Developing measurement methods for EU Ecodesign and Energy Labelling measures

-a discussion paper-

February 2014

Edouard Toulouse

clasp

Acknowledgements

The author would like to thank the reviewers Mike Scholand, Mark Ellis and Conrad Brunner for reviewing the paper at various stages of its development.

Citation

This paper should be cited as Toulouse, E. (2014) Developing measurement methods for EU Ecodesign and Energy Labelling measures. A discussion paper. Published by CLASP.

Disclaimer

The views are those of the author and do not necessarily represent those of CLASP.

About the Author

Edouard Toulouse is an engineer and has been involved in monitoring energy and climate policies since 2001. From 2007 to 2013 he was Policy Officer at ECOS (European Environmental Citizens' Organisation for Standardisation) where he was responsible for monitoring both the development of EU Ecodesign and Energy Label requirements as well as that of harmonised standards for the European environmental NGO community. In this capacity he has been a member of the Ecodesign Consultation Forum since 2007. An important part of his job was to analyse and provide technical opinion on the implementing measures developed by the European Commission. He is now a freelance consultant on the environmental and energy performance of products.

About CLASP

Established in 1999, CLASP's primary objective is to identify and respond to the analytical needs of S&L practitioners in selected countries and regions while making the highest quality technical information on S&L best practice available globally. To this end, CLASP provides technical analysis and expertise to national governments and local partners; aggregates resources; assembles project teams from diverse and highly-qualified organizations; oversees projects; partners and collaborates with policy makers and members of industry alike; and disseminates information for maximum impact. CLASP has provided technical assistance on standards and labelling in over 50 countries, supporting and promoting energy-efficiency in appliances, lighting and equipment. Currently, CLASP has offices or programmes in China, the European Union, India, Latin-American and the United States. For more information about CLASP, please visit: www.clasponline.org/index.php

Executive summary

Since 2005 the European Union has engaged in a challenging programme of setting energy performance requirements and new energy labels for a wide range of energy-using product groups. At the end of 2013, 21 Ecodesign regulations and 9 labels had been adopted, and 2 voluntary agreements recognised.

Measurement methods, also referred to as test procedures, are a fundamental building brick in such a framework. In the EU they are enshrined in EU-wide 'harmonised standards'.

The EU approach to standardisation and therefore to the development of measurement standards grew out of the 1970s and 1980s internal market project which sought to reduce trade barriers between Member States in order to encourage growth in Europe.

This paper examines the relationship between the development of Ecodesign and Energy Labelling requirements on the one hand, and of measurement methods on the other. In particular it examines the effectiveness of the development of measurement methods with respect to underpinning the requirements.

A historical overview of the development of measurement methods in support of the 2005 Ecodesign Directive is provided, particularly looking at the way measurement standards have been mandated by the EU to standardisation bodies. Three phases are distinguished: early mandating (2004-2008), product specific mandates (2009-2011), and the so-called 'horizontal Ecodesign mandate' (since 2011).

To be effective, measurement methods must be delivered in a timely fashion and be adequate to enable the implementation and enforcement of policy measures. They must be fit for purpose. Contribution to international harmonisation may also be a goal.

The development of measurement methods for Ecodesign and Energy Labelling is assessed firstly in terms of the intrinsic quality of the measurement methods themselves with respect to e.g. their representativeness; accuracy, repeatability and reproducibility; cost and complication; and integrity against misuse.

Secondly they were assessed in terms of their relationship with the regulations that they are to underpin. Here the extent to which measurement methods are available when implementing measures come into force was assessed, and the extent to which the substantive content of the measurement methods and the implementing measures is sufficiently coherent.

It was found that since 2005 there have been significant delays in the production of measurement methods such that they have normally not been available when implementing measures came into force. It was also found that the imperfect co-ordination of the process of producing measurement methods on the one hand and of implementing measures on the other, has meant that there were issues of coherence of content between measurement methods and implementing measures, sometimes leading to additional policy delays.

It is clear that with the horizontal Ecodesign mandate in 2011, and additional measures in 2013, the European Commission and European standardisation bodies have taken steps to address the problems of delays and coherence in the production of measurement methods.

However, given the likely increasing complexity of product groups to be covered in the future, the interest in including a more systemic perspective and a wider range of environmental impacts under the Ecodesign and Energy Labelling framework, it will be important to continue to pay attention to the capacity of the EU standardisation process to adequately support

policy. In particular, account should be taken of the implications for the effectiveness of standardisation of any changes proposed to the regulatory framework. It is also worth considering whether the review of the regulatory framework now going on affords any opportunities for improving the relationship between the policy and standardisation processes.

A menu of options for making limited adjustments to the current approach is outlined, as well as a set of four more exploratory scenarios to help inform a discussion about potentially more substantial changes to the EU approach. These different scenarios all have different implications for the degree of control which the European Commission has over the development of measurement methods in the context of the Ecodesign and Energy Labelling Directives.

Table of Contents

List of tables and boxes

Tables

Boxes

List of acronyms

ADCO	Ecodesign Market Surveillance Administrative Cooperation
ANEC	European consumer voice in standardisation
CCMC	CEN-CENELEC Management Centre
CECED	European Committee of Domestic Equipment Manufacturers
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
CSES	Centre for Strategy & Evaluation Services
EHI	European Heating Industry
EPEE	European Partnership for Energy and the Environment
ETSI	European Telecommunications Standards Institute
EU	European Union
IEA	International Energy Agency
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
JRC	Joint Research Centre
OJEU	Official Journal of the European Union
SEAD	Super-efficient Equipment and Appliance Deployment Initiative
UNEP	United Nations Environment Programme
US DOE	United Nations Department of Energy

Glossary

Citation in the Official Journal of the European Union: procedure by which the European Commission gives recognition to a harmonised standard prepared by European standardisation organisations and signals that it is fit for the purpose of supporting or facilitating compliance with legal provisions.

Ecodesign Policy: refers to the EU Directive 2009/125/EC on the Ecodesign of Energy-Related Products and its implementation, by which EU Institutions set energy and other environmental requirements for products placed on the EU market.

Energy Labelling Policy: refers to the EU Directive 2010/30/EU on the Energy Labelling of Energy-Related Products and its implementation, by which EU Institutions set energy labelling obligations on products placed on the EU market.

Ecodesign/Energy Labelling regulations (also referred to as policy measures): Regulations adopted under the Ecodesign and Energy Labelling Directives that specify the Ecodesign/Energy Labelling requirements applying to certain product groups or product categories.

Harmonised standard: standard elaborated at EU level on the basis of a request from the European Commission to European standardisation organisations in order to support or facilitate compliance with a legal provision. For instance, a harmonised standard may describe a measurement method necessary for checking the compliance of a product with an Ecodesign or Energy Labelling requirement.

Measurement method (also referred to as test method): procedure by which a characteristic or performance level of a product is assessed. Measurement methods are necessary to demonstrate and check the compliance of products with Ecodesign and Energy Labelling requirements.

Presumption of conformity: a concept expressing the fact that manufacturers will be presumed compliant with "essential provisions" of a Directive or Regulation if they apply certain rules or procedures (for example a harmonised standard) that have been developed in relation to it. Following the rules to benefit from a presumption of conformity is an asset in case of a control or enquiry by a market surveillance authority.

Standard: technical specification developed on a consensus basis and approved by a recognised standardisation body (e.g. CEN,CENELEC and ETSI in Europe) or agreed upon between economic operators, for repeated or continuous application and with which compliance is not compulsory. It can be an international, European, national or 'fora' and 'consortia' standard. For instance, a standard may describe a measurement method.

1 Introduction and approach

Through the Ecodesign and Energy Labelling Directives and their implementing measures, the European Union (EU) sets energy label and energy performance requirements for a wide range of energy-using products. The Ecodesign Directive was adopted in 2005 and recast in 2009, while the Energy Labelling Directive was adopted in 1992 and recast in 2010. Previous policy measures had been in force for a limited number of products.[1]

The scope of the Ecodesign Directive includes more than 40 product groups as specified in the 2005-2008 'transitional period' and the 2009-2011 and 2012-2014 triennial Working Plans.[2] [3] They range from appliances, lighting and electronics to commercial and industrial equipment.

The regulatory framework for setting Ecodesign and Energy Labelling requirements is under review in 2014, there is thus an opportunity to look at the various building blocks that together make up the framework, and to consider whether they can be made to support each other more effectively.

The world of measurement methods (or test procedures) can seem complex for those who are not directly involved. And yet, measurement methods are an essential part of setting minimum energy performance and energy labelling requirements (CLASP, 2005).

The purpose of this paper is to set out the main features of the EU process for developing measurement methods, assess its effectiveness in terms of its capacity to underpin the EU's Ecodesign and Energy Labelling Directives, and consider additional opportunities for improvement. It therefore looks in some detail at the interplay between the Ecodesign and Energy Labelling measures and the development of related measurement methods. The assessment is focused on effectiveness aspects. It does not address the efficacy of these processes (i.e. the impact of measurement methods on energy savings for instance) nor their efficiency (i.e. whether they do what they do in a cost-optimal way).

The paper is based on a mixture of desk research and interviews with key stakeholders (see Annex A). It is also based on the experience of the author as a participant in the process over several years. There is thus an element of (informal) participant observation in the approach.

The paper is structured in the following way: section 2 sets the context by providing some brief information about the EU approach to setting Ecodesign and Energy Labelling regulations, the importance of measurement methods in this context, characteristics expected from measurement methods, the EU approach to developing measurement methods, and finally the role of international standardisation. In section 3, the effectiveness of the EU approach is assessed with respect to a set of key parameters which cover certain 'intrinsic' characteristics of measurement methods and their relationship to the regulations they are supposed to underpin. Section 4 explores some potential ways forward, and section 5 provides a brief conclusion.

[1] The first EU energy labels were elaborated in the late 1970s for ovens (updated in the 2000s), then for refrigerating and washing appliances and lamps in the 1990s, and air-conditioners in the 2000s. (Weak) energy performance requirements were set for heaters in 1992, and for refrigerating appliances in 1996 and lamp ballasts in 2000.
[2] The so-called 'transitional period' refers to the period between the entry into force of the Directive and the adoption of the first tri-annual working plan under the Ecodesign Directive.
[3] An overview of the adopted measures and drafts in the pipeline is available on: http://www.eceee.org/Eco_design/products

2 Context

This section provides a brief overview of EU Ecodesign and Energy Labelling policy, the importance of measurement methods in this context, and the key characteristics expected from measurement methods. The current EU approach to developing measurement methods is set out, and placed in an international context.

2.1 The EU Ecodesign and Energy Labelling policy

Many jurisdictions in the world are implementing minimum energy performance requirements and energy labelling programmes on a range of appliances and other energy-using products. The objective of these programmes is to save energy by transforming the market and stimulating the offer and uptake of more energy efficient products.

In the EU, this process is governed by the Ecodesign Directive (2009/125/EC) and Energy Labelling Directive (2010/30/EU). The details of product-specific requirements are adopted through dedicated implementing measures. The EU has engaged in a challenging programme: product-specific measures are either being currently implemented or under preparation for more than 40 product groups.

The steps of the policy process leading to the adoption of Ecodesign and Energy Labelling measures have been documented in several other reports (e.g. CSES, 2012). They follow the EU regulatory procedures for comitology and delegated acts, and include the following sequence for a typical product group:

1. Inclusion in a triennial Working Plan;
2. Preparatory study;
3. Working documents prepared by the European Commission;
4. Discussions with stakeholders in the Ecodesign Consultation Forum;
5. Impact assessment study;
6. Notification to the World Trade Organisation.
7. Vote by a Regulatory Committee of Member State representatives for the Ecodesign measures (when they take the form of a mandatory regulation)[4];
8. Scrutiny by the European Parliament and Council;
9. Adoption of Ecodesign and Energy Labelling measures by the European Commission;
10. Final publication in the Official Journal of the European Union (OJEU).

The European Commission is the lead policy maker in this process, drafting legislative proposals that stakeholders, Member States and the European Parliament respond to.

2.2 Why do measurement methods matter?

Measurement methods are a key building block in the development and implementation of labels and minimum energy performance requirements. Without them, policy decisions cannot be optimised and enforced and the full potential for energy savings cannot be realised. This is because measurement methods provide an agreed way to describe the energy performance of comparable products, and therefore enable a comparison of such products with respect to their energy performance.

[4] At present, there is still a distinction between the Energy Labelling Directive process (which falls under the EU Lisbon Treaty) and the Ecodesign Directive (which still follows an older procedure). For Energy Labelling, the EU Member States no longer vote on the measures in a Regulatory Committee, and the measure is adopted by the Commission before scrutiny by the European Parliament and Council. Streamlining of the two processes is planned.

Measurement methods are necessary to:

- Assess and describe the energy performance of products in an unambiguous way.
- Enable the comparison of similar products with respect to their energy performance, and facilitate informed policy decisions on the stringency of future energy performance requirements and energy labels.
- Finally, measurement methods ensure that manufacturers and market surveillance authorities have a clear way of testing energy performance to verify supplier claims and effectively enforce the Ecodesign and Energy Labelling regulations.

2.3 Characteristics of adequate measurement methods

CLASP (2005) dedicated a whole chapter to the 'how to' of developing a testing programme to support a minimum performance and energy labelling programme in any given jurisdiction. In this context key characteristics necessary for an adequate measurement method were outlined. In particular, an energy performance measurement method should:

- Yield repeatable, reproducible, and accurate results;
- Reflect typical usage conditions;
- Reflect the relative performance of different design options for a given appliance;
- Cover a wide range of models within a category;
- Produce results that can be easily compared with results from other test procedures;
- Be inexpensive to perform;
- Be designed for integrity, i.e. not easily circumvented/misused to artificially show better performance.[5]

As the authors point out, it is rarely possible to meet all these characteristics at the same time. The development of a measurement method is often a subtle compromise between different properties. For instance, greater accuracy in measurement can sometimes increase the cost of the method (because it may involve more costly testing equipment). Knowing that measurement methods are never going to be perfect makes it all the more important to pay attention to the specifics of any given measurement method, to understand the compromises being made, and their implications for the effectiveness of the policy measures they underpin.

Measurement methods and policy measures must be sufficiently aligned in terms of key aspects of their content. They must also be temporally aligned so that measurement methods are available in time to support the implementation of regulations.

2.4 The EU approach to developing measurement methods

In this section an overview of how measurement methods are developed in the EU is provided, including some of the changes in approach over time. This is set in the context of the EU approach to standardisation.

2.4.1 Measurement methods and standardisation

In the EU, measurement methods to support Ecodesign and Energy Labelling regulations are developed by European standardisation organisations[6] and take the form of so-called 'harmonised standards'.

[5] Otherwise, the integrity of the policy can be compromised and the legal level playing field is not secured. With products becoming increasingly complex and smarter, this risk should not be neglected (Meier, 2000; CLASP, 2005, p.82).

[6] European Committee for Standardisation (CEN), European Committee for Electrotechnical Standardisation (CENELEC) and European Telecommunications Standards Institute (ETSI).

Standards (in general) are technical documents that specify agreed procedures and processes that business and others may use to facilitate their operations. An illustrative example is the introduction of 'standard time' in the 19th century to facilitate rail travel (imagine what would happen to the Eurostar if clocks in London and Brussels were not synchronised). There is a variety of definitions of what standards are[7], and several ways of differentiating between them that are useful in different contexts. A good place to start in the present context is the distinction between four different types of standards below[8]:

1. Standards for interoperability (or compatibility);
2. Minimum quality and safety standards[9];
3. Variety-reducing (or inter-changeability) standards; and finally,
4. Information and measurement standards.[10]

This distinction helps to clarify a potential confusion between *performance standards* (2) such as Ecodesign requirements, and *measurement standards* (4) such as the measurement methods defined in European standards to support Ecodesign and Energy Labelling policy. To avoid this confusion in this paper, the former are referred to as 'requirements' or 'policy', whereas the latter is referred to as 'measurement methods or 'measurement standards'.

Standards may be defined at different geographical scales such as the national, European and international level. They are developed by different types of bodies, for instance standardisation organisations CEN, CENELEC and ETSI in the EU.[11] The large majority of standards are developed by standardisation organisations on their own initiative or that of industrial or other stakeholders. This also means that most of the cost of developing standards is born by industry. There are also a number of standards that are developed following a request by the European Commission to specifically support legislation, through a so-called 'mandate'. Of those standards *mandated* by the European Commission, a further distinction is made between 'harmonised standards' and other types of standards to support European policies.

The percentage of standards (produced by European standardisation organisations) that are mandated by the European Commission increased from 18% in 1999 to 34% in 2009. Of those standards, the proportion of harmonised standards grew from 3.55% to 20% over the same period (European Commission, 2011a).

The principle and usefulness of harmonised standards to manufacturers and EU policy-makers is that manufacturers wishing to place a product on the internal market are presumed to comply with the essential requirements of a Directive or Regulation if they apply the procedures specified in the harmonised standard that has been developed and cited to support the given Directive or Regulation. This is referred to as the 'presumption of conformity'. The use of harmonised standards as a way of demonstrating compliance remains *voluntary*. Manufacturers may use another way of demonstrating compliance, but in case of control the technical evidence they will then have to provide is more burdensome. The fact that harmonised standards provide a 'standard' way of demonstrating compliance therefore means that they often become the *de facto* default way to comply with or demonstrate compliance with an EU

[7] European Commission (2011a) provides a useful comparison of definitions of what a standard is and can be (see p. 120 footnote 90).
[8] From European Commission (2011a, p.118-119).
[9] Such standards "*allow consumers to assess the quality or safety of a product before purchasing it. These standards are developed to specify acceptable product or service performance along one or more dimensions such as functional levels, performance variation, service lifetime, efficiency, safety, and environmental impact.*" (European Commission, 2011a).
[10] Standards that "*establish a common technical language in which to compare physical attributes and convey descriptive technical information*" (European Commission, 2011a).
[11] See page 120 of European Commission (2011a) for a good overview.

law. This is the case with the choice of measurement methods to assess whether a product complies with EU Ecodesign requirements and in which energy labelling class it should be declared.

The EU approach dates back to the early 1970s when key concepts such as harmonised standards and presumption of conformity were first defined in the context of the Low Voltage Directive (Directive 73/23/EEC) (Vardakas, 2003). To help complete the Internal Market by 1992, a 'New Approach' to product regulation and a Global Approach to conformity assessment were defined (European Commission, 2000). Under this approach European level legislation is supposed to focus on what is essential (the 'essential requirements' that manufacturers have to comply with), whereas technical aspects that are considered less essential are delegated to standardisation through harmonised standards. The complexity and need to update legislation is thus reduced (Vardekas, 2003; European Commission, 2011e).[12]

In this context, standardisation organisations play a significant role in supporting the implementation of EU policy. The development of a harmonised standard by EU standardisation organisations – as for any other European standard – takes place in technical working groups the membership of which is mostly appointed by national standardisation organisations from the 28 Member States, often experts working for private companies. However, the EU has retained a degree of control e.g. through agreeing successive guidelines[13] with CEN, CENELEC and ETSI on how standards must be developed, and through the possibility of rejecting a standard. Once a harmonised standard is accepted by the European Commission, this is recognised by citing the new harmonised standard in the OJEU. The European Commission thus has the option of *not* recognising a proposed standard that it deems unsatisfactory for the purpose of adequately supporting the related policy.

In summary, bodies with different agendas, practices and statutes are required to produce outputs that are consistent. On the one hand, the European Commission (supported by Member States) issues legally binding regulatory measures with the aim of achieving political targets set by the EU. On the other hand, standardisation organisations are operating on a voluntary basis, producing a variety of non-binding standards with the primary aim to support industry practices and business development, including harmonised standards for the Internal Market.

2.4.2 The mandating procedure

The mandating of European standardisation organisations by the European Commission follows a pre-defined procedure and template.[14] There are four main phases to the mandating process:

Stage 1: The European Commission prepares the mandate, laying down the needs for harmonised standards to support a new or revised EU Directive or Regulation. Where relevant, views of stakeholders such as consumers and environmental NGOs are sought.

Stage 2: The European standardisation organisation(s) accept(s) the mandate. As standardisation organisations are independent bodies based on voluntary participation, the mandating is not a formal obligation and a mandate has first to be accepted by the standardisation bodies.

[12] The overall legislative framework governing standardisation in Europe was updated in 2012 to address certain issues in the framework, including the slowness of the standardisation process, the insufficient representation of SMEs and societal stakeholders in standardisation activities, and the insufficient treatment of ICT in the existing framework (EU, 2012).

[13] General guidelines for the cooperation between CEN, CENELEC and ETSI and the European Commission and the European Free Trade Association. 28 March 2003. OJ C 91 p.7-11. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2003:091:0007:0011:EN:PDF.

[14] All standardisation mandates are available on: http://ec.europa.eu/enterprise/standards_policy/mandates/database/.

Stage 3: The development of the standard. The concrete work is then executed within a technical committee consisting of representatives of industrial stakeholders (individual companies and federations). National administrations and civil society organisations also have the right to take part in the standardisation work, although in practice their participation may be constrained by lack of resources. This means that in practice, the work is usually led by a small group of industry experts.[15]

Stage 4: The validation and citation of the harmonised standard in the OJEU. Once the work is completed and has passed all internal steps in the standardisation organisation, the published standard is submitted to the European Commission. If it is accepted, it is then 'cited' in the OJEU as an official 'harmonised standard'. If the proposed standard is not accepted, a reconciliation is necessary and amendments to the standard may be requested, thus introducing delays into the process.

Standardisation bodies can apply for EU funding to support their work under mandates (e.g. a part of the technical work or expertise needed). Overall, the development of a harmonised standard takes time. The entire process for mandated standards can easily take up to 3 years and often longer (European Commission, 2011a, p.12).

2.4.3 Mandating in practice: steps and adjustments (2004-2012)

The way in which the European Commission and standardisation bodies have organised and prepared the mandating work related to the Ecodesign and Energy Labelling Directives has evolved over time and fall into three distinct periods. We did not look into the process for developing harmonised standards prior to the 2005 Ecodesign Directive.

2.4.3.1 Early mandate (2004-2008)

The first standardisation mandate issued in the field of Ecodesign dates from January 2004 - just before the Ecodesign Directive was adopted (European Commission, 2004). The mandate was a brief 4-page document which asked standardisation organisations to "*draw up a comprehensive standardisation programme with the view to producing standards which will assist the realisation of the objectives of the draft Directive*". The mandate included not only energy consumption but (in line with the wider scope of the Ecodesign Directive) other environmental aspects such as water consumption, use of hazardous substances, end-of-life aspects and information along the production chain.

Standardisation bodies were given twelve months (from acceptance of the mandate) to present a first work programme of standardisation work items and related target dates. Such a programme, said the mandate, should give a clear description of work required to meet the objectives of the Ecodesign framework Directive, and enable a prioritisation of its elements. The European Commission noted that the mandate might be subject to further clarification or modification, depending on the progress of discussions on the proposal for an Ecodesign Directive within the EU institutions. And finally that, following the execution of the mandate and depending on its results, possible further specific standardisation mandates could be envisaged for future work in this field.

In practice, the process of developing measurement standards did not take off and no other standardisation mandate was issued in the following 5 years. Part of the reason may have been insufficient resources within the European Commission to follow the process in standardisation

[15] Ellis and Rozite (2013) observe that "[*s*]*ince attendance at standardisation meetings involves a considerable amount of time and cost, in reality larger industries tend to be in the best position, and have the commercial interest to volunteer to participate in meetings (…) The need for more balanced representation has become apparent.*" See also Frankel (2004) and European Commission (2011a).

bodies, as staff working on Ecodesign and Energy Labelling began to prepare the content of numerous implementing regulations.

2.4.3.2 Product-specific mandates (2009-2011)

By 2009, several Ecodesign and Energy Labelling measures had already been or were close to being published and the need for the corresponding measurement standards therefore pressing. In less than 3 years, the European Commission prepared and issued 14 product-specific mandates related to the first product-specific Ecodesign regulations.[16] These included detailed instructions to develop the standards as well as criteria against which they would be assessed (Box 1).

Box 1 Main criteria included in the product-specific mandates

Adequacy of the measurement method

The standards should:

- Be reliable, accurate, reproducible;
- Take into account the generally recognised state of the art;
- Reflect the user behaviour;
- Include a procedure that avoids an appliance being programmed to recognise the test.

Conditions of use

The standards should:

- Identify the conditions outside which the application of the standard is unpractical;
- Identify and reduce to a minimum the sources of variability to be considered for market surveillance;
- Provide the minimum values achievable for measurement uncertainties for the purposes of verification;
- Verify if, in order to reduce the impact of variability to the system, the standard should include specific criteria to be met by laboratories involved in the verification.

Format

The standards should:

- Include the necessary definitions of the products and parameters to be measured;
- Define a template for a test report indicating the information to be declared.

Source: Based on product-specific standardisation mandates M/469, M/470, M/498, M/488, M/476, M/485, M/459, M/458, M/481, M/450, M/455, M/439, M/477 and M/451.

2.4.3.3 Mandating in practice: steps and adjustments (2004-2012)

The publication of so many specific mandates in a short timeframe was the result of a significant effort from the European Commission services. However, it was not enough to recover the delay, and as a result many mandates were either issued late in the process of adopting policy measures, or even after the requirements had entered into force (see Section 3.2.1). In consequence, a change of approach was decided in 2010 whereby all Ecodesign-related standardisation would be regrouped under a single horizontal mandate. The mandate, referred to as 'horizontal mandate M/495', was finalised in July 2011 (European Commission 2011b). In the meantime, several more Ecodesign and Labelling regulations had been adopted.

The horizontal mandate includes general instructions and two annexes. Annex A contains the list of product-by-product standardisation work to be developed, and Annex B provides technical details on the standardisation work to be undertaken for the product groups listed in Annex A. The horizontal mandate also includes a procedure for updating these annexes, that is

[16] In the field of circulators, motors, pumps, air-conditioners and comfort fans, variable speed drives, tertiary lighting, domestic fridges and freezers, domestic washing machines, domestic dishwashers, external power supplies, common chargers for mobile phones, standby and off modes, televisions and set top boxes.

for adding products (Annex A), or specifying the standardisation work to be undertaken for a specific product (Annex B).

Importantly, the horizontal mandate sought to put in place a more precise and tighter temporal framework for the development of measurement methods. An overview is given in Table 1 below. The overarching goal was that the relevant standards should be published in the OJEU *before* the relevant Ecodesign or Energy Labelling measure comes into force.

Table 1 Timeline for developing implementing measures and deadlines for adopting standards

	Table 1 – Typical timeline for developing new implementing measures and corresponding deadlines for adopting standards							
Implementing Regulation	Ecodesign preparatory study		Preparation of proposal (Commission)	Discussion with Consultation Forum	Vote in Committee and EP scrutiny	Formal adoption (OJEU)		Appli cation
Indicative timeline	**24 months**		**6 months**	**6 months**	**6 months**	**6 months**	**12 months**	
Related Standards (**'at the latest' deadlines**)	Definition of the scope of the study & identification of main standardisation gaps	End of study : First agreement on the product definition and categorisation, and standardisation needs	CEN CENELEC: adoption of preliminary work items		Update of Annex B CEN CENELEC: final adoption of work items		Publication of the EN standard(s) in OJEU	

Source: European Commission, 2011b

Table 1 outlines a sixty month process from the launch of an Ecodesign preparatory study to the coming into force of specific Ecodesign and/or Energy Labelling measures in Member States.[17] It suggests that the planning of standardisation work should start as soon as the launch of the Ecodesign preparatory study for a product group, in particular through the identification of the main standardisation gaps and in the course of the study, a first agreement on product definition and categorisation and the specification of standardisation needs. To facilitate such coordination, the European Commission now systematically invites standardisation experts at the kick-off meetings of preparatory studies.

About 30 months into the process, the preparation of the first draft of the implementing measure by the European Commission is intended to coincide with the adoption of the related 'preliminary work items' by the standardisation bodies.[18] The latest date at which the European Commission should update Annex B for a product group (that is to say, provide the detailed specifications of the standardisation work for a given product) is some 12 months later, immediately after the end of the period of scrutiny in the European Parliament of the stable draft of a given implementing measure. If this timetable is followed and the first requirements of the implementing measure come into force within the final 18 month period foreseen in Table 1, this leaves about 18 months for standardisation organisations to develop the core content, finalise, and adopt the standard if it is to be cited in the OJEU *before* the requirements come into force. The Commission notes that the final period may in some cases be extended to 24 months.

[17] In practice the policy process tends to be substantially slower, see Siderius (2013).
[18] See http://www.cen.eu/boss/supporting/guidance%20documents/gd%20-%20adoption%20of%20a%20new%20work%20item/Pages/default.aspx.

The mandate foresees a number of organisations being involved in the standardisation work. Thus the standardisation organisations are instructed to (as appropriate) invite the representative organisations of consumers' interests, environmental protection, workers and small and medium-size enterprises to take part in the standardisation work. In addition the standardisation organisations are also required to invite Member States' representatives, in particular those appointed to the Regulatory Committee on the Ecodesign of Energy-Related Products and to the Ecodesign Consultation Forum, or the technical experts assisting these representatives to take part in the work.

European Commission desk officers responsible for the development of implementing measures for specific product groups have seldom been able to attend meetings of standardisation technical committees to date. The European Commission launched a call for tender in 2012[19] to hire technical consultants who can provide additional technical assistance and help ensure that harmonised standards are delivered in line with the horizontal mandate. A parallel call for tender was also launched to support the participation of civil society organisations in the standardisation committees.[20] The intention is to inject additional independent opinion in the process (NGOs active in standardisation have a cooperating partner status but no voting rights in European standardisation organisations).

Following the adoption of horizontal mandate M/495, CEN and CENELEC prepared a work programme in response to the mandate. An Ecodesign Coordination Group kicked-off in April 2013 and is permanently established within CEN and CENELEC to serve as an exchange platform.[21]

2.5 The role of international standardisation

Products covered by energy performance requirements and labels are often traded globally, or at least in regional markets. Manufacturers of these products usually favour rules and measurements that are internationally aligned. This may reduce compliance costs and avoids having to use different product designs or testing protocols for different countries. There are also potential benefits for governments: regulatory requirements can be more easily developed and benchmarked, and test results can be shared. Reduced compliance costs may also be reflected in lower consumer prices.

2.5.1 Harmonising policy

It has been estimated that the upward alignment and harmonisation of minimum energy performance standards could yield significant energy savings worldwide (Waide, 2011). Greater international harmonisation has also been recommended by the International Energy Agency (IEA) as part of transforming global equipment markets towards better energy performance (IEA, 2010).

The increased international alignment of policy measures and energy labels has been a topic of discussion for many years, but so far progress has been slow. In many cases, product definitions can still differ, efficiency metrics diverge, policy terms of reference differ and the levels of requirements and labelling classes remain un-aligned from one jurisdiction to another (Waide, 2011).

[19] The full specification of the work can be found here: http://ec.europa.eu/dgs/energy/tenders/doc/2012/ener_c3_08052012_tenders_specification440.pdf.
[20] The full specification of the work can be found here: http://ec.europa.eu/dgs/energy/tenders/doc/2012/ener_c3_08052012_tenders_specification441.pdf.
[21] See http://www.cencenelec.eu/standards/sectors/EcoDesign/Pages/default.aspx.

Attempts at progressing the harmonisation of policies are made in various fora such as under the auspices of the IEA (4E Implementing Agreement), United Nations Environment Programme (UNEP) (En-Lighten initiative on lighting) and the Super-efficient Equipment and Appliance Deployment Initiative (SEAD).

2.5.2 Harmonising measurement methods

The institutions and processes for developing measurement methods are historically rooted and differ across economic regions. In some countries (e.g. Japan and Korea), measurement methods are developed by national standardisation organisations as they are in the EU, whereas in the US, the Department of Energy (US DOE) is primarily responsible for measurement methods with assistance from external organisations (CLASP, 2005).[22] International alignment of measurement methods falls under the auspices of international standardisation organisations, mainly International Organisation for Standardisation (ISO) and International Electrotechnical Commission (IEC).

Part of the reason why it is difficult to harmonise policies across regions is because the way energy performance is described through energy measurement methods also differs between regions. International harmonisation of measurement methods can ensure better product comparability and benchmarking, increased transparency in consumer information and streamlining of testing practices. And it can enable the alignment of policy. However, here again, progress has been both slow and limited.[23]

[22] More information on approaches to developing measurement methods in different parts of the world can be found in CLASP (2005), Waide (2011).
[23] Some of the reasons for this are set out in CLASP (2005) Chapter 4.

3 Assessment of the effectiveness of the EU approach

In this section, the EU process to develop measurement methods for Ecodesign and Energy Labelling measures is assessed against the following criteria:

1. *Intrinsic qualities of the measurement methods:* whether accuracy, reproducibility, applicability, representativeness and cost-effectiveness aspects are well addressed;
2. *Timeliness:* whether measurement methods are prepared and delivered in a timely way to support the Ecodesign and Energy Labelling policy process as desired by the European Commission;
3. *Substantive alignment with policy measures:* whether the content of policy measures and that of measurement methods are developed in a consistent way so that they fit well and measurement methods can adequately underpin policy measures;
4. *Compatibility with international harmonisation:* this more externally oriented criteria covers the ability of the process to deliver measurement methods that contribute to more international alignment.

3.1 Intrinsic characteristics of EU measurement methods

3.1.1 Representativeness

Measurement methods have to reflect typical use conditions. If they do not, manufacturers may optimise their products for energy efficiency on the wrong basis and potential energy efficiency improvements may be lost. This has been observed in the past for some products covered by EU Energy Labels.

To improve the representativeness of measurement methods, the trend is now to favour more sophisticated test conditions that better reflect user behaviour. One example is the shift from a measurement at one temperature and full load to a mix of varied temperatures and loads in the standard for household washing machines. Another example is the shift from measurement at full load to a seasonal cycle in the standards for air-conditioners.

As noted above, measurement methods often have to strike a balance between competing criteria. Thus greater representativeness may mean it takes longer to develop measurement methods, and may increase the cost of test procedures. For instance, the preparation of Ecodesign and Labelling measures for vacuum cleaners appears to have suffered from delays in part due to attempts to assess the energy performance of the products in an excessively sophisticated way.

It may be useful to increase the attention paid to analysing user behaviour in Ecodesign preparatory studies. This aspect of the preparatory studies is often quite limited. Understanding user behaviour could help to enhance understanding of real energy savings, and could serve to enhance the representativeness of measurement standards. It may be that the skill-set required to study user behaviour adequately needs to be given greater emphasis in the recruiting of consultant teams, together with an indication of the resources which should be dedicated to this part of the study.

3.1.2 Accuracy, repeatability and reproducibility

The accurate measurement of parameters required for the calculation of energy efficiency metrics, not only energy use but also e.g. the light output of a lamp, the cleaning efficiency of a vacuum cleaner, etc., is important. Energy-using products are becoming more sophisticated, efficient and usually embody more varied functions than previously and, as a result, the accurate measurement of the required parameters is increasingly complex. This suggests that

designing-in sufficient accuracy, repeatability and reproducibility in measurement methods will become more and more challenging.

The repeatability and reproducibility of test methods are usually assessed through so-called round robin tests (i.e. the same product model is tested in different labs). Standardisation organisations or policy makers usually undertake these when they develop new test methods in order to identify potential concerns with reproducibility. These include whether the test method contains a sufficient level of detail so that the number of assumptions made by laboratories is minimised and the exact procedures are followed by all laboratories.

So far, no major concerns about the repeatability and reproducibility of harmonised standards adopted for Ecodesign and Energy Labelling could be identified. This is a reflection of the robustness of the technical work carried out. However, to our knowledge not all the testing aspects of these measurement methods have been backed by round robin testing. It could be relevant to systematise such procedures even more and provide the budget for it, in the case of standards supporting Ecodesign and Energy Labelling regulations.

3.1.3 Cost and complication

If a measurement method is too costly or complicated to apply, market surveillance authorities may be reluctant to launch verification and enforcement activities. Keeping cost and complication low is all the more important since the testing of compliance (especially under the Ecodesign Directive) is known to be limited (CSES, 2012), and the limited resources available to enforcement authorities in many Member States is a significant constraint on such testing (Waide et al., 2011; CSES, 2012). In addition, limiting the cost of measurement methods also means lower costs to manufacturers.

For traditional household products and appliances, the balance between accuracy, representativeness and cost-effectiveness is a well-known and long-standing challenge. However, a future difficulty will be faced with products in the professional and industrial sectors. For these, it is not only the measurement methods themselves but also the established market surveillance principle of testing one unit and then three more units that may be put into question. For instance, when it comes to testing the compliance of a supermarket fridge, professional refrigeration systems, walk-in cold rooms, machine tools, large power transformers or industrial furnaces, it is difficult to imagine how energy performance tests can be performed in standard laboratories on several identical units. There will be issues of feasibility, practicability and cost.

For these cases, other creative and tailored ways of setting and testing requirements, and exerting market surveillance will probably be needed. Potential ideas include testing at the component level, using modular approaches, setting generic instead of quantified requirements (e.g. imposing doors on supermarket fridges), ex-post on-site verification through standardised audits, etc.

3.1.4 Integrity against misuse

CLASP (2013) surveyed the integrity of several of the regulations currently in place. In the present context however, what is at issue is the integrity of measurement methods, in particular their capacity to be robust against intentional misuse. This issue is for example raised in CLASP (2005) on the basis mainly of US examples. Smart appliances may promise better energy performance, but they could also outsmart measurement methods... (see also CLASP, 2011; Choice, 2010). We are not aware of any systematic evidence on this matter regarding the EU Ecodesign and Energy Labelling Directives, but the potential risk has prompted the European Committee of Domestic Equipment Manufacturers (CECED) to raise the matter with the European Commission (CECED, 2008), and to our knowledge at least one

suspicious case regarding TVs has been under discussion in the context of the ADCO group (European Commission, 2011d).

Another way of misusing a measurement method is the strategic use of tolerances to claim a better energy performance. A concern for some time, the European Commission has recently moved to address the issue (European Commission, 2012b).

3.2 Relationship with regulations

3.2.1 Timeliness

Table 2 below provides an overview of the state of play of products groups for which Ecodesign and/or Energy Labelling measures were adopted between 2008 and 2012 (where requirement have already entered into force), and the status of the related harmonised standards.[24] The table indicates the year implementing measure(s) were published in the OJEU, the date the first Ecodesign requirements entered into force, the date in which the European Commission officially requested the European standardisation bodies to develop a harmonised standard, and finally where the process of developing such standards had got to by November 2013.

It should be noted that most of the products in Table 2 are covered by individual mandates that pre-date the horizontal Ecodesign mandate M/495 introduced in July 2011. Out of the fourteen product groups mentioned, the harmonised standards had been completed (as marked by citation in the OJEU for six product groups only: standby and off modes, external power supplies, motors, circulators, household dishwashers and tumble dryers (highlighted in green). That is to say less than 50%.

Table 2 Implementing measures, mandates and harmonised standards 2008-2012

Product group	Adoption of measure(s)	Entry into force of Ecodesign requirement(s)	Commission mandate to CEN / CENELEC	State of play (November 2013)
Standby & off modes	2008	Jan. 2010	Dec. 2008	Standard EN 50564:2011 has been cited in the OJEU in December 2012
Simple set top boxes	2009	Feb. 2010	Sep. 2009	2009 version of standard EN 62087 was not deemed satisfactory. 2012 version under evaluation by European Commission
Tertiary lamps	2009	Apr. 2010	Feb. 2011	A set of 'transitory measurement methods' has been published in 2010 until the availability of harmonised standard(s)
Power supplies	2009	Apr. 2010	Sep. 2009	Standard EN 50563:2011 has been cited in the OJEU in May 2013
Motors	2009	Jun. 2011	Jun. 2010	Standard EN 60034:2009 has been cited in the OJEU in December 2012
Circulators	2009	Jan. 2013	Jun. 2010	Standard EN 16297 has been cited in the OJEU in September 2013

[24] Since the measurement method used to establish energy performance is often the same for the purposes of Ecodesign as for Energy Labels (for a given product), the table does not distinguish between the two types of measures.

Product group	Adoption of measure(s)	Entry into force of Ecodesign requirement(s)	Commission mandate to CEN / CENELEC	State of play (November 2013)
TVs	2009 & 2010	Aug. 2010	Dec. 2010	2009 version of standard EN 62087 was not deemed satisfactory. 2012 version under evaluation by European Commission. A set of 'transitory measurement methods' has been published in 2010
Household fridge & freezers	2009 & 2010	Jul. 2010	Dec. 2009	A set of 'transitory measurement methods' has been published in 2010 until the availability of harmonised standard(s)
Household washing machines	2010	Dec. 2011	May 2010	Standard EN 60456:2011 has been completed in 2011 but European Commission requested some amendments
Household dishwashers	2010	Dec. 2011	Jan. 2011	Standard EN 50242 was completed in 2008 already, but has been under evaluation by the European Commission for a long time. A citation in the OJEU has been made in July 2013 but excluding a clause on tolerances and control procedures
Non-residential fans	2011	Jan. 2013	Jan. 2012	No harmonised standard has been cited yet
Domestic air-co.	2012	Jan. 2013	Feb. 2011	A set of 'transitory measurement methods' has been published in 2012 until the availability of harmonised standard(s)
Water pumps	2012	Jan. 2013	Oct. 2011	A set of 'transitory measurement methods' has been published in 2012 until the availability of harmonised standard(s)
Household tumble driers	2012	Nov. 2013	In M/495	Standard EN 61121:2013 has been cited in the OJEU in December 2013. This is an update of a standard already in place since an older mandate issued in 1994

Source: European Commission website and interviews with stakeholders

It can also be seen that for the six product groups where the standardisation process has been completed, this took some 2 to 4 years from the time of the official request from the Commission to the publication in the OJEU. In some cases, such as external power supplies and electric motors, the specific process to evaluate and agree to standards once they were released by standardisation bodies took a couple of years (and, it appears, even longer for dishwashers). This was in part due to issues related to some 'administrative content' missing in the adopted standards, such as certain annexes describing the relationship between the measurement method and the policy requirements.

For the eight product groups for which the process of citing harmonised standards had not yet been completed by November 2013, two types of situations can be distinguished. In the first

group a set of transitory measurement methods have been suggested by the European Commission.[25] [26] This applies to five product groups namely tertiary lighting, TVs, household fridges & freezers, water pumps and domestic air-conditioning (highlighted in blue). The second situation applies to three product groups namely simple set-top boxes, household washing machines, fans (not highlighted). Here there are neither completed harmonised standards in place nor transitional measurement methods indicated. This may be because the standards are still being assessed by the Commission, or have been deemed unsatisfactory. While there is neither a harmonised standard nor a transitory measurement method in place, it is left to the discretion of manufacturers and market surveillance authorities to use the measurement methods they see most fit for purpose.

Overall, the assessment shows substantial delays in the availability and recognition of harmonised standards. There appears to have been a variety of reasons for these delays. As noted above, following the 2004 request to the European standardisation bodies to develop a work programme, no individual mandates were issued until 2008. This made it difficult for standardisation organisations to deliver the harmonised standards in time for the entry into force of policy requirements. It was also noted that part of the reason for this may have been lack of resources within the Commission, as work got underway with developing the implementing measures for the large number of product groups foreseen in the 2005 Ecodesign Directive. This lack of resources seems to make itself felt in other parts of the process too, such as insufficient coordination and exchange of information between the European Commission and its consultants in charge of Ecodesign preparatory studies (on the one hand), and standardisation organisations (on the other).[27] This also appears to have meant that, once developed, it took more time for the European Commission to technically assess and approve the standards, than might have been the case. For instance, administrative delays could have been avoided with clearer instructions to the standardisation organisations and monitoring of the standardisation work in progress. This could have helped avoid standards being adopted by standardisation organisations while still missing some formal annexes. Finally, it can take time to develop standards within standardisation bodies, and perhaps the amount of time required was underestimated.

It remains to be seen whether the 2011 Ecodesign horizontal mandate to standardisation organisations (and the more recent contracts to send additional technical and NGO experts to technical committees of CEN and CENELEC) will help improve the pace of delivery and validation of the standards. It does tackle some of the existing weaknesses in the system as discussed in the preceding sections, e.g. by providing an overarching planning framework and increasing the European Commission's and other stakeholders' capacity to be present in the process, and thus enhancing the possibilities of co-ordination between the development of implementing measures and their supporting harmonised standards. For the horizontal mandate set-up to be swift and successful, the mandate annexes must be updated in a timely fashion with new product groups and with clear specification of the work for specific product groups (ANEC, 2010). However, some difficulties may remain. In their response to the

[25] This also applied to household dishwashers until the recent completion of harmonised standards for this product group.

[26] Transitory measurement methods are based on older or non-EU standards. Their purpose is to reduce legal uncertainties until the harmonised standards are completed and cited. However, as noted by in the evaluation of the Ecodesign Directive by CSES (2012) "*[t]he transitional arrangements that have been put forward on a number of occasions have been helpful but are not ideal and cannot replace standards.*" Transitory methods may not be perfectly fit for the policy measures, and potentially affect the initial stringency of the requirements. Market surveillance authorities may be reluctant to start testing products based on transitory methods, as their validity is time-limited and testing results may be more easily challenged by manufacturers. In addition, manufacturers may be less inclined to develop or place on the market more efficient or optimised designs if the testing is done according to old standards that cannot properly reflect these new developments.

[27] This issue was raised in an evaluation of the Ecodesign Directive: "*There should be far more dialogue between the consultants of the Ecodesign preparatory studies and the European standardisation organisations, preferably including discussions with relevant technical committees*" (CSES, 2012).

horizontal mandate, CEN and CENELEC sounded a note of caution with respect to the implied timelines for their work They considered that the timeline of 18 months for developing a standard would be "*difficult to reach*" and meant "*new ways of working*" for them (CCMC, 2010).

The objective of the horizontal mandate is mainly to ensure the availability of the harmonised standards once the Ecodesign and Energy Labelling enter into force. However, having access to up-to-date and effective measurement methods could be an advantage even earlier. At the stage of policy discussion and formulation it could help provide a clearer picture of the market performance and assess the ambition of future requirements. The lack of an agreed measurement method can sometimes be one of the reasons for difficulties and delays in the preparation of an implementing measure.[28] The analysis above suggests that for the time being this would be very difficult to achieve. It is however worth noting that the availability of harmonised measurement methods will enable to drawing up of *future* requirements in the context of the review and revision of existing Ecodesign and Energy Labelling measures.

3.2.2 Substantive alignment of measurement methods and policy measures

A central condition for the success of the European approach is the quality of interaction and synchronisation between the development of regulatory measures on the one hand, and of measurement standards on the other so that the output of the two processes align and complement each other adequately in terms of their content (European Commission, 2011b and 2012). Since policy measures and standards are supposed to be revised and updated regularly to take into account latest technological and market developments, the need for coordination is on-going.

The experience since 2004 suggests that some of the abovementioned weaknesses in the European approach could be mitigated not only by better forward planning (as addressed in the horizontal mandate M/495) but also by better interaction between the development of policy measures and their supporting standards.

This may however not always be as easy as it sounds. There are two dimensions to this. The first has to do with the appropriate division of labour between policy measures and harmonised standards, and the second has to do with optimising the synchronisation between the development of policy measures and that of standards. These two aspects, if not addressed properly, may be the source of misalignment between the content of standards and policy measures which in turn will cause subsequent difficulties.

Table 3 below provides several examples of some of the difficulties that have been experienced so far in the EU context and which point to the importance of these aspects. In some cases, the European Commission had to prepare and pass amendments to some Ecodesign measures to fix inconsistencies or insufficient alignment with standards. Amending an Ecodesign or Energy Labelling regulation is a lengthy and time-consuming process, as all regulatory steps need to be followed a second time.

3.2.2.1 Division of labour between policy measures and harmonised standards

In theory, the boundary between policy work and standardisation is clear: all aspects related to the measurement of parameters (including the measurement protocols, measurement instruments and technical uncertainty of the measurement) should be dealt with in

[28] As an example, the Ecodesign preparatory study for professional dishwashers and dryers concluded that "*the overall need for harmonised standards for testing and measuring the performance is seen as the most necessary step before implementing any further specific ecodesign requirements, labelling programme, benchmarking values or Minimum Energy Performance standards in the EU.*" (Öko-Institute et al, 2011). Since then, CENELEC has established a working group (CLC/TC59X/SWG 2) in this area.

measurement standards, while the setting of the level of the energy labelling classes and performance requirements are covered by the policy measures. In reality, there is often a *grey area* of technical issues that may be responsibility of either of the parties: for instance technical formulas for energy efficiency metrics, modelling to take into account different conditions or combination of technologies, adjustments or correction factors to ensure comparability between measured parameters, conditions in which the product needs to be placed before it is actually measured, etc. Even for tolerances, it is not always clear where the different 'layers' of tolerance are accounted for (measurement uncertainty, laboratory variability, production variability, 'arbitrary' level of tolerance for market surveillance activities, etc.). Thus, the division of labour between policy work and standardisation has been a little less clear cut than might be expected, and the consequences of this have sometimes been underestimated. More systematic clarification and guidance on these aspects to both policy and standardisation staff – especially new staff - may prove useful.

3.2.2.2 Synchronisation between the two processes

The synchronisation of the two processes needs to be considered carefully, in particular the timing of the mandating instructions to standardisation organisations.

If mandating comes too early in the policy process, it may be that measurement methods are developed while metrics that will be used in policy measures are far from being stabilised. It is then difficult for standardisation experts to anticipate the exact content of the work they need to prepare. On the other hand, if mandating comes too late in the process (once the policy measure is well advanced or finalised) the content of the policy measure may have to be built on the basis of old standard(s) (or no standard at all), and may contain technical details that may not be sufficiently aligned with the new harmonised standard.

In practise, policy-makers may use existing or draft standards to develop the product definitions, scope and descriptions of exemptions in their policy measures. Sometimes, they may be tempted to copy even more provisions from standards, for instance suggested metrics, formulas or other technical aspects. This can be successful if the standards were prepared with a view to support legislation and there is confidence that their content is stabilised and up-to-date. However, if these standards were not prepared for the purpose of supporting a legally-binding measure, the way the scope, definitions and exemptions were designed may make them unfit for purpose or provide unexpected loopholes. Besides, copying technical specifications from an insufficiently stabilised draft standard into a policy measure runs the risk of being inaccurate later on.

Table 3 Examples of past problems and their impact on the policy process

Nature of the problem	Description of the case	Impact on the policy process	Likelihood of recurrence
Loophole related to scope	<u>Electric motors</u> The Ecodesign regulation passed in 2009 included a definition of the scope and exemptions inspired by IEC/CENELEC standard 60034. The way one exemption was phrased triggered the risk of a loophole: motors able to operate in normal conditions but bearing a plate or declared as operating over a certain temperature or in high altitude could be fully exempted from Ecodesign requirements (European Commission, 2012a).	The European Commission had to prepare and pass an amendment to the regulation in order to fix this problem. Amending an EU regulation is a lengthy and time consuming process.	Such a problem may occur again. However, the involvement of standardisation experts as soon as the launch of Ecodesign preparatory studies could help avoid recurrence.

Nature of the problem	Description of the case	Impact on the policy process	Likelihood of recurrence
Misalignment of scopes	<u>Fans</u> The Ecodesign preparatory study for fans had originally limited its scope to ventilation fans in non-residential sector. During the policy discussion later on, some Member States and stakeholders requested an adjustment of the draft policy measure to be more in line with an ISO standard under development at that time. Consequently, the measure was better aligned with ISO and the scope extended to all non-residential fans (European Commission, 2011c). However, this late change in scope was negatively perceived by some manufacturers, who complained that this broader scope had not been analysed entirely in the original preparatory study.	Such moves bear the risk of decreasing industry acceptance of the regulation and process. Changing the scope in the middle of the policy discussion also increases the risk of adoption delays. The fact that a part of the new scope had not been studied in a preparatory study can also create difficulties.	The involvement of standardisation experts as soon as the launch of Ecodesign preparatory studies should help to better streamline the preparatory work of Ecodesign with that of standardisation, especially regarding scope aspects.
Policy measure overlapping with standardisation	<u>Domestic air-conditioners</u> As there was no European standard available for assessing the seasonal performance of air-conditioners, the preparatory study team decided to develop its own methodology. Standardisation work was initiated in parallel. In the end, two conflicting approaches had to be reconciled, which proved difficult. The Industry Federation European Partnership for Energy and the Environment (EPEE) claimed to have made efforts to "*work in parallel on standardisation and Ecodesign*" to make sure that "*the standards under preparation are ready to align*", but that "*the core calculation for determining the seasonal performance ha[d] been changed*" in the Commission version and was diverging from a version "*passed on into the standardisation process*" (EPEE, 2009).	Delays were reported in the preparation and adoption of Ecodesign and Energy Labelling measures for air-conditioners. They are in part due to this necessary reconciliation effort between the policy and standardisation.	Better planning through horizontal mandate M/495 and cooperation between preparatory study consultants and standardisation bodies should help, provided standardisation organisations agree to be actively involved in filling gaps sufficiently early (i.e. in the very early stages of the policy preparatory work).
Policy measure overlapping with standardisation	<u>Domestic washing machines</u> The European Commission copied certain equations and technical parts of a draft measurement standard into the Ecodesign regulation. However, some of this technical content proved inaccurate and should be modified, according to standardisation organisations.	Such a problem can lead to inconsistencies between the policy measure and the standard. Amending the policy measure is lengthy and time-consuming.	Better planning through horizontal mandate M/495 and cooperation at preparatory study stage should help, provided standardisation work can be accelerated.

Nature of the problem	Description of the case	Impact on the policy process	Likelihood of recurrence
Policy measure overlapping with standardisation	<u>Central-heating boilers</u> As existing standards for measuring and assessing the performance of space heaters (especially combination of systems) were relatively unsatisfactory and incomplete, the consultant in charge of the Ecodesign preparatory study developed an in-house holistic model specifically designed for the Ecodesign context. Several parts were going into very refined technical details. Boiler manufacturers complained several times that this approach should be dropped in favour of a simplified one *"using existing product standards"* (EHI, 2009).	Long delays experienced with this product group are in part due to the time required by policy-makers to evaluate in detail the different versions of the model, as well as to reach a compromise with industry. Now a pilot project between the EU Joint Research Centre (JRC) and CEN has been set up to work on the necessary standards.	The better planning through horizontal mandate M/495 and better cooperation between preparatory study consultants and standardisation should help, provided standardisation organisations agree to be actively involved in filling gaps sufficiently early (i.e. in the very early stages of the policy preparatory work).
Inaccuracy in tolerances	<u>Standby and off modes</u> When the Ecodesign regulation was prepared, the international IEC measurement standard for low power modes was under revision. EU decision-makers decided at that time to include in the regulation precise provisions regarding the uncertainty of the measurement procedure (i.e. *"Measurements of power of less than 0.50 W shall be made with an uncertainty of less than or equal to 0.01 W at the 95 % confidence level"*). However, CENELEC came back two years later with evidence that such uncertainty levels were not technically achievable for all products covered by the regulation (CENELEC, 2010). This has been acknowledged by the European Commission: *"In the light of the result of the standardisation process (…) some of the required uncertainties were identified as being too tight. At the time the Standby Regulation came into force EN 50564 was not available, and the uncertainties are now correctly specified in EN 50564"*. (European Commission, 2012e)	The provision will be deleted from the policy measure through an amendment to the regulation (European Commission, 2012e), and uncertainties specified in the measurement standard will prevail. Preparing such an amendment takes time. In addition, unachievable requirements create difficulties for manufacturers and surveillance authorities.	This difficulty could arise again if there is not a clear decision that measurement uncertainties should be specified in standards and not in policy measures. Uncertainties related to measurement procedures can be best defined in the measurement standards, while tolerances for market surveillance purposes are supposed to reflect the allowed variability in the production rely more on a political decision and can be set in the policy measures.
Inaccuracy in tolerances	<u>Domestic air-conditioners</u> For the declaration of the cooling capacity of an air-conditioner, neither the Ecodesign regulation published in 2012 nor the applicable measurement standard specifies a tolerance margin.	Manufacturers do not have confidence in how measurements should be declared, and market surveillance bodies lack a basis to undertake tests.	Such a difficulty could arise again, if there is insufficient coordination between the policy and standardisation processes.

In addition to these examples, a last potential source of misalignment is provisions in policy measures and/or standards that voluntarily or involuntarily lead to more favourable energy efficiency ratings than what decision-makers expected or anticipated. This in turn leads to policy measures that are less ambitious than intended. Examples of this are testing conditions or changes to former testing protocols that affect the resulting measurement.

With the recent changes brought to the EU process - especially an earlier coordination between the policy and standardisation work - the risk of intentional undermining seems rather limited but has been raised and discussed in a consultation meeting to which policy-makers and stakeholders participated (European Commission, 2009).

There are however examples of unintentional cases. For instance, the Ecodesign and Labelling measures for televisions specify that the consumption of TVs should be measured in a 'home mode'. It appears that by fine-tuning this mode, manufacturers have been able to claim very high energy efficiency levels. Even the industry refers to this provision as "*typically an artificial improvement of 30% of the apparent efficiency, that is a change of the test method rather than an improvement in real efficiency*" (Digital Europe, 2012). Solutions should be found to avoid that similar issues are replicated in future measures.

3.3 Compatibility of the EU approach with international harmonisation

Under this criteria, we assess whether the EU approach contributes to international efforts at increasing global harmonisation of regulations and measurement methods in the field of energy-using products.

The European Commission can only issue standardisation mandates to European standardisation organisations (CEN and CENELEC), and not international standardisation bodies such as ISO or IEC. However, there are agreements between these organisations[29] that provide the means for international standards to become European standards and vice versa. This has the potential to increase global harmonisation and avoids duplication of work. It also ensures a mutual influence, so that refinements in measurement methods developed at one of these levels can benefit the other. And it helps ensure that energy performance of products can be compared across between economic regions. The latest versions of these agreements have reinforced even more the primacy of international standardisation. We can conclude that by nature, European standardisation organisations are putting a strong emphasis on consistency with international standardisation.

When it comes to measurement methods for Ecodesign and Energy Labelling there is a clearly expressed desire among EU decision-makers and CEN and CENELEC to use internationally agreed standards as much as possible. In theory, this could mean that the work of CEN and CENELEC would mostly consist in converting ISO and IEC norms into EU harmonised standards. Illustrations of this can be found in the adopted Ecodesign measures for standby and off modes for which the measurement method EN 50564:2011 is directly inspired by IEC 62301; or electric motors for which the measurement is based on standard EN 60034-30:2008, directly copied and translated from IEC 60034-30.

However, such cutting and pasting is not always possible. For some product groups ISO/IEC standards may not be available, or be under revision or not wholly adequate. This may be because they are outdated, not designed to be applicable in certain conditions, or not covering all products to be regulated in the EU. In these cases, additional work is required in CEN and CENELEC to (re)design the measurement methods so that they are fit for the EU regulations under development.

[29] The Vienna Agreement between ISO/CEN and the Dresden Agreement between IEC/CENELEC.

3.4 Summary of assessment

This assessment comes at a time when the process of developing measurement methods for Ecodesign and Energy Labelling measures is undergoing changes, and where the impacts of these changes are yet difficult to discern. In particular, the European Commission has taken steps from 2011 onwards to streamline the mandating of new harmonised standards through a horizontal mandate. This brings changes in the relationship between the European Commission and European standardisation organisations, and from 2013 onwards greater resources for Commission and NGO experts to follow the standardisation work. This assessment is therefore to a certain extent retrospective in as much as it mainly addresses the situation prior to these changes or to their full effect. As such, it may serve as a kind of benchmark against which to assess the effectiveness of changes in the future. It can also serve as a useful pointer to some of the issues that should be paid particular attention to going forward.

3.4.1 Intrinsic characteristics

It was noted that there is a case for improving the *representativeness* of measurement methods but that this should be balanced against cost and complexity. *Cost and practicability* will also be challenged by the inclusion of more complex (commercial and industrial) products over time. It was noted that *repeatability and reproducibility* are fundamental aspects that standardisation organisations are used to consider and address, but that a greater systematisation of round robin testing could be envisaged. With respect to *integrity against misuse*, it was noted that there is no systematic evidence of illegal practices yet in the EU context, although there is nevertheless a persistent concern about the issue. While the European Commission moved lately to clarify that tolerances shall not be used improperly to inflate energy ratings, it may be useful to have a more dedicated look at other forms of misuse or the way in which technological developments may increase this risk.

3.4.2 Relationship with regulations

The temporal and substantive alignment of measurement methods and regulations they are designed to support was assessed. It was shown that over the period 2004-2012, there were significant delays in mandating, producing and citing the harmonised standards. The objective of having harmonised standards systematically in place when policy requirements enter into force is not met yet. While transitory measurement methods have sometimes been indicated as a temporary solution, this situation is unsatisfactory. It was also found that the substantive alignment of measurement methods and regulations had sometimes been difficult to fine-tune (due in part to coordination and synchronisation challenges during the development process), resulting in delays and need to amend some measures or standards afterwards. Early and steady interaction between the two processes is the way forward, and lessons can be learned from past difficulties. A concerted effort will be required by all involved to catch up delays and assure a systematic alignment between policy measures and standards, while not compromising on the expected intrinsic qualities of measurement methods.

3.4.3 Compatibility of the EU approach with international harmonisation

EU standardisation organisations CEN and CENELEC and the European Commission put a strong emphasis on consistency with international standardisation. As a consequence, several of the EU harmonised standards adopted thus far or in preparation are directly inspired or copied from ISO and IEC standards. This contributes to international harmonisation efforts.

4 Potential ways forward

In this section potential ways forward are considered, in particular with a view to addressing the weaknesses of the current process highlighted in the previous section. It is mostly an invitation to a discussion among interested parties as to whether – and to what extent -, there is an opportunity and scope to improve the EU approach.

There are two parts to this exercise. Firstly, further ideas and suggestions for how the current process could be improved are outlined. This is based on maintaining the overall set-up and institutional balance as it is. Secondly, four more exploratory scenarios for change are presented, including some that would mean quite substantial modifications to the EU set-up.

4.1 Improvements to current processes

Maintaining the approach currently in place would have the advantage of minimising the need for legal or structural changes. In this context, there may still be some opportunities for improving the process as outlined in Box 2 below.

Box 2 A menu of options for improving the current set-up

1. The European Commission could develop a handbook and training on standardisation for its policy officers, where past difficulties would be documented and more systematic instructions would be provided to reduce substantive and administrative misalignment risks;
2. Following the adoption of a new triennial Ecodesign Working Plan, the Commission could already screen its content alongside standardisation organisations and jointly prepare a prioritisation and schedule of work consistent with the international and European standardisation agendas;
3. At kick-off meetings of Ecodesign preparatory studies, procedures and budgets should be considered for the production of test data to inform policy decision, including the use of EU funds for inter-laboratory tests for new measurement standards and collaboration with some market surveillance authorities. At these meetings, the schedule of standardisation work should also be discussed;
4. Stakeholder meetings of Ecodesign preparatory studies and meetings of related standardisation technical committees could be organised back-to-back and in the same place. This would facilitate the participation of industry, NGO and independent experts in both;
5. The scope and exemptions in Ecodesign, Energy Labelling measures and measurement standards should be co-ordinated and fixed as early as possible, to reduce the risk of loopholes and uncertainty. In general, exemptions should only be granted when there is robust technical justification;
6. Policy measures should generally avoid getting into too refined technical details of metrics, formulas and testing conditions, in order to avoid inconsistencies with existing or future standards. Copying parts of draft standards in policy measures should be done with extra caution and discussed with standardisation committees beforehand, and only included where they are necessary to the clarity of the policy measure. The technical content of policy measures should be sufficiently generic so that it can remain unchanged for as long as possible and limiting the need to introduce subsequent amendments on technicalities. Mandating instructions to standardisation organisations can be quite detailed in order to clear any risk of misinterpretation;
7. If tolerances are to be provided for market surveillance activities, these should be included within policy measures, while measurement standards are the place to specify measurement uncertainties. These allowances should generally be as small as possible and be well justified;
8. In the revision clauses of Ecodesign and Energy Labelling measures, indications are usually provided of what will be key aspects to study in order to improve the requirements at a later stage. More details regarding which measurement methods require development or revision to allow the setting of future requirements could be mentioned. This could then trigger an immediate inclusion in the annexes of mandate M/495 and the start of relevant standardisation work earlier than might otherwise be the case.

4.2 Four scenarios exploring more significant changes to the EU approach

This section sets out four exploratory scenarios which could inform discussion about how the EU approach may develop in the future. In particular it considers the extent to which modifying the EU approach in line with each of these scenarios would be likely to speed-up the delivery of measurement methods and ensure better coordination between the development of policy requirements and that of measurement methods.

The scenarios have been chosen because they either reflect what is implemented in other jurisdictions, have already been identified as potential options in other studies, or were suggested by interviewees as a potential way to improve some of the current issues in the EU. For each, a list of potential advantages and disadvantages are explored, with the aim of making a contribution to future discussions on the evolution of the EU process. For this reason, no preference for any of the options is given.

4.2.1 Scenario 1: Increase delegation to standardisation organisations

One of the options for ensuring better coordination would be to increase the scope of the work delegated to standardisation bodies, so that they intervene not only on measurement methods, but also on product definitions, scope, exemptions, energy efficiency metrics, tolerances for market surveillance and, potentially, the level of Ecodesign requirements and Energy Labelling classes to be adopted by decision-makers.

Increasing the scope of the delegation to standardisation bodies was promoted by some policy makers and stakeholders when the 2005 Ecodesign Directive was first developed (in the spirit of the New Approach principles). More recently, this option has been put forward again and discussed in a report from the Association of Swedish Engineering Industries (Teknikföretagen, 2011).

Potential advantages:

- Greater consistency of technical content underpinning the policy (as all technical content would be developed in the same arena);
- Greater chances of global harmonisation if, for instance, efficiency formulas and metrics as well as the way to define different efficiency classes are aligned between standardisation organisations around the globe;
- Less work and burden for EU policy-makers and administration, because they would not need to be involved as much in developing technical working documents and regulations (although they would still need substantial technical expertise downstream to assess the relevance and applicability of the broader harmonised standards).

Potential disadvantages:

- Risks entailed in the delegation to standardisation organisations of decisions of a political nature. The level of ambition of Ecodesign and Energy Labelling requirements, and sometimes even the choice of a scope or that of an energy efficiency metric have direct consequences on the achievement of policy objectives. Important policy decisions would be channelled to bodies that have not been created for this purpose, and in which the balanced representation of societal stakeholders is not always guaranteed;
- A risk of less ambitious legislation, as standardisation organisations operate under the rule of consensus, which can often tend towards some sort of lowest common denominator;
- No obvious progress on timeliness issues, as the process could still be lengthy, perhaps even slower than the adoption of policy measures today, due to potentially even longer time for the preparation, adoption and citation of harmonised standards. Instead of two parallel work streams, everything would rest on the shoulders of standardisation bodies.

4.2.2 Scenario 2: Decrease delegation to standardisation bodies

A contrasting option would be to reduce or even cease altogether delegation of measurement methods to standardisation organisations. Under this scenario, the European Commission would control the development of both policy and measurement methods. In practice, the technical work could take place in one of the EU technical bodies (for instance the JRC) or through outsourcing to technical consultancies.

This model is akin to the one followed in the US (Waide, 2013). US DOE has control over the development of both measurement methods and minimum energy performance rules and measurement methods are usually developed before policy measures. In addition, the process is governed by stricter deadlines and a higher level of resources than in any other country.

In the European context it could for example take the form of the creation of a broader European agency for standards (i.e. not just for Ecodesign) under the auspices of the European Commission to replace the whole CEN and CENELEC. Such an option was considered in the Impact Assessment for the review of the EU legislative framework for standardisation (European Commission, 2011a). It was however not taken forward.

Potential advantages:

- Better alignment of timelines and agendas of policy measures and measurement methods, as these would be centralised under the same body;
- Higher chances for coordination between policy measures and measurement methods and swifter resolution of alignment problems, since the same technical experts could be mandated to support both and technical assessments could be synchronised.

Potential disadvantages:

- A need for additional public resources to increase the technical expertise within the European Commission;
- Would not necessarily develop measurement methods in a faster way since participation from industry experts could be less easy to secure compared to the well-established working procedures in standardisation organisations.

4.2.3 Scenario 3: Increase European Commission control over standardisation

Under this scenario, the task sharing between policy and standardisation would not change, but the European Commission would be granted greater powers to initiate, drive and control the development of harmonised standards. This would require a certain change of philosophy in the standardisation process, as so far it is currently voluntary-based and characterised by a substantial degree of independency and autonomy.

A set-up could be imagined in which the European Commission (or consultants assisting it) would produce a first draft of the measurement methods which would then be passed to standardisation organisations for comments and validation. The draft would include the key elements, and the role of CEN and CENELEC would be limited to filling the technical gaps. This type of process has been used in Australia to speed-up and control the delivery of some test methods.

More legal sticks could be envisaged to constrain standardisation bodies, such as a possibility for the EU to take these organisations to court or submit them to high financial penalties if the standards are not delivered in time or are not fit for purpose.

The 2012 revision of the EU legislative framework for standardisation made a few steps in this direction. Standardisation organisations are now required to publish a yearly work programme, and the European Commission can request the delivery of harmonised standards within set

deadlines which standardisation bodies must meet in order to receive public support (EU, 2012). However, as public funding is not dominant in the CEN and CENELEC operational budgets, the impact of the latter stick may be limited.

Potential advantages:
- More control from EU policy-makers on the timescale for the development and delivery of standards, in particular through higher pressure on standardisation organisations to speed-up their activities and reach consensus;
- Reduced risk of administrative mistakes triggering delays (such as the lack of a formal annex or item in the harmonised standards).

Potential disadvantages:
- Less autonomy and flexibility in the preparation of standards, with a related risk of rushing some standardisation work and not reaching expected technical quality;
- A risk that CEN and CENELEC would refuse to work on mandated standards (especially where they are likely to be contentious), to avoid the risk of loss of credibility or legal action.

4.2.4 Scenario 4: Direct link to international standardisation

Since there is an increasing trend towards the globalisation of energy-using products, CEN and CENELEC work in this sector is already closely related to, and relies heavily upon, international standardisation. It is possible to imagine a scenario where the need for separate European standards in this sector becomes unnecessary. This scenario assumes that the international standards developed by ISO and IEC could meet the EU need for standards in this area fully. Only international measurement methods would be cited, and gaps would be filled by mandating standardisation work directly at ISO and IEC levels. This is currently not legally possible for the European Commission to do.

Potential advantages:
- Further increased international harmonisation, *de facto*;
- Less duplication and paper work between the International and European levels, which could mean saved time as well in administrative procedures. European industry and independent experts, as well as consultants appointed by the European Commission could be more actively involved in the work of ISO and IEC directly to ensure that the standards are fit for the EU;
- Increased chances for a more balanced process, as the standard development in ISO and IEC brings experts and company representatives from all over the world, thus diluting the risk of a single interest dominating the process (although some could argue that such domination does currently exist sometimes at IEC and ISO levels).

Potential disadvantages:
- Increased problems of synchronisation, as the EU policy process would be more strongly dependant on an international process involving more participants. Development of some policy measures could be slowed down: "*The slow pace of international standardisation may also be frustrating to national governments and potentially incompatible with local policy roadmaps*" (Ellis and Rozite, 2013);
- Less control over measurement methods, as the European Commission would have more limited influence than it currently has in CEN and CENELEC;
- Potentially less transparency in the development of measurement methods, as European stakeholders (such as civil society organisations) would probably have more difficulties in participating in international standardisation.

5 Conclusion

It is well-established that robust measurement methods are an essential part of the building blocks of any energy performance standards and labelling programme.

In Europe, the implementation of Ecodesign and Energy Labelling measures has suffered from delays in the development of related measurement standards, and sometimes there have also been inconsistencies between policy measures and measurement standards. This can among other things lead to difficulties in the enforcement of implementing measures. The consequences of insufficient coordination between the development of policy measures on the one hand, and the measurement methods that underpin them, on the other, has been analysed in some depth in this paper.

While the European Commission has taken steps to improve the situation, it is too early to say how effective these will be in practice. It has also been argued that with the introduction of more complex products, greater emphasis to systemic energy consumption, and wider environmental impacts, all parts of the framework for setting Ecodesign and Energy Labelling requirements will come under greater pressure, including the aspects that relate to the development of adequate and well-aligned measurement methods.

It is therefore necessary to pay attention to any implications for standardisation arising from the simultaneous review and revision of the Ecodesign and Energy Labelling Directives planned in 2014 and 2015; and furthermore, to consider whether there are opportunities for improving the European approach to setting measurement methods underpinning these policies in the context of the review. In the present paper, a menu of simple ideas for improvement of the present set-up and a set of scenarios exploring more substantial changes have been outlined and discussed.

6 References

ANEC (2010), Final ANEC comments on the Commission's Ecodesign horizontal mandate and future way of working between the Commission and ESOs.

CCMC (2010), Ecodesign and standardisation - EC draft horizontal mandate on Ecodesign - ESOs perspective.

CECED (2008), CECED's Anti-circumvention position.
http://www.ceced.org/ICECED/easnet.dll/Execreq/News?eas:dat_im=000009&eas:year=2008

CENELEC (2010), Progress Report of CENELEC joint working group on standby (JWG).

Choice (2010), LG accused of greenwashing (article on www.choice.com.au).

CLASP (2005), Energy-Efficiency Labels and Standards : A Guidebook for Appliances, Equipment and Lighting (Ed. 2).
http://www.clasponline.org/Resources/Resources/StandardsLabelsGuidebook

CLASP (2011), Analysis of Background Illuminance Levels During Television Viewing.
http://www.clasponline.org/en/Resources/Resources/StandardsLabelingResourceLibrary/2011/Background-Illuminance-Levels

CLASP (2013), Estimating potential additional energy savings from upcoming revisions to existing regulations under the ecodesign and energy labelling directive. A contribution to the evidence base. Published in collaboration with eceee.
http://www.clasponline.org/~/media/Files/SLDocuments/2013/Estimating%20Potential%20Additional%20Energy%20Savings.pdf

CSES (2012), Evaluation of the Ecodesign Directive (2009/125/EC) - Final Report.
http://www.cses.co.uk/ecodesign_evaluation/documents/

Digital Europe (2012), Pre-consultation forum response to the report entitled 'CF paper on the review of TV regulations and displays'.
http://www.digitaleurope.org/Portals/0/Documents/ENV/EcoDesign/DE%20Response%20Pre-CF%20Lot%205%20IM_20121005.pdf

ECOS (2010), Comments on the European Commission's horizontal Ecodesign mandate and future way of working between the Commission and the ESOs.

EHI (2009), Extended product proposals for Ecodesign Lot 1, 20 May 2009.

Ellis, M. and Rozite, V. (2013), A spanner in the works? Are ambitious energy efficiency policy objectives frustrated by the standardisation processes or can ambitious technical standards accelerate progress? *Presented at the 2013 eceee Summer Study*.
http://proceedings.eceee.org/visabstrakt.php?event=3&doc=1-367-13

EPEE (2009), Comments in preparation of the consultation forum of 22 June 2009.
http://www.epeeglobal.org/epeedocs/internet/docs/EuP_-_Lot_10_-_EPEE_additional_comments_-_12062009_2781.pdf

EU (2012), Regulation (EU) n° 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation.
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:316:0012:0033:EN:PDF

European Commission (2000), Guide to the Implementation of Directives Based on the New Approach and the Global Approach.
http://ec.europa.eu/enterprise/policies/single-market-goods/files/blue-guide/guidepublic_en.pdf

European Commission (2004), Mandate M/341 to CEN/CENELEC/ETSI for Programming of Standardisation in the Field of Eco-Design of Energy-Using Products.
http://ec.europa.eu/enterprise/policies/sustainable-business/documents/eco-design/standardisation/files/mandate_en.pdf

European Commission (2009), Minutes of the first meeting of the Ecodesign Directive Working Group.

European Commission (2011a), Commission Staff Working Paper – Impact Assessment Accompanying Proposal for a Regulation of the European Parliament and of the Council on European Standardisation.
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:0671:FIN:EN:PDF

European Commission (2011b), Horizontal Standardisation Mandate to CEN, CENELEC and ETSI under Directive 2009/125/EC Relating to Harmonised Standards in the Field of Ecodesign (M/495). ftp://ftp.cencenelec.eu/CENELEC/EuropeanMandates/M_495.pdf

European Commission (2011c), Explanatory Memorandum accompanying Commission Regulation with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W - 500 kW.
http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&5ZbPCjUd5PCvU9zTF83xMzxULz92u0YVCZ82bVv1LibFVn2fKR/JLqARftA4KsTY

European Commission (2011d), Consolidated list of questions on grey areas for the Ecodesign ADCO meeting of 3 October 2011.

European Commission (2011e), A strategic vision for European standards: Moving forward to enhance and accelerate the sustainable growth of the European economy by 2020 Communication from the Commission to the European Parliament, the Council and European Economic and Social Committee. COM(2011)

European Commission (2012a), Explanatory Notes accompanying Draft Commission Regulation Amending Regulation (EC) N° 640/2009 with regard to ecodesign requirements for electric motors.
http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&glj03s0IyyPv0Pe0Mc27Q6yUgpHbOeMXvLKx8KZ3hNADftvKFOKx2dvStAkgOQoq

European Commission (2012b), Working Document on tolerances used in Ecodesign and Energy Labelling Implementing Measures.
https://www.wko.at/Content.Node/Service/Umwelt-und-Energie/Energie-und-Klima/Energieeffizienz/Note_on_Tolerances_.pdf

European Commission (2012c), Minutes of the 2012 Ecodesign Working Group meeting.

European Commission (2012d), Discussion paper on the review of the Ecodesign and Energy Labelling Regulations for televisions and on the draft Regulation on electronic displays, including computer monitors.
http://www.ebpg.bam.de/de/ebpg_medien/tren5/005_workd_12-08_revision.pdf

European Commission (2012e), Explanatory Memorandum to Commission Regulation amending Commission Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment.
http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&63GyaMlgMyp6oHHpJlUFSW4sPu2kRlXNgDa2VMHlqcoDftvKFOKx2dvStAkgOQoq

Frankel Christian (2004), Why has Technical Standardization become a Tool for Environmental Policy?, *The Journal of Transdisciplinary Environmental Studies vol. 3, no. 2, 2004.*
http://www.journal-tes.dk/vol%203%20no%202/Christian%20Frankel_h%f8j.pdf?id=00029

IEA (2010), Transforming Global Markets for Clean Energy Products – Energy Efficient Equipment, Vehicles and Solar Photovoltaic.
http://www.iea.org/publications/freepublications/publication/global_market_transformation.pdf

Öko-Institute, BIO Intelligence Service, Büro Ö-Quadrat (2011), Preparatory Studies for Eco-design Requirements of Energy-using Products - Lot 24.
https://circabc.europa.eu/w/browse/f27f80a1-0cb3-4bb3-b73d-d75fa23c0b54

Siderius, P.J.S. (2013), Speeding up adopting ecodesign and energy labelling measures – analysis, challenges and solutions. Proceedings of ECEEE Summer Study, June 2013, pp. 1627-1639.
http://proceedings.eceee.org/visabstrakt.php?event=3&doc=6-068-13

Teknikföretagen (2011), Ecodesign Directive: How to Create a More Efficient Legislation.
http://www.teknikforetagen.se/Documents/Miljo/Ecodesign_directive_how_to_create_a_more_efficient_legislation.pdf

Vardakas, E. (2003), Standardisation and the Directive 98/34/EC. Historical Background. *From:* Vademecum on European Standardisation. Part I: General Framework. Chapter 1.1.
http://ec.europa.eu/enterprise/policies/european-standards/files/standards_policy/vademecum/doc/standards_directive_98_34_history_en.pdf

Waide, P. (2011), Opportunities for Success and CO_2 Savings from Appliance Energy Efficiency Harmonisation. Published by CLASP.
http://www.superefficient.org/~/media/Files/CLASP%20Harmonization%20Study.pdf

Waide, P. (2013), International Comparisons of Product Policy. Published by EEB.
http://www.coolproducts.eu/resources/documents/Comparison-Report/International-Equipment-Efficiency-Comparison-Report_FINAL.pdf

Waide, P., Watson, R., Eide, A. and Scholand, M. (2011), Enforcement of energy efficiency regulations for energy consuming equipment: findings from a new European study. Proceedings of EEDAL, 2011, Copenhagen, Denmark.
http://re.jrc.ec.europa.eu/energyefficiency/EEDAL/EEDAL11_Proceedings/33/Policy4_Paul_Waide.pdf

Winward J., Schiellerup P. and Boardman B., 1998. Cool labels. The first three years of the European energy label, Environmental Change Unit, University of Oxford; European Commission, Contract DG-TREN SAVE N°4.1031/E/97-001.
http://www.eci.ox.ac.uk/research/energy/downloads/coollabels.pdf

Annex A: Methodology

The paper is based on a mixture of desk research and interviews with key stakeholders conducted at end of 2012 and beginning of 2013. In addition, the author draws on his experience of working (from 2007 to 2013) in the field of Ecodesign and Energy Labelling for a non-governmental organisation monitoring both processes. There is thus an element of (informal) participant observation in the method.

A.1 Desk research

Literature from the following sources has been reviewed:

- CLASP reports and handbooks on standards and labels.
- Scientific literature on measurement standards (especially from Lawrence Berkeley National Laboratory).
- Communication and guides from the European Commission on European standardisation.
- Standardisation mandates from the European Commission in the area of measurement methods, especially horizontal mandate M/495 on Ecodesign measurement methods.
- Guidance documents from standardisation organisations CEN and CENELEC.
- Legislation and studies related to EU Ecodesign and Energy Labelling measures.
- Minutes of Ecodesign Consultation Forum, Ecodesign Working Group and CEN-CENELEC Ecodesign awareness meetings related to measurement methods.[30]
- Position papers from various stakeholders on these policy measures and measurement methods.

A.2 Interviews

Seven interviews were conducted in December 2012 and January 2013, focusing on the most important decision-making bodies and stakeholders involved in the process covered: EU policy-makers on Ecodesign and Energy Labelling (European Commission, Member States), standardisation organisations (CEN-CENELEC), manufacturers, NGOs and independent experts:

- Marcos Gonzalez Alvarez (European Commission, DG Energy).
- Cesar Santos-Gil (European Commission, DG Enterprise).
- Hans-Paul Siderius (Ecodesign and Energy Labelling expert for the Dutch government).
- Alexandre Della Faille de Leverghem (CEN-CENELEC Management Centre).
- Matteo Rambaldi (CECED, the European federation of appliance manufacturers).
- Stamatis Sivitos (ECOS, the European Environmental Citizens' Organisation for Standardisation).
- Bob Harrison (expert on the energy efficiency of electronics).
- Conrad Brunner (expert on the energy efficiency of electric motors, fans and pumps).

Each interviewee was provided with a short overview of the study context and outline. Interviews lasted between 1h and 1h30 and were conducted face-to-face with the exception of the last two.

An overall interview guide with questions focussing on three main areas was developed and is shown in Box 3 below. The exact list of questions and time allocated to each part has been tailored to each interviewee, based on the areas he was most likely to contribute to. After each interview, an interview report of 3 to 4 pages was sent to the interviewee for review and correction on the basis that these would remain confidential.

[30] The minutes are available on websites with a restricted access to members of the Ecodesign Consultation Forum or associated members of standardisation organisations.

Box 3 Interview guide

The process of setting measurement standards for Ecodesign and Energy Labelling measures

1. Has the process of preparing/updating measurement methods for Ecodesign and Energy Labelling measures worked fine so far in your opinion?
2. Currently, none of the harmonised measurement standards prepared by CEN-CENELEC have been published in the OJEU, while several Ecodesign and Energy Labelling regulations have already been issued. How do you rate the importance of these timeliness issues?
3. What are the consequences of the current situation?
4. What are in your opinion the causes to this late publication of standards? Are they identical across product groups?
5. Do you think that this situation is only transitory or reveals more fundamental difficulties?
6. In your opinion, what have been the reasons for the recent changes in the process?
7. Do you think that these changes will improve the process effectiveness?
8. Apart from timeliness aspects described before, what other criteria seem important to you in the evaluation of this process?
9. Do you see other main strengths and weaknesses to mention about this process?

Aspects related to the content and technical adequacy of measurement standards

1. What are in your opinion the most essential qualities that measurement standards should have to be fit for their job?
2. When measurement standards and Ecodesign/Labelling regulations are prepared, what are the main potential risks of inadequate alignment and interaction between both?
3. Do you have negative and/or positive examples of such alignment aspects, that have already been experienced? Did the negative ones hamper the development and adoption of policy measures?
4. The study author has so far identified 8 potential areas of this nature: Missing or incomplete standards; scope differences; Overlaps in technical specifications; tolerance/uncertainty discrepancies; measurement methods affecting the stringency or integrity of regulations; difficult applicability of measurement standards; representativeness of measurement conditions; risks of misuse and circumvention techniques. Does this sound as a comprehensive and relevant categorisation?
5. Do you think that some of these risks are now well understood and will be systematically avoided?
6. If not, what should be done?

Ways forward and recommendations

1. Do you see short-term modifications/improvements that could have a positive impact to better streamline the parallel work of EU institutions and standardisation organisations?
2. What is your view on the following possible recommendations identified by the author?
3. How does the EU process compare to other jurisdictions having a different approach (for instance the US, where the same administration is in charge of developing both the measurement methods and regulations, and does so one step after the other)?
4. Do you believe that a fundamentally alternative approach should and could be envisaged in the EU, and how would it work?
5. To which extent do you think that the 2014 revision of the Ecodesign and Energy Labelling Directives should address these questions?