CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Concerted Action for the Energy Efficiency Directive

Executive Summary Report

March 2017

Introduction

The Concerted Action for the Energy Efficiency Directive

The Concerted Action for the Energy Efficiency Directive (CA EED) was launched in spring 2013 to support the effective implementation of the European Commission Directive on Energy Efficiency (2012/27/EU), henceforth the EED, in all 28 EU Member States and Norway (henceforth collectively referred to as MS). By providing a trusted forum for the exchange of experiences and collaboration, the CA EED helps countries learn from each other, and so avoid pitfall and build on successful approaches when implementing the EED.

The CA EED is financed under the Intelligent Energy Europe Programme of the European Commission, and builds upon the second Concerted Action (CA ESD II) that supported the implementation of the European Commission Energy Services Directive (2006/32/EC), henceforth the ESD. The CA EED benefits therefore from a strong European network, and from a wealth of information already gathered and lessons learned.

More specifically, the objectives of the CA EED are to:

- Enhance and structure the sharing of information and experiences from national implementation whilst promoting good practice concepts in activities to improve and strengthen MS implementation of the EED.
- Create favourable conditions for an accelerated degree of convergence of national procedures in EED related matters.

The work of the CA EED is structured around eight focus areas that cover the key requirements of the Energy Efficiency Directive:

1: National Energy Efficiency Action Plans (NEEAPs) and annual reports: measuring progress in energy efficiency
2: Public Sector - public buildings and public purchasing
3: Metering and billing, demand response and grid issues
4: Funds and Financing for energy efficiency
5: Energy services and energy services companies (ESCOs), energy auditing, solving administrative barriers
6: Consumer information programmes, training and certification of professionals
7: Efficiency in Energy Supply
8: Energy efficiency obligation schemes, monitoring the impacts of eligible measures

In practice, the work carried out within the CA EED is organised around a series of 11 two-day meetings spread over the six-year duration of the action. Each meeting involves parallel sessions focusing on specific subtopics within the main focus areas. For each subtopic, a team of 2 to 3 participants from different MS is established, and is in charge of collecting information, preparing discussions, and summarising key findings in a report after the meeting.

Each of these reports is based on input from the 29 participating CA EED countries (all then-current EU Member States, plus Norway), as well as the conclusions and recommendations emerging from group discussions at the meetings. This report covers the findings and recommendations of every topic covered by all eight focus areas. Where possible, the results are illustrated with examples of good practice at work in various MS.

Further information

More detailed information and in-depth reports on each topic covered, including further examples of good practice, is available via the CA EED website: http://www.ca-eed.eu

The eight CA EED key focus areas

1 NEEAPs and annual reports: measuring progress in EE

Overview

The EED includes many reporting, notification and other reporting-related requirements for MS. Annual reports provide a basis for monitoring the progress towards national 2020 targets, while National Energy Efficient Action Plans (NEEAPs) – produced every three years - provide a framework for strategy development.

The EED required all MS to submit a 1st EED NEEAP (NEEAP-3) by April 2014. Article 4 also required MS to publish the first version of a long-term building renovation strategy by the same date, and to update it every three years thereafter, as part of future NEEAPs. The minimum information to be included in the NEEAP is specified in the Directive, Annex XIV.

The focus area sought initially to provide a comprehensive overview and timeline for all reporting requirements and notifications mentioned in the EED. As the CA EED developed, more emphasis was placed on measuring MS progress in fulfilling the requirements.

In 2016 a retrospective look at the outcomes from all meetings was used to highlight expectations for the upcoming 2nd EED NEEAPs (NEEAP-4), due April 2017. The status of the preparation of the Energy Union Governance initiative regarding reporting obligations and how this might affect future EED planning and reporting requirements was also covered.

Overview of EED reporting-related requirements

The Commission provided a template and guidance for compiling the NEEAPs. The use of these was recommended but not obligatory. Only the compulsory elements required in the EED were included in the template, while the guidance also covered optional reporting elements.

The different targets set in various articles of the EED, and how these are connected, remained challenging for many MS. It also caused difficulties for MS implementing organisations tasked with informing and explaining the EED to relevant stakeholders at national level. Another issue was the timeframe for EED reports and notifications, considered demanding by many MS. Some were concerned about their ability to produce the quality of information aimed at by the EED. Many considered the requirement to include all measures when setting the target (Article 3 of the EED) problematic, as many did not have a clear picture of the measures and policies they would adopt or need to achieve their target. Fulfilling these reporting and notification requirements stretched their resources to their limits. However, separating the obligations for the EED made it easier for them to keep track of them and their due dates.

The CA EED's research provided Ministries and implementing bodies with a tool for developing a checklist for reporting. It also distinguished between the different forms of reporting, supporting the furtherance of the general understanding of the Directive. This tool received very positive feedback from CA participants.

1st annual report and processing of the 1st EED NEEAPs for 2014

The 1st EED NEEAP (NEEAP-3) of 2014 required the reporting of energy savings to show progress towards the 2016 national target for final energy savings, as set by the former Energy Savings Directive (ESD). MS said they set their national targets in various ways, and differed in how they plan to use previous work when preparing the NEEAP.

The most common options for setting indicative national targets according to EED Article 3(1) were final energy consumption and primary energy consumption. In most MS, national circumstances that affect primary energy consumption were considered when setting targets. Other important influencing factors were GDP forecasts and the development of various energy production options.

Most MS have introduced new or updated legislative and/or non-legislative measures fulfilling EED provisions since the previous NEEAP. Measures included funding and other financial instruments and covered e.g. buildings and heating systems; education and training; energy services; solar energy in buildings. Updated measures mainly relate to existing obligation schemes.

Most CA participants also said they planned to use the work done for energy savings calculations and their reporting for the 2nd ESD NEEAP when preparing their NEEAP-3 for 2014, and would use the same calculation methods. The majority, however, either did not have a methodology or a description of how to calculate and/or estimate expected primary energy savings in 2020, or they had not yet considered the issue or made a final decision. Savings were only expressed in primary energy terms in a minority of MS. Most used conversion factors.

EED Article 4 long-term strategies and processing of the NEEAP 2014

Most MS found the EED Article 4 long-term building renovation strategy a demanding task with a short timeframe. NEEAP-3 had to be delivered by April 30 2014, and the first version of the strategy had to be submitted as part of that.

There were several common themes across MS when developing strategies. Most used existing information where available; the residential sector was the best understood; and it was widely agreed that addressing the barriers to uptake should be part of the strategy. In most MS, modelling was more detailed for the period up to 2020, and less certain for longer time frames. There was, however, no clear consensus about what represented a 'longer time period'. Understanding the processes in consumer decision making was also considered vital; and consideration of the multiple benefits of EE was viewed as an important part of any strategy.

Most CA participants found preparing NEEAP-3 challenging. The problems they encountered included the heavy reporting burden imposed by the EED and its tight deadlines; dealing with new chapters that were not present in previous action plans; and the double-reporting of the same issues in different parts of the plan. MS said they were using NEEAP-2 as much as possible as a basis for preparation of NEEAP-3. The Commission's template and guidance documents were being used by all MS, and seen as a great help, although some said there were confusing discrepancies between the two documents.

The inclusion of primary energy savings in the NEEAP-3 differed between MS, but all planned to report final energy savings using calculation methods established for NEEAP-2.

Measuring energy savings from soft measures

EED Articles 12 and 17 highlight the implementation of behavioural measures to promote an efficient use of energy through instruments and policies. Such 'soft' measures are also eligible as Article 7 measures,

and one method for calculating savings in Annex V is dedicated to them. Measuring the impact of soft measures has been a challenge however.

Half of all MS included soft measures in their Article 7 notification report. These measures included national energy performance certificates for buildings, product labelling, audits, energy management, education and training, information campaigns, smart meter deployment and capacity building with networks. Only some MS calculated energy savings for these measures. The most common methods used for this were deemed and surveyed savings, and savings based on studies or small-scale trials.

It was agreed that information campaigns and awareness-raising activities will be needed in all MS to achieve behavioural change among consumers towards more EE choices. Such campaigns could have other positive impacts besides energy savings and these must also be considered. Information gained regarding consumer behaviour could be used to tailor other policy interventions more successfully. Budgets for these activities must therefore be ensured.

Few MS evaluated soft measures in ways other than energy savings. Further effort will be needed to capture the wider qualitative benefits. This topic is covered in more detail in Chapter 8, below.

New or updated EE measures introduced in MS (October 2014)

With NEEAP-3 in place and national implementation plans underway, MS were asked to report on new or updated EE measures fulfilling EED requirements introduced or updated since NEEAP-2. Mapping these measures reveals which national policies are contributing to EE targets, and demonstrates the efforts MS are making towards EED implementation. Most policies focus on end-use sectors, a legacy of ESD implementation.

Around 300 new or updated EE measures had been introduced after the NEEAP-2 in 2011. Many previous measures introduced to comply with ESD requirements that also fulfilled EED requirements had been updated. New legislative and non-legislative measures have also been introduced that serve different target groups or sectors and cover several EED requirements.

Measures related to energy production, transmission, distribution and tariffs were outside the scope of ESD and not reported in NEEAP-2. MS had between them around 100 undated or new measures in this area, mainly relating to Combined Heat and Power (CHP) and District Heating (DH). However, many MS still had no measures in these areas prior to NEEAP-3.

Few introduced measures tackle split incentives. Barriers preventing this include: rent contracts that include energy supply; lack of minimum EE standards in the rental sector; lack of regulation outlining who bears retrofit costs; and retrofit loans being longer than lease contracts. Changing political priorities and a lack of legislative framework and financial support also act as barriers. Moreover, some MS consider other EE problems a priority.

Possible solutions include: more dialogue between stakeholders, backed by political will; minimum requirements for rented buildings; regulations obliging tenants benefiting from savings to implement retrofits; applying green procurement principles to government leasing; simplifying EE financing through guarantees; and green leasing and utilisation of energy services companies (ESCOs).

Measuring progress in energy efficiency

EED Article 24(1) and Annex XIV required MS to provide an annual report including analyses of energy trends in sectors where consumption remains stable or is growing. In 2015 the focus area looked at MS understanding and implementation of this requirement. The use of decomposition methodology was also investigated.

Most MS fulfil the requirement to analyse energy trends, but some said they would benefit from more guidance. Decomposition methodology as an analysis tool is well known, but mainly used for sector-specific analysis at national level. Only two MS use it for EED purposes. A new web tool to analyse energy trends based on top-down (TD) savings has been developed as part of the IEE-project ODYSSEE-MURE to complement the ODYSSEE database (www.indicators.odyssee-mure.eu/decomposition.html).

Issues raised over the applicability of the ODYSSEE facility for EED reporting include: it is not possible to report on year 'x–2', where data for only 'x–3' is available in the database; the requirement to use some non-official data; the interpretation of the residual or remainder fraction of the decomposition; and the need to have a TD estimate for energy savings using an approved indicator.

DG ENER highlighted MS requirements related to EED annual reporting under Article 24(1) and Annex XIV Part 1, and suggested using Eurostat (ESTAT) data. MS should provide information on the definitions behind the reported data. If they reported data in such a consistent way it would help the Commission report on EU progress meaningfully. However, most MS are unable to report previous year savings by the end of April.

Monitoring and verification for EE measures in MS

The aim of this work was to gain understanding of the terminology 'monitoring and verification' and 'measurement, control and verification systems' in EED Article 7; to get an overview of MS progress; and to identify the main challenges in setting up monitoring systems. These topics were discussed together with focus area 8 and are covered in detail in Section 8 (below).

NEEAPs – what actions are working and how do you know it?

As MS progress with EED implementation the focus area looked at examples of policies and measures (PaMs) for which evidence of an impact had been developed.

MS have implemented a wide mix of successful measure types across all sectors: economic, information, policy support, regulatory, research and voluntary. The most common are economic instruments. A broad range of methods are used to assess whether PaMs have worked. Calculated savings based on monitored data is the most common.

Defining methods for assessing the success of a policy is not uniformly done at the planning stage, nor are concrete targets always set. There does however, seem to be a significant advantage in having good measured data from the outset. It can lead to increased funding and greater recognition of the benefits, which can help make the case for a policy.

The Joint Research Centre (JRC) highlighted some strengths and weaknesses of NEEAP-3. Overall, the quality of NEEAPs was assessed to be improving. However, one conclusion was that more guidance is needed to establish a level playing field for how policy measures are reported and how energy savings are calculated.

Good practice example

Optimising Power @ Work - A large-scale behavioural change campaign, Ireland

A behavioural change campaign is being run in 270 buildings in the Irish public sector. The highlight of the programme is the use of detailed metering from the start of each project, the cost of which is around 5% of the energy spend in any given year. Measured results indicate a 20% saving, which must be diligently maintained if savings are to persist.

Article 4 building renovation strategies – good practices

MS delivered their EED Article 4 long-term building renovation strategies alongside their NEEAP-3. Updated strategies will be submitted to the Commission with the NEEAP-4 (April 2017).

One positive was that three-quarters of MS first renovation strategies addressed EED Article 4 requirements. However, there were differences between sections. Section (a) (national building stock) was best addressed, while section (d) (forward-looking perspective to guide investment decisions) was hardest. It must also be remembered that a strategy is not a result but a starting point. MS need a clear long-term road map for implementation.

MS could be stronger on future targets and measures, and R&D is often neglected. More analysis of annual retrofit rates would inform about MS plans and expectations. In general, a more holistic approach is suggested, so that all plans include cost-benefit analyses beyond investment and savings. The non-residential sector also needs better coverage. Existing and proposed M&V plans could be stronger, and separate sections could be interlinked, leading to more coherent strategies.

The World Green Building Council's Horizon 2020 Build Upon Project aims to help MS to deliver their updated building strategies by bringing together governments, businesses, NGOs and householders to enable the achievement of challenging renovation targets.

2nd EED NEEAPs for 2017 and the future of planning and reporting obligations

The EED requires MS to submit their 2nd EED NEEAP (NEEAP-4) by April 2017. The focus area discussed what is expected of these plans, as well as the status of the Energy Union Governance initiative related to the streamlining of planning and reporting obligations.

Following a JRC assessment of previous NEEAPs, several recommendations for the development of NEEAP-4 were made. These included: clarity around targets; updating Article 7 lists of policies and measures to highlight good practice; better integration of renovation strategies; better M&V proposals; highlighting what works well and what doesn't; and sharing savings calculation methodologies. A majority of MS say they will take work undertaken at the CA EED into account.

Regarding the objectives of the Energy Union Governance initiative, a National Energy and Climate Plan incorporating exiting obligations such as the NREAP and NEEAP templates, with new obligations on energy security, internal energy market and R&D, could help MS adapt to the 2030 targets, increase coherence and integration, and reduce the administrative burden. Further discussion and clarification is needed, however, on how the initiative will work in practice.

2 Public Sector - public buildings and public purchasing

Overview

The EED requires the public sector (henceforth PS) at national, regional and local level to fulfil an exemplary EE role. This covers both public buildings (Article 5) and public procurement (Article 6).

Article 5 permits two approaches to improving energy performance in public buildings: 'default' and 'alternative', plus various flexibility mechanisms. The default approach stipulated that, as from 2014, each MS shall ensure 3% of the total floor area of heated and/or cooled buildings owned and occupied by central government is renovated annually to meet at least the minimum energy performance requirements it set in applying the Energy Performance of Buildings Directive (EPBD). Under the alternative approach, MS may take other cost-effective measures to achieve at least the equivalent energy savings in eligible buildings. Such measures may include deep renovations and actions resulting in occupant behaviour change, and savings are reported annually.

The focus area first looked at general aspects of EE in public buildings and public procurement. In the second period the focus switched to specific topics that had received most interest from CA participants, such as exemptions to the implementation of Article 5(1); EE in historical buildings; the contribution of the PS to EED goals; and model contract and guidelines for energy performance contracts in the PS.

Public procurement is a powerful tool for public authorities to demonstrate their leading role in the EE process, embracing the whole economy and society. CA EED activities on the role of the PS also revealed that MS are trying to build on their current knowledge, experience and infrastructure.

Inventories of central government buildings

Most CA participants said their MS had insufficient knowledge and experience of Article 5 to guarantee smooth and secure implementation. Since creating an inventory is both complex and costly, the implementation process should be initiated, governed and monitored by central governments. The process of preparing inventories of government buildings differed across MS.

It was recommended that MS continue to develop individual approaches to reach the renovation objectives in Article 5. Another recommendation was that exemptions (Article 5(2)) should be examined at national level and presented as a win-win-opportunity enabling energy cost reduction.

Assessment of the cost-effectiveness of renovating public buildings should include broader social and environmental considerations, and since cost-effectiveness is important when choosing between 'default' and 'alternative' approaches, elaboration of this is needed at EU and national level. Methods for estimating savings potential under the 'alternative' approach also need elaborating.

Where possible, existing building stock databases should be used as a basis for the inventory required by Article 5. The scope of the inventory should also be enriched by providing additional data, e.g. reduction of CO2 emissions or energy intensity.

The work undertaken by central government should be promoted and communicated effectively to regional and local governments to stimulate action. MS should encourage municipalities and other public bodies to adopt integrated and sustainable EE plans with clear objectives, and to involve citizens in their development. The Covenant of Mayors was seen a good framework for this.

Those MS in which the EED and EPBD were implemented separately, or with only loose connections, were urged to consider closer co-operation to exploit synergies.

As the renovation obligations in Article 5 require substantial long-term funding, adequate financial resources were viewed as being of primary importance, and implementation should be carried out in close coordination with Article 4 implementation (national building renovation strategies).

The Alternative Approach in Article 5 in Practice

The 'Alternative' approach to cost-effective EE measures in public buildings is stipulated in EED Article 5(6). At the time of this topic, most MS were implementing Article 5, but most had faced delays and difficulties. Critical factors for successful implementation included political support, co-ordinated administration, human and financial resources and reliable data.

At the time of the discussion, most MS had not yet decided whether to adopt the 'default' or 'alternative' approach. The 'default' approach was considered less flexible. In MS where building energy performances are already high, deep renovation payback times may be unacceptably long, making the alternative option more attractive. In MS where average building energy performances are low, the default approach is preferable. Cost effectiveness is the deciding factor. Most CA participants understood the alternative approach, but more clarification of definitions was required. Finding methodology to measure savings from behavioural change was challenging.

The recommendation was that PS obligations in EED Article 5 should be further investigated, and best practices shared among MS. MS should try to implement different Directives in a coherent way to avoid duplication. Achieving this may require organisational changes. For its part, CA EED will seek further co-operation with CA EPBD to share knowledge and experiences.

Encouraging other bodies to follow central government exemplary role in building renovation

MS have an obligation under EED Article 5(7) to encourage public bodies at regional and local level to follow central government's exemplary role in building renovation.

At the time of the discussion (March 2014), around half of MS were already renovating public buildings. The main booster for this was the EPBD, but the EED was also a stimulus. The most common measures undertaken by central government (the so-called 'Top-Top' approach) were a combination of adopting an EE plan; establishing an energy management system; and using ESCOs and energy performance contracting (EPC). Similar measures were most common at regional or local level, where public bodies received encouragement from central governments to renovate public buildings (the 'Top-Down' or TD approach). Energy management systems, including energy audits, were completely lacking at local level.

Little conclusive information was available about what measures or approaches at regional or local level contribute to the fulfilling of Article 5 by central government (the 'Bottom-Up' approach). The Covenant of Mayors could potentially play a role.

While most CA participants said the measures in Article 5(7) offered a wide enough range of options, other measures could include: setting up mandatory performance standards; prompting behavioural changes through awareness and information campaigns for employees; and knowledge and experience sharing between central and local levels in both directions.

The recommendation was that MS should try to set up 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. The connections between the measures implemented at local level and the energy performance improvement of the governmental buildings should be investigated. Ways should also be found to overcome the weakness of the 'default' approach that may suffer from a lack of financial resources and the scarcity of technical skills in the PS. Projects launched by central governments should be fostered and developed by local stakeholders.

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

Article 5(2) exempts MS from setting or applying Article 5(1) requirements in certain categories: officially protected historical buildings; some buildings serving national defence purposes; and places of worship. Such buildings can offer high energy savings, but Article 5 implementation is affected by complex issues, including: energy consumption data availability and reliability; the view that the impact of interventions is limited; shared energy responsibility; and the level of building protection. EE is often not seen as a priority.

Barriers include: potential savings not substantially affecting previous consumption; heating, cooling and lighting plants must comply with national requirements and standards; fear of endangering a building's architectural or historical characteristics; lack of energy consumption data; investments are not seen as cost effective; little co-operation between ministries; and security concerns.

Ten MS opting for the default approach asked for exemptions under Article 5(2), primarily for defence buildings. Of the 16 that chose the alternative approach, 6 have undertaken or plan measures to implement Article 5 in these areas. The defence sector has the highest rate of interventions under both approaches, followed by historical buildings. Some buildings can access grants, but a decision on whether to undertake measures is left to the building operator.

Exempted buildings are not prevented from installing EE measures, and some MS NEEAPs envisage interventions. These are financed in various ways, including EU structural funds, national subsidies and

specific incentives. Positive experiences have been realised in many MS where an energy audit system is in place and the prescribed measures are not on the building envelope. The most-common measures cover heating systems and are part of general building renovations.

Despite barriers and constraints, the EE potential in these areas is significant and a thorough assessment is recommended. A deeper knowledge of actual energy consumption would attract government attention. Priority should be given to easy cost-effective measures, and all buildings should comply with national standards. Funds could come from each ministry assigned to building maintenance and the energy ministry, and allocated to PS building renovation. One approach could be legislation targeting both heritage and energy matters, considering the requirements of the EED, the EPBD and the RESD.

It must be remembered that despite their relatively low energy consumption, the three areas have a large impact on society and play an essential role in raising public awareness about EE.

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

EED Article 6 requires MS to ensure that central governments purchase only products, services and buildings with high EE performance, provided they are cost effective, economic, sustainable, technically suitable and follow competition rules. Moreover, regional and local public bodies are encouraged to follow this example. Specific requirements are laid down in Annex III.

Most MS consider the Article 6 requirement an important and well-established EE mechanism. The impact of the EED on new activities in energy-efficient public procurement (EEPP) is visible. Barriers to EEPP include: lack of practical know-how; lack of guidance and practical toolkits; and unclear assessment criteria. However, progress is being made and EEPP is gaining political and public support.

Central government actions should meet local needs by providing help without creating extra burdens. The importance of knowledge transfer down the administrative structure is well understood, but a weak central government position on EEPP makes it difficult to encourage local or regional bodies.

Most MS do not consider Public-Private Partnerships (PPP) in the context of EEPP, indicating that the public and private sectors fail to co-operate in EE projects. Awareness of sustainability criteria in public procurement is rising, but there are few examples of large-scale campaigns to inform interested parties. More time is needed for this transformation.

EEPP has the power to change the way we live, but Article 6 is hard to implement. Making EEPP a success requires binding obligation at EU level. This could mobilise resources and stimulate the transition towards a sustainable market. Policy makers should develop EEPP skills to foster demand-side policy and enable market power within the PS.

EE criteria should be introduced into public procurement rules under the broader term 'sustainability', as this is better received than 'energy efficiency'. EE criteria should be combined with other green criteria in national EEPP frameworks to gain acceptance and mitigate market distortion. Involving all interested stakeholders is essential.

As 'lowest cost' is the most-widely used criterion, 'cost-effectiveness' should be widened to include indirect benefits such as societal costs. The longer-term benefits should also be emphasised by considering full life-cycle costs. Moreover, as EEPP promotes certain products and services, but excludes others, anti-competitive market rules must be considered when setting criteria. Central governments have a leading role in creating suitable legislative frameworks and providing instruments such as model contracts and guidance.

Public sector in energy efficient transport services

Transport is critical in the transition to a low-emission economy. It accounts for 19% of global energy use and one-quarter of energy-related CO2 emissions. Transport is also vulnerable to supply disruptions and key to EU energy security. The fact that the EED does not directly address EE in transport is therefore a weakness. Issues related to transport are scattered throughout the Directive and can used to improve EE, but this requires attention.

Neither ongoing efforts to improve EE in other sectors nor current transport trends are sufficiently linked to EE improvement in transport. Transport has avoided being subject to stringent EE regulations, despite it having a significant role in total energy consumption. Small improvements in fuel efficiency can make a big difference to SME profitability. Yet improvements in transport reported in the NEEAPs are inadequate, and MS are unwilling to set ambitious targets.

Most vehicles and services procured by the PS are available across the EU and there is excellent potential for knowledge sharing. However, most MS do not know how much their PS transport energy use is. Not all MS were able to report on compliance with the Clean Vehicle Directive.

There is clearly a need to better define public transport procurement. One suggestion is 'all purchases of road transport vehicles, as covered by the public procurement directives and the public service regulation'. Good data demonstrating the benefits of EE may remove many barriers. There may be a role for better reference standards, and guidance and support to improve confidence across personnel in both the public and private sectors.

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

The aim of this topic was to investigate how MS have understood the requirement for the cost effectiveness of measures used in implementing EED Article 5, both in the default and alternative approach, when developing EE projects in public buildings.

Most MS chose the 'alternative' rather than the 'default' approach as more measures can be considered and higher savings achieved with lower investment costs, but there are no relevant differences related to financing sources.

Some MS recognised an association between cost effectiveness and cost-optimal methodology developed under the EPBD to fulfil EED requirements, but an inability to check cost effectiveness ex-post is a weak point. Checks are not carried out for reasons including lack of methodologies and standards, insufficient capacity, and lack of interest. The lack of evaluation is not seen as a major concern. Economic factors such as Internal Rate of Return (IRR) also often fail to reveal the benefits of PS building renovation. Improved evaluation methods are needed. Behavioural changes are probably the clearest examples of low investments with high savings potential.

The use of EPCs to support Article 5 implementation (default approach) is a challenge due to the long payback periods of EE measures in the building envelope. Some countries solve this by supporting the development of integrated EE projects in government buildings.

Recommendations include harmonisation between cost effectiveness (EED), cost benefit (EED) and cost optimal (EPBD); and information sharing to allow MS to develop more effective policies.

Contribution of the public sector to the EED goals - achievements and perspectives

The objective of this topic was to see whether and how EED goals for the PS have been implemented, and to review earlier work carried out by focus area 2 regarding implementing Articles 5 and 6, in order to identify what areas MS still struggle with and what they need. The aim was to improve knowledge, skills and awareness; to provide stronger links with other Directives; to provide stronger synergies between competent public bodies; and to provide easier access to funding opportunities for EE-related projects.

Several recommendations were proposed, including: combining future discussions with building renovation as stipulated by EED Article 4; better linking of activities at local level; more focus on practical cases and model solutions; more cooperation if beneficial to implementation; more practical implementation tools in the frameworks of other programmes, e.g. Horizon 2020; and clarification of relations between EED-inspired energy savings and the functioning of the EU ETS.

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

Articles 5 and 6 require the PS to play a leading and exemplary role in promoting EE, especially in public buildings and procurement. However, other Articles also address the PS, particularly 18 and 19 that refer to taking up energy services, ways to support the PS, and removing barriers deterring public bodies from Energy Performance Contracting (EPC) and third-party financing.

ESCO markets in the PS are growing in many MS. Most see EPCs and ESCOs as a solution to make buildings more EE, and EPCs in the PS have stimulated others in the commercial market. Around half of MS have developed Model Contracts, Guidelines, Minimum Requirements and/or Minimum Criteria for EPC in the PS at national level. The use of EPCs and ESCOs is far less developed at regional and local level.

Barriers to EPCs in the PS include lack of trust and transparency, lack of knowledge and experience, lack of capacity, slow tendering procedures, and lack of flexibility in contracts. To overcome these, raising awareness is important and support programmes are needed. Facilitators are crucial at all market stages. Qualification or certification will build confidence and communication. Accounting and tendering procedures and measurement and verification schemes must be simplified. Centralised contracting can also simplify EPC for the PS.

Good practice example

The Czech Republic has more than 150 EPCs, of which 90% in the PS.

These have achieved total energy savings worth Ð11 million per year. There are six ESCO facilitators at Enviros; their role is crucial for the contracting. They 'cost' Ð5,000–10,000, but they save a lot more in terms of both energy and costs.

3 Metering and billing, demand response and grid issues

Overview

There are many different metering and billing situations in the EU for the five different energy products (Electricity, Natural Gas, District Heating, Cooling, and Domestic Hot Water). There are also considerable variances in the way MS are implementing Articles 9, 10, 11 and 15 of the EED.

Article 9 relates to the metering of energy consumption, and Articles 10 and 11 require MS to create rules for billing information and the costs thereof. Article 15, 'Energy Transformation, Transmission and Distribution', is related to Annex XI and Annex XII. The main objectives of these are to maximise grid and infrastructure efficiency and promote demand response.

Metering and Billing - Current Status and Issues

Implementing the EED requirements for electricity metering and billing could be achieved in the short-term for almost all MS. But some CA participants thought the costs and technical difficulties regarding gas might bring unexpected challenges. Regarding DHC and DHW, there would be a high degree of difficulty if meters needed to be installed for all users. Neither the current feedback for final customers, nor the definition of 'technically possible, financially reasonable and proportionate', were considered satisfactory. MS need more details about these. Without agreement on standards, or criteria for consistent usage of these stipulations, some MS could use them as an excuse to avoid taking action. Therefore, the joint development of consistent standards or criteria is essential. There is also a need to assess what is 'technically possible, financially reasonable and proportionate' to avoid ineffective investments. Such assessments are often country specific and need to be addressed further.

Regarding DHC and DHW, local situations and views on implementing metering and billing stipulations varied between MS. More effort is needed to retrieve information from MS to construct a 'blueprint'. Individual meters in these cases should also consider both volume and temperature.

Although Article 11 says customer bills and billing information should be free of charge, most CA participants did not expect energy companies to act accordingly. Regulation may be necessary to prevent suppliers charging customers via other tariffs.

There is a clear link between smart meter roll-out and EED metering and billing stipulations. The roll out was having a direct impact on costs and benefits, and on technical aspects of stipulations in Articles 9, 10 and 11. As the roll out was developing rapidly, many MS found it challenging to define this impact exactly.

MS had different market models for informing end users about the advantages of smart meters, resulting in different tasks for different parties. Complications arose if the party providing information was not the same party installing the meter.

Billing and billing information

The primary difference between billing and billing information is that the former is exclusively financial. Billing information also provides a tool to final consumers and allows them to manage their consumption based on real readings, and it allows energy suppliers to advise consumers.

Independently of whether smart meters are installed, MS must ensure that bills are presented in clear and understandable terms to final energy users (Article 10). Annex VII adds that MS shall ensure that, where appropriate, bills include information on prices, actual consumption, a comparison of current consumption with consumption for the previous period, and contact information for organisations that can help reduce consumption. Billing can be a starting point for dialogue between energy suppliers and customers, and a structured system for this is needed.

The EED required MS to ensure (by 2014) that billing information is based on actual consumption and made available at least quarterly on request, or where customers have chosen electronic billing, otherwise twice a year. Article 10(1) says these minimum requirements need not be followed if it is not 'technically possible and economically justified'.

In the context of Article 9 and 10, it is simple to meet the Article 10 and Annex VII requirements in the electricity sector. However, in the gas sector there are many situations where billing on actual consumption is not 'technically possible and economically justified' because it is not possible to install individual meters, particularly where centralised distribution in a building or district exists.

It is important to remember that Article 11(1) requires MS to ensure that final customers receive all their bills and billing information free of charge.

Cost Effectiveness of Individual Metering/Billing

In Europe, heating and cooling accounts for almost half of final energy demand. Cooling, ventilation and refrigeration can account for 20% of a building's electricity consumption, depending on location. Where many buildings are heated and cooled from a central source, substantial EE improvements can be realised by making users aware of their usage, by introducing individual metering and billing. Many MS considered this a quick, cost-effective way to improve energy security. Articles 9 requires that, in multi-apartment and multi-purpose buildings with a central heating/cooling source, or supplied from a DH network or central source serving multiple buildings, individual meters shall be installed by December 31 2016. Articles 10 and 11 also require MS to create rules for billing information and costs of billing homogenisation.

Due to climate and political differences, characterising the situation of each MS is complex, and there is no single solution. Pilot cases involving individual meters for heating, cooling or hot water have shown savings averaging 20%. This was the result of changes in consumer habits.

Energy savings related to the installation of individual meters depend on the building and vary between MS. Some CA participants believed the benefits of individual meters were negative in their country, although they acknowledged the need to invest in control systems or other EE measures. In general, metering systems are most useful when installed prior to the identification and installation of EE measures. There is a clear need to legislate and invest in a combination of control systems and individual metering for heating, cooling and DHW.

A list of criteria and a set of guidelines to estimate the cost-effectiveness of individual metering and billing of heating, cooling and hot water consumption is currently being drafted by CA participants from the UK and Sweden. This will include the cost of educating end-users.

The overall focus of individual metering and billing for heating and hot water was on the residential sector in the EU, and was generally considered to have a significant impact. All CA participants believed they could learn from each other. This indicated a high need and a high potential for sharing information among MS.

Consumer engagement

Consumer acceptance is critical to the successful roll-out of smart meters. Articles 9 and 12 require appropriate advice and information to be given to customers at the time of installation. As the roll-out of smart meters is still in an early phase, only 6 MS have a consumer engagement strategy.

In most MS, the distribution system operator (DSO) is responsible for the roll-out of smart meters and the primary link to the consumer. DSOs are therefore strategically important for consumer engagement. In many MS they are legally obliged to inform consumers about EE during roll-out.

Once in place, interactive smart meters allow users to control and manage their consumption patterns, providing strong incentives for efficient use through behavioural change. Some studies estimated the average savings to be around 3% for electricity and 1.7% for gas, but studies where actual savings have been measured show them to be higher in practice: up to 6% for electricity and 7% for gas.

The Commission recommends 10 minimum functionalities of smart meters, and 16 MS say they are interested in retaining all these. Some will include additional functionalities.

Another important area is the development of energy services based on data from smart meters, privacy and protection of data gathered by smart meters is considered important in all MS. The Data Protection Impact Assessment (DPIA) Template for Smart Grid and Smart Metering Systems is an evaluation and decision-making tool that could help identify risks and provide guidance to help guarantee fundamental privacy rights during smart meter roll-out. The Commission foresees a two-year test phase to gather feedback on the template before it is fine-tuned.

Smart meters are an enabler for smart grid functionalities. However, explicit consent from the consumer is required under all circumstances. Consumer awareness and commitment should be an integrated element of all smart grid plans.

Service market development for smart electricity and gas metering

Constant feedback on energy use is key to leveraging the EE potential of smart meter data. Appliance manufacturers and software developers are expected to build additional functionality into meters. Hence it is important to know how to foster the emergence of the smart meter market.

The smart meter roll-out will change the way utilities and suppliers interact with customers and compete in the market. By investing in infrastructure and services they will improve data quality and feedback. Although most CA participants agreed smart metering will not increase energy costs, half think it will have a cost effect, although the investment may be recovered in a few years by consumer behavioural changes reducing bills.

Demand response and/or home automation services are the most common type of services already being implemented. Virtual power plants and dynamic tariffs have also been established. Most MS also see new business opportunities arising from smart meters, including smart appliance development and professional training.

Barriers to the development of a smart meter market include: lack of demand due to lack of knowledge about the benefits; lack of roll-out policy; data security issues; lack of funding; and a lack of professional structures. Market actors can see the value in having access to real-time energy consumption data, but so far little interest has been shown by consumers. It is therefore essential that smart meter applications are made user-friendlier.

(Smart) metering implementation state

MS are proceeding with the roll-out of meters, albeit at different paces. EED Article 9(3) requires that individual meters should be installed by December 31 2016, subject to technical and economic feasibility. The roll-out of gas meters is lagging relative to electricity meters. However, more than half of participants expect their MS will meet the target.

EED implementation regarding DHW and DHC is more challenging given the technical and physical necessity when installing individual meters to measure the consumption of single users.

Due to different MS opinions regarding which objectives and which benefits to customers should be considered when setting smart meters, there are different (legal) arrangements regarding minimum functionalities, privacy, product and market development, advice and meter reading management. Only the requirement to allow exporting of electricity into the grid from final

Good practice example

Heat2go, Slovakia

In Slovakia, the Heat2go monitoring system controls energy consumption and provides a complete overview of heat, water, electricity and gas consumption in multi-apartment and multi-purpose buildings. Measured data is transparent and established based on customer requirements. A web interface can export readings to tabular or graphical reports. Another important feature is the ability to create multiple levels of user, allowing some users only to view final consumption, while others with administrator permissions can act more effectively in real time on final consumption.

Article 15 – Measures undertaken and planned to enable and promote demand response

Article 15 is interrelated to Annex XI and Annex XII and aims to maximise grid and infrastructure efficiency and promote demand response (DR). This is a tariff or programme designed to prompt changes in the energy use of final customers, in response to changes in energy price over time, or as a result of incentive payments.

Demand-side management (DSM) has long been used in the power industry to reduce energy consumption and improve efficiency through the implementation of policies and methods to control demand. This is usually a task for power companies/utilities to reduce or remove peak load, and thus a TD approach. DR however implies a bottom-up (BU) approach: customers manage their own consumption to achieve efficiency gains and economic benefits.

Since electricity cannot be stored economically, grid circumstances and demand can change rapidly, and new infrastructure requires major investments, power grids must be planned years in advance to ensure they operate reliably in real time. DR offers the flexibility to address these challenges at relatively low cost, and pilots have shown that tailored stimuli result in consumers changing their behaviour and contributing to EE objectives. But DR can only succeed if developments in other parts of the energy value chain are considered. It is equally important to consider the market model. Enabling DR requires both the removal of existing barriers and the promotion of additional programmes. It is therefore important to plan the best way to take advantage of Article 15 implementation.

The THINK[1] project supported by the Commission has developed a report which provides a sophisticated overview of contract types and consumer preferences (risks). MS may use this to ensure that end users have choices regarding dynamic pricing and DR so they can fulfil their own needs with a customer-friendly offering.

Infrastructure efficiency potential assessment

This topic was developed in partnership with focus area 7 (Efficiency in Energy Supply). EED Article 15(2) requires all MS to assess the potential for improved EE in energy grids (electricity and gas), and to specify measures to improve efficiency.

Few MS have made a comprehensive assessment, but several have undertaken initiatives to improve grid efficiency. The identified potential for improvements was distributed across a range of measures such as grid re-enforcement, demand response, dynamic tariffs and improved access to distributed generators.

Annexes XI and XII provide guidance regarding EE requirements, but the framework is too open for interpretation regarding the methodology of undertaking assessments of EE potential. MS could benefit from sharing best practices, methodology etc. The CA can be a powerful tool here.

Regulation and incentives for access to distributed generators for heating or cooling could impact on the EE of the system. MS and stakeholders such as system operators must take an integrated view of entire energy systems to promote cost-effective mechanisms for improving efficiency. The promotion of relevant demand responses should also be considered.

Energy efficiency in network design and regulation

It is important to consider which measures will be implemented and what their impact will be on transport and energy distribution networks. Article 15(2b) introduces the concepts of operation and design of the gas and electricity infrastructure, while Annex XI and Annex XII aim at maximising infrastructure efficiency and promoting demand response.

Smart grids encompassing smart meters monitor and manage the transport of electricity from all generation sources to meet varying demand, thus maximising system reliability and stability, and minimising costs and environmental impact. An assessment was made of how to improve network infrastructure and reduce grid losses.

Most MS have identified at least one EE measure for improving electricity and gas networks. Equipment replacement solutions include EE transformers, expanding the capacity of network lines and increasing system voltage. Management solutions include switching off transformers, more direct network configuration, new DSM tools, and increased renewable energy penetration. Operational solutions include enhancing network stability through distributed generation, and switching out under-utilised plants.

1 www.eui.eu/Projects/THINK/Documents/Thinktopic/Topic11digital.pdf

4 Funds and financing for energy efficiency

Overview

EE measures and projects are financed in different ways. The PS, national and local governments, and the EU are continuously working on incentives to encourage EE investments.

EED Article 20 requires MS to stimulate the use of newly established or existing financing facilities for EE improvement measures, to maximise the benefits of multiple financing streams. The objective of this focus area is to address the conditions required to achieve this, and to facilitate the exchange of good practice between responsible national implementing bodies. Due to the horizontal nature of funds and financing, the focus area also looked at ways different provisions and measures in the EED can be supported and implemented from a financial perspective.

Involving banks in energy efficiency financing

CA participants expect the involvement of banks in EE financing to gain more attention across all sectors. In principle, EE financing should rely on market mechanisms, and public funds should only be used where market failure occurs. The EED however, requires MS to encourage the use of financing facilities to further EE objectives. Bank financing was therefore seen as critical for developing EE projects at scale, and the ability of MS to reach CO2 reduction targets will in part be reliant on the deployment of private as well as public finance.

Many banks have packages to support EE and other green investments, but many barriers prevent lenders providing financing and borrowers receiving funds. These include lack of awareness, long paybacks, mistrust, and risk perception. Different beneficiaries (households, SMEs, municipalities, etc.) also had different needs, and financial products must be adjusted accordingly.

Some barriers to bank financing have been addressed, but others such as high-risk perception and low attractiveness of EE financing, or the lack of reliability in the EE policy framework, have not. There is a growing need to understand and tackle these barriers at EU, national and local level. Solutions could include: Concerted Action on finance, bringing together public and private sector actors at national level; creating a market comparison website of EE options and products and associated finance; information exchange and collaboration between technical experts and financial experts; better use of EU funding opportunities (e.g. project development assistance projects); integrating EE into everyday decision making; harmonising existing EU databases and creating a detailed building performance database.

The role of governments is key, since public funding can leverage significant private investment. A pipeline of projects must be fostered to reach a bankable size of investment.

Financing renovation of 3% of central government buildings

EED Article 5 requires that, as from 2014, 3% of the total floor area of heated and/or cooled buildings owned and occupied by central government must be renovated each year, or equivalent energy savings achieved by an alternative approach. MS therefore need to identify sources and schemes to finance this.

Several EU-level financial sources are applicable: e.g. EEEF (European Energy Efficiency Fund), JESSICA (Joint European Support for Sustainable Investment in City Areas), and ELENA (European Local Energy Assistance). These, however, only provide limited support compared to the total amount needed. Other financing opportunities are EU Structural and Cohesion Funds, the use of which depends on the priorities of the MS, and financing options at national, regional and local level, both public and private. Grants are important, especially at national level.

Those MS able to estimate said that, as of August 2013, their rates of renovation and financing levels were below that needed to meet the 3% target. One third had no plans for financing their obligations, and two-thirds had not estimated the funds needed. Most expected funding to be a serious problem. Other problems included a lack of capacity to create a financial plan, and accounting difficulties.

Best Practice in leveraging market finance through public funds

Since costs for EE improvements may be recovered entirely or partially through verified energy bill savings over time, Energy Performance contracting (EPC) could be an interesting model for restricted PS budgets. More specifically, there are a variety of risk sharing and contractual models that could be applied to finance EE projects. Depending on the contract, the ownership of assets might vary and finance for the project could remain on or off balance sheet.

However, CA participants said the use of EPCs in the PS was hindered by several challenges, including: stringent EU purchasing rules; issues of public debt and the implementation of national and EU accounting rules related to the issue of on/off balance sheet accounting; concern about the use of EU funds on ESCO projects; difficulties in preparing an accurate emissions baseline; the high transaction costs for smaller projects; and a lack of trust between the PS and ESCOs, meaning risk sharing was not handled in the right way.

More generally, EE improvements required financing from a wide range of resources. EU and national funds as well as private capital were available to start an investment, but there was a mismatch in the demand and offer sides. EE retrofits also did not produce direct income streams, but instead created avoided costs. The energy and associated cost savings were often not considered a tangible revenue stream by financial institutions.

In planning a policy or programme it would be beneficial to combine funding sources with other instruments (regulations, tax schemes). Public finance is often needed to kick start the EE market, but the eventual goal is to shift towards market-based solutions. The exact structure of these, and options to retain project control or to outsource delivery and risk, are important considerations, and they rely on the involvement of finance managers and EE experts. Further awareness-raising of the available options, and institutional capacity building in the public and private sectors will be needed if increasing amounts of finance are to be diverted into EE projects.

Bank financing is critical, and many banks already have specific packages for households and companies to support EE investments or to complement national programmes. CA participants suggested that governments should seek greater involvement of banks across all sectors.

Selecting appropriate financial instruments to deploy 2014-2020 structural funds

The European Cohesion Policy for 2014-2020 stipulates that a minimum share of each region's European Regional Development Fund (ERDF) must be invested in measures supporting the shift to a low-carbon economy through dedicated financial instruments.

It is important for MS representatives to understand and assess the various financial mechanisms available, from grants and loans to EPCs, and to identify the one most appropriate for achieving higher quality, bankable projects with a broad range of sustainable energy measures. Interventions could be tailored to meet objectives and combine financing mechanisms, by considering the maturity of the local market, key players and their needs, as well as the project type and how the financial instruments best address the needs.

Facilitating access to private financing

Access to private investment is critical in financing wide-scale retrofit. Full engagement of the private sector is key to fulfilling long-term climate objectives and will support the overall reduction in energy consumption in the economy. To develop the for a fully sustainable EE market, sound support frameworks are needed.

The main obstacles to EE investment are related to market immaturity (lack of EPCs, scarcity of support schemes) and legal clarity (the absence of clear national EE strategies, problems with full transposition of EED regulations). One way to stimulate investment is to create a coherent, well-communicated market among financial institutions. This should not crowd out available financing sources, should use adequate levels of public and EU funds, and should increase private sector interest by reducing risk.

The ideal financial instrument system will encompass: an investment strategy based on ex-ante assessment; an institutional and contractual set-up between parties; capacity building and promotion; a proper system of accounting, reporting, monitoring and evaluation; a structured communication platform; additional financial resources; and precisely designed financial tools.

The Energy Efficiency Financial Institution Group (EEFIG - www.eefig.eu) makes several key recommendations to improve access to private financing.

Unlocking private finance for energy efficiency: perspectives from Member States and private financial institutions

Opportunities for EE financing have been realised by many Private Financial Institutions (PFIs), and products to support investments have been developed. These support a range of projects from the refurbishment of commercial and public buildings to financing DHC systems.

Good practice example

Financing by a commercial bank: BOS Bank, Poland

The Polish Bank of Environmental Protection (BOS) is a commercially run company. Its mission is: to support activities that contribute to the development of products and services in environmental protection; the development of an ecology-related goods and services market; and further encouragement of environment-friendly attitudes and initiatives. The bank performs provides specialised banking and financial services tailor-made for specific projects and beneficiaries in the areas of EE and RES. They include measures to make offers more attractive to investors and to increase the bankability of project proposals, such as preferential loans.

Several barriers limit opportunities for EE financing. These include: PFIs prefer short or medium-term financing (not corresponding to payback periods); insufficient creditworthiness of specific investor groups; lack of interest in environmental impact assessments; the relatively low value of some projects does not appeal to risk-averse investors and banks focused on 'low-hanging' fruit investments; and banking regulations.

CA participants identified the following potential solutions to overcome these barriers: standardisation of EE projects; creating a robust business case; third party verification; reducing investor risk; reduced transaction costs; and better Measurement, Reporting & Verification (MRV) and Quality Assurance.

Financing energy efficiency: dealing with State Aid rules

State Aid rules are designed to prevent public resources being used to selectively support organisations or businesses in ways that distort EU competition and free trade. The provision of European Structural and Investment Funds (ESIF) to support EE projects is subject to these requirements. Failure to properly address these rules may result in severe financial and political ramifications for both funder and recipient.

The need for MS to fully understand State Aid requirements is therefore critical in ensuring successful financing of EE projects. There are, however, some exceptions that have been established to simplify procedures for aid-granting authorities at national, regional and local level. The 'De minimis' exemption grants up to Ð200,000 subject to certain conditions.

To help MS deal with the complexity and administrative burden of State Aid rules, the CA recommends: information sharing between MS; better promotion of the State Aid information available on the e-State Aid Wiki platform, hosted by the Commission; including successful State Aid projects gathered from Commission monitoring reports on a platform to promote best practice and cross-working between MS; and identifying areas of intervention and real market needs when designing EE support programmes.

New and existing 'off the shelf' Financial Instruments

The Commission wants MS to double their ESIF investments through financial instruments such as loans, equity and guarantees. Consequently, the 2014-2020 ESIF framework provides more flexibility, clarity and possibilities for using financial instruments to help achieve the goals in the Investment Plan for Europe. The framework also introduced new standardised 'off-the-shelf' financial instruments (OTS FIs) with pre-defined terms and conditions designed for swift roll-out. One advantages in the context of EU funds is their compliance with ESIF and State Aid rules.

The initial scope for using OTS FIs focused on providing support for SMEs, energy and resource efficiency, and R&D and innovation. In July 2016, the scope was expanded, including a co-investment facility to provide funding to start-ups and SMEs and Urban Development Funds that support sustainable urban projects in public transport, EE or regeneration of urban areas. Details and specific regulations concerning OTS FI are outlined in Commission Implementing Regulation (EU) 2016/1157 of 11 July 2016 amending Implementing Regulation (EU) No 964/2014.

5 Energy services and ESCOs, energy auditing, solving administrative barriers

Overview

Energy audits evaluate the state of energy health of an organisation, service or system and identify potential savings. They are the first step in an energy services approach, and in energy planning. The EED encourages the use of audits by public authorities, sets an audit obligation for large enterprises, and presents minimum criteria.

Energy audits can be carried out by qualified and/or accredited experts. They may be carried out by in-house experts or energy auditors, provided the MS has a scheme in place to assure quality. Audits may be implemented and supervised by independent authorities under national legislation.

Energy auditors fall under the certification requirements for energy service providers in EED Article 16, which required MS - where they found the national level of technical competence, objectivity and reliability insufficient - to set up certification and/or accreditation schemes and/or equivalent qualification schemes by December 31 2014.

Among the other measures to promote energy efficiency, the EED requires the removal of regulatory and non-regulatory barriers deterring energy efficiency investments due to the "split incentives" between owner and the tenant, or among owners. It also requires the removal of barriers deterring public bodies from energy performance contracting (EPC) and third party financing (TPF). The public sector should be supported by providing model contracts for EPC and diffusing information on EPC best practices. To promote the market of energy services the EED requires the availability of up to date public lists and/or the development of quality labels for providers. To support the functioning of this market it also suggests that independent mechanisms to ensure an efficient handling of complaints are considered.

Energy audits: obligations, minimum criteria and qualification, accreditation and certification schemes

Three aspects of EED transposition are interconnected: qualification-accreditation-certification schemes for energy audits providers; minimum requirements for energy audits, taking into consideration Annex VI and Article 8(7); and the obligation under Article 8(4) for large enterprises to undergo an energy audit by December 2015, and every four years thereafter. This topic was discussed jointly with focus area 6 (Consumer information programmes, training and certification of professionals).

High-quality, cost-effective energy audits are widely available in the household, buildings and industrial sectors, but less common in other sectors. Most were carried out by qualified or accredited/certified experts. Various methods were used to assure audit quality: auditor training, guidelines, tools and templates were common, as were accreditation/certification procedures.

Annex VI minimum requirements for energy audits were widespread among MS, but less consideration was given to data storability and life-cycle cost analyses (LCAs), and there was little uptake of the suggestion in Article 8(7) regarding the feasibility of connecting to DHC.

CA participants stressed that useful, cost-effective tools (guidelines, templates for data collection and reporting, checklists) should be considered in setting up an audit programme. A database of energy audits is also useful for managing and monitoring programmes, and can build bank confidence in audit results, making funding available. Audits should also contain financial indicators (Discounted Payback, IRR) if those indicators are used by the decision maker, or if financing is required.

Incentives to carry out audits and implement suggestions are a key factor in engaging those affected. Other requirements linked to incentives should also be considered, such as simplified management systems. A website for collection of and information about audits

is a must. A dedicated web application offering other tools and information would also inform users. Web tools and databases are widely used and have proved to be very (cost) effective.

After the audit: encourage the implementation of the identified measures

Energy audits identify opportunities to improve EE with both hard and soft measures, but if no measures are implemented, the audit has no effect. Other actions can therefore be carried out after an audit to encourage implementation of the identified measures.

The results of energy audits are widely collected at national and local level. Some MS collect data on the savings generated by implemented recommendations, and many have programmes to stimulate uptake of audits and/or implement recommendations. In many support schemes the audit is part of a broader framework involving voluntary agreements, energy management systems, etc. But while more structured support schemes could deliver more, they are regarded as more complex to set up and manage, and they require more resources.

Energy audits could be made compulsory for large entities over certain thresholds. A number of different schemes/practices already exist, and more details on some are available as good practice factsheets and presentations on the CA EED website.

Encouraging SMEs to undergo energy audits and the subsequent implementation of the recommendations from these energy audits

Schemes to encourage SMEs to undergo energy audits are in place in half of MS, and are under discussion or will start soon in most others. Schemes to foster the implementation of audit recommendations are also in place in half of MS, but only a few others are discussing them.

Most existing initiatives are at national level, due to the more limited resources of local administrations, but new initiatives are split between national and local level. This could indicate a redistribution of roles and responsibilities and/or that a local actor is considered more effective in involving local SMEs.

Support mechanisms for energy audits in SMEs include guidelines/templates, registration/qualification of audit providers, free advice, and subsidies covering part of the costs. In some cases, these are linked to voluntary agreements. The implementation of recommendations is supported by tax credits, low-interest loans and guarantee funds, many of which are part of more general frameworks. But while these are among the main triggers to act, there is also need for assistance and facilitation through sector organisation, local agencies and engineers' networks

Current barriers are linked to major differences between SMEs that make them difficult to reach and involve, and the scarce resources SMEs can devote to EE, suggesting a need to simplify reporting obligations and bureaucracy. Currently the most common management systems for SMEs in MS are ISO50001, ISO14001 and EMAS. Experiences show that simplifying SME energy management systems using (web-based) tools is both possible and effective in improving EE implementation rates. Various approaches to reaching SMEs are also suggested, from general media communication to direct phone calls or even direct personal contact by energy experts/auditors. The latter can be very effective.

Transposition of energy audit obligation for large enterprises

All MS had made progress towards the transposition of EED Article 8 and Annex VI, which cover energy audit obligations for large enterprises, using a wide range of approaches that reflect national circumstances. Some developed more detailed planning, consultation documents and draft legislation, while others indicated they would do so. Several MS planned to adapt existing incentive/obligation schemes.

Options considered in fulfilling the obligation included allowing large enterprises to comply via a certified Energy Management System. Where the qualification and/or quality control of energy auditors was left to the market, such systems gave more guarantees. Another option was to use voluntary agreements. However, these required a more complex framework and were not always welcomed by the boards of enterprises as there was a risk the benefits would not be realised, making them difficult to justify to shareholders. Nevertheless, MS agreed it was important to involve the enterprise's board after the energy audit to promote the implementation of recommendations.

Several MS were already providing financial support for companies to undertake energy audits. However, in most cases this will be affected by the energy audit obligation, which makes audits obligatory for large enterprises. However, it will be possible to subsidise large enterprises to undertake more frequent (non-mandatory) audits and implement recommendations. Measures considered to ensure enterprises carry out regular audits include penalties, considered a necessary backstop to ensure compliance with Article 8.

There was a wide range of approaches to energy audits. Most MS have no plan to go beyond Annex VI requirements. Some CA participants said more detailed guidance on audits might be provided, while others argued that businesses should have greater discretion. However, where MS did not specify detailed requirements, this necessitated a greater focus on support tools and 'auditing the auditors' to ensure audits both met EED standards and added value to business. In several MS, audits must meet EN 16247-1 and/or ISO 50002 standards.

Regarding the boundaries of energy audits, a certain minimum energy consumption threshold could be identified and used to focus audits, but there was no consensus among CA participants on whether this should be specified and set in law. Uncertainties also remained on how to deal with external services (heating, transport), since considering them could lead to double counting. One approach could be to assign energy consumption according to who pays.

Having a suitable qualification for energy auditors is essential for ensuring high quality audits. There are, however, different approaches, and representatives of multinational enterprises have expressed concerns about internal auditors having to be recognised/certified in different MS. The EED contains no specific provision on the qualification of internal auditors – it is up to MS.

Many MS are concerned that there may not be enough skilled auditors to meet demand. There was also thought to be a need for auditors to have the skills to 'sell' cost-effective recommendations to businesses in addition to identifying them.

The diversity in transposition of the obligation between MS presents a challenge to ensure businesses are not put at a competitive disadvantage. But the exchange of information presents MS with the opportunity to see what works and to learn from others.

Energy audit obligation for multinational and multisite enterprises

Enterprises with many sites within the same MS and multinational enterprises with premises within and/or outside Europe highlight specific issues in fulfilling the Article 8 energy audit obligation.

There are big differences between MS in how they are implementing the obligation, including how they interpret 'obliged organisation'. The obligation is applied to different areas of energy consumption and different sites within one MS, and there are different approaches regarding enterprises with partner sites outside the MS/EU. In the case of rented properties, the obligation can refer to the tenant, the owner, or the person paying the energy bills. Exemptions are mainly linked to non-economic activities or to consumption being lower than defined qualification thresholds. Different energy or environmental management systems are considered an alternative to compliance with the obligation in almost all MS.

Multinational enterprises have to face several different legal frameworks across the EU market. A more standardised approach would be useful, but is not easy to design. Examples from some MS might help others adapt and adopt some practices. Another way to harmonise and simplify the process and make it more useful would be to have an energy consumption threshold definition of obliged organisation.

It was widely agreed that it would be particularly useful to develop common guidelines and legal requirements for aviation and maritime transport to improve the adoption of the energy audit obligation in these sectors. Commission guidelines would be welcome, but should be discussed with relevant stakeholders.

Cross-border recognition of energy auditors is another problem. Mutual recognition is theoretically possible but not simple, due to differences in minimum requirements (education, experience), specialisations (buildings, processes, transport, or all three), and even the nature of the auditor (a physical person, a legal entity, or both).

A fixed deadline for compulsory audits also creates a peak in demand. A different approach should be considered both to maintaining the demand for energy audits within MS and/or allowing auditors from abroad to be present to make the market more competitive.

The kaleidoscope of approaches to all aspects of the energy audit obligation makes creating a level playing field difficult.

Results of energy audit obligation

By the second half of 2016 the first round of compulsory energy audits in non-SMEs had ended in most MS and it was possible to discuss some results and issues, particularly with a view to exploiting the data and preparing the next round of audits. Because of the widely different transposition of the obligation discussed above, various forms of flexibility have been introduced, delaying deadlines or suspending the penalties for a transitional period.

Information gathered during energy audits is usually collected as a full report or a summary. Only a few MS have a working online platform to register enterprises and upload data. Data from audits are widely considered useful, although some MS have yet to decide how best to use them.

Transposition of the energy audit obligation required considerable effort for all MS, even those with supporting schemes in place. The main challenges identified included the setting up of the framework, communicating the obligation to the obliged enterprises, and the availability of auditors. Another issue was the compressed timeline – some audits are still not complete.

Implementation has influenced the energy audit model, template and guidelines. The model has become

more standardised, albeit mainly within individual MS. The level and requirements of audits still varies considerably. At country level the availability of the list of obliged enterprises was the area where MS see most room for improvement.

Good practice example

ENEA, Italy

ENEA undertook the energy audit obligation in Italy involving large and energy-intensive enterprises. Some 95% of energy-intensive industries, identifiable on an official list, fulfilled their obligation, but the rate for other non-SMEs was lower. In addition to a full audit report, an Excel file displayed the main data. All enterprises with a management system or undergoing energy audits must report savings every year. Data analysis is now underway to create sector-specific guidelines.

A revision of the definition of 'obliged enterprises' in Article 8 is recommended, since the current one makes it difficult for MS to make a comprehensive list and guarantee the cost effectiveness of an audit without introducing flexibility. A definition considering energy consumption would make it easier to identify obliged parties, communicate with them, and safeguard cost effectiveness.

More shared approaches to the audit obligation could be beneficial. A starting point for this could be the development of common guidelines for international transport, particularly aviation.

A shared approach to energy audits and audit provider requirements could facilitate mutual recognition of audit providers. The number and qualification of energy audit providers are key to guaranteeing competitiveness and cost effectiveness. This would also create a level playing field for multinationals.

Data from energy audit/management systems can be exploited in several ways. Collection of energy savings data between the four-year audit period, as various MS plan, could help to improve audit framework and the accounting of savings at MS level. A common approach for data collection and handling could be a topic for future discussions.

Split incentives

Split incentives in the building sector, between different parties bound by the terms of a contract, is the split of motivations prompting those parties to pursue different objectives. This usually arises when one party is responsible for investment costs while another takes advantage of the savings, such as where a tenant pays the energy bill, so the owner has no interest in investing.

Many MS gave information regarding split incentives in their NEEAP-3. They are considered a barrier to EE in residential and private buildings, but the situation varies across MS due to building type, weather, etc. The problem is less in non-residential buildings. Measures to tackle split incentives are in place in two-thirds of MS, and can be divided into regulatory/legislative measures and support measures such as tools, model contracts, etc.

The issue of split incentives is complex and must be addressed through a combination of linked measures. Solutions must be tailored to the specific conditions.

One solution is for EPCs to include the possibility to increase rent, dur to the tenant's lower energy bills. To make this smoother a voluntary agreement between owner and tenant associations should guarantee that total expenditure will not rise. A regulatory framework is also a prerequisite for energy services, third-party financing, and to prevent a tenant (or landlord) refusing to implement EE measures.

In multi-family houses the decision process is critical, and can preclude the implementation of measures if incentives, funds and/or performance contracts are present. This issue must be addressed with communication and decision-making support and tools, model conventions and tailored financing.

For the non-residential PS, and split incentives within organisations, an all-inclusive rent and life-cycle costing approach should be considered. If compatible with legislation and accounting rules, an internal fund could be created fed by revenue from savings from the implemented measures.

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

EED Articles 18 and 19 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 EPCs and third-party financing.

Model EPCs have been established in the national PS in half of MS, but there has been less development at regional/local level. Ten MS have also established contract guidelines at national level. Reasons for developing these include: the growing EPC market and the need for standardised guidelines or minimum criteria to be covered by ESCO contracts; and encouragement of using ESCO and EPC concepts in large building where procurement rules and competition makes ESCO tendering challenging.

Model contracts are either part of regulations or published independently without obligation. The most common concepts are collecting contracts and information from the existing national market, taking experience from abroad, and involving experts. Around 1/3 of MS have included all EED Annex XIII minimum requirements in their model EPC.

Information on best practices for EPCs in the PS is mostly provided in the frame of wider EE information, to be used in both the public and private sector. Successful ESCO/EPC projects are publicised through journals, seminars and websites.

A wide range of measures can foster the diffusion of EPCs in the PS. These include: information and awareness of all involved parties; sector-specific training and communication; consultancy support in developing regulatory frameworks; bundling building sets in a single contract, or smaller similar contracts within a bigger tender to reduce risk for ESCOs; and online systems. Centralised contracting can simplify EPC for the PS.

Nevertheless, the diffusion of EPCs is below potential. Further solutions could be the clarification of balance/off balance sheet treatment, and simplification of accounting and tender procedures. In more mature markets, the main barriers are legislative. A more standardised approach can help grow the market, by simplifying transactions and lowering costs. Since every case (or building) is different there must be flexibility to adapt to each situation.

Lists of energy service providers, quality labels and handling of complaints

EED Article 18 requires MS to promote the energy services market by developing quality labels or making publicly available lists of qualified/certified energy service providers. Lists are widely used among MS, mostly for providers of building energy performance certificates but also for audit and service providers. Some MS consider ESCOs only as service providers offering EPCs; others have a broader definition.

Lists of service providers are considered very useful as they help customers understand what the market offers and who to contact. Moreover, they usually guarantee that the actors have a track record and/or are qualified/certified. In most MS, lists or ESCOs and/or labels are publicly available.

Labels are generally perceived as expensive (potentially limiting the participation of start-up companies) and so are more appropriate for a mature/competitive market. Lists can be free or require a fee from the listed, but what the list offers determines its success. Most lists have mandatory (experience, qualifications) and voluntary criteria (competences in performance contracting, financing), and there is usually some form of check on the provider's qualifications. Some lists are based on self-regulation. Not all have filter/search functions.

An independent mechanism – usually court or arbitration - to handle complaints and settle disputes arising from energy services is present in one third of MS, but in other MS there is some freedom for contractual parties to agree how to resolve issues.

The different approaches present in almost all the investigated aspects of lists/labels is linked to differences of ESCO service, size, customers, etc., and to country-specific conditions.

Lists are an important communication/marketing channel, so it is important to consider accessibility and usability. Lists build transparency in the market, and in some cases set quality standards. The signing of a code of conduct to join a list can help build trust and facilitate marketing. Filtering/search options are a must-have feature to enhance accessibility.

Experience/references have a major role in market-based lists and are important for all lists in general. Showing only recent experience by limiting the timespan with a filter function can help demonstrate that providers are still active and force them to update their details. Keeping lists up to date is important and a key challenge. One solution could be to require an annual validation, and removing providers if this is not performed.

There are often several lists for different providers hosted in different places. To simplify their use, the creation of a website should be considered, hosted by an institutional body, containing all lists of energy-related providers, or at least a webpage with links.

Complaints need a quick and accessible mechanism so as not to interrupt energy services. Some MS have successfully used ombudsmen or other forms of dispute resolution with low costs and short response times for complaints from small users. But these mechanisms have limitations on the maximum monetary amount, making them not suitable to larger contracts. In such cases, more extensive provisions for dispute resolution must be included. Facilitators can have a role in this. If both parties agree the facilitator can be the one involved in the early phase of the contract - thus knowing the project - or someone chosen by a third party.

6 Consumer information programmes, training and certification of professionals

Overview

MS use many activities, organisations and channels to inform and advise citizens and organisations about energy usage and EE investments, all of which may have an impact. Information and communication is a vital aspect of promoting EE. However, this needs to be done accurately, in dialogue with local and regional authorities, market actors and others. It is certainly not easy to inform in a way that citizens and companies understand and can translate into action.

MS can learn from each other about empowering consumers (both citizens and small companies) to make use of EE technologies and to change their energy behaviour. We also need professionals that are reliable and competent, if we want the market to move towards EE. Both providers of energy services and energy audits as well as installers of energy-related building elements have important roles to play. The aim is to sustain and make available qualification and/or certification schemes, training programmes and other incentives for these groups of professionals, in order to increase their credibility.

The general recommendations and conclusions reached within this focus area have been shared with other CAs and other organisations, without disclosing details of individual MS that fall under the confidentiality agreement.

Several issues were identified by CA participants as of the highest priority for future cooperation: how to change consumer behaviour through ICT; transport management; prosumers; and verification of soft measures. This will serve as input for the forthcoming CA EED 2 project.

Energy audits: obligations, minimum criteria and qualification, accreditation and certification schemes

CA participants discussed the issue of how to guarantee the quality of energy audits. As there are close links with the requirement for large enterprises to undergo regular audits, this topic was covered jointly with focus area 5: 'Energy services and ESCOs, energy auditing, solving administrative barriers' and is covered above.

Most audits are carried out by qualified or accredited/certified experts. Audit quality is guaranteed through a range of measures including auditor training, guidelines, tools and templates for auditors, random checks and sanctions for non-conformity. Most MS have a programme for qualification and/or certification. For those MS planning to launch a scheme, there is a need for new or improved systems for training energy auditors, especially in the building and transport sectors.

Policies and national strategies to promote behavioural change

EED Article 12 requires MS to take appropriate measures to promote and facilitate an efficient use of energy by small consumers, including domestic customers. Most CA participants said their MS plan to implement the first option in this Article (a range of instruments and policies to promote behavioural change), and to prolong existing measures and programmes. Some saw a need for a new national strategy to fulfil the requirements. Information measures, subsidies and fiscal incentives were the most common planned measures. There are many examples of existing EE measures, indicating that MS are ambitious with reaching their 2020 goals.

Achieving behavioural change requires deep insight into consumers. It is therefore essential to communicate the right message. While designing an information campaign, messages must reflect the target group. Where there is a lack of interest in energy consumption in that group, the message should provoke curiosity rather than guilt.

While few MS planned to implement Article 12 option b) (ways and means to engage consumers and consumer organisations during the roll-out of smart meters), many may do so in future. Those that do should follow the example of countries that have already chosen to link information measures to the smart meter roll-out, and plan for communication at the same time.

Designing measures for behavioural change

EED Articles 12 and 17 require MS to take appropriate measures to promote and facilitate an efficient use of energy by small energy customers, including domestic customers. Furthermore, MS shall, with the participation of stakeholders, including local and regional authorities, promote suitable information, awareness-raising and training initiatives to inform citizens of the benefits and practicalities of EE improvement measures.

Recognising the importance of social context and social practices is a must to successfully design and implement behavioural measures. Different approaches (sociological, physiological, economical) may be needed, and the planning phase is crucial. It is important to understand the whole system, what the problem is, and which factors make things happen. It is also important to keep the message simple, and to clearly identify the target group and what their motivating factors are. When designing a measure for behavioural change, it is important to identify and recognise other benefits of EE, such as health, well-being, convenience, etc.

One concern related to the implementation of the EED, was how to measure savings from measures for behavioural change in energy units. This was covered in Chapter 3, above.

Only 8 MS had qualitatively evaluated measures for behavioural change. This was seen as an important task for the continued success of different measures and programmes, but was not easy, Evaluation is a continuous learning process and sharing experiences is important.

Availability of qualification, accreditation and certification schemes

EED Article 16 requires MS, where they consider the national level of technical competence, objectivity and reliability to be insufficient, to ensure that certification, accreditation or equivalent qualification schemes are available for energy service providers, auditors, managers and installers of energy-related building elements.

Most MS consider the national level of competence, objectivity and reliability to be sufficient for most categories of energy professionals. Several have qualification/accreditation and certification schemes in place, the most common being for energy auditors.

Personal certification is more common than company certification. For energy services providers, it is often the company that is certified. Most MS who have or are planning a scheme are also planning to inform citizens about their availability.

Seven MS currently cooperate (or plan to) with other MS regarding the recognition of accreditation schemes. Cross-border collaboration is most important for small countries. The first step in collaboration is understanding the requirements in other MS.

To raise consumer awareness about energy audits, information campaigns must be adapted to different target groups. A register of experts will enable consumers to find certified/accredited/qualified experts.

If certification is mandatory to perform certain tasks, this is clearly a strong incentive for energy professionals to become certified. Another incentive is making access to financial incentives such as soft loans dependant on certification. It is also important to identify areas in which there is most need for training energy service providers.

There is a need for a coordinated central national contact point for certification, because requirements are often found in different Directives (including the EPBD and RED) and typically handled by different ministries. This will avoid energy expert who could cover several professions having to meet overlapping requirements.

Smart meters and consumer engagement

This topic was covered jointly with focus area 3 (Metering and billing, demand response and grid issues) and is reported above.

EED Art. 17 Information to banks and financial institutions

EE financing is essential for EED implementation and the achievement of energy and climate goals. The Commission estimates investment worth Đ100 billion per year is needed, mostly from the private sector. However, EU funding sources can help trigger projects, and these represent a significant proportion of the public funding available in several MS.

In order to use EU funds efficiently, financial instruments are needed. It is important that banks and financial institutions take part in developing these. More discussion at national level between policy makers and banks would help both parties achieve their goals. There is already dialogue in many MS regarding Article 4. However, this could benefit from being more structured and more oriented towards other parts of the EED.

A major barrier to EE financing is a lack of proper communication, as energy experts and financing experts use different language and terminology. The Energy Efficiency Financial Institutions Group (EEFIG) is bridging that gap by gathered experts from both fields at EU level. Other barriers are weak marketing of financial instruments and a lack of awareness of the options. EE investments are also often small-scale and difficult to compare, meaning investors cannot always identify the business case. The lack of standardised performance data and lack of commonly accepted risk assessment methods mean investments are often regarded as high risk, even when the actual risks are low.

Solutions to overcoming financing barriers include: aggregating investments to reduce transaction costs; project development assistance to de-risk investments; standardisation and benchmarking; and innovative instruments and new business models. Further exchange at national and EU level would help banks and policy makers overcome many barriers. Communication could be improved by: showing concrete examples; making EE a priority; showing that supporting EE can enhance a bank's image; making the bank aware of its role; and working with certified auditors.

Addressing energy poverty within the context of the EED

Energy poverty, where a household cannot afford to heat or cool their dwelling due to a combination of low income, poor building performance and high energy prices, affects most MS. The number of energy poor households is estimated in different ways across the EU, indicating there is no common understanding. Nevertheless, the inability to adequately heat homes can impact on the health, wellbeing and social inclusion of the energy poor. CA participants discussed way of addressing this using the EED provisions.

The responsibility to tackle energy poverty is clearly defined in most MS, but often spread over several actors at national, regional and local level. Coordination of initiatives is therefore important.

The EED can be instrumental in fighting energy poverty as it addresses the energy performance of buildings and appliances, and consumer awareness, and can help promote easy-to-implement energy saving measures. The Directive could also be used more strategically to identify the households most at risk and to incentivise energy poor households who lack the financial means to invest in EE renovation or products.

Measure that individual MS could implement to alleviate energy poverty include: social tariffs for electricity; basic energy audits for homes; minimum roof insulation standards and enforcement for landlords; standard EE improvement packages; national action plans; public funding through grants and cheap loans; and better communication of best practice.

Empowering energy consumers – the role of the EED

EED Articles 12 and 17 cover information, awareness raising and behavioural change. The EED requires MS to promote efficient energy use among small energy consumers.

Barriers to EE in households, SMEs and other organisations are often related to lack of knowledge, interest, time or resources. Energy services such as energy audits are important for increasing knowledge and awareness. For households and SMEs it is important that professional service providers are easy to find.

In the transport sector, EE policies can act at different levels, from avoiding travel altogether, through shifting to more efficient transport, to improving the EE of vehicles. It is therefore important not to focus solely on vehicle efficiency. Examples of EE policies include: vehicle fuel economy labels; free parking and access to express lanes for electric vehicles; urban planning tools to change consumer preferences; improving public transport; eco-driving programmes; better ICT; and dynamic road and parking pricing.

Good practice example

Night Hawks

The EU's Night Hawks project aims to identify easy-to-realise EE potential through energy checks during closing time, using night walks: a check on a building (shop, SME, library, school, etc.) after hours, when it is unoccupied. One target group is shopping centres, where potential energy savings from 5% to 50% have been identified, and where 10% savings can be achieved through low cost or free measures. Around 4.5 TWh could be saved across Europe. One concrete example is the Regent Arcade shopping centre in Cheltenham, UK, where estimated annual cost savings of around Đ20,000 were identified. The project also includes training and capacity building. The method of performing Night Walks is easily replicated in other kinds of businesses.

7 Efficiency in energy supply

Overview

EED Article 14 aims to encourage the identification of potential measures for cost-effective EE and foster delivery of these measures. It encourages exploration of the use of high-efficiency CHP and DHC, and addresses other EE heating and cooling supply options. Article 15 and Annex XI cover grid and infrastructure efficiency and promoting demand response.

Energy sector regulation varies widely across MS, as do policy frameworks and climatic conditions. There is therefore significant potential for the exchange of experiences where CA could be a framework for successful policy implementation. The objectives of this focus area were to gain a common understanding of Articles 14 and 15; to exchange opportunities, barriers and best practice to support implementation; and to make existing tools and methods available to all.

Efficiency in energy supply (March 2013)

There are many challenges and opportunities involved in the implementation of Articles 14 and 15. There are large variations in heating and cooling demand between MS, due to climatic conditions and building design, and conflicting interests with the EPBD and the RES.

Although CA participants said they may profit from exchanging experiences in the promotion of DHC and CHP, they agreed they must follow paths reflecting individual circumstances. Consumer protection and strict heat price regulation in some MS prevent them generating sufficient revenue to attract investment from efficient DHC and CHP. And since CHP plants need to run at base load capacity in DH systems to be financially viable, this was a challenge in areas with short heating seasons and/or large renewable energy shares.

Promotion of CHP and DHC through public funding and other incentive schemes has also been hampered by EU State Aid rules. Moreover, CA participants said there was a strong need for the dissemination of existing tools, methods and data, for heating and cooling mapping, and for potential assessment. There was also a need to disseminate relevant information regarding experiences at MS level of cost-effective support schemes.

The implementation framework should cover the entire energy sector to ensure that high-efficiency CHP and DHC is promoted in the most cost-effective way. Systems must be carefully planned against individual heating and cooling systems to minimise double supply, and should be promoted via mechanisms aligned with national energy policies, as well as broader national policy and the organisational set-up of the sector.

Key sponsors should be identified, such as one ministry to ensure proper coordination of efforts. But stakeholders from ministries, the power sector, and other sectors should all be involved in the implementation process.

Tools, guidelines, methods and management of the comprehensive assessment

EED Article 14(1) requires MS to assess the potential for CHP and district energy. While some have made progress in implementing Articles 14 and 15, most CA participants said their greatest challenge was meeting deadlines. Other barriers were a lack of resources and uncertainty about the process. Tools and methods for undertaking comprehensive assessments and cost-benefit analyses existed, but they were not immediately transferable across MS due to language and other issues. Several participants expressed concerns about data availability. Regarding district cooling, there did seem to be scope for sharing experiences between MS.

The context for implementing Articles 14 and 15 also varied across MS. Not all MS had implemented a large share of their CHP and DH potential and had regulatory and administrative frameworks in place. MS with a significant existing DH and CHP sector will have to assess the potential for keeping existing customers connected while increasing EE.

Several MS planned to outsource at least part of the work of undertaking the comprehensive assessment. Whichever approach is chosen, it is important to make effective use of existing experience, tools and methods across MS.

Efficiency in Energy Supply (March 2014)

A comprehensive assessment of CHP and DHC potential can provide a basis for developing efficient and cost-effective ways to implement EE policy. It may also open the market through the identification of technical potential, and economic and financial viability potential for increased use of CHP and DHC.

The level of comprehensive assessment implementation varied significantly, with most MS still in the early stages at the time of the meeting. Methods also differed. Some MS had applied analytical tools to assess energy demand, while others used surveys or meter readings. Many MS faced major challenges with lack of data and methodological clarity. Most said the most urgent issue was developing the administrative framework for installation-level cost-benefit analysis (CBA). The (end of 2015) deadline for the comprehensive assessment was also considered a challenge. One tool for CBA analysis was under development by the Joint Research Centre for DG ENER.

Since climatic, political and regulatory differences mean contexts differ significantly between MS across the EU, the key challenges must be addressed regionally. MS in the southern EU only see limited potential for CHP and DHC, and assessment was hampered by a lack of data. Eastern European MS had precise data from existing systems, but other issues remained. Most other MS had GIS-based mapping tools in place.

Many MS faced a decline in electricity production from CHP following an increase in gas prices and a reduction in electricity prices. Also, increased electricity production from RES may reduce the future economic viability potential for CHP. The main MS focus at the time of this topic was on the promotion of biomass-based CHP.

Mapping of demand and supply for cooling and heating

Comprehensive mapping of demand and supply options for heating and cooling is the foundation for any assessment of the potential for increased efficiency. The availability of energy demand data varies considerably across MS. The best coverage is heating demand in residential buildings. Industrial demand and cooling demand are more challenging. Solar and biomass resource maps are available in some MS, but information regarding other thermal energy sources such as waste industrial heat is generally lacking.

MS apply different methodologies for assessing heat demand and mapping geographical distribution. Few had experience in mapping heating/cooling demand and waste heat, but most plan to outsource some parts of this to partners outside government. The role of national authorities is therefore primarily to define the tasks and set the requirements for the tendered activities.

Huge untapped potential for efficient heating and cooling in EU

In February 2016 the Commission published the EU Strategy on Heating and Cooling, its first comprehensive plan to tackle the energy used to heat and cool Europe's buildings. The communication is a strategy (not an action plan) aiming to raise awareness of the key issues, facts and options for follow-up actions to increase the uptake of efficient heating and cooling in EU.

Several good practice examples have demonstrated that there is huge potential for efficient heating and cooling in the EU. These include: Heat Roadmap Europe (www.heatroadmap.eu); the STRATEGO project (http://stratego-project.eu); the Geo-DH project assessing geothermal heat potential for DH (geodh.eu); the cost-benefit analysis of the SDHPlus project for Solar DH (www.solar-district-heating.eu); the RESCUE project for renewable cooling (www.rescue-project.eu); CELSIUS (see BOX); and the progRESsHEAT project for local district energy (www.progressheat.eu). The results of EU-financed projects could contribute to the successful implementation of the CA.

Good practice example

The CELSIUS project

Led by Gothenburg, Sweden, the CELSIUS project links the spectrum of planning, implementing and optimising new and existing smart infrastructure solutions for heating and cooling. The aim is to help the target cities (Gothenburg, London, Rotterdam, Cologne and Genoa) be more EE and promote the role of DH in using excess city heat. Demonstrated solutions include heat recovery from sewerage systems, use of buildings for short-term storage in DH networks, and waste heat from industry. The project offers support through workshops, and a toolbox was developed to assist decision makers. Over 50 other EU cities also benefit from CELSIUS support: www.celsiuscity.eu.

Socio-economic cost-benefit analysis

The fundamental purpose of carrying out a socio-economic CBA for a project is to enable the prioritisation of scarce resources within society at national level. To establish sensible prioritisation across sectors, assessments must be made based on uniform and transparent preconditions, assumptions and methods. Special issues and non-monetised impacts need to be described. This process can improve the basis for political decision-making, although it will always be a balance of economic and non-economic considerations, including social and ethical matters.

While financial CBA is widely used as an indicator of project and technology viability, few MS apply socio-economic CBA for policy development. EE or RES projects are, however, often more viable from a socio-economic than from a financial perspective, because the socio-economic discount rate is lower than the financial discount rate. Socio-economic CBAs also take account of external benefits such as carbon emissions. In most cases the external costs of conventional technologies are higher than those of efficient technologies.

Policy and measures

Political and regulatory frameworks regarding DHC and CHP vary considerably across MS. These variations are reflected in the policies applied to promote efficient supply of energy. Several MS provide support to CHP and DHC schemes.

Survey results indicate that CA implementation in half of MS has contributed to a better understanding of the potential for using waste heat. The highest potential use is in industry, but there is also potential for power generation. The waste heat market is becoming more active in many MS, and some consider it an eligible measure under EE obligation schemes. Around half of MS think waste heat utilisation and renewable energy should be treated equally.

8 Energy efficiency obligation schemes, monitoring impacts of eligible measures

Overview

EED Article 7 requires MS to set up an EE obligation scheme for energy suppliers and/or distributors that achieves yearly end-use energy savings of 1.5%. As an alternative, MS can implement other policy measures that lead to the same savings. Combinations of both options are permissible. Examples of acceptable alternative measures mentioned in Article 7(9) include energy and CO2 taxes that have the effect of reducing end-use energy consumption. MS must also set up a monitoring and verification system to ensure savings are correctly accounted for.

Article 7 is clearly challenging to implement, but the CA has helped MS identify their options and learn from others.

Implementation options and plans for Article 7

CA participants had to report which measures and instruments their country was introducing to implement Article 7. Most MS planned to use a combination of the eligible options in Article 7(2) to reduce the Article 7energy saving target by a maximum of 25%. The most common option chosen was counting early actions towards the target, followed by starting with a lower yearly target and incrementally increasing this to 1.5%, and excluding industrial activities covered by the EU ETS from the calculations.

Most MS planned to implement Article 7 with alternative measures (Article 7(9)). Nine planned to use a combination of EE obligations and alternative measures, while 4 planned to comply through EE obligations only. Planned alternative measures ranged from subsidy schemes to audit schemes and energy taxes. Most MS planned to use a mix of measures.

The main challenges encountered in Article 7 implementation were budgetary constraints, tight timelines and political agreement. CA participants saw future challenges arising from: final political decisions on measures and the finalisation of legislation; financing of the necessary EE measures; technical issues concerning monitoring and reporting; setting up new schemes, and adaptation of existing schemes.

Although MS have notified the Commission on their Article 7 implementation plans, some issues remained concerning technicalities and further notification and implementation. Double counting remained an important problem.

CA participants stressed that a final decision by the Commission regarding the eligibility of measures, as well as on the interpretation of the additionality requirement (e.g. RES, refurbishment of buildings) would ease the implementation process.

A follow-up study in 2016 showed that 11 MS still planned to implement Article 7 with alternative measures and 4 through EE obligation only. The number of MS combining these had increased from 9 to 12. The CA meetings clearly demonstrated MS interest in EED Article 7, but also revealed a pressing need for more information.

Monitoring and verification of energy savings at low administrative costs

Several paragraphs of Article 7 and Annex V require proper control, monitoring and verification systems to be in place. It is important to find ways to implement these at low administrative costs.

Elements that could reduce administrative burdens in these schemes include: involving all relevant actors in the monitoring process; using standardised report procedures and templates; having clearly defined eligible measures and documentation requirements; using standard values for calculation where possible; checking most measures on paper rather than on-site; and automating as much of the process as possible via on-line tools. It is important that all solutions for monitoring, control and verification of EE schemes balance the need for accuracy of calculations and process with administrative costs. Most MS are interested in exchanging information on existing schemes.

Measuring energy savings from soft measures and energy taxes

The calculation of energy savings from EE measures is a key aspect of Article 7. Discussions on soft measures and energy taxes enabled participants to exchange experiences and learn about possible approaches.

MS had different plans for reporting savings from the application of energy and CO2 taxes for Article 7 implementation. While only 4 reported energy savings from energy and CO2 taxes in their NEEAP-2, 10 planned to calculate savings from energy taxes. Others had not ruled out this possibility. The main issues to be considered when calculating energy savings from taxes are: excluding double counting; differentiating between short- and long-term effects; substitution effects between energy carriers due to tax/price increases; and inflation.

Measuring the impact of soft measures in energy terms already proved challenging for MS during the roll-out of the ESD. Behavioural measures are eligible under Article 7 and one method for calculating energy savings in Annex V is dedicated to 'soft' measures. Soft measures include: advice, energy audits, energy management, education and training, information campaigns, smart meters and capacity building with networks.

The main challenge concerning the use of energy taxes and soft measures is seen as the development of a sound energy savings calculation methodology. Some MS had not yet defined this. The most common methods in use in other MS are deemed and surveyed savings, and savings based on studies or small-scale trials.

Tackling Double Counting in Article 7 Implementation

Most MS indicate that they would use more than one policy measure or action to implement Article 7, but this clearly increases the risk of double counting the resulting energy saving when the measure or action is attributable to more than one actor (e.g. funding institutions).

Approaches for allocating energy savings between actors include: applying an estimated distribution; splitting savings by support provided; and attributing savings to only one actor.

To prevent double counting, most MS have or plan to set up databases to collect information on, and to monitor, control and verify savings. However, databases alone cannot eliminate the risk. They must be equipped with a function to check for double reporting. Measures must be given ID codes, and the database must be combined with expert staff. Many MS have more than one relevant database. It is recommended that these are consolidated or interlinked so that all information is stored in one place and administered by one body. This requires clear guidelines, possibly in a legal act.

MS without databases plan to separate measures by type or sector, or to set measures with clear boundaries. In MS with a White Certificates Trading System in place, identifying double counting is granted by the system itself. Having clear rules or guidelines also applies here.

Several challenges remain, not least of all collecting data to identify double counting, and knowing how to allocate the effect of an action. Some MS see a challenge in avoiding double counting due to the lack of clear rules and guidelines for monitoring, control and verification. Identifying target groups is another challenge.

It is recommended that MS assess the most appropriate means to monitor and verify energy savings that identifies and eliminates the risk of double counting. This will depend on the size and administrative structure of the MS. Verification of savings and identification of potential double counting must be aligned with established reporting rules. Having one independent monitoring body per MS to collect all information on EE measures is probably the best solution.

Good practice example

SMIV, Croatia

Croatia has a web tool for monitoring, measuring and verifying energy savings (SMIV). A central authority is responsible for data collection, analysis and reporting of savings in all sectors at national level, and maintains and improves the SMIV. It assesses the effect of EE programmes and measures, including those in the NEEAP. The system will be used by all governmental bodies, companies that implement EE service contracts and financing bodies. Most importantly, double counting will be avoided through a bylaw that specifies who is responsible for monitoring and verification, when and how data is entered, and how savings are attributed. All information is double checked by an administrator, and the platform is equipped with an alarm system to report potential risks of double counting.

Monitoring and verification for EE measures in MS

Reviewing and monitoring the impact of policies and measures in relation to EED Article 3 is related to topics around monitoring impacts and verifying energy savings within the framework of Article 7. Article 7 uses different terms such as 'measurement' and 'monitoring' for obligation schemes and alternative measures. But there is no universal interpretation of these. Many MS see little or no difference, but around one third do, including with the level of effort associated with fulfilling them. Different understandings can influence how MS implement Article 7 measurement/monitoring and verification requirements.

In addition to this, different measures need different actions, rendering complete harmonisation of measurement/monitoring, control and verification requirements impossible. In most MS there is no single system in place. Of the 12 MS who have chosen a combination of an obligation scheme and alternative measures, only 5 plan to use the same organisation for monitoring/measurement, verification and control. There are clearly major differences between MS. It is however important that the methods applied within each MS follow a consistent approach.

Elements hindering MS in setting up measurement/monitoring systems include: national regulation and rules; financing; definition of the statistically significant sample and control mechanism; lack of an advanced database for data collection; and definition of the baseline and methods.

Methods for the calculation of energy savings

Although EED Article 7 provides a set of requirements on how to calculate energy savings, MS have significant flexibility in selecting the methodology, provided they comply with Annex V.

MS plan to use a wide variety of EE measures to implement Article 7. These include EEOs, subsidy schemes, energy taxes, and standards and norms. Possible different approaches concerning the calculation of savings include: the choice of basic measurement methods; the determination of baselines; and how the lifetime of measures is applied.

Deemed and scaled savings are the most frequently used basic calculation methodology. The share of different methodologies in total savings can vary, because large projects are often evaluated using a metered savings approach. MS often restrict the use of some calculation methodologies according to sector. While many MS have clearly defined rules for the calculation of savings, control and verification remains an issue.

Methods for the calculation of energy savings in the transport sector

Although energy sales in the transport sector can be excluded from the calculation of the energy savings target according to EED Article 7(1), savings from transport measures can be counted towards the requirement under Article 7. Most MS plan to apply this.

The highest number of measures and methodologies in this sector are reported for EE vehicles (private and public), where energy savings are easily calculated and relate to specific consumption and distance travelled. There are several methodologies for calculating savings from increasing the use of public transport. Only one MS currently applies calculation methodologies to measures related to increasing the share of non-motorised transport and public sharing systems. Calculations of savings from behavioural measures are based on evaluations of existing schemes.

While the transport sector offers high energy savings potential, evaluating programmes and measures is challenging, due to the complex variety of influencing factors (daily decisions on the means of transport, lifestyle), unclear system boundaries, and a lack of standardised evaluation procedures. One way to tackle complexity is to require savings measurements before measures are eligible for Article 7.

Data collection is another challenge, as the amount of data is large and reliability often questionable. Missing or inaccurate data leads to the need for assumptions, and the baseline and rebound effect are difficult to determine. Analysis must often be carried out on a case-by-case basis as measures are exposed to changing framework conditions.

Many MS developed standardised calculation methods, but the result is often a mix of BU and TD calculations combined with modelling. CA participants raised issues about the eligibility of some transport measures under Article 7, e.g. it may be difficult to prove the materiality of new public transport lines as such measures are often part of business-as-usual developments.

New policy instruments triggered by Article 7

The most important challenges MS face in implementing Article 7 include: calculating energy savings; mobilising additional funds; and meeting monitoring and verification requirements.

The EED has triggered additional MS activities. New policy measures have been introduced or are planned to comply with Article 7 requirements, but in most cases existing measures and EEOs are being used or adapted. The most common changes relate to methods for calculating energy savings and monitoring, verification and control mechanisms.

The overall need to make changes to policy measures was low. This could be due to the fact that strong measures and ambitious targets were already in place and only required minor adaptations. Where MS needed to make changes, the most common reasons were deviation from the intermediate target, limited public finances, and the need for new legislative provisions concerning Article 7 implementation.

Most MS expect industry and households to benefit most from Article 7 implementation energy savings. Many MS say implementation has helped to create new business models for EE. Others report that national discussions on Article 7 implementation have led to increased awareness at political level of the importance of EE policies.

Many MS based their decision regarding policy measures to implement Article 7 on established policy at national level, and the focus was to look first at existing measures to assess their compliance with Article 7. However, Article 7 has clearly led to a reassessment of EE policies across the EU.

Reasons given for not introducing new EEOs include: the domestic market in some MS is too small for a workable EEO and it would entail higher costs than most alternatives; the energy market design in MS is not suited for EEOs; EEOs could not be introduced for political reasons.

On the other hand, some MS have decided to introduce an EEO. Their reasons were political pressure, positive experiences with existing EEOs, and the failure of alternatives to realise the expected savings.

Abbreviations used

BU	Bottom-up
CA	Concerted Action
CA EED	Concerted Action Energy Efficiency Directive
CA EPBD	Concerted Action Energy Performance Building Directive
CA ESD	Concerted Action Energy Services Directive
CA RES	Concerted Action on the Renewable Energy Directive
CA ESD II	Second Concerted Action for the Energy Services Directive
CBA	Cost-benefit analysis
CHP	Combined Heat and Power
DC	District cooling
DG ENER	Directorate-General for Energy
DH	District Heating
DHC	District Heating and Cooling
DHW	Domestic hot water
DR	Demand response
DSM	Demand side management
EE	Energy-Efficient / Energy Efficiency
EED	Energy Efficiency Directive
EEEF	European Energy Efficiency Fund)
EEO	Energy Efficiency Obligation
EEPP	Energy Efficient Public Procurement
EPBD	Energy Performance of Buildings Directive
EPC	Energy performance contracts/contracting
ESCO	Energy services company
ESD	Energy Savings Directive
ESTAT	Eurostat
EU	European Union
IEA	International Energy Agency
JRC	Joint Research Centre
LCA	Life-cycle assessment, or life-cycle analysis
MS	Member States (in this report, all CA EED participants including Norway)
NEEAP	National Energy Efficiency Action Plan
OTS FI	Off-the-shelf financial instrument
PaMs	Policies and Measures
PFI	Private Financial Institutions
PPP	Public-Private Partnerships
PS	Public Sector
RED	Renewable Energy Directive
RES	Renewable Energy Sources
SC	supply contracting
SME	Small and Medium-sized Enterprises
TD	Top-down

The Concerted Action for the Energy Efficiency Directive (CA EED) was launched by 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).

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