EPBD, which require MS to ensure that when existing buildings undergo major renovation their energy performance is upgraded so that they meet minimum energy performance requirements.

The results from the questionnaire showed that the overwhelming majority of CA EED national representatives had a clear understanding of art. 5. The questionnaire also provided insights on the reasons why the "default" approach (fig. 1) was preferred.

Figure 1: Reasons why MS have chosen the default approach (as opposed to the alternative approach)



1 It seems to be easier from a technical point of view.

2 It seems to be easier from an organisational point of view.

3 It seems to be cheaper.

4 It seems to be flexible to reach the target in time.

5 Other.

The following conclusions were drawn from the CA questionnaire and discussions at the CA EED Plenary meeting in Dublin in March 2013:

- At that time, knowledge and experience of art. 5 was being steadily accumulated but was not sufficient to secure smooth and secure implementation in the majority of MS.
- Inventory creation is a complex and costly task best carried out by central government. The process of art. 5 implementation should therefore be initiated, governed and monitored by central governments.
- The CA participants reported few needs for clarification of the requirements of art. 5.
- The process of preparing the inventory of central government buildings is different across the MS. At that time, a few countries were well advanced, but a few were still in the conceptual phase of preparation.
- The possible exemptions laid out in art. 5(2) were generally seen as second-order priorities, but should not automatically be seen as insignificant to the EED energy efficiency targets (art. 3).
- At that time, relatively few countries had decided whether to choose the "default" or the "alternative" approach. The reasons provided for choosing a particular approach are varied and country-specific. Further work is required to identify more objective, cost-benefit based criteria.
- For the "alternative" approach, establishment of the central government building inventory is not obligatory but is strongly recommended.

The report presented to the Working Group and subsequent discussions led to the following recommendations:

- MS should continue to develop their individual approaches in order to optimise how they will reach the renovation objectives set in art. 5.
- The possible exemptions in art. 5(2) should be carefully examined at national level and presented to relevant bodies, e.g. military forces, architecture or historical heritage supervision authorities or religious societies. They should be presented as a win-win-opportunity enabling energy cost reduction. Training on possible, applicable energy saving measures is recommended.
- Assessment of the cost-effectiveness of renovating public buildings should include broader social and environmental considerations. The assessment of costs and benefits should be communicated across society to explain to citizens the reasons why government is spending public resources on its own building stock.
- As cost-effectiveness of approach seems to be the most important criterion when choosing between the "default" and the "alternative" approach, further elaboration of the issue is needed at the EU level as well as within each MS. MS should take into account national resources, experience and conditions.
- Where possible, existing building stock databases, public or private, should be used as bases for the inventory required by art.5. Some good examples of such databases were reported (e.g. by the Czech Republic (to be found at the CA EED website: **www.esd-ca.eu/private-area/themes/public-sector-ct2/good-examples-of-making-inventory-of-the-central-government-building-czech-republic**), Croatia, the UK).
- The art. 5 inventory should serve other purposes and therefore its scope should be enriched by providing additional data, i.e. reduction of CO2 emissions, energy intensity of the building measured in terms of one occupant or visitor. The idea of providing energy intensity and energy saving potential rather than floor area in m2 was supported. Linking with energy audit databases seems to be realistic and helpful. A Geographical Information System (GIS) was suggested as an example of a flexible and appropriate instrument.

- The work undertaken by central government should be promoted and communicated effectively to regional and local governments at the earliest possible stage to stimulate action at these levels. The use of a local energy agency is essential for effective and low-cost diffusion of information from central to local level.
- Based on their experience of renovating public buildings, MS should encourage municipalities and other public bodies to adopt integrated and sustainable energy efficiency plans with clear objectives, to involve citizens in their development and implementation and to adequately inform them about their content and progress in achieving objectives. The Covenant of Mayors is an example of a good framework for this.
- Methods for estimating savings potential under the "alternative" approach and for calculating savings stemming from measures other than renovations should be further elaborated as they play an essential role in the "alternative" approach.
- The MS in which the EED and the EPBD are implemented separately - or are only loosely connected — should consider closer co-operation as the potential for synergy effects is large and, in some MS, remains untapped.
- As the renovation obligations set in art. 5 require substantial and stable long-term funding, secure adequate financial resources are of primary importance for MS governments. EED implementation should be carried out in close coordination with art. 4 implementation (national buildings renovation strategies and plans). The provisions of art. 20 of the EED should be considered.

Good practice examples

Several good practice examples were reported during the working group, including:

The Czech Republic:

Producing an inventory of central government buildings. This provided details on the inventory being operated in the Czech Republic, e.g. how has been the inventory structured? Who are the ministers or public bodies responsible/involved in the process of inventory preparation? What types of data have been included?

Poland:

An effective scheme for financing public building restoration; competitive criteria for project selection, transparent procedures; strict rules of monitoring of results. This case study also gave extensive information on different financial schemes provided by the National Fund of Environmental and Water Management.

3 'Alternative' approach — inventory of central government buildings

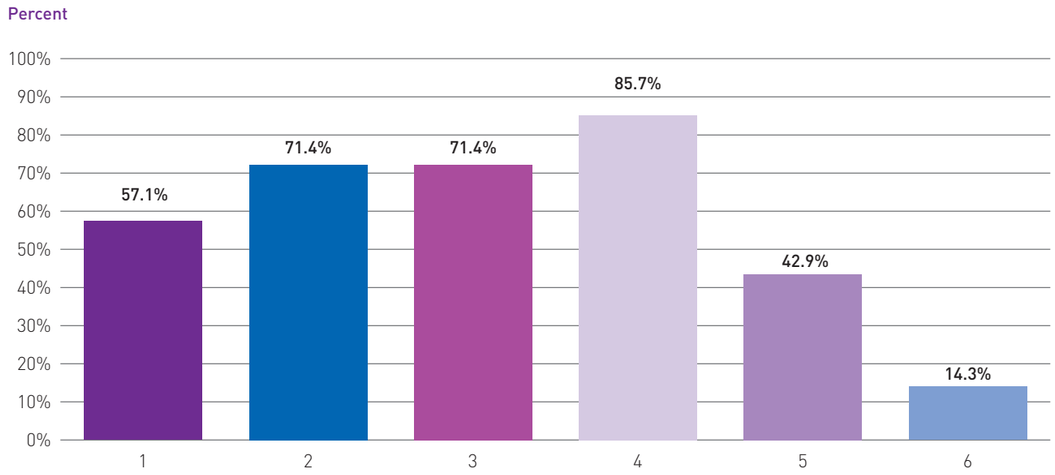
Under the "alternative" approach stipulated in Art. 5(6), MS may decide to take other cost-effective measures to achieve, by 2020, an amount of energy saving at least equivalent to that required in Art. 5(1) in eligible buildings owned and occupied by their central government. These measures may include deep renovations and actions resulting in occupant behaviour change, and savings are to be reported on an annual basis.

The issues on the 'alternative' approach were studied at the Plenary Meeting in Vilnius in October 2013. Interalia the following topics were discussed:

1. Insight into the 'alternative' approach as understood by MS.
2. The reasons why the "alternative" approach has been chosen (as opposed to the "default" approach).
3. Measures that have already been chosen and/or are planned under the 'alternative' approach.
4. Comparison and value of the two approaches, taking into account different criteria e.g. technical complexity, resources required, flexibility.

The most frequently cited reason for choosing the "alternative" approach was the assumption that it seems to be a more flexible approach to reaching the target in time. MS are required to achieve the sum of annual targets over the whole period between 2014 and 2020, irrespective of the savings achieved in each individual year during that period (fig. 2).

Figure 2: Since your country has chosen the alternative approach, please specify the reasons why (as opposed to the default approach)



1 It seems to be easier from a technical point of view.

2 It seems to be easier from an organisational point of view, e.g. does not require a central government building inventory.

3 It seems to be more cost-effective (cheaper), e.g. it allows in the inclusion of savings from behavioural chawnge.

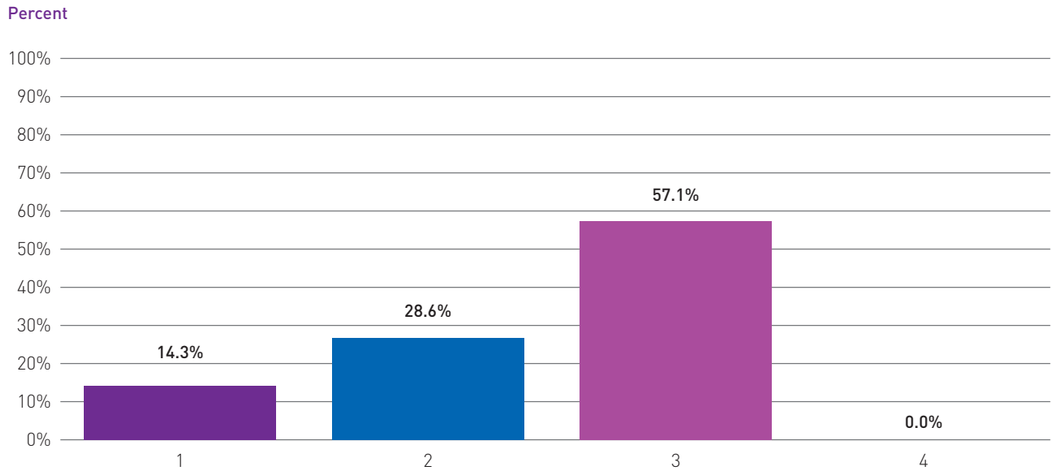
4 It seems to be a more flexible to reaching the target in time, since MS are required to achieve the sum of annual targets over the whole period between 2014 and 2020, irrespective of the savings achieved in each individual year during that period.

5 It seems to be more energy-efficient.

6 Other.

MS also reported very limited experience in their country with the purchase of energy performance contracts and/or energy service companies (ESCOs) that may be applicable in art. 5 implementation (fig. 3).

Figure 3: Do you have any experience with the purchase of energy performance contracts and/or energy service companies (ESCOs) that may be applicable in art. 5 implementation?



1 Yes. **2** Yes, partly / sometimes. **3** No. **4** I don't know.

The working group reached the following conclusions as regards the use of the alternative approach for art. 5:

- The implementation of Art. 5 poses a real challenge for MS. In a majority of MS, the process is likely to be delayed compared to the schedule set in the EED. For instance, MS representatives listed several factors which they considered to be crucial for the successful implementation of Art. 5. As many as four of these factors were ranked almost equally: political support, well-co-ordinated administrative infrastructure, human and financial resources and main stakeholders.
- Possessing reliable data related to Art. 5 was considered a prerequisite. There is a general shortage of information on the number of buildings belonging to central government that fall within the scope of the obligation, energy consumed and potential energy savings.
- At the time of writing (March 2013), only a few MS have already decided which approach they will take. 2 have decided on the "default" approach and 4 on the "alternative", totalling 6 Member States. The vast majority are still in the process of making a decision (80% altogether).[2]
- Discussion about the pros and cons of the two eligible approaches provided some interesting and highly practical conclusions. For instance, one of the UK CA EED participants was of the opinion that it is better to let each individual body decide how to meet the target. Representatives from NL also found the "alternative" approach better since according to them it offers more flexibility, is more cost effective and enables use of the existing legal framework.
- It was remarked that, in countries where minimum energy performance standards of buildings are already in use, it is very likely that the payback time of deep renovation in already refurbished building stock would be unacceptably long.
- It was raised that in those MS where the average energy consumption in buildings is high in comparison to the most advanced countries in the EU, which may show a need for costlier investments, the "default" approach should be chosen and accompanied by the allocation of sufficiently high funds within the EU cohesion policy to cover the costs of the "3%" renovation.
- Cost effectiveness is no doubt one of the major criteria when choosing between the permissible options. However, other criteria should also be used to enable a more in-depth overview of the energy - or rather, more broadly sustainable - condition of every specific building under consideration. For example, it should be taken into account whether the building has an energy manager, energy monitoring and management system or whether full information and long-time energy consumption statistics are available.
- MS choosing the "alternative" approach plan to use the whole spectrum of eligible measures; i.e. deep and shallow renovation and behavioural change measures are being considered.
- Finding an adequate methodology to measure savings resulting from behavioural change remains a challenge. A few MS representatives reported that their country possess a suitable approach, such as bottom-up methodology, smart metering or direct feedback from occupants.
- Again, it was confirmed that joint implementation of the EED and the EPBD encounters a common barrier in many MS, namely the fact that the two directives are being implemented in different governmental organisational units and usually by two different ministers.

Finally, the working group produced the following recommendations on art 5:

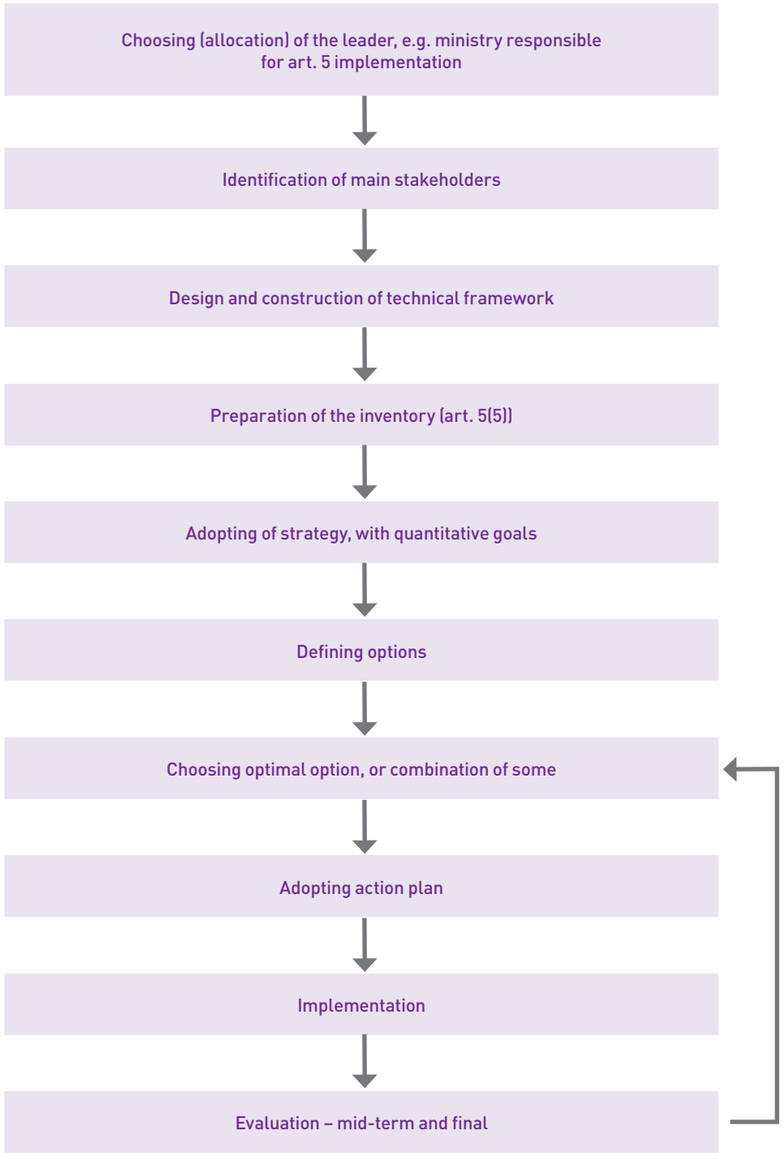
- Obligations for the public sector stipulated in Art. 5 still pose a challenge for the majority of the MS. These obligations should be further investigated and discussed, and best practices should be exchanged among MS.
- MS should try to implement different directives in a coherent way, assuring synergy and avoiding duplication where possible. To accomplish this, procedural and organisational changes within governmental units may be required.

2 Claudia CANEVARI, DG ENER.C.3, Athens, PM CA ESD, 27 March 2014, provided the following information on the latest state on implementation of art. 5 as on 31 December 2013 'Article 5, notification of alternative approach (17) or publication of inventory (4)'.

Good practice example

The CA participants recommended the action plan for art. 5(6) effective implementation as depicted in fig. 4.

Figure 4: Action plan for effective implementation of art. 5(6) of the EED



4 Encouraging other bodies to follow central government's exemplary role in building renovation (art. 5.7)

The EED stipulates that public bodies should play an exemplary role in energy efficiency through the renovation of buildings owned or occupied by central governments (Art. 5) or by ensuring that central governments purchase only products, services and buildings with high energy performance, meeting specified conditions (Art. 6). Both articles also contain obligations for MS to encourage public bodies at regional and local level to follow central government's exemplary role (Art. 5(7) and Art. 6(3) respectively).

Article 5(7) provides a list of measures that can be used in this process:

1. Adopt an energy efficiency plan, either standalone or as part of a broader climate or environmental plan, containing specific energy saving and efficiency objectives and actions, with a view to following the exemplary role of central government buildings laid down in art. 5. paragraphs 1, 5 and 6.
2. Put in place an energy management system, including energy audits, as part of the implementation of their plan.
3. Use, where appropriate, energy service companies and energy performance contracting to finance renovations and implement plans to maintain or improve energy efficiency in the long term.

Most important findings

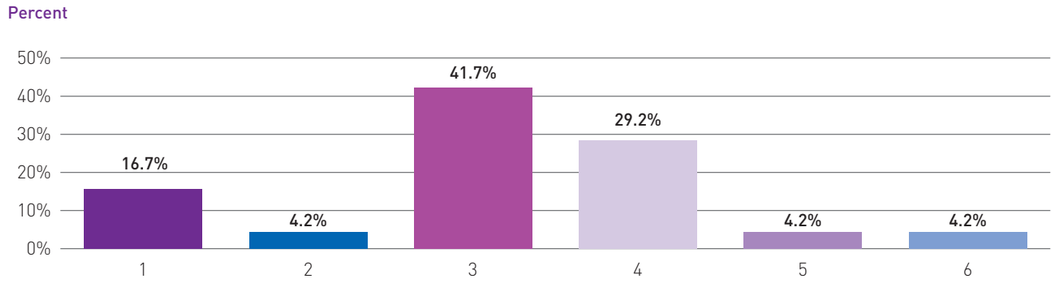
Work carried out and presented at the Plenary Meeting in Athens, March 2014, was focused on the encouraging role of central governments as set out in Art. 5(7) only, that is, concentrating on building renovation at regional and local level exclusively. Social housing bodies governed by public law were not included in the scope of this Working Group.

According to the results of the Working Group questionnaire, the main stimuli for renovating public buildings in MS are the two main EU directives addressing energy efficiency, namely the EPBD and the EED (fig. 5), with the first and main booster being implementation of the EPBD.

3 Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast), OJ L 153, 18.6.2010.

4 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 2012/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, .OJ L 315, 14.11.2012.

Figure 5: Reasons for renovation of public buildings induced or encouraged by central government as stipulated by art. 5



1 Yes, it has been started by the EPBD and is ongoing independently from the EED.

2 Yes, it has been started by the EED (art. 4 or/and art. 5).

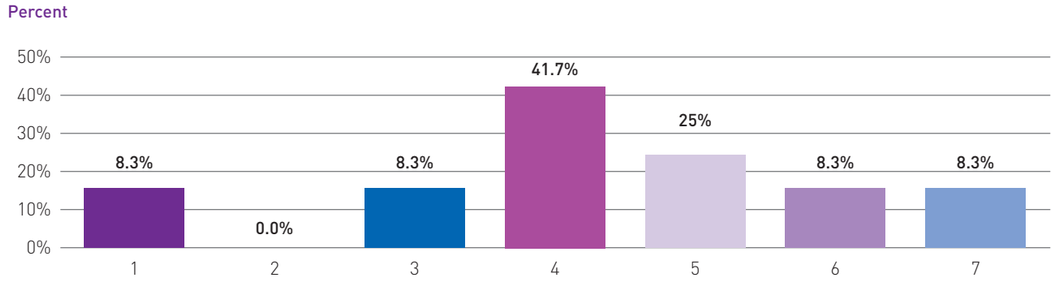
3 Yes, it has been started by the EPBD and then has been invigorating by the EED.

4 No, but it is planned to start in the near future as part of implementation of the EED.

5 No, it has not been planned to start in the near future.

6 I don't know.

Figure 6: Measures already implemented or planned to be implemented in the near future by central government to encourage public bodies at regional or local level to renovate public buildings as stipulated by art. 5 (top-down approach)



1 Adoption of an energy efficiency plan, freestanding or as part of a broader climate or environmental plan, containing specific energy saving and efficiency objectives and actions.

2 Putting in place an energy management system, including energy audits, as part of the implementation of their plan.

3 Use, where appropriate, energy service companies and energy performance contracting to finance renovations and implement plans to maintain or improve energy efficiency in the long term.

4 A combination of any of the above measures.

5 Any of the above measure(s) supported by additional measure(s). Please specify the additional measure in the comments box below.

6 No such measures have been undertaken or are planned to be launched in the near future.

7 I don't know.

The working group reached the following conclusions as regards the implementation of Art. 5(7):

- 62% of MS have started renovating their public buildings, all within the frame of EPBD and/or EED implementation.
- Most central governments are planning to use energy efficiency plans, Energy Management Systems (EMS) and Energy Performance Contracting with ESCOs to encourage public bodies at national, regional and local level to renovate their public buildings. However, only a few participants reported the use of EMS including energy audits as a standalone measure.
- The majority of CA EED participants declared that the measures listed in Art. 5(7) already offer a wide range of options and do not see the need for further ones. However, some suggested additional measures such as: compulsory energy audits in PS, energy meters installation, sharper and stricter criteria in deep renovations, Voluntary Agreements, "green" public procurement, subsidies, partnerships, best practices, monitoring and reporting.
- Behavioural changes are promoted by the implementation of awareness and information campaigns for public employees.
- The Covenant of Mayors has been cited by most of the countries as an initiative that can play a supportive role in Art. 5 implementation. Also, national energy agencies have been identified as organisations that can provide technical advice and consultancy to governments for the implementation of Art. 5. The European Energy Service Initiative (EESI) has also been identified since it has widely promoted the implementation of Energy Performance Contracting (EPC).
- Right combination of measures and their matching are essential, e.g. money and funding schemes.

A number of recommendations were also proposed:

1. MS should try to set individual targets for the renovation of public buildings to be implemented by administrations and the services under their responsibility, as well as monitoring and reporting commitments.
2. In the top-down case, the possibility of hiring ESCOs and EPC implantation should be further investigated.
3. Since several other measures have been indicated as contributing to fulfilling art. 5, it seems appropriate to investigate the connections between the measures implemented at local level and the energy performance improvement of the governmental buildings.
4. Attention should be paid to overcoming the weaknesses of both approaches in art. 5,that may suffer from a lack of financial resources and the scarcity of technical skills in the PS.
5. Projects launched by central governments should further be fostered and developed by local stakeholders.

Good practice examples

The following good examples were demonstrated at the meeting:

Broad scope of central government initiative

- **Bulgaria:** Encouraging public buildings' renovation in Bulgaria (BG). This provided a description of measures used to support public building renovation in Bulgaria, e.g. legislative framework, energy efficiency plans and building audits, energy management system, energy efficiency measures, financial support.
- **Greece:** The "EXIKONOMO" project (GR). The project aims to improve energy efficiency at a local level/in municipalities, to promote energy saving activities with direct applicable results and to increase the awareness of citizens and managers of local authorities regarding energy saving and protection and sustainable management of the urban environment.

Working EPC scheme launched by central government and developed at local level

- **Portugal:** EED and Eco.AP (PT). This described an energy efficiency programme within the public administration of Portugal. It included details of the main measures used an energy manager in all central government bodies; development of the barometer Eco.AP in order to evaluate the energy efficiency of the central government sector; development of energy performance contracts in the buildings/equipment with an higher energy consumption (or inefficiency); development of energy efficiency action plans for the remaining buildings or equipment.

Bottom-up tool for building management, demonstrating allocation of incentives

- **Netherlands:** A briefing on a specialised tool for owners and users to make buildings more sustainable (including use, facility management, and exploitation).

5 Energy efficiency in historical buildings, places of worship and buildings owned by the armed forces – Article 5(2)

Article 5 "Exemplary role of public bodies' buildings" of the EED permits two approaches: the "default" (Art.5(1)) and the "alternative" (Art. 5(6)). For the obligation outlined in Art. 5(1) some exemptions were introduced in the areas where its implementation may at least be difficult, unrealistic or even impossible.

This issue of exemptions was addressed in Art. 5(2) which states that MS may decide not to set or apply the requirements referred to in Art. 5(1) to the following categories of buildings:

(a) Buildings officially protected as part of a designated environment, or because of their special architectural or historical merit, in so far as compliance with certain minimum energy performance requirements would unacceptably alter their character or appearance.

(b) Buildings owned by the armed forces or central government and serving national defence purposes, apart from single living quarters or office buildings for the armed forces and other staff employed by national defence authorities.

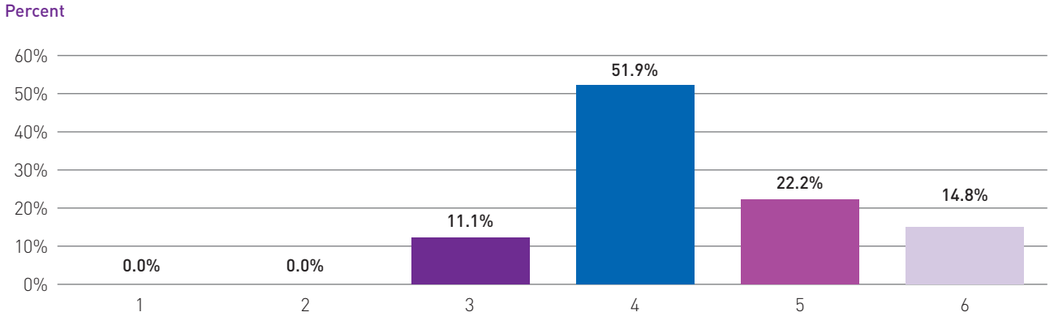
(c) Buildings used as places of worship and for religious activities.

Thus Art. 5(2) allows for exemptions of buildings falling within the above-mentioned categories.

Article 5 implementation in the specific areas, namely in historical buildings, the defence sector, and places of worship (later referred to as "the three areas") is affected by many complex issues.

Availability and reliability of data on energy consumption in the three areas is rather scarce. For example awareness of the availability of such data in the religious buildings is presented in fig. 7.

Figure 7: Answers given to the question 'Are the exact data on energy consumption in worship buildings in your country known?'



1 Yes, known, substantial in the energy consumption.

2 Yes known, and negligible in the energy consumption.

3 No, unknown, but can be considered substantial.

4 No, unknown, but can be considered negligible.

5 I don't know.

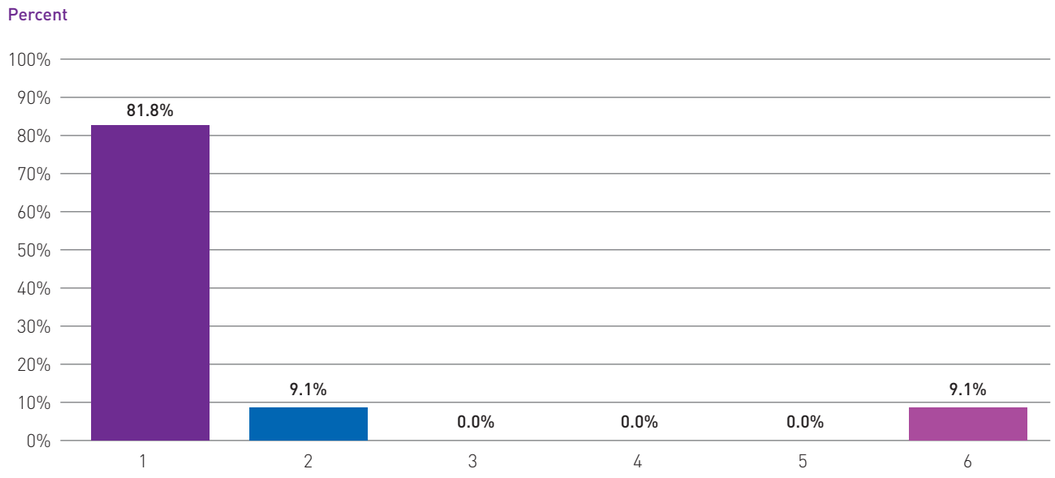
6 Other.

The general feeling is that in these areas EE is not a priority in most of the MS (at least in 25 out of the 27 who responded the questionnaire), especially in historical buildings, and therefore it is not a driver when interventions in the buildings are under design and implementation.

The main barriers in undertaking EE measures in the three areas were identified. Apart from typical barriers some specific were also added e.g. fear of endangering the architectural or/and historical characteristics of the buildings, the upfront investments needed is not proportionate to the economic benefits achievable from related energy savings, due to the specific architectural requirements involved in refurbishment of such buildings, military security reasons are a significant factor and hinder the design and implementation of EE improvement (EEI) measures.

11 MS have chosen the 'default' approach and 10 of them asked for the exemptions under Art. 5(2), primarily for the defence sector buildings, and then for both the historical and worship buildings (fig. 8).

Figure 8: Answers given to the question 'Are the exact data on energy consumption in worship buildings in your country known?'



1 Yes, for all three.

2 Yes, for two.

3 Yes, for one.

4 No, for none.

5 I don't know.

6 Other, please specify.

6 MS out of the 16 that have chosen the alternative approach have undertaken or planned measures to implement Art. 5 in the three areas; when there is no target specifically addressing these types of buildings, an overall target is set for all.

The defence sector is the sector with the highest rate of implementation, with 13 MS that are in the process of undertaking EEI measures in this area. Historical buildings followed in second place with a range of 10 MS active on EEI.

NEEAPs in some countries have already envisaged EEI measures in buildings of the three areas.

Recommendations

It has been concluded that the issue under consideration is, despite the variety of above mentioned comments and constraints, quite sensitive and worth studying further.

Despite identification of barriers and constraints it was assumed that the potential for EEI of buildings in the three areas is not insignificant:

- A thorough assessment of the EE potential in buildings in these categories might be advisable.
- Similarly, the set-up of energy management systems (EMS), based on the positive experiences provided by a few MS, in the three areas could be a useful undertaking.
- A deeper knowledge of the actual energy consumption of the buildings belonging to the categories in question would strengthen the attention of governments to this issue.
- Priority should be given to EEI measures that can be tackled more easily, and with a better cost/benefit ratio (cost-effectiveness).
- All buildings, except the strategic ones, should comply with the national standards set up for EE.
- Funds could come from the combination of the budgets of each ministry assigned to the maintenance of the building, and from the budget of the ministry responsible for energy, and allocated to public sector buildings renovation.
- Since energy data is generally lacking, while setting up the saving objectives it could be appropriate to express them in percentage of savings (e.g. 15%) rather than in m2 or kWh.
- A pragmatic approach, based on a balance between comfort, costs and protection of historical heritage could be pursued via ad hoc legislative measures that target both heritage and energy matters.
- EE is not a driver in monumental buildings, but is essential in historical ones when we consider the buildings as subjects for energy consumption reduction.
- In all cases and in a short-medium term timespan, an integrated approach that considers the requirements not only of the EED but also of the EPBD and the Renewable Energy Source Directive (RESD) is strongly advisable.
- Thorough assessment of a project is recommended, e.g. deeper knowledge of the actual energy consumption makes untypical ESCO projects less risky, for example in theatres.
- This runs alongside the recommendation to concentrate (or "consolidate"?) efforts among the different institutions involved, who usually have different interests, approaches and scopes for the buildings involved.
- It is necessary to identify financing mechanisms for building renovations that meet both the needs of the PS and of the financing entities, and encourage the banks to adapt their strict financing rules to be more suitable for energy efficiency schemes.
- It was noted that buildings can be defence operated and also historic, be large/remote/mobile, resource demanding (cooling/heating), and of bespoke design.
- Although the majority of MS do include military and historic buildings in their energy efficiency programmes, 10 countries have opted for exemptions. Religious buildings or places of worship do not generally offer potential for energy efficiency (they are used infrequently and are not well heated) and are therefore often outside the scope of energy efficiency programmes.

It should not be forgotten that, despite their relatively low energy consumption, the three areas have a large impact on society and may play an essential role in raising public awareness on the importance of energy efficiency.

An issue worth further investigation was suggested, namely the utilisation of financing facilities (such as those from the European Investment Bank), alongside an associated evaluation of pros and cons.

Good practice examples

Some model projects include (to be downloaded from www.ca-eed.eu):

- **Netherlands** – Energy efficiency in historical buildings and buildings owned by the armed forces.
- **Italy** – Historic Building Protection and Energy Efficiency: the pilot case of Serravalle, the historic centre of Vittorio Veneto, Italy.
- **European Defence Agency** – Defence Buildings – Some Unique Challenges.
- **Czech Republic** – Reconstruction of the National Theatre in Prague.
- **Italy** – Il Caso Di Serravalle.
- **Italy** – Applicability and feasibility to implement new funding mechanisms: CERTUS Project.

Other cases and examples of projects:

1. UK examples are available at:

- webarchive.nationalarchives.gov.uk/20130109092117/http:/decc.gov.uk/assets/decc/11/tackling-climate-change/saving-energy-co2/6922-a-guide-to-financing-energy-efficiency-in-the-publ.pdf
- www.quaker.org.uk/sustainability-grants
- www.churchandcommunityfund.org.uk
- www.nationalchurchestrust.org

2. Examples of EE improvement interventions in NL:

A structural programme for energy saving for 850 buildings owned by the armed forces and for 350 national historical buildings (part of the alternative approach, 2% energy saving per year), among which:

- Rijksmuseum.
- Van Gogh Museum (BREEAM very good certificate).
- Menu Green Lease (www.platformduurzamehuisvesting.nl/english).

6 Implementing Article 6 in public purchasing of products, services and buildings

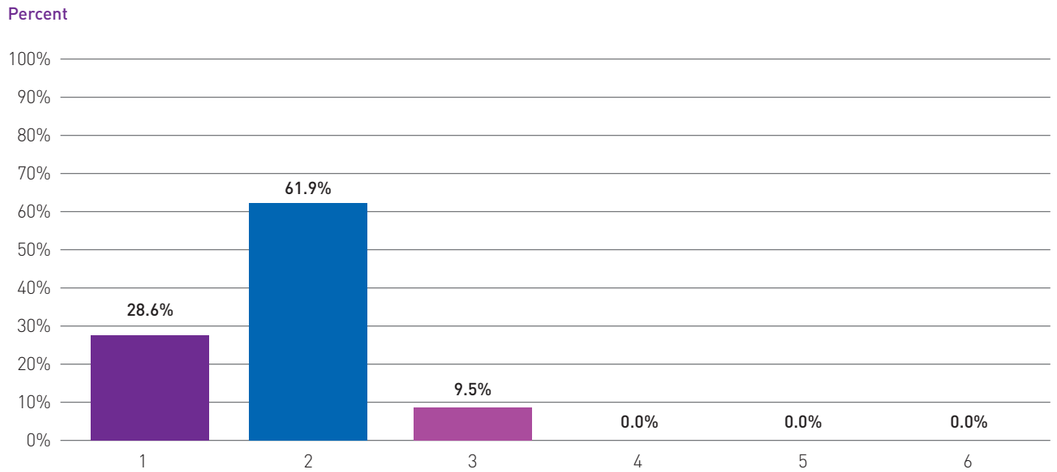
Article 6 of the EED addresses the issue of purchasing made by public bodies.

Article 6(1) states that MS shall ensure that central governments purchase only products, services and buildings with high energy efficiency performance, in so far as is consistent with cost effectiveness, economic feasibility, wider sustainability, technical suitability and sufficient competition.

Article 6(3) also imposes an obligation to encourage regional and local public bodies to follow the exemplary role of their central governments in purchasing. Specific energy efficiency requirements for purchasing products, services and buildings by central government are laid down in Annex III of the EED.

In the majority of MS, the requirement for central governments to purchase only products, services and buildings with high energy efficiency performance (Art. 6(1)) is considered either as "very important" (29%) or "fairly important" (62%). It can be concluded that the idea of purchasing energy efficiency products and services at a central government level is well established, and considered an important mechanism for increasing energy efficiency (fig. 9).

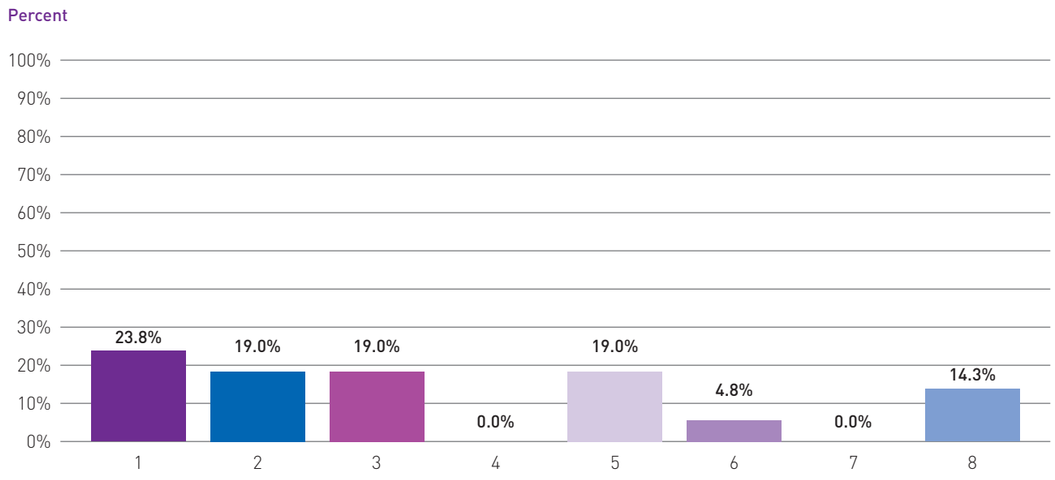
Figure 9: Answers given to the question 'Are the exact data on energy consumption in worship buildings in your country known?



1 Very important.
2 Fairly important.
3 Rather unimportant.
4 Completely unimportant.
5 I do not know.
6 Other.

The impact of the EED on new activities in energy efficient public procurement is very visible: 5 MS undertook new activities in direct response to Article 6. 4 others have continued the ones already in place, presumably at least partly induced under the ESD. In 8 other MS, new activities are being planned, among which 4 are in direct response to Article 6. Only in 1 MS are there no activities and none are planned (fig. 10).

Figure 10: Answers given to the question 'Regarding article 6 of the EED, what activities have been undertaken in your country as a direct implementation of the article?'



1 New activities have been undertaken as a direct implementation of art. 6.

2 New activities have been undertaken but not as a direct implementation of art. 6.

3 No new activities, but the previous ones have been continued.

4 There are no activities at all.

5 There are not activates but they are being planned.

6 There are not activates and they are not being planned.

7 I don't know.

8 Other.

The main barriers to energy efficient public procurement (EEPP) were restated: lack of skills and practical know-how among public procurers on EEPP; lack of clear guidance and a shortage of practical toolkits; and unclear criteria for public procurement assessments. However, some positive practical examples were given that may indicate progress is being made, at least in a few specific areas. The issue of EEPP is steadily gaining importance, political and public interest and support, although a critical mass has not yet been reached to make a real breakthrough.

It was striking that in their answers to the survey MS did not mention Public-Private Partnerships (PPP) which may indicate that this widely promoted financing mechanism is not commonly considered in the context of public procurement, and proving once again that the public and private sectors fail to co-operate in energy efficiency projects.

Recommendations

EEPP can cut across the whole of society if properly developed and has the power to change the way we think and live our lives. Yet Article 6 is hard to implement in practice: its efficient implementation requires mutual understanding and close co-operation among all stakeholders.

It is a common belief that to make EEPP a success it is necessary to introduce a legally binding obligation at the EU level. Obligatory EEPP could mobilise additional resources and serve as a stimulus for a transition to a more sustainable market. Policy makers should continue to develop further skills in EEPP to foster demand-side policy and enable full market power within the public sector.

It was confirmed that energy efficiency criteria should be introduced into public procurement rules as an element under the broadly understood term "sustainability", as this is much better received by politicians and society than "energy efficiency". Energy efficiency citeria should be combined with other green criteria while establishing national frameworks of EEPP to get common acceptance and to mitigate the risk of market distortion. The involvement of the research and development sector and other stakeholders (e.g. manufacturers, trade chambers) is essential from the very beginning.

As "the lowest cost" is the most widely used criterion in public procurement procedures, "cost-effectiveness" should be interpreted more widely to include indirect benefits to the procuring entity, such as external societal costs of energy use.

Furthermore, "cost-effectiveness" should also look at the longer-term benefits for the procurer itself in terms of energy efficiency and energy savings. This can mean solutions that are more expensive to purchase at the beginning are the most cost-effective in the longer term: these are life cycle costs for the procurer.

EEPP promotes certain products and services but excludes others from the market. Risks of anti-competitive market rules must be taken into account when setting energy efficient criteria in public procurement. Central governments have a leading role in creating suitable legislative frameworks and providing instruments such as model contracts, financial schemes and guidance, and promoting best solutions.

There is still a need to explain to regional and local administrations the role of EEPP as a means of local development, e.g. due to low public sector costs, manufacturing of more competetive products or delivering energy services.

Many MS believe that EEPP should be further promoted and more widely exploited in PPP programmes.

Synergies should be sought when implementing all energy efficiency focused Directives, and supported by closer co-operation among different European, national and regional initiatives, e.g. among different Concerted Actions.

Lack of knowledge and experience remains a weak point and deserves further development. It is of paramount importance to be able to select, disseminate and transfer best practice solutions.

Good practice examples

The inclusion of all stakeholders is well understood as a prerequisite to success. MS reported several programmes or actions that involved large numbers of stakeholders.

Italy – Consip, the Italian Central Body of Purchasing promoting energy efficiency under EED implementation

- Consip offers consultancy and project design services. The company handles projects including strategic designs. These projects have developed over time technical, legal and project management skills.
- Consip is a competence centre specialising in all phases of the procurement value chain; it stands beside public administrations both in the procurement strategic planning phase and in the real purchasing phase, by providing e-procurement tools, assistance and consultancy.
- Consip relies on about 300 employees, with an average age of 43 years. 83% of the employees are university graduates and 50% of them are women.
- The entire action of Consip is based on core values such as innovation, transparency, competence and competition.

Ireland – Procurement of energy related equipment, services and facilities in Ireland

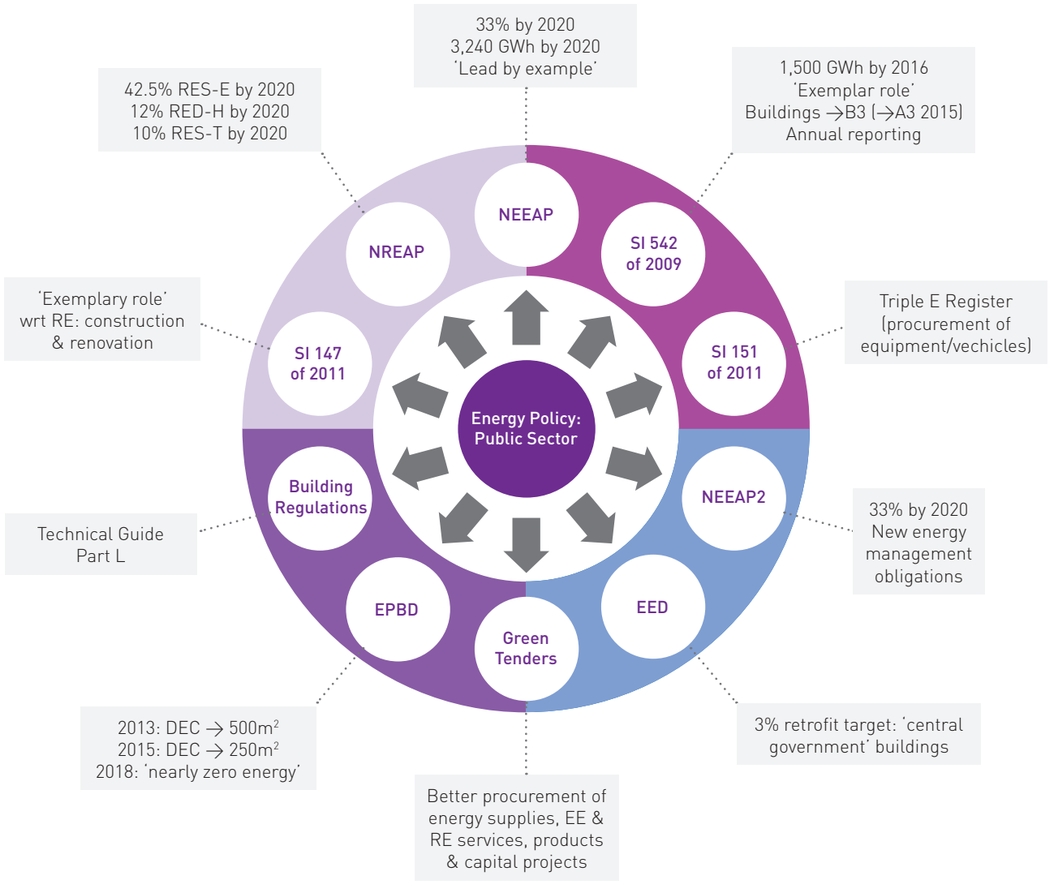
Shift from buying products (e.g.lamps)to buying services (e.g. lighting).

- Integrated energy service framework contracts. Registration of energy efficient products is mandatory for purchases by government.

The four energy related elements of Green Public Procurement:

- Purchasing energy supplies.
- Purchasing energy using equipment.
- Purchasing energy services.
- Purchasing new facilities / buildings etc.

Figure 11: Policy and legal obligations around the public sector in Ireland



www.seai.ie/Your_Business/Public_Sector/Funding_Finance_Procurement/Public_Sector_Procurement_Requirements/Public_Sector_procurement_requirements.html

Netherlands – Rewarding Energy Efficiency with Public Procurement Implementation strategy for the Dutch procurement practice of central government

Key to success:

- Start as early as possible.
- Shift from technical requirements to functional requirements.
- Minimum criteria are mandatory; reward criteria are voluntary.
- National public expertise centre offers support for national and local governments.
- If you start thinking about sustainability too close to the purchasing decision you will be too late to make real impact.

Ask questions such as:

- Do you need a building with 1 000 workplaces or a building in which 1 000 persons can work?
- Do you need a car or a transport service?
- Do you need extra cars or can you use the existing car fleet more efficiently?
- Don't forget the contract phase (dialogue with the supplier, monitoring, bonus / penalty)
- A possible risk of the EED is that public bodies focus too much on the specific provisions within the EED.

7 Public sector in energy efficient transport services

Transport is a critical and difficult sector in the transition to a low-emission economy. Transport accounts for about 19% of global energy use and almost one-quarter of energy-related CO2 emissions. With current trends, these factors are likely to increase by more than 80% by 2050. Cars and trucks are the biggest contributors, but aviation and shipping are also growing rapidly.

Transport is much more vulnerable to any potential disruptions in oil import than other parts of the economy. Therefore, transport dependence on oil import also has strategic importance in the energy security of the EU.

Transport contributes heavily to Green House Gas (GHG) emissions, and as such should be an area of intensive effort to reduce emissions by all possible means. However, transport emissions (including aviation) in 2012 were 20.5% above 1990 levels, despite a decline between 2008 and 2012. Emissions will need to fall by 67% by 2050 in order to meet the EU Transport White Paper targets.

The EU transport system is currently not sustainable, neither concerning energy demand nor recycling of materials. For years the EU has been trying to build and enforce its legislative framework on energy efficient transport (Box 11).

Main elements of the EU framework on energy efficiency in transport

- The European Renewable Energy Directive (RED).
- The European Fuel Quality Directive (FQD).
- The European Directive on Clean Power for Transport (CPT).
- The EU Sustainable Urban Mobility Package (2013)
- The Clean Vehicles Directive (2009/33/EC) (CVD).
- EU regulations on CO2 emissions.
- Public Procurement Directive 2014/25/EU.
- Air transport is now included in Europe's Emissions Trading Scheme (ETS).
- Ships use Ultra Low Sulphur fuel and have Ship Energy Efficiency Management Plans (SEEMP).
- European Commission White paper 2011 Roadmap to a Single European Transport Area.

In July 2015, MS completed a survey on "Public sector procurement of energy efficient transport services within EED" to review whether and how the public sector (PS) in MS address the issues of energy efficiency in transport in relation to EED implementation.

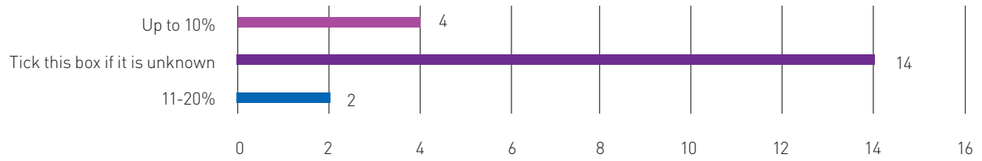
The EED does not directly address energy efficiency in the transport sector and this may be seen as its weakness. However, issues related to transport are scattered all over the Directive and can used in the process of improving energy efficiency overall. The issue of energy efficiency in transport requires more attention if we are to meet our targets for this sector. The main research question was "How can the Public Sector contribute through implementing the EED, to the EU transport sector GHG emission reduction goals, and the EU energy efficiency targets under Art. 3 of the EED?"

The survey provided the following main findings and conclusions:

- The ongoing efforts to reduce energy consumption by improving energy efficiency in other EU sectors and current trends in transport development are not sufficiently linked to expected improvement in energy efficient transport. In this way transport has managed to avoid being subject to stringent EU regulations on energy efficiency.
- Energy consumption in transport has a significant role in total country energy consumption in the overwhelming majority of MS – a low share of energy in transport is no longer a valid argument for avoiding energy efficiency measures in this sector.
- Fuel comprises 30% or more of a vehicle's operational cost, so small changes in fuel efficiency can make a big difference to the cost of providing a service and to the profitability of SME suppliers.
- Energy improvements in transport reported in the NEEAPs are not adequate in relation to energy consumption and energy saving potential offered by modern technology. MS would rather avoid declarations and are not willing to set ambitious energy saving targets for energy reduction in this sector.
- Knowledge on energy consumption in transport and related statistical data is limited, which indirectly confirms the low priority of transport in the work of MS to lower energy consumption and GHG emissions.
- MS provided a list of barriers to energy efficiency in transport, as well as a number of opportunities that might contribute to development of more energy efficient public transport and inspire more active EU and MS responses at all levels, constituting an invigorated and coordinated approach.
- 10 MS reported examples of best practice to be shared; 16 MS made suggestions to improve strategic links between energy efficiency and transport. This indicates strong interest in the topic, potential for shared learning and transfer of knowledge and practical solutions between MS.
- The vast majority of vehicles and services being procured by the public sector are available across the EU. The results of this survey show there is excellent potential for knowledge sharing and delivery of measured energy savings in public transport procurement at the EU level.
- For the majority of MS, total transport energy use makes up at least 26% of Total Primary Energy Requirement (TPER), with 5 MS reporting transport energy use at over 30% TPER.
- Within MS NEEAP targets, transport is targeted to deliver from 5% of total savings (25% of respondents) to 11-30% of total energy savings)50% of respondents - 10MS).
- Most (70%) MS do not know how much public sector transport energy use is, or its share of MS's TPER (fig. 12).

Figure 12: Knowledge on how much of the transport energy use (or TPER) is publicly procured, owned or procured by the public sector

What proportion of your MS transport energy use (or TPER) is publicly procured, owned or controlled by the public sector?



When asked about the implementation of the Clean Vehicle Directive (CVD) 2009, 40% of respondents were able to report on compliance, with 45% don't knows. 25% of these MS (5) confirmed that 76-100% of public transport tenders comply with the CVD.

Here it is worth mentioning the Clean Fleets project that assists public authorities and fleet operators with the implementation of the CVD and the procurement or leasing of clean and energy-efficient vehicles . It provides a lot of documentation and training on the public procurement of clean vehicles, compliant to the CVD.

Recommendations

- There is a need to define what is meant by public transport – perhaps 'publicly procured, managed and operated transport, vehicles and services' would be a more useful definition that would help to narrow and clarify boundaries. However, this proposed definition is very narrow and would exclude all vehicles purchased by private companies carrying out public transport services and vehicles purchased by public or private authorities carrying out a public service obligation (e.g. garbage collection, municipal fleets). Therefore, a suggestion could be - "all purchases of road transport vehicles, as covered by the public procurement directives and the public service regulation".
- An understanding of the benefits and business case for improving energy efficiency can only be based on hard data. Good data, with simple but trusted savings calculation methods, may remove many of the funding and cost barriers cited by MS once the cost savings from reduced fuel use or a shift towards alternative fuels and or electric mobility are calculated and demonstrated in use.
- There may be a role for better reference standards and/or provision of guidance, support and expertise to reduce transaction costs and provide much needed confidence across procurement personnel in both public and private sectors.

Good practice examples

Case study: E-mobility and car sharing in Germany's Stuttgart region.
This case study demonstrates the achievements in transport policy in Stuttgart, and more broadly in some other regions in Germany. A long-term consequent approach of alternative mobility options have been adopted in the town, a long-term programme called "LivingLab BWe" and a car sharing programme.

Mobility in Stuttgart – alternatives

Public transport:

- 1 million users of public transport in the metro region
- 15 underground lines, 7 urban railway, 9 regional railway lines
- 56 bus lines with 504 stops (667 km)
- Free transport of bikes in off-peak hours

Cycling:

- 450 rental bikes
- 180 km of bicycle tracks
- 7,000 places in bike sheds

Since 2010: e-mobility and car sharing

Policy outline LivingLab BWe

- 2,000 e-mobiles in Stuttgart & Karlsruhe by 2015 Đ reached: The two towns are Germany's top 2 e-car regions at present
- 1,000 recharging stations
- PPP: cluster of some 100 partners
- Dedicated focus on inter-modality and connectivity (coordination via ICT – apps, online-booking)
- Annual calls for proposals on demonstration projects (3.5million € until 2020)
- Projects need to link to "status quo"

Mobility concept Stuttgart – car sharing

- Since 2010: Model region for sustainable mobility
- City concept with the "classical" targets: Emissions, public mobility etc.
- E-mobility: state-funded demo projects Đ quickly abolished for positive framework conditions (licensing, parking space, ...)
- No public support for one concept, rather market based approach to allow all operators to get into business
- Multitude of concepts: Traditional car rental, station based short term car rental, floating e-cars and e-bikes

Ireland also presented a case study on the topic "Transport Energy". Ireland provided a review of methods enabling energy efficiency increases in transport. The presentation covered the present legal framework as well as a number of cases illustrating programmes aimed at energy savings in Irish transport companies. The main massage was the conclusion that savings are possible and can be attained with relative ease and low cost investments if the programme is well designed and carried out with appropriate determination (fig. 13 and fig. 14).

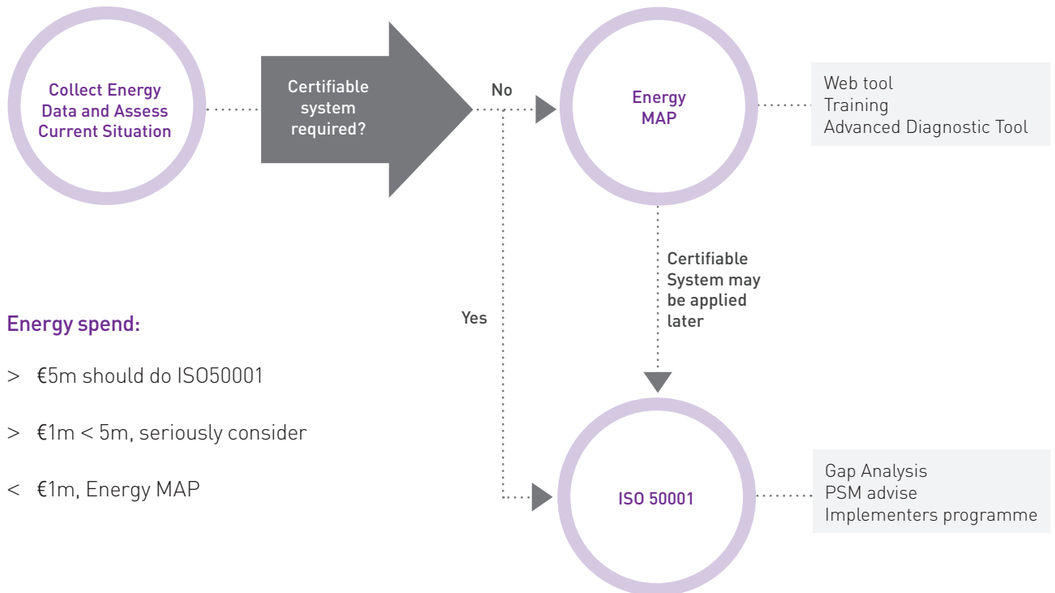
Figure 13: Simple tips for saving energy in transport

Got organised
- Weekly fuel review
- Weekly feedback to drivers (screen in drivers' room)

Speed limiters reduced
- 93+kph to 85kph (57 to 52mph, limit is 60mph(96kph))

Detail maintenance
- Tyre pressures monitored
- Batteries replaced (idling reduced)
- Idling reduction (15% to < 5% of engine hours)
- + Many more actions

Figure 14: Public bodies to lead by example – subject to Art.8 (audits) of the EED – Irish case



8 Monitoring of Art. 5 implementation progress – cost effectiveness of measures

We aimed to investigate whether and how MS have understood and implemented the requirement for the cost effectiveness of the measures used in the implementation of Art. 5 of the EED, both in "the default and alternative" approach, when developing energy efficiency projects in public buildings.

"Cost effectiveness" is referred to twice in Art. 5:

- "Member States shall require that central government buildings with the poorest energy performance be a priority for energy efficiency measures, where cost effective and technically feasible" (Art. 5(1)).
- "...they take other cost effective measures, including deep renovations and measures for behavioural change of occupants..." (Art. 5(6)).

The main questions this research addresses are: What is cost effectiveness? Is it important and possible to implement energy efficiency measures in public buildings cost effectively? How cost effective do we need to be? What cost effective measures have been implemented? What calculation methodologies or tools are used to assess cost effectiveness (especially for behavioural change programmes)?

Most important findings

1. The majority (64%) of MS have decided to implement Art. 5 of the EED based on the "alternative approach". This is reported to be because of the higher number of measures that can be considered, the higher energy savings that can be achieved and the lower associated investment costs.
2. There are no relevant differences related to the financing sources between the alternative and default approaches and MS try to use the best financial mechanisms currently available, from the European Structural and Investment Funds (ESIF) to national funds (including governmental budgets), using in several situations a combination of different funds.
3. Energy Performance Building Directive (EPBD) requirements have a relevant impact on cost effectiveness of the projects. In several MS there is a recognised association between the cost effectiveness and the cost-optimal methodology developed under the EPBD to define the requirements that must be fulfilled (Heat Ventilation Air Conditioning (HVAC), envelope and lighting). A small number of MS have defined cost effectiveness themselves.
4. Inability to check cost effectiveness ex-post is a weak point of Art. 5 implementation in the majority of MS. There are different reasons why such a check is not carried out: lack of methodologies and technical standards, insufficient human capacity, no need or interest. Lack of courage/desire to learn the real cost effectiveness of public investment was also mentioned. In addition, ex-post evaluation of the cost effectiveness of projects does not seem to be a major concern for the majority of countries.
5. Standard economic factors, such as Payback Time (PBT), Net Present Value (NPV) and Internal Rate of Return (IRR), in general fail to reveal the full benefits of public sector building renovation. Improved methods of evaluation are required to assess the full benefit.
6. Behavioural changes are considered for the energy saving calculation in the majority of the MS that have adopted the alternative approach. This is probably the clearest example of low investment costs and high energy savings potential.
7. The use of EPCs to support the implementation of Article 5, based on the default approach, presents a challenge due to the long payback periods of energy efficiency measures in the building envelope. Some countries have solved this problem by providing support in order to allow the development of integrated energy efficiency projects in central government buildings.

Recommendations

1. Harmonisation between cost effectiveness (EED), cost benefit (EED) and cost optimal (EPBD). It may be useful to clarify the differences and how MS can develop their own policies in relation to each definition.
2. Only one MS (Denmark) has developed a calculator to evaluate the cost effectiveness of the projects. This could be used as a good example for other countries.
3. Some MS have defined systems to manage and monitor energy consumption of public buildings allowing a clearer understanding about how energy is used in the central government buildings. This initiative should be evaluated by other countries as it could be used to inform the development of more effective energy efficiency policies.
4. The existence of ex-post cost effectiveness evaluation seems to be of special relevance for measuring the success of energy efficiency projects, and would allow MS to quantify the savings achieved and the success of the legal, financial and administrative instruments that were developed for that purpose.

Good practice examples

Public procurement procedures in Croatia

- Public sector should among others build and invigorate EPC+PPP market.

The Government of the Republic of Croatia adopted the programme of energy renovation of public sector buildings for the period 2014 – 2015.

Programme goals:

- To contract and completely renovate 200 public sector buildings - approximately 420 000 m2 of heated floor area.
- To decrease energy consumption in refurbished buildings for 30 - 60% (approximately 150 kWh/m2 per year).
- To decrease CO2 emission for approximately 20 500 t per year.
- To mobilise investments amounting to approx. 400 million kn.
- To start energy services market (ESCO).

Energy efficiency project in Croatia

- Mobilisation of all resources.
- Deep involvement of the government.

Key steps to introducing energy management in public buildings:

- A political decision on project implementation and a public declaration of an energy policy and its aims.
- Establishing and organising an Office for Energy Management (EE team) within the organisational structure in public administration and local management.
- Establishing the buildings' registry.
- Using the Energy Management Information System (EMIS).
- The identification and implementation of measures that improve energy efficiency (energy audits are the key instrument in identifying economically feasible measures in order to improve energy efficiency, and their implementation is recommended before initiating any investments).
- Local promotion of a sustainable use of energy and the implementation of measures that improve energy efficiency in the public sector.

Training and capacity building (public administration, EE team, technical staff, employees).

Cost optimum methodology within the EPBD (fig. 15)

- A voice from the EPBD has been very fruitful as it briefed on the achievements already done in the pursuit of EPBD implementation.

Guidelines for calculations (EPBD):

- Establish at least 9 reference buildings – one for new buildings and two for existing buildings subject to major renovation - for single-family, multi-family, and office buildings respectively.
- Define packages of energy efficiency measures to be applied to these reference buildings.
- Assess the primary and final energy needs of the reference buildings and the impact of the applied improvement measures.
- Calculate the life cycle cost of the building after energy efficiency measures are implemented, by applying the principles outlined in the comparative methodology framework.
- Derivate a cost-optimal level of EP for reference buildings.

Ireland: Cost effective implementation of Article 5 (fig. 16, fig.17)

Energy Conservation in the Public Service:

- Ireland's National Energy Efficiency Action Plan (NEEAP) requires Public Service Organisations to provide exemplary role.
- Public Sector Target = 33% energy reduction by 2020.
- Originally thought to be ambitious but the Office of Public Works (OPW) well on the way to achieving this goal.
- No room for complacency.
- Energy Conservation Programmes – easiest savings are the initial savings.

The key success factors:

- Three key elements to programme:
  1. Technology.
  2. Specialist Expertise.
  3. Continuous Staff Engagement.
- Endorsement at Senior Management level.
- Active energy teams within participating buildings cornerstone of the campaign.

Figure 15: Global cost curve after renovation

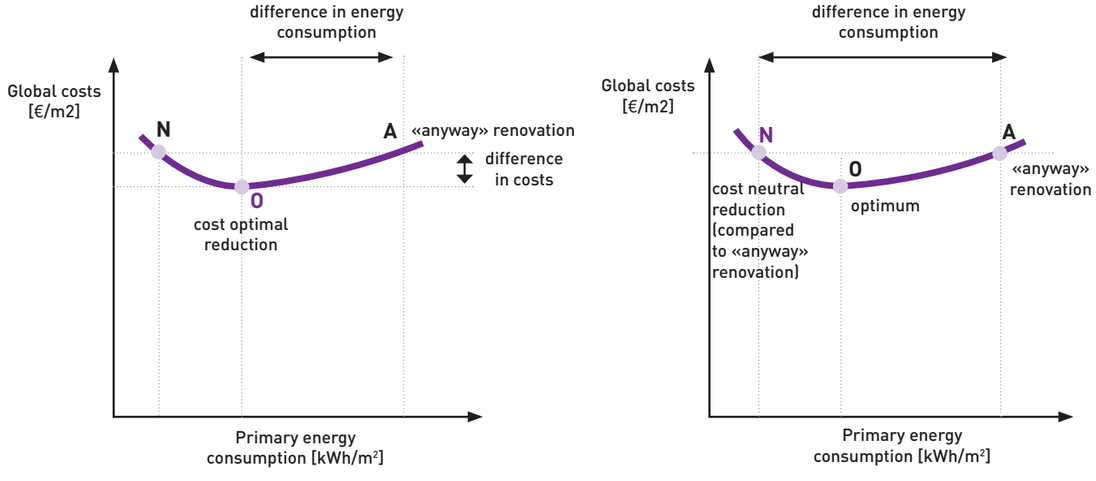


Figure 16: Active Energy Teams: The Key to Success

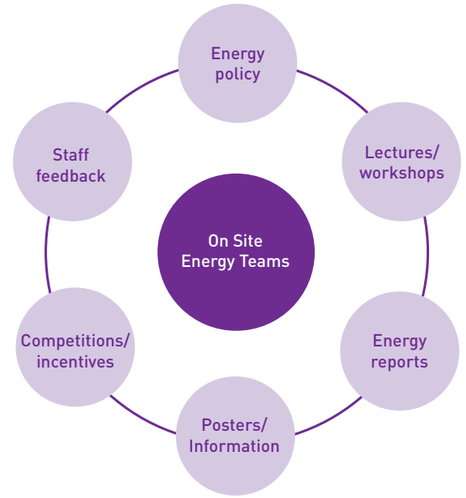
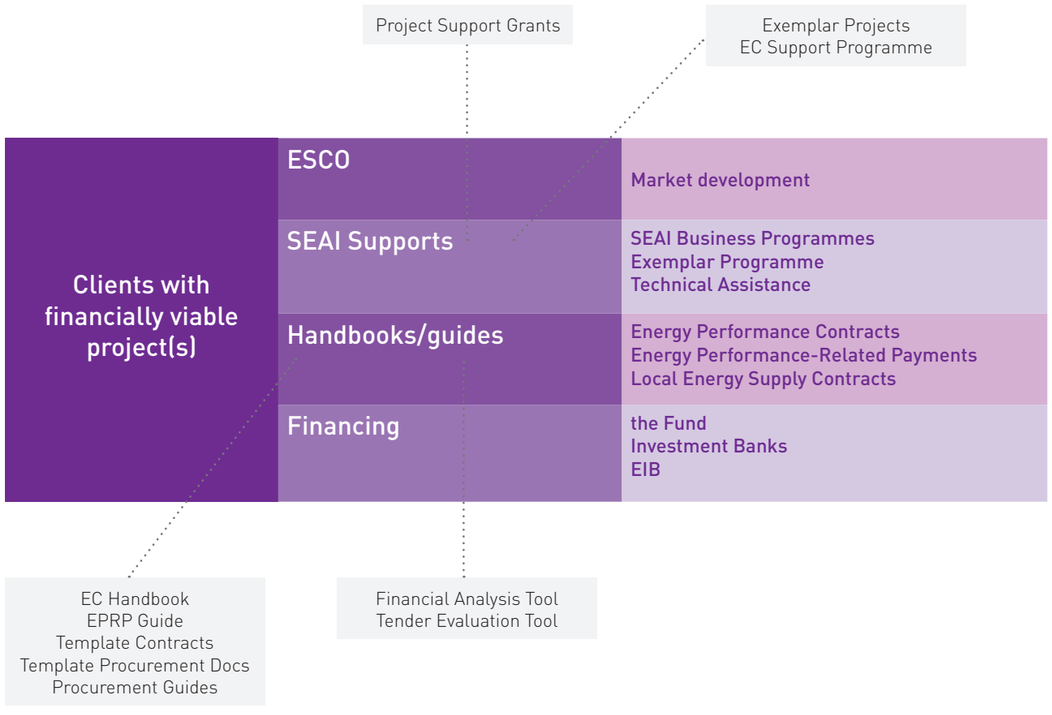


Figure 17: National Energy Services Framework in Ireland



Cost effectiveness turns out to be difficult in implementation. Presented model solutions give optimism as they show that practical solutions are implemented in a few countries (Croatia, Ireland, Denmark). Future advances will be based on the experience of the few leading MS.

9 Contribution of the public sector to the EED goals — achievements and perspectives

The main objective of the Woking Group 2.8 was to discuss whether and how the goals set by the Energy Efficiency Directive (EED) for the public sector have been met from the practical point of view of implementation. CT2 activities in CA EED focused on addressing specific problems of implementations of Art. 5 on public buildings and Art. 6 on public purchases.

This working group aimed to provide a retrospective review of the work carried out by CT2 within the CA EED and assess the strengths and weaknesses. The methodology applied consisted of reviewing and selecting the topics which best illustrated the contribution of the CT2 to successful implementation of the EED in the public sector. Maintaining a balance between Art. 5 and Art. 6.

Six aspects of the EED implementation were discussed;

- energy efficiency in historical buildings, places of worship and buildings owned by the armed forces,
- implementing Art. 6 on public purchasing of products,
- services and buildings,
- public sector in energy efficient transport services,
- monitoring of Art. 5 implementation progress – cost effectiveness of measures, and
- contribution of the public sector to the EED goals achievements and perspectives are very specific and detailed.

As each aspect was discussed three questions were addressed: What areas are MS still struggling with? What do they need to implement the directive? What assistance is still needed in the future?

Discussions on both articles, i.e. Art. 5 and Art. 6, produced some conclusions and observations on the needs of:

- Improving knowledge, skills and awareness.
- Stronger linkage with other directives, not only with the EPBD but as well with the RES, Eco Labelling & Design, public procurement, Clean Vehicles).
- Stronger synergies between different competent public bodies within MS.
- More room for exchanging good practice and examples.
- Easier access to funding opportunities for all energy efficiency related projects.

General assessment of CT2 activities provided some general conclusions:

- Discussions contributed to a better understanding of the implementation of Art. 5 and Art. 6 of EED across MS.
- A JWG of CT2 reviewed the cross-cutting issue of Energy Performance Contracting as a modern mechanism of financing energy efficiency projects.
- These topics discussed as part of the CA EED were chosen in an open process of selection to guarantee their relevance and being of interest to the audience.
- These efforts highlighted by Member states were illustrated by demonstrating practical cases so that the real problems could be brought to the surface and discussed. It produced a wide spectrum of implementation processes ongoing in different MS.

Based on the discussions that have already taken place a number of recommendations for future work were proposed:

- Future discussion related to the public sector should be closely combined with the building renovation as stipulated by Art. 4 of the EED.
- The activities undertaken at the local level as required in Art. 5 and Art. 6 should be better linked to become more effective.
- Future discussion should, as much as possible, focus on practical cases and model solutions.
- Following good experience with co-operation with the CA EPBD we recommend that more cooperation should be undertaken if seen as beneficial to implementation.
- Practical tools needed for implementation, e.g. spreadsheets enabling assessment of energy efficiency in MS, could be made available in frameworks of other EU programs, e.g. Horizon 2020.
- The relations between the EED inspired energy savings and the functioning of the EU ETS should be cleared. Complementarity, overlapping or a gap between?

Good practice examples

In Bratislava the following good examples were presented and discussed:

Energy Performance Contracting. Best practices in the Netherlands

- Guideline for Tenders for EPCs.
- Whitepaper with best practices.
- Infographic illustration.
- Online tool for creating an EPC.
- **http://www.platformduurzamehuisvesting.nl/instrumenten/menu-performance-contracts/**

GuarantEE:

- EPC facilitators network.
- Online precheck, available 2017.
- Database: www.guarantee-project.eu/bestpractice
- Reports, market reports, Newsletter: http://guarantee-project.eu

Implementing Art. 6 on public purchasing of products, services and building – best practices

Ireland – aligned with Green Public Procurement.

- Procuring energy supplies – encourage electricity supplies with high % renewable energy.
- Procuring equipment – off list of EE equipment or equivalent.
- Procuring services – consider energy contracting.
- Procure new build/retrofit/design – minimum rated building and use Energy Efficiency Design concepts.
- 2017 developing a procurement pack.

Netherlands

- National public expertise centre offers support for national and local governments.
- Start as early as possible.
- Shift from technical requirements to functional requirements.
- Minimum criteria are mandatory; reward criteria are voluntary.

Italy - CONSIP, the Italian Central Body of Purchasing promoting EE under EED implementation

- offers consultancy and project design services,
- is a competence centre specialising in all phases of the procurement value chain,
- relies on about 300 employees

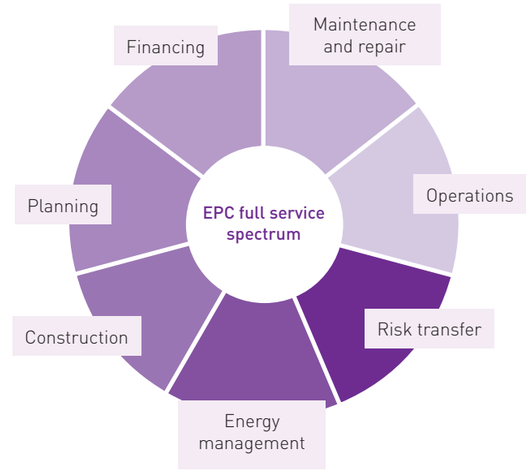
Capacity Building on Energy Performance Contracting in European Markets in Transition. Project EnPC-INTRANS

Objective of the project

Develop local capacities of municipalities to set-up and use Energy Performance Contracting (EPC) for the financing of investments in energy efficiency improvements in public buildings and services.

Public building owners can finance energy efficiency measures in general by means of:

- Commercial and bank credit (loans)
- National or international subsidy programs and schemes, if available
- Own financing (budget-financed)
- Energy perfromance contracting (EPC)



Financing is an important part of the services covered in an EPC.

For many potential customers financing is the most attractive part of EPC services for public buildings.

More about EnPC INTRANS project **www.enpc-intrans.eu**

10 Model contract and guidelines for energy performance contracts in the public sector

The tasks in the EED directly attributed to the public sector are in Art. 5 and Art. 6. They stipulate that the public sector shall play the leading and exemplary role in promoting energy efficiency, especially in public buildings and public purchases. However, there are also cross-cutting provisions which indirectly address the public sector, among which Art. 18 and Art. 19 deserve special attention. They refer to the taking up of energy services, indicating ways to support the PS, and the removal of regulatory and non-regulatory barriers, deterring public bodies from Energy Performance Contracting (EPC) and Third Party Financing (TPF).

The most important findings can be summarised as:

- ESCO markets in the public sector are growing in many MS.
- In some MS there is an emerging market, others are more developed. Most MS see EPCs and ESCOs as a possible solution to make buildings more energy efficient.
- In most MS EPCs in the public sector have stimulated EPCs in the commercial market.
- 10 out of 22 MS already have developed Model Contracts, Guidelines, Minimum Requirements and/or Minimum Criteria for EPC in the public sector on a national level.
- Half to two-thirds of these were established before the obligation in the framework of the EED was introduced.
- At a regional and local level, the use of EPCs and ESCOs is much less developed.

The main barriers, possible solutions/best practice of EPCs in the public sector have been identified in Table 3.

Table 3: Main barriers of EPCs and possible solutions to them

Main barriers / needs	Possible solutions/best practice
Awareness raising Encouraging demand side	Support programme (Ireland)
Lack of trust and transparency	Certification Code of Conduct (Transparense) ESCO facilitator (Germany, Czech Republic, Ireland)
High transaction costs	Subsidies Financing models Combine small contracts (umbrella model)
Lack of knowledge and experience	Training of energy managers ESCO facilitator
Lack of capacity	
Model contracts Standardised guidelines Minimum criteria Monitoring and verification schemes	Standardisation ESCO facilitator EPC menu, online tool (Netherlands)
Legal aspects Slow and heavy tendering procedures	Rules on public authority accounting, procurement and reporting
Lot of different supporting schemes	Models or standardisation
Lack of flexibility of the contracts	

The main conclusions are as follows:

- Awareness rising is important; support programmes are needed.
- Facilitators are crucial for the market at all stages; they should be independent and in most MS are part of the national government or introduced by energy agencies.
- Qualification or certification is important for confidence and communication.
- Transaction costs are high; special support, subsidies and funds are diffused among MS.
- Simplification of accounting and tendering procedures is strongly needed.
- Measurement and verification schemes are needed.
- Centralised contracting can simplify EPC for the public sector.

Good practice example

A number of best practice examples have been identified and are highlighted in Table 4.

Table 4: Selection of EPC best practice

Denmark	15 ESCOs and more than 500 EPCs. Mostly in commercial sector and/or only for installations. ESCO facilitators play a crucial role. In Denmark there are about 50 active ESCO facilitators. They work in Energy Agencies and follow a training programme.
Czech Republic	More than 150 EPCs, of which 90% in the public sector. Total savings €11 million per year. There are six ESCO facilitators at Enviros; their role is crucial for the contracting. They 'cost' €5 000 –10 000, but eventually they save a lot more (energy and costs).
Ireland	20 best practices online available, 10 public and 10 private. Also with the help of ESCO facilitators. They cost €50 000 per project. Public pipeline of 100 projects that start with investigating a possible EPC, only five of them will actually be realised.
Netherlands	EPC menu, online web tool that helps landlords to construct an EPC. It is free available for other MS, if they make it fit for their own standards and legislation.
Italy	Integrated energy service framework contract for 13 000 buildings. Public procurement for public lightning. Huge support programme and training for energy coordinators.
EU	Code of Conduct, developed by the EU Transparense programme.

11 Concluding remarks

The eight aspects of the EED implementation discussed here; namely the "default" approach focused on inventory of central government buildings, "alternative" approach to Art. 5 in practice, encouraging other bodies to follow central government exemplary role in building renovation (art.5.7), energy efficiency in historical buildings, places of worship and buildings owned by the armed forces, implementing Art. 6 on public purchasing of products, services and buildings, public sector in energy efficient transport services, monitoring of Art. 5 implementation progress – cost effectiveness of measures, and contribution of the public sector to the EED goals — achievements and perspectives are very specific and detailed. For better understanding of these issues, this report should be read alongside the previous CTSR 2.

This report covers also an interdisciplinary topic "Model contract and guidelines for energy performance contracts in the public sector".

All parts of work presented above dealt with the role of the public sector in demonstrating its exemplary role in increasing energy efficiency. They created an EU-wide panorama of the process of implementation of art. 5 and ar. 6 of the EED. Concerning art. 5, they demonstrated how different the practical ways of implementation chosen by MS are, while reinforcing that cost-effectiveness appeared to be the most important criteria when choosing between the 'default' and the 'alternative' approach. They also showed that MS have in general no problems with interpretation and understanding their roles as stipulated in art. 5

The important, or even crucial, role of regional and local authorities in the EED implementation has been proven once again. This finding supports the necessity of co-operation between different levels, and the need for establishing frameworks, platforms and other channels of information and experience exchange between different stakeholders. When implementing the provisions in Art. 5 and Art. 6 that refer to encouragement of work at a lower than national level (e.g. regional or local), a synergetic combination of activities of different scales should be fostered to tap full potential and bring added value.

It is hard to overestimate the role of energy efficiency improvements made in historical buildings, churches, chapels or military barracks, considering their positive and creative impact on public awareness. Therefore any exemptions, though allowed, should be taken with care and minimised in number whenever possible. Even the MS which asked for exemptions should make a review of the real necessity of the exemptions in future.

It was agreed that public procurement is one of the most powerful tools in the hands of public authorities to demonstrate its leading role in the process of energy efficiency improvements, embracing the whole economy and society. Due to its market position, the power sector is a crucial player in the process of the transformation of the markets of products, services and buildings to become more energy efficient. Despite continuous progress in making public procurement "greener" in some MS, the transformation is developing rather slowly, encountering many well recognised problems. In general it was concluded that although the EEPP is steadily receiving more interest from the bodies involved in public procurement, a critical mass has not yet been reached to exercise the full potential of this power. The opinion that the EU Directives on public procurement shall be modified to introduce some "green" binding legal obligations into public procurement rules is common across MS, and is regarded as absolutely necessary to make the process work: further investigation is required however as there are MS in which even the current EU legal framework (EEPP) is in place and works successfully.

It has been proven that despite the fact that transportation is not directly addressed in the EED, some of the current provisions are applicable in the transport sector. This topic received keen interest from the members of the Concerted Action and should be continued. In the case when the revised EED contains articles on transport, the issues and future activities should concentrate on implementation of these provisions.

Cost effectiveness of measures in the renovation of public buildings is still an Achilles heel of the vast majority of such projects. Inability to prove economic advantages is even more important when public money is being invested rather than in privately financed projects. Providing standardised methods of cost effectiveness evaluation would therefore remove one of the most important barriers in public building renovation. This is a challenge faced both in the EED and the EPBD implementation. It is commonly agreed

that this issue should be further investigated jointly by the two Concerted Actions. Such works should create topics for more scientific research in Horizon 2020. Substantial progress in the use of the EPCs has been made over recent years. EPC together with ESCO are the most frequently used form of energy services. They also contribute to the development of energy audits and the development of interest from financing institutions in energy efficiency. They are becoming accepted in both private and public sectors. The use of EPC requires further investigation but should be promoted in MS where there are still legal and administrative barriers. Exchange of experience should help to remove the obstacles faced by some MS, e.g. by cross-country dissemination of model contracts or technical standards.

The CA EED activities on the role of the PS also revealed that MS are trying to build as much as possible on their current knowledge, experience and infrastructure. The progress was proved and illustrated by a large number of working examples on successful implementations presented during the PM. They constitute the real added value of the meetings in providing model solutions to be implemented in other MS.

Impact and possible co-operation and co-ordination with the EPBD-inspired works were also discussed. It was generally concluded that, where possible, MS should seek synergy between the implementation of the two directives. A wide area of convergence and synergy between the two was considered obvious. MS show great interest in practical working examples demonstrating possible ways and methods of implementation. Not all of them can be called "best" or "model" solutions since some revealed problems encountered and did not bring the expected results, however the lessons learnt are worth presentation and discussion.

Discussions in CT2 as well as in other CT revealed the necessity of combining different provisions of the EED into horizontal topics, and that joint WG across different CTs need to be set up to tackle them effectively.

Abbreviations

Table 1: Country codes for the Member States

Country code	Member State
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

Table 2: Miscellaneous abbreviations

Abbreviation	Full text
CA EED	Concerted Action Energy Efficiency Directive
CA ESD	Concerted Action Energy Services Directive
CT	Core Theme
EED	Energy Efficiency Directive
EEPP	Energy Efficient Public Procurement
EPBD	Energy Performance Building Directive
ESCO	Energy Saving Company
ESIF	European Structural and Investment Funds
ESD	Energy Services Directive
EPC	Energy Performance Contract(ing)
EU	European Union
GPP	Green Public Procurement
HVAC	Heat Ventilation Air Conditioning
MS	Member State (including Norway in this questionnaire)
PM	Plenary Meeting
PS	Public Sector
RESD	Renewable Energy Source Directive
ESIF	European Structural and Cohesion Funds
GHG	Green House Gases
IRR	Internal Rate of Return
TPER	Total Primary Energy Requirement
NPV	Net Present Value
LCA	Life Cycle Assessment

The Concerted Action for the Energy Efficiency Directive (CAEED) was launched with support from the Intelligent Energy Europe (IEE) in spring 2013 to provide a structured framework for the exchange of information between the 28 Member States and Norway during their implementation of the Energy Efficiency Directive (EED).

For further information please visit **www.ca-eed.eu** or email **caeed@ca-eed.eu**

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