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A spanner in the works?

Are ambitious energy efficiency policy objectives frustrated by the standardisation processes or can ambitious technical standards accelerate progress?

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Abstract

International technical standards can be instrumental in creating global markets for efficient energy technologies. Technical standards play an important and growing role in support of energy efficiency performance requirement and labelling programs for appliances and equipment. The growth in the scope of standards and labelling (S&L) programs globally, together with calls for greater harmonization, has reduced the use of local test methods and increased reliance on international test methods.

Energy efficiency has typically not been a key consideration in the development of technical standards but over recent years several government-led initiatives have attempted to make standards more appropriate to their policy ambitions. The improvement of test methods and inclusion of energy performance tiers as informative guidelines within international technical standards are amongst these initiatives. While not mandatory, the latter have been seen as a means of limiting the number of different performance requirements called up by government S&L programs, leading to reduced compliance costs. There may also be benefits for developing countries that do not necessarily have the resources to develop their own performance requirements. If sufficiently ambitious, performance tiers could also inform on successive updates of requirements for countries with established programs.

However, some governments and experts query the wisdom of such approaches, which they say provide industrial lobbyists with the opportunity to limit minimum energy performance requirements at an un-ambitious level. Many governments are also concerned about the lack of a formalised structure within international standardisation processes to take account of policy ambitions. The slow pace of international standardisations may also be frustrating to national governments and potentially incompatible with local policy roadmaps.

This paper will describe several recent successful, as well as unsuccessful, experiences with using international standards to advance energy efficiency for products. It will also discuss the pros and cons of this approach and identify a range of potential solutions that will make it more likely for governments to realize their policy ambitions.

Introduction

The Link Between Energy Efficiency and 'Technical Standards'

As governments develop strategies in response to the challenges posed by climate change and the need to maintain secure energy resources, there is growing demand to build on successful energy efficiency initiatives, such as Standards and Labelling (S&L) programs.

Despite considerable achievements to date, the potential exists for even greater energy savings from S&L in the future as markets and technologies develop. Appliances and equipment are being used by an increasing proportion of the world's population, and new categories of energy consuming devices are appearing continually. Many of these product categories are largely untouched by existing energy efficiency policies (OECD/IEA, 2009).

In view of their ability to stimulate markets for high efficiency products and provide opportunities for the next generation of efficient technologies, many governments around the world are therefore encouraging the expansion of their S&L programs, or initiating new ones, in order to have a greater impact (OECD/IEA, 2011).

National or regional voluntary and mandatory S&L programs, as well as other product policy measures, rely upon an ability to measure the performance of energy consuming products for a given level of energy service. They therefore need to define:

- Test methods that can provide repeatable and reproducible determinations of energy performance in specified energy-using appliances and equipment.
- The way that energy performance will be identified, known as the efficiency metric.
- Energy performance thresholds, requirements or targets for defined equipment, measured according to a specified test method. (Waide, 2011)

Although these are contained in a single document in some S&L programs, they have very different purposes, development and governance issues and therefore should be considered as separate components. In this paper they will be referred to as 'Test Methods', 'Efficiency Metric' and 'Performance Thresholds' where feasible in order to maintain the distinction. Where both are referred to collectively, they will be referred to as "standards".

The Link Between S&L Programs and 'Technical Standards'

Most national S&L programs (e.g. minimum energy performance standards (MEPS) and energy labelling) are established through legislation which provides the institutional framework and sets the necessary powers for the S&L programs to operate. S&L programs may also publish administrative 'rules' that provide additional details of program implementation. It is a basic requirement of any S&L program that the legislation, associated regulations or administrative rules:

- Define the scope of the program and the target products.
- Identify the test method and efficiency metric to be used in the measurement of energy performance.
- Identify the relevant performance thresholds required under the program (Waide, 2011).

In this way, managers of national or regional S&L programs have the ability to select the Test Methods, Efficiency Metric and Performance Thresholds that they believe are most appropriate to their circumstances. This includes the referencing or replication of external documents including test methods or performance thresholds from other countries, or international standards, benchmarks, etc. This practice is frequently used to enforce external standards, guidelines or other documents that are not otherwise mandatory.

Energy Efficiency in International Standards

The Role of International Technical Standards

In general, international technical standards provide clear identifiable references that are widely recognised and encourage fair competition and trade through greater interoperability and compatibility, greater ease of maintenance and reduced compliance costs. Conversely,

incongruent standards can be barriers to trade, giving some organisations advantages in certain areas of the world.

Amongst the international standards that contain test methods for the energy performance of appliances and equipment, many are currently used by S&L Programs as the basis for measuring product performance[1]. In some cases, these international standards are referenced directly, while in other instances a national or regional technically equivalent copy of the standard is referenced.

In response to calls from the World Trade Organisation amongst others (see later section), it is common for individual countries and regional groups to have policies that require the use of international standards, unless there are good reasons for not doing so (i.e. see ASEAN, 2012). For example, China has a policy of using international test methods when they are available and suitable for domestic purposes, and 59% of the test methods for products covered by the S&L program are derived from ISO or IEC standards, with 15% derived from US standards (Waide, 2011).

Even where countries have adopted a policy of using international test methods, there are valid reasons why they may not do so. These include where:

- No current international test method for this category of equipment exists. For example, there are very few test methods for energy using systems.
- The current international test method is insufficiently accurate for the intended purpose.
- The local product market has developed based on an existing test method creating costs in transitioning to a new protocol.
- There are significant regional differences in climate and product usage that influence the performance of equipment and may be reflected in different designs. Creating standards that can cope with these regional variations is not a trivial matter (Harrington, 2009).

The difficulties associated with tackling these issues are well illustrated by the example of domestic refrigerators, a widely traded product with sales of 100 million per annum, and subject to energy efficiency requirements in over 60 countries using at least 10 different test methods (Harrington, 2009). Efforts spearheaded by the Japanese government and industry since 2002 have led to the development of IEC 62552, first released in 2007 and then as a revised committee draft in 2011, which aims to more accurately reflect real usage and take into account regional climatic variations. Getting to this stage has taken a substantial investment by the Japanese, and further investment in training public and private test laboratories will be required before this test method can be widely adopted.

The Role of International Energy Performance Tiers

The inclusion of energy performance tiers or performance classes in international performance standards, which could be used or referenced by national energy efficiency schemes as the basis for their mandatory or voluntary performance specifications, may also have benefits.

In general, informative tiers within international technical standards may provide stepped levels of energy performance appropriate for different types of policy measures (e.g. to remove the worst performing products or promote the best) in different national circumstances (e.g. developed or developing economies).

An example of this approach is IEC 60034-30, *Rotating electrical machines: Part 30: Efficiency classes of single speed, three-phase, cage-induction motors*, where informative

[1]For example, IEC 60969 is widely used by Programs targeting compact fluorescent lamps, standby power is measured according to IEC 62301 in many regions and IEC 60076 is typically used to determine the performance of distribution transformers.

performance classifications have been included. The forward stresses the harmonization aims of this standard:

> *"This IEC standard provides for the global harmonization of energy-efficiency classes of electric motors. It deals with all kinds of electric motors that are rated for sinusoidal voltage as long as their efficiency can be determined independent of the voltage source."*

The classification of nominal efficiencies is provided in a series of tables in IEC 60034-30, which specify the performance of IE1 (low) to IE4 (high), when motors are tested to IEC 60034-2-1.

It should be noted that IEC 60034-30 does not usurp or interfere with the rights and responsibilities of governments, or other bodies, from setting their own performance requirements for motors. IEC 60034-30 establishes a suite of threshold efficiency levels and their classification that can be referred to, or called up, by national energy efficiency programs if they consider there are advantages in doing so.

To date, energy efficiency regulations in the following countries specify performance according to one of the IEC classifications: Australia, Brazil, Canada, China, Costa Rica, Europe, Israel, Mexico, New Zealand, South Korea, Switzerland, USA, Taiwan (Brunner, 2012; IEC, 2012). In a new development, the International Commission on the Rules for the Approval of Electrical Equipment (IECEE) has proposed a global labelling scheme based on the IEC classification scheme (IEC, 2012).

The development of this classification system, initiated in 2005-6, and its on-going maintenance and improvement has owed a lot to the efforts of SEEEM[2]& EMSA[3] which have focussed the resources and expertise of governments, industry and experts on the creation of standards that support policy objectives (Waide, 2011). Critical to the success of the standardisation process has been:

- The early support by key industry players to the inclusion of the classification system, developed through a dedicated working group;
- The prolonged commitment by governments to participation in the work of relevant Technical Committees, primarily by Switzerland and Australia (Brunner, 2012b).

The importance of the relevant technical committee's willingness to consider the policy objectives of governments is further illustrated by the experience with compact fluorescent lamps (CFLs). In this case, 13 countries endorsed proposals to improve the test method and include a series of informative performance tiers within IEC 60969. Despite subsequent efforts by the Australian Government and the lites.asia initiative, the relevant committee, TC 34, has taken the view that the creation of performance tiers, even on a voluntary basis, is outside the scope of IEC technical committees (Ton & Jeffcott, 2010; lites.asia, 2012).

Role of World Trade Organisation in International Standards

The World Trade Organisation (WTO) has influence on standards for energy efficiency through the Agreement on Technical Barriers to Trade (WTO TBT), which obliges members to ensure that technical regulation, voluntary standards and conformity assessment procedures do not create unnecessary obstacles to trade.

In accepting the TBT Agreement, WTO Members agree to ensure that their central government standardizing bodies accept and comply with Annex 3: the Code of Good Practice for the Preparation, Adoption and Application of Standards, and agree also to take

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[2] Standards for Energy Efficiency in Electric Motors

[3] The Electric Motor Systems Annex of the IEA Efficient End-use Electrical Equipment Implementing Agreement

reasonable measures to ensure that local government, non-governmental and regional standardizing bodies do the same (Steele, 2010).

Where international standards exist or their completion is imminent, the Code of Good Practice says that standardizing bodies should use them or, least, the relevant parts of them, as a basis for standards they develop.

On the issue of stakeholder engagement, the TBT encourages all standardizing bodies to participate in the preparation of international standards by the relevant international bodies and also recognises that it is important to involve players that may be materially affected by the Standard's implementation (industry, government, consumers, NGOs, etc.). In reality, this is often achieved through engagement of relevant international organisations representing these interests (Steele, 2010).

Although the Code is voluntary, the fact is that if an economy or region chooses to adopt a local standard then this is subject to greater scrutiny than if international standards are adopted. Local standards are open to challenge under the TBT, but more often authorities are required to justify local standards, which is not only administratively burdensome but can introduce substantial delays.

These provisions create a disincentive for the adoption of local standards, and this applies as much in the field of energy efficiency as to other areas.

Issues with International Energy Efficiency Standards

From the perspective of energy efficiency policy making, referencing international test standards or performance thresholds raises a number of issues, which are discussed below[4].

Benefits of closer harmonization and alignment of policies

The potential benefits of international standardisation in the energy field include:

- Promoting good energy management practices
- Supporting scientific cooperation and possible harmonization of public policies
- Helping to improve consumers and users understanding and confidence
- Avoiding unnecessary technical barriers to trade related to energy policies
- Enabling the creation of world markets for energy efficient technologies (Steel, 2011)

Currently there are a large and increasing number of countries that have S&L programs. Not only do the performance requirements vary for the same products across different jurisdictions but there are also frequently variations in the test procedures and the criteria that underlie these requirements. Improved alignment of test methods and performance thresholds will enable suppliers of internationally traded goods to minimise the number of tests conducted and this will lead to lower compliance costs for industry.

Quality of outcomes

Compared to local standards, the robustness of both technical standards and performance thresholds will be improved as a result of access to international technical expertise and rigorous consultative processes:

- As noted by the IEA, International standardisation bodies provide access to: "state-of-the-art knowledge formalized by recognized experts in the field, based on international consensus from a balance of interests reflecting the technological, economic and public interest conditions in the vast majority of the countries of the world." (OECD/IEA, 2007).

[4] It should be noted that two reports (Waide, 2011; and ICF, 2011) provide further explanations of the benefits of harmonisation together with a detailed assessment of opportunities for achieving greater harmonisation on a product basis.

- International standards are subject to extensive and formal consultation processes amongst member organisations and through them, national and regional technical committees. Gaining the views and input from this wide network ensures that the results are not prejudicial to particular regions, technologies, or interests, although as discussed previously, they may not take account of government policy ambitions.

Reduced development costs for energy efficiency programs

The presence of international test methods makes it easier and cheaper for governments to copy existing protocols rather than invest in new policy development processes and technical analysis. Common standards also increase the opportunity for governments to pool technical understanding on how energy performance can be optimised.

Benefits of informative tiers or classes limit number of differences

The availability of suitable performance tiers or classes allows for:

- A reduction in the time and expense for countries developing appropriate performance thresholds individually, and allows them to better track technology change and streamline the updating processes.
- A reduction in the number of performance requirements for products marketed globally, making it easier and cheaper for industry to understand and comply.
- Manufacturers to plan investment in R&D and marketing, and to develop economies of scale in production based on clear performance targets set for many years in advance, as noted by the IEA:

  "Reducing uncertainty for all the economic players, thus creating a climate favourable to public-private partnership for accelerating the development and marketing of more energy-efficient products and renewable energy sources" (OECD/IEA, 2007).

Improved conformity mechanisms

Closer alignment amongst policy measures will not only reduce compliance costs for industry but also improve the ability of government to enforcement national requirements at lower costs.

- Sharing market surveillance data will assist governments to better target non-compliant products and emerging compliance issues (APEC, 2012).
- It may also allow for internationally recognised performance certification schemes, such as the equivalent of the International Electrotechnical Commission's (IEC's) existing IECEE CB scheme[5] which already does this for the safety of these (same) products.

International Product Benchmarking

The use of common test methods facilitates international benchmarking and comparisons of product performance in different regions. This is important for governments in order to ensure that local markets have access to the most energy efficient products.

Improved visibility

International standards have a high profile and are readily accessible by all stakeholders around the world. From the point of view of encouraging as large group of countries to adopt the same or equivalent standards, this is an advantage.

Suitability of regional circumstances

To be globally applicable, international standards must be developed to adequately (and accurately) deal with regional and climatic issues.

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[5]IEC System for Conformity Testing and Certification of Electrotechnical Equipment and Components, which is a multilateral agreement that allows international certification of electrical and electronic products so that a single certification allows worldwide market access.

This is particularly difficult and important for those products for climate control (heating cooling) or refrigeration and to some extent water heating or other weather/climate affected products (Harrington, 2009).

Accounting for regional differences, particularly in test procedures, is complex and often requires a completely new approach to measuring and calculating energy performance. Changing test procedures from established practice is difficult and may be expensive for industry, laboratories, etc, and can meet with resistance.

Suitability for regulations

Energy efficiency regulations need to be underpinned by robust test procedures that ensure results are reproducible and repeatable, in order to avoid ambiguities and support possible enforcement action. In the past, test standards for energy-using products were primarily used to provide product ratings to assist categorisation, and therefore did not need to be particularly accurate. As a result some of the existing test standards are not very suitable for regulation.

Not mandatory

By their nature, international standards are not mandatory, and are required to be either referenced in local legislation or administrative program rules to take effect. Therefore, no single authority acting on its own can be sure that because it uses international standards, this course of action will be widely or universally followed.

Timing issues

A more practical consideration is the question of timing. Most S&L programs have a timetable for the review and updating of existing test methods and performance thresholds, and for the addition of policy measures covering new products. In the extreme case of the US DOE, Congress requires the adherence to a strict timetable for the publication and implementation of new and revised standards[6]. Many S&L programs are concerned that a close association with international standards, and their somewhat laborious processes, will cause conflict with their own timetable.

Who controls policy?

There is concern amongst governments or authorities in charge of S&L programs that referencing international standards will lead to less control over their national policy measures. This stems from a historical lack of government involvement in international standardisation at the product level where decisions about test methods and performance thresholds are made. The success of efforts to encourage standardisation organisations to develop structural means to recognise national policy aspirations have been limited. Without such means in place, governments are concerned that they will surrender their close control over issues that impact on the production, performance and availability of products within their jurisdiction and for export.

There are also concerns that if standardisation organisations were to propose performance benchmarks, this could open up opportunities for industry to delay more stringent energy efficiency requirements or that policy-making could be influenced by the lowest common denominator.

This issue in particular requires an understanding of the standardisation processes and issues of representation, which are discussed further in the following section.

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[6]Section 141 of EPAct 2005 requires DOE to issue an initial report and semi-annual reports thereafter to describe its rulemaking schedule and plan for implementing the schedule. The report was first published on January 31, 2006, and has been updated semi-annually since.

Understanding the Role of Standardisation Bodies

Standards are known to have existed as early as 7000 B.C. (NBSIR, 1987) and since then they have played a key role in facilitating commerce and eliminating technical barriers to trade. Examples are many and varied, including such initiatives as standardized freight containers and associated documentation; the format and size of banking cards, credit cards, and telephone cards, paper sizes, and the same symbols for automobile controls in cars all over the world.

The Standardisation Landscape

There are now many thousands of standardisation organisations at the international, regional and national level, including industry/trade and professional bodies. For example, there are more than 600 private sector organisations involved in standards development in the US alone (Deshpande, 2001). While the geographical scope and scope of work of standardisation organisations varies, there is also considerable overlap and fragmentation. Governments are faced with the challenge of understanding the national, regional and international standardisation landscape and to identify standards that can be useful in the development of energy efficiency policies.

It is estimated that there are approximately 175 organisations that are engaged in preparing standards at the international level (Deshpande, 2001), with the three major international standardisation organisations including:

- International Organisation for Standardization (ISO). ISO was founded in 1946 and is a federation with a membership comprising over 125 national standard bodies, each one representing one country, and 2,800 technical committees, subcommittees and working groups. The World Trade Organisation (WTO) has observer status and ISO collaborates with the UN and UN agencies (Steele, 2010)
- International Electrotechnical Commission (IEC): The IEC was founded in 1906 and is responsible for international standardisation and harmonization in the fields of electricity, electronics and related technologies. The IEC's members are national standards committees, which are required to be fully representative of all electrotechnical interests in the country concerned. IEC is working with national standardisation bodies in Europe, National Electrical Manufacturers Association (NEMA) in America, and Japanese standardisation bodies to harmonize the standards (Deshpande, 2001).
- International Telecommunication Union (ITU): The ITU began its work on standardisations of telecommunications in 1865 and is now an agency of the United Nations that specialises in telecommunications and radio-communications. It currently includes over 400 sector members.

In the field of energy efficiency, the Institute of Electrical and Electronics Engineers (IEEE) is also a significant and relevant international standards making organisation.

At the regional level, groupings of standardisation organisations with recognition by international standardisation organisations include the following:

- In the **European Union**, the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC) have parallel activities in ISO and IEC, and in some cases the same organisation provides the secretariat for both an international and regional committee. There are agreements between CEN/CENELEC and ISO/ IEC regarding exchange of information, avoidance of duplicated effort, and the use of International Standards as the basis of European Regional Standards[7].
- The European Telecommunications Standards Institute (ETSI) develops European standards in the telecommunications field.

[7] The main co-operation agreement between ISO and CEN is known as the Vienna Agreement. The agreement between IEC and CENELEC is known as the Dresden Agreement.

- In **North America** there has been an agreement on co-operation in Standards development between Canada, the USA and Mexico under the title 'Pan-American Standards Commission' (COPANT).
- Although not a standardisation body, MERCOSUR or MERCOSUL is a common market made up of the economies of Argentina, Brazil, Paraguay and Uruguay which works to eliminate trade barriers between its member countries.
- In **South-East Asia** and the Pacific there is no significant regional development of Standards. However, there is congress of interested parties: the Pacific Area Standards Congress (PASC), which comprises standards bodies in Asia and the Pacific rim. In parallel with PASC, there exists the standardisation group of the Asia Pacific Economic Conference (APEC), which is a conference of government agencies concerned with trade and economic affairs (SA, 2008).

At the national level each country possesses its own national standardisation system. The central or most representative national standards body participates within the regional or international bodies identified above. At the national level, standardisation work is generally conducted by standards committees, which can obtain assistance from groups of experts. These committees or working groups are made up of qualified representatives of the industrial circles, research institutes, public authorities, consumer or professional bodies.

Representation and Standardisation Organisations

As can be seen from the previous outline, standardisations bodies exist at the three levels: national, regional and international; and these are structurally linked through representation. At all levels, standardisation bodies are organised into strategic or thematic committees, as well as product-specific technical committees and working groups. The task of writing standards for electrical products has traditionally focussed on issues such as safety and been viewed as one best left to technical experts closely involved in the development and manufacture of these products.

At the national level, technical committees seek a balanced representation from amongst interested parties and commercial interests, and often seek experts from academia, NGOs and other stakeholders. However, since attendance at national 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 and fund associated travel costs. Previously, when the focus of standardisation was on issues such as electrical safety or product rating, the dominance of industry in national technical committees was not an issue, however as standards have become a vehicle for the delivery of energy efficiency policies, the need for more balanced representation has become apparent.

Government representatives may be invited to join national technical committees, for example, if there are related energy efficiency policies, however this is far from standard practice. There are examples where governments have sponsored the direct involvement of experts or government staff in national or regional standards committees that relate to energy efficiency. Several European countries participate in CEN meetings, and the Australian Department of Climate Change and Energy Efficiency has formalised their representation with Standards Australia through a memorandum of understanding. This enables DCCEE to have direct representation on relevant national technical committees.

The composition of the technical committees of regional and international standardisation bodies is drawn from representatives of national organisations, plus some representatives of partner organisations. Since national standards bodies tend to be dominated by industry, and because the costs associated with participation in international or regional technical committees are high, this is reflected in their representation on regional and international committees. Governments do not themselves have representation on the major international standards organisation committees.

Is there an alternative to formal standardisation?

The question is: does there exist a viable alternative for S&L programs from different economies to reach agreement on test methods and performance specifications outside the formal standardisation framework?

One option is for the development of product-specific multilateral or bi-lateral agreements between economies or S&L Program administrators. In broad terms, these agreements could take the form of:

- Sharing resources, funding, technical expertise, test results, etc.
- An agreed project plan and development path.

The intent of such agreements might be that each party uses the results to inform their local policy measures, whether this through incorporation in program criteria, legislation or other appropriate mechanisms. In other words, the results of the collaboration would act as a reference for local implementation, as international standards are frequently used.

While this approach has not been used often, the following section describes one previous initiative and compares of the strengths and weaknesses of this approach with international standardisation.

Development of Test Method and Policy Alignment for External Power Supplies

The development of energy efficiency policy measures for external power supplies (EPS),a product used in all economies and globally traded on an extremely large scale, is an example of policy alignment between nations achieved largely outside the formal standardisation process. .

Beginning in 2003, interested parties including U.S. Energy Star, the Californian Energy Commission, CECP[8] and CNIS[9] in China, JRC[10] in Europe and the Australian Greenhouse Office agreed to share the work needed to provide the basis for policy development and implementation. The major aims of that coalition included:

- The development of a robust energy performance test methodology for EPS, suitable for the support of policy measures, in any location throughout the word;
- Co-ordination in establishing a set of specified performance thresholds suitable for use in developing and developed country policy measures, in order to maximise opportunities for harmonisation and alignment;
- Co-ordination in establishing a mandatory product marking scheme which would assist in compliance activities.

Test method development

US consultants produced a first draft test method, which was then circulated to partners in Europe, China and Australia. Comments from those experts were included in further revisions and the draft test method was 'proofed' by measuring over 650 EPS in the U.S., China and Australia. This ring test identified clarifications needed to improve the universal application of the methodology.

Energy performance criteria

The large quantity of data gathered allowed detailed analysis of the current performance of products in most major markets. Early on in the process, it became clear that one single performance requirement would not suit the needs of the various agencies involved nor would it build a robust scheme capable of accommodating future product improvement. The

[8] China Certification Centre for Energy Conservation Products
[9] China National Institute of Standardization
[10] Joint Research Centre

resulting scheme was a compromise amongst participants which fixed a limited number of performance tiers of increasing stringency.

The coalition also developed a simple efficiency mark to indicate to enforcement agencies that the product has been tested according to the unified test method, and claims to meet a certain performance level. Comprising a roman numeral (I - least efficient to VII – currently the most efficient) that corresponds to each agreed performance level, this 'efficiency mark' is placed on the product nameplate, alongside safety and other compliance information.[11]

Status

EnergyStar was the first national program to adopt the test method, performance specifications and marking system in 2005. Since then Australia, Europe, China, Korea, and Canada have introduced (or are in the process of introducing) policy measures based on technically identical test methods, and the tiered performance specifications. Most programs require or encourage the use of the marking system.

Comparison of this Approach with International Standardisation

Unfettered by the formal structures of international standardisation, this approach provided a relatively quick result with modest investment: an internationally accepted energy performance test method was developed from concept to implementation within a 2 year timeframe.

This timeframe has been extended in some economies that have either sought to adopt the test method as an official standard, or used the performance tiers as the basis for regulations, in which instances the requirements for further local consultation have been observed.

This initiative began because of the coincidence of interest from several major economies. All of those involved saw a domestic need to tackle the energy efficiency of EPS and the benefits in terms of access to data and technical expertise from collaborating internationally. This coincidence of timeframes may not necessarily be applicable to a large number of products.

This approach may also have particular application for the development of energy efficiency policies for other 'greenfield' products which are internationally traded and have not yet been subject to varying national, regional, mandatory or voluntary energy efficiency policies.

The lack of a formal structure for this collaboration, while of benefit in terms of speed, has also meant that there is no mechanism to tackle the need for on-going development. It is a weakness of this approach that as new products enter the market and performance has improved, there has been no systematic means to undertake the tasks of fine tuning the test method and adding further efficiency tiers. By comparison, international standards are reviewed regularly with established processes to incorporate improvements.

International standards have a high profile amongst manufacturers, importers, government agencies and other relevant stakeholders and a developed system of notifications. This degree of visibility is hard to replicate and has not been achieved in the case of EPS. As a result, economies that now wish to adopt measures for EPS may not have ready access to the work that has been done. The informality of this approach means that it is unlikely to avoid WTO scrutiny.

The Challenge of Aligning Energy Efficiency Standards

There is now in principle agreement amongst most governments and industry sectors that the closer international alignment of energy efficiency test methods and performance

[11]Each level corresponding to the efficiency mark has requirements for both no-load and average efficiency requirements

requirements for globally traded energy using products is an important objective (SA, 2008). The WTO has been influential in gaining a commitment to this view.

For governments, the referencing of international test procedures is acknowledged to bring cost and time advantages, particularly as national S&L Programs try to expand their coverage, including the avoidance of lengthy scrutiny by the WTO. Although still a not a familiar concept, the example of motors has brought increasing support for the idea of informative performance tiers. On the other hand, governments still have to balance the desire to adopt international standards with the need to support local industry, especially where there is conflict with enshrined practices.

The energy efficiency industry benefits from international standardisation through reduced costs of compliance, and less time taken for products to enter the market. The availability of existing robust international standards encourages the growth of S&L Program, bringing access to new markets. The use of performance tiers signposts the direction of government policy.

International standards bodies must ensure that their standards remain relevant and "respond to global needs" (Steele, 2010), as determined through engagement with a wide range of organisations, including governments. S&L Programs are now recognised as a key response mechanism used by governments to curb greenhouse gas emissions globally (WEO, 2012), and therefore these Programs and their governments are a significant stakeholder in the standardisation process.

Due to this convergence of interests, and the benefits of using international standards as the vehicle to pursue greater alignment of product test methods and performance requirements, finding suitable mechanisms to effectively integrate government objectives within the work of international standardisation bodies has proved to be a challenge.

While the examples of motors and the new draft IEC test method for refrigerators illustrate what can be achieved, it is evident that these isolated cases are the result of:

- Technical standards committees highly receptive to accommodating governmental objectives;
- The use of considerable resources dedicated over a long period, by governments and others.

The two issues are discussed further in the following section.

Standardisation Organisations and Government Objectives

The issue of engagement between governments and standardisation bodies has been much debated over the past decade and resulted in the following initiatives.

The IEC and ISO established strategic committees in 2007 and 2008 respectively, IEC SG1and ISOSAG-E, to provide a strategic approach to energy efficiency and to engage with external organisations. In additional to membership by several countries, SAG-E includes representation from the IEA, World Energy Council (WEC), ISO COPOLCO (Committee on Consumer Policy of ISO). The IEA also sits on SG1.

In addition, 300 experts from the public and private sectors attended a joint meeting in held by the IEA, IEC and ISO in March 2009 (IEA, 2009). The workshop stressed the need:

- To highlight and promote the complementary relationship between public policies and technical standards,
- For participation by all stakeholders with relevant interests in promoting energy efficiency and reducing carbon emissions (particularly representatives of public authorities) from the earliest stages in the standards development process.

- To improve coordination and optimize involvement of experts in ongoing standardisation work at the sectoral, national, regional, and international levels, ensuring exchange of information and promoting the use of already existing standards.
- To adjust standardisation processes and deliverables to be more adaptive in addressing fast-moving technologies and evolving usage contexts of products and services.

However, despite these useful initiatives, there is no systematic approach to energy efficiency by the major international standardisation bodies. For example, approaches to TC34 have been told that it is not within the remit of the IEC to include performance tiers for CFLs and light emitting diodes (LEDs) within international standards (lites.asia, 2012). This appears inconsistent with the approach taken for motors within IEC TC2.

Whether it is through the existing strategic groups, or another mechanism, it is important that the international standardisation bodies recognise the importance of S&L Programs as a major, and potential even larger, user of their products, and develop improved ways to ensure that international standards meet the needs of this group.

Maximising government influence and resources

The strategic groups within ISO and IEC can identify gaps in the current coverage of standards, and clarify the role of standards with respect to energy efficiency, however most of the key decisions regarding energy efficiency are taken at the technical committee level, where government representation is only achieved through the direct sponsorship of national delegates by their individual governments over a prolonged period.

The experience gained in the development of standards for motors suggests that effective government representation on international standardisation technical committees relies upon:

- Having more than a single representative in order to gain traction with the committee.
- Representatives with access to up-to-date research results and, the time and expertise to provide information and drafts as required.
- Representatives with a range of skills including experience in writing technical standards, and the ability to present arguments and gain support from other members.
- Adequate resourcing in terms of expert time and expenses to attend meetings, and to source information outside meetings. (Brunner, 2012)

It should be noted that, while the IEA has observer status on many TCs, the IEA does not have the resources to deal with the myriad of detailed issues dealt with by the many relevant technical committees, and does not represent governments from countries that are not members of the IEA.

Since few individual governments have the resources available to engage sufficiently with technical committees across the full spectrum of products covered by S&L Programs, co-operation between interested governments involving the pooling of resources is likely to be most effective. The basis for such co-operation might include:

- Governments agreeing to devote resources to an agreed plan of action that identifies priority standardisation issues.
- These issues include gaps in the availability and suitability of existing technical standards, and where opportunities exist for the inclusion of informative performance thresholds.
- Each government endeavours to maximise the targeting of national government representation towards this plan.
- Governments agreeing to support the drafting of documents for presentation to technical committees, and the on-going provision of information, in order speed up the standardisation process.

The structure of such co-operation amongst governments may need to be formalised in order to facilitate the terms of an agreement and the allocation of resources. There are a number of

possible models for inter-governmental collaboration and these were discussed at a workshop amongst the IEA, SEAD[12], and IEA-4E[13]held in November 2012 in Tokyo.

Attended by 29 government energy efficiency officials and experts from 12 economies, participants pledged to work together to develop more effective mechanisms for engaging with the International IEC and ISO on initiatives to deliver greater international comparability of energy efficiency policies for appliances and equipment.

As a start, representatives from IEA-4E, SEAD, and IEA will form a "community of practice" to map out the framework for future collaboration. Although there are many hurdles to cross before it is possible to determine whether this group is likely to be effective in addressing the issues raised in this paper, this initiative offers some prospect of delivering improved dialogue between governments and international standardisation bodies.

Conclusions

Ultimately, seeking common test methods and informative performance thresholds through international standards is likely to achieve governments and industry objectives for closer alignment and rationalisation of energy efficiency requirements. This can only be achieved if mechanisms are put in place to ensure that the needs of policy makers are adequately taken into consideration in the standardisation process, recognising that S&L Programs are significant user of international standards and therefore in a good position to provide advice on the relevance of international standards.

This requires establishing a long-term, ongoing and effective framework for the interaction between the international energy efficiency policy making community and international standardisation organisations. Since energy efficiency considerations within the standardisation process is determined by activities at the management level, the strategic level (where the ISO SAG-E and the IEC SG-1 operate) and the technical level (technical committees, this framework needs to address all three levels.

At the same time, governments will need to seek ways to ensure representation on technical standardisation committees, where most important decisions are taken on issues relating to product energy efficiency. A key to this will be for governments to make better use of their representation through local standardisation bodies to better represent government interests.

Due to the large commitment required to resource adequate on-going representation on technical committees, agreements amongst governments to collaborate, pool resources and prioritise are likely to be the most effective way forward. An important role for such a platform could be to simplify dialogue with standardisation organisations by providing a clear message on key priorities and issues.

The key task for a co-operative platform amongst governments would include:

- To map the standardisation landscape, identifying key gaps in the coverage of technical standards and their adequacy to support energy efficiency policies.
- To develop and agree informative performance thresholds.
- To identify and agree priorities, and communicate these to international standardisation bodies.
- To develop drafts documents and provide on-going expert input to technical committees.
- To organise the resources of participating governments to deliver these commitments.

[12] The Super Efficient Deployment initiative under the Clean Energy Ministerial
[13] The IEA Implementing Agreement for Efficient Electrical End-Use Equipment

Although in its infancy, the IEA/4E/SEAD initiative of 2012 to create an informal community of practice for dialogue amongst governments may be a helpful initial step towards realising this ambition.

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