Environmental Goods and Services Series



Harmonising Energy Efficiency Requirements – Building Foundations for Co-operative Action

By Rod Janssen,
Independent Consultant

ICTSD
International Centre for Trade and Sustainable Development

Issue Paper No. 14

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LIST OF ABBREVIATIONS AND ACRONYMS

APEC	Asia-Pacific Economic Cooperation
CLASP	Collaborative Labelling and Appliance Standards Programme
EU	European Union
GHG	Greenhouse gases
IEA	International Energy Agency, Paris
kWh	Kilowatt-hour
MEPS	Minimum energy performance standards
OECD	Organisation for Economic Co-operation and Development, Paris
TBT	Technical Barriers to Trade Agreement
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

FOREWORD

Increasing energy efficiency is an important tool for mitigating climate change. According to the International Energy Agency's World Energy Outlook, energy efficiency can contribute as much as 65 percent of greenhouse gas emissions reductions in 2020. To promote and accelerate the deployment of more energy-efficient technologies, energy efficiency policies are increasingly used.

Energy efficiency policies include Energy Performance Standards (MEPS) and energy labeling, which are the focus of this paper. These requirements can however form trade barriers, especially when differing per region or country, limiting trade flows in energy-efficient goods and technologies. As international trade has been increasing, so have efforts, at the global and especially the regional level, to harmonize energy efficiency standards.

These harmonization efforts have, however, thus far been restricted to certain (mainly developed) countries which have actively pursued energy efficiency policies. Most developing countries lag behind in developing their own energy efficiency policies, developing and implementing standards, and in participating in the harmonization efforts. For these countries, energy efficiency policies of others can still form important trade barriers, even when harmonized.

From a global point of view it is also very important that developing countries develop standards and labeling programs for energy efficiency. Logically, such measures would improve the energy efficiency of the developing economies and thereby contribute to mitigation climate change. In addition, such measures will avoid environmental dumping, in this case dumping of energy inefficient goods, which partly renders measures taken by other countries ineffective.

This paper, written by Rod Janssen, outlines and puts into context energy efficiency requirements and their related harmonization efforts. In so doing, the implications of these efforts for developing countries are considered in particular.

The paper shows that even though generally speaking developing countries lag behind in developing and implementing national energy efficiency policies, in some large developing countries there have been many new developments. In China for example, more and more mandatory labels and minimum energy performance standards are being implemented. However, the situation is different for smaller developing countries, which mainly camp with policy related problems. Often the policy commitment to make capacity and resources available to develop and implement energy efficiency requirement lacks. Unfortunately this means that there are many benefits to developing countries that go unrealized, which in many cases is due to a lack of awareness.

On the bright side, there is both bilateral and international support to help developing countries. These initiatives are in many cases still in their early stages however. In addition, effective policy commitment to energy efficiency is necessary, which is still lacking in many developing countries. Without this policy commitment, international efforts to help and assist developing countries will not be able to fully succeed.

The author of the paper, Rod Janssen, is an independent energy consultant conducting policy and programme analysis in the fields of energy and climate change, energy efficiency, energy management, renewable energy, and energy and the environment. He is a member of HELIO International, a network of energy analysts, and of the board of the European Council for an Energy Efficient Economy, a non-profit, independent organization conducting research on energy efficiency.

This paper is part of a series of issue-papers commissioned in the context of ICTSD's Global Platform on Climate Change, Trade and Sustainable Energy. One of the objectives of this Platform is to identify trade policies that can contribute to a rapid diffusion and transfer of clean technologies around the world and provide new incentives for innovation and investment in climate-friendly technologies. We hope you will find this paper to be stimulating and informative reading material and useful for your work.

Ricardo Meléndez-Ortiz
Chief Executive, ICTSD

SUMMARY AND CONCLUSIONS

To promote and accelerate the deployment of more energy-efficient technologies, countries and regions increasingly use minimum Energy Performance Standards (MEPS) and energy labelling. A high percentage of those products are internationally traded goods. Standards and labelling aim to bring about market transformation towards energy-efficient equipment. Labelling gives important signals to consumers who may not necessarily have energy efficiency high on their list of priorities when buying a consumer product, whereas MEPS "invisibly" help remove the least efficient products on the market for the consumer.

Because of the increase in international trade, on both the global and regional level, efforts are now being made to harmonise standards – both energy performance standards and test procedures. Many of these efforts have been underway for many years. Others are just starting. This report outlines the efforts being currently undertaken by a wide range of actors, from government bodies to not-for-profit organisations to international organisations. At the moment, harmonisation is restricted to certain countries that have actively pursued energy efficiency policies. This has left many developing countries on the sidelines to some extent.

Climate change, along with energy security and other energy-related environmental problems, are overarching global concerns that are increasingly causing all countries to get involved. However, developed countries have lagged behind in implementing some policies that can have a major impact on greenhouse gas (GHG) emissions, such as improved energy efficiency. This report attempts to put these policies and initiatives into context, considering the implications of all these efforts on developing countries in particular.

The main conclusions that have come from this analysis are as follows:

- Harmonisation of standards and labelling for energy-using products is expanding globally, although to date much of this harmonisation is being done on a regional basis, not a global one. The harmonisation is for test procedures, minimum energy performance standards and product labelling.

- Labelling can be either voluntary or mandatory. Even voluntary programmes, however, require test procedures, which themselves are often mandatory. Minimum energy performance standards are mandatory.

- Energy efficiency standards and labelling are used for a wide range of traded goods, including household appliances, heating and cooling equipment, home entertainment, information and communication technology equipment for home or office, lighting, building materials, electric motors and so on. Many of these goods are not necessarily thought of as "energy efficiency" technologies.

- There is a strong policy framework for these efforts. Much of this work is now being driven by climate change concerns, but there are other policy considerations that are also important, such as energy security, local air quality and balance of payments.

- Trade is often a driver of these efforts, primarily intra-regional trade (e.g. within Europe). However these programmes also have an impact on international trade, given that importers have to meet the same standards and labelling requirements.

- Harmonisation occurs at both governmental and non-governmental levels. Industry generally stays in line with the developments going on at these levels, and tends to participate quite well in the process.

- The harmonisation of test procedures is very important although it is not given a high enough priority in many countries. Test procedures, often through international standards bodies, form the foundation for future minimum energy performance standards and labelling.

- For large developing countries, there have been many new developments that are being increasingly recognised internationally. Climate change is a big driver of these efforts.

  - In China, for example, more products are being labelled. There are now more mandatory labels, following the initial voluntary approach. More minimum energy performance standards are also being implemented. While there are still implementation issues that need to be addressed, by and large much progress is being made.

- OECD countries have been very active in the last 10-15 years with minimum energy performance standards and labelling.

  - Many countries are revising standards for the first time in several years. There is a growing realisation that, with technological improvements, revisions need to be made on a regular basis.

- The situation is mixed for smaller developing countries.

  - The problems are largely policy related; making capacity and resources available is in part related to policy commitment).

  - There are many benefits to developing countries that go unrealised – in many cases due to lack of awareness.

- There is both bilateral and international support to help developing countries, though in many cases this is still in the early stages.

- There needs to be greater awareness amongst both decision-makers and economies as a whole that a strong energy efficiency policy framework is essential in even the least developed countries. This is particularly important for both climate change and energy policy reasons.

- Trade is fundamental for the deployment of energy-efficient products. Economies need to be open to the introduction of energy-efficient technologies.

  - This can happen, not by the introduction of “defensive” strategies (i.e. attempting to avoid the import of inefficient products), but rather by mirroring efforts being undertaken in OECD/major developing countries. There is a need for developing countries to develop national energy efficiency policies [not just in relation to mitigation through the Clean Development Mechanism, or CDM] in the context of climate change.

  - If this occurs, the “technical” base (e.g. test procedures, development of other standards) could then have a better opportunity for expansion.

- Trade can become an even bigger driver if international trade in energy-using products and products that affect energy consumption (e.g. efficient windows, insulation, tyres) expands rapidly into more and more markets in developing countries.

- The current situation can be seen as a barrier for countries that are poorly involved in current harmonisation efforts. In the context of a global climate change approach, it is right for developing countries to participate more fully, since there are important mitigation and

adaptation reasons for them to have a more rigorous approach. This involvement will also be important in the case of any technology transfer commitments that come out of the UNFCCC/ Kyoto Protocol process.

- OECD countries and international organisations need to encourage developing countries to get more involved in the following areas:

  - assistance on policy development in climate change and energy efficiency;

  - technical assistance in all aspects of the standards development and implementation process;

  - financial assistance to help in standards development and implementation; and

  - exchange of best practices.

1. INTRODUCTION

The purpose of this report is to examine the connection between energy efficiency, climate change and trade policy. Standards and labelling are increasingly used by countries and regions to promote and accelerate the deployment of more energy-efficient technologies. A high percentage of those products are internationally traded goods. Standards and labelling aim to bring about a market transformation towards energy-efficient equipment. They give important signals to consumers who may not necessarily have energy efficiency high on their list of priorities when buying a product.

Energy efficiency experts that design these policies focus on energy efficiency as an element of energy policy and environmental policy (mainly climate change). International trade implications are often secondary to the initial work by these experts, although trade may be an important aspect in federal countries or in regions such as the European Union. Policy makers broadly integrate some trade issues because they want to avoid unacceptably inefficient equipment from entering their country or region (or being used in their country at all) and they want to benefit from globalisation, given that the manufacturing of energy-using products has moved to lower cost countries.

With a wide range of technologies that are energy-using, it is difficult to establish where the boundary of environmental goods is. The OECD wrote in 2006 that:

> "[W]ork is required to either standardise or harmonise product descriptions and energy-performance metrics or to develop algorithms that would allow simple conversion from one set of requirements to another without necessitating retesting . . . work towards harmonising test procedures for measuring the energy performance of household and office electrical appliances would in itself help to lower *non-tariff* barriers affecting energy-efficient goods and thereby help to achieve one of the goals of the Doha Development Agenda".[1]

While efforts are being made to encourage the trade of low-carbon technologies, it is still debatable where the border is: ***should televisions be considered relatively low-carbon technologies?***

There are currently many efforts to improve the harmonisation of national energy-performance standards and labelling. It is important to review those efforts to assess why they are happening and to get a better indication of how "global" these efforts are. It is also important to know where there are gaps in this harmonisation process that need to be filled. Furthermore, it is necessary to assess what these harmonisation efforts mean for many developing countries that do not have the capacity – or have not given priority to building the capacity – to develop the full range of elements in standards development and implementation. Are they being marginalised and losing out, or will they still benefit from these efforts? This paper cannot address all issues but it will attempt to shed some light on how trade can promote better global harmonisation of energy efficiency standards.

1.1 Background

The demand for energy services is growing at a fast pace. Homes and offices want the latest appliances, communications equipment, electronic games and gadgets. Societies want to improve comfort, health and welfare. All of these require energy, much of which is carbon based. Western economies followed a high-carbon approach for generations, in part because it was cheap, easy and available. While most of the West still does lead a high-carbon lifestyle, there is now a growing realisation that this cannot continue. As a result, there are many efforts underway to reduce carbon consumption.

Meanwhile, developing countries are increasing their use of energy services, putting them on a carbon pathway that is often too similar to that of the Western economies. Yet with high energy costs and the growing realisation that the resulting greenhouse gas emissions are a major contributing factor to climate change, this approach is unsustainable – for both developed and developing countries.

One of the most cost-effective ways of reducing GHG emissions is through improved energy efficiency. While energy efficiency has been a stated policy objective of most governments since the oil crisis in 1973-74, it is now also expected to play an important role in addressing climate change concerns. Reducing the need for imported energy products can also improve energy security.[2] This is particularly important for major importing countries, such as Japan, the United States and several EU economies. However, it is also true for many developing countries where the cost of energy imports can have a crippling effect on their balance of payments, along with their economy as a whole. In many developing countries, energy is subsidised, which adds further stress to the national budgets and balance of payments.

However, improving energy efficiency requires a comprehensive, long-term approach. There is need for a stable policy framework to encourage investment in the manufacturing and distribution of energy-efficient products and for consumers to develop the necessary confidence to deploy such products. Many of these products, understandably, must be imported.

OECD countries have seen stop-and-go approaches to energy efficiency since the 1970s. The subject's perceived importance waxed and waned as energy prices rose and fell, and as energy security became more or less important. But now, in the early 21st century, the arguments for energy security and climate change are too compelling to ignore, and are thus widely acknowledged. The need for energy efficiency, along with its potential benefits, are simply too important to dismiss – which the OECD countries have come to accept. It must be acknowledged, however, that these benefits are only likely to be realised if there is a long-term commitment to improving the energy efficiency policy framework, in order to ensure that it is implemented effectively.

Improved energy efficiency is dependent on the deployment of a wide range of energy-efficient technologies. Innovations come about through government support for research and development (R&D), as well as R&D undertaken by the private sector itself. However, labelling programmes and MEPS have helped put the efficient technologies on the market and helped investments in R&D pay off. Household appliances and other energy-consuming devices today are certainly much more efficient than those products were even a decade ago. Many of those improvements are the result of government policies such as MEPS and labelling programmes, which have helped transform the market.

Energy-efficient technologies range from those that are energy-using (such as refrigerators, televisions, computers, boilers and compact fluorescent lights) and those that influence the use of energy (e.g. insulation, tyres, energy-efficient windows). The definitions are explained in more detail below.

This leads to the issue of deployment. As the next section will show, global trade and trends increasingly influence deployment. Energy efficiency policy is largely about deployment on a societal scale if there is to be significant impact to meet energy and environmental goals. On an increasing scale, many of those technologies – if not most of them – cross borders before reaching their final destination. Thus, they are influenced by international trade policies.

2. A REVIEW OF RELEVANT ENERGY EFFICIENCY STANDARDS AND LABELLING POLICIES

Promoting energy efficiency in an effective manner requires a range of policy instruments, from information programs to financial incentives to appropriate price signals. One category of instruments relates to regulations and standards that provide long-term signals and can be used in all end-use sectors. Regulations and standards can apply not only to specific technologies or systems (e.g. building codes) but also to the availability and quality of information (e.g. for labelling of energy-using equipment or vehicles). They can also be used, for example, to require energy managers in industry to monitor and report their energy use to government. And they can be used to require energy companies to undertake specific activities to improve their energy efficiency.

Regulations and standards are used globally in all end-use sectors. They have been used increasingly since the oil crisis of the 1970s. Some of the earliest of these policies included fuel efficiency standards in the United States, combined with labelling at the point of sale. Some countries also had appliance-labelling programmes in the 1970s.

> Energy-performance improvements in consumer products are an essential element in any government's portfolio of energy-efficiency policies and climate-change-mitigation programs. Governments should develop balanced programs, both voluntary and regulatory, that remove cost-ineffective, energy-wasting products from the marketplace
>
> and stimulate the development of cost-effective, energy-efficient technology...
>
> ... Wiel and McMahon, Energy Efficiency Labels and Standards – A Guidebook for Appliances, Equipment and Lighting, 2nd Edition, CLASP, 2005, page 32.

The following describes some of the existing energy-efficiency standards and labelling policies:

- Many countries have appliance-labelling programs. They can be comparative labels or endorsement labels. Comparative labels show the energy efficiency of a particular model relative to similar models on the market. Endorsement labels identify the best-performing models within an appliance category, to make it easier for consumers to differentiate one from the other through the label. More information regarding these labels is available later in the report.

  Canada has had its labelling program since 1978, in which it uses a comparison label. Some other countries with comparison labels include Australia, China, all countries of the European Union and EFTA countries, Japan, New Zealand and many others.[3] Labelling can be either mandatory or voluntary, although there is normally a mandatory test procedure used. Labels need test methods to measure consumption of the individual products; the formulation of these procedures is generally undertaken by bodies such as the International Electrotechnical Commission (IEC).[4]

Labelling in the European Union

The EU regulatory framework regarding labelling of energy-related products is set in the Energy Labelling Directive (92/75/EEC) to which implementing Directives for the following household appliances have been adopted:

- refrigerators, freezers and their combinations;
- washing machines, dryers and their combinations;
- dishwashers;
- ovens;

Labelling in the European Union. *Continued*

- water heaters and hot-water storage appliances;
- light sources;
- air-conditioning appliances.

The requirements are mandatory and common for all member states. Household appliances offered for sale, hire or hire-purchase shall be accompanied with information relating to their energy consumption or other features, such as energy use, noise and volume.

Under the Directive, the retail trader is obliged to provide all the appliances displayed in salesrooms with energy labels and to list technical data in table form in the sales records. The information necessary to do so has to be provided by the supplier of the individual appliance.

In addition there is a mandatory comparable label for fluorescent lamp ballasts. This label is only intended for the business-to-business market, and the label must not displayed visibly.

The leading endorsement label is the ENERGY STAR label from the United States, which is administered by the US Environment Protection Agency (with the US Department of Energy being responsible for a few products). This label is also used in many other countries, including Australia, Canada, Japan (since 1995) and the European Union. In the European Union, for example, ENERGY STAR is used for nine different energy-consuming ICT products. In the United States, the label began as a voluntary labelling programme, established in 1992, whose purpose was to promote energy-efficient products and to reduce greenhouse gas emissions. Computers and monitors were the first labelled products. It has since expanded to a wide range of appliances, including office equipment, lighting, home electronics, and more. The label also covers new homes and commercial and industrial buildings. Figure 1 shows the efficiency advantage over average products on the market for some of these ENERGY STAR products.[5]

Figure 1: Selected ENERGY STAR Qualified Products

Product category	Average energy saving above standard product**	Product category	Average energy saving above standard product**
OFFICE		CONSUMER ELECTRONICS	
Monitors	20-60%	TVs	25%
Computers	5-55%	VCRs	30%
Fax Machines	20%	TVs/DVDs/VCRs	90%
Copiers	20%	DVD products	60%
Multifunction devices	20%	Audio equipment	60%
Scanners	50%	Telephony	55%
Printers	10%	External power supplies	35%
		Battery charging systems	35%
RESIDENTIAL APPLIANCES		HEATING AND COOLING	
Room air conditioners*	10%	Fumaces	15%
Dehumidifiers	15%	Central air conditioners	15%
Room air cleaners	45%	Air source heat pumps	10%

Source: from IEA, Gadgets and Gigawatts, OECD, Paris, 2008.

- Numerous countries or regions have also adopted minimum energy performance standards (MEPS). They stipulate the minimum efficiency levels or the maximum energy-use levels acceptable for products sold in a particular country or region.

MEPS in Australia

The following products are also regulated on the basis of MEPS: refrigerators and freezers; mains pressure electric storage water heaters; small mains pressure electric storage water heaters and low pressure heat exchanger types; three phase electric motors; single phase air conditioners; three-phase air conditioners up to 65 kW cooling capacity; distribution transformers; ballasts for linear fluorescent lamps; linear fluorescent lamps; commercial refrigeration; compact fluorescent lamps; external power supplies; set top boxes; televisions; commercial building chillers; close control air conditioners; and transformers and electronic step-down converters for Extra Low Voltage (ELV) lamps.

China and India are amongst the leading developing countries in this field. China started using MEPS in 1989 and there are now MEPS for all major household appliances. There are no mandatory MEPS in India, although the Energy Conservation Act authorises the government to introduce them and there are currently plans to do so.

- There is a separate form of performance standards based on sales. These are sales-weighted performance standards, first used for vehicles in the United States in the 1970s.[6] Japan uses them for its Top Runner Programme (described in the following box) and the EU uses them for average allowed CO_2 emissions for cars sold.

From Japan – the Top Runner Programme

Expectations regarding the role of energy conservation are increasing due to mounting global environmental problems. As a result, demands that machinery and equipment's energy consumption efficiency be increased to the greatest extent possible are now a reality. The Top Runner Programme has come into existence in light of this situation. This Top Runner Program uses, as a base value, the value of the product with the highest energy consumption efficiency on the market at the time of the standard establishment process and sets standard values by considering potential technological improvements added as efficiency improvements. Naturally, target standard values are extremely high. For achievement evaluation, manufacturers can achieve target values by exceeding target values by weighted average values using shipment volume, the same as the average standard value system. The implication of using weighted average values is the same as the average standard value system, that is, the system is meant to give manufacturers incentives for developing more energy-efficient equipment. Above all, deliberation studies during the value establishment process in this system can proceed smoothly in a shorter period from the start to the final standard determination. While this system gives manufacturers substantial technological and economic burdens, the industry should conduct substantial prior negotiations on possibility of achieving standard values and adopt sales promotion measures for products that have achieved target values.

Source: Energy Conservation Centre Japan, http://www.eccj.or.jp/top_runner/e_02.html.

2.1 The Impact of Labelling and Standards

Figure 2 compares expected with actual results under the Japanese Top Runner programme. It provides information on what they had expected and on what actually happened. Actual results for the 11 products showed that improvements were from 1 percent to 25 percent better than expected for 10 out of the 11 products. Only for passenger cars did actual results just meet expectations. One product, diesel freight vehicles, actually exceeded expectations by more than three times its initial estimate.

Figure 2: Improvements in Top Runner Products

Product category	Energy efficiency Improvement (result)	Energy efficiency Improvement (initial expectation)
TV receivers (TV sets using CRTs)	25.7% (FY 1997 → FY 2003)	16.4%
VCRs	73.6% (FY 1997 → FY 2003)	58.7%
Air conditioners* (Room air conditioners)	67.8% (FY 1997 → 2004 freezing year)	66.1%
Electric refrigerators	55.2% (FY 1998 → FY 2004)	30.5%
Electric freezers	29.6% (FY 1998 → FY 2004)	22.9%
Gasoline passenger vehicles*	22.8% (FY 1995 → FY 2005)	22.8% (FY 1995 → FY 2010)
Diesel freight vehicles*	21.7% (FY 1995 → FY 2005)	6.5%
Vending machines	37.3% (FY 2000 → FY 2005)	33.9%
Computers	99.1% (FY 1997 → FY 2005)	83.0%
Magnetic disk units	98.2% (FY 1997 → FY 2005)	78.0%
Fluorescent lights*	35.6% (FY 1997 → FY 2005)	16.6%

*For the product categories marked with *, energy efficiency standard values are defined by the energy consumption efficiency (e.g. km/l), while those without * are by amount of energy consumption (e.g. kWh/year). In the above table, values of the "Energy efficiency improvement" indicate the rate of improvement calculated based on each standard. (Example: If 10 km/l is developed to be 15 km/l, an improvement rate is calculated as 50% (It is not calculated as the improvement of fuel consumption by 33% from 10 liters down to 6.7 liters for 100 km drive); and if kWh/year is developed to be 5 kWh/year, the improvement rate is 50%).*

An IEA paper by Mark Ellis provides several examples of the impact that labelling and energy performance standards have had:[7]

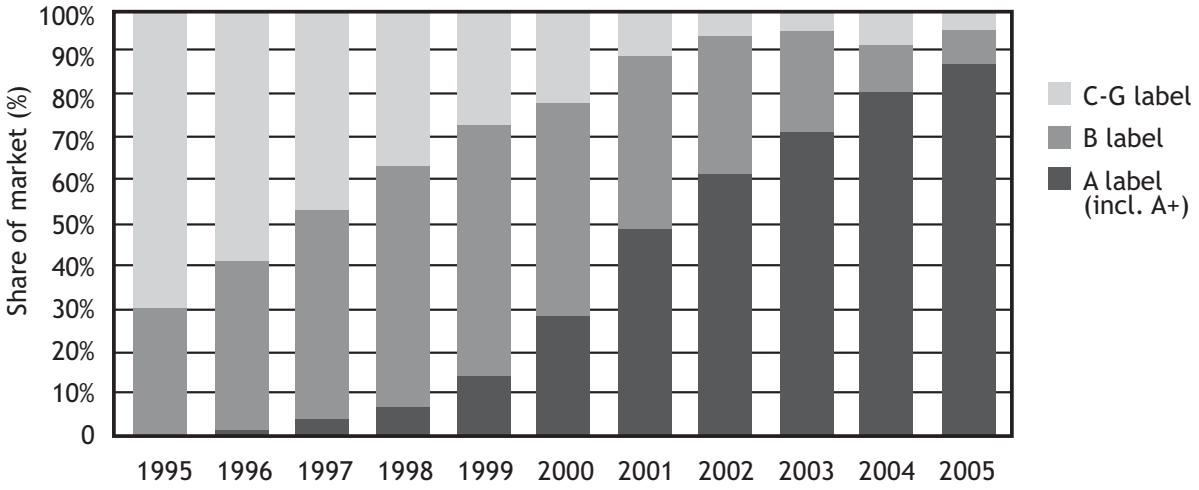
- between 1993 and 2005 the average energy consumption of the refrigerators in Australia has dropped by 40 percent;
- between 1980 and 2001, the average energy consumption of refrigerators and freezers in the United States dropped by 60 percent. Following the introduction of MEPS in 1993, and their subsequent revision in 2001, the energy consumption dropped by 20 percent each time; and
- in the United Kingdom between 1989 and 2001, energy consumption of refrigerators and freezers dropped by 20-25 percent. Labels were introduced in 1995 and MEPs in 1999.

The paper reviewed several other appliances as well. An important point worth mentioning, however, is that these improvements were made despite falling energy prices. The equipment saw increases in efficiency of between 10 and 60 percent, while real prices for those products declined 10 to 45 percent.

Normally, such energy efficiency gains would occur when prices are declining by those rates.[8]

The use of labels can be an important aspect of market transformation to more energy efficient products being deployed. Figure 3 shows how "A" and "A+" labels increased in market share in Denmark between 1995 and 2005 for cold appliances. They now represent over 80 percent of the market.[9]

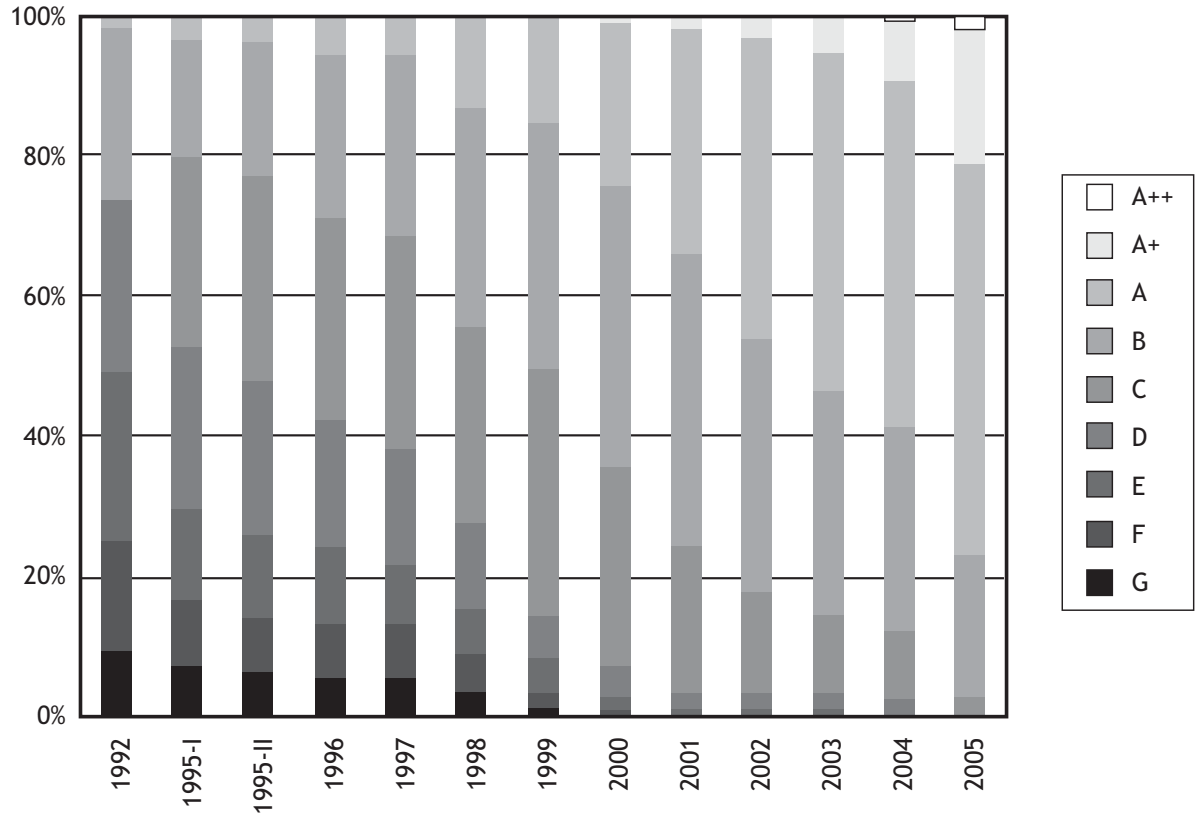
Figure 3: Sales of cold appliances in Denmark, 1995-2005 by energy rating



Source: Danish Energy Agency

Figure 4 shows the evolution of energy classes in Europe between 1992 and 2005. The move to the top classes accelerated after 2000, when minimum energy performance become effective and banned the sales of E to G labelled products (in some classes even D products were banned). This example further illustrates how standards and labelling programmes can and should be harmonised to gain maximum impact.

Figure 4: Evolution of energy classes in Europe, 1992-2005



Source:European Committee of Domestic Equipment Manufacturers, http://www.ceced.org.

There is considerable potential for more improvements in product energy efficiency through labelling and standards programmes. A recent study published by the Energy Charter provided information regarding the potential savings for several countries.[10] For example:

- UK expects delivered savings of approximately 3.5 TWh of electricity per year by 2020 just for refrigerators and freezers – equivalent to 2 percent of residential electricity demand;
- Australia expects savings of 6-7 percent of electricity demand to 2020;
- calculations by Lawrence Berkeley National Laboratory for Pakistan show that the country could save 20 percent of its projected energy demand over 25 years;
- UNDP calculates a potential of 6 percent of electricity demand in Russia; and
- indicative savings potential for countries of the Former Soviet Union is 50,700 TWh, with annual monetarised savings of over US$5 billion.

Studies conducted by the German Öko-Institut found that there were approximately 188 million large appliances in use in homes across Europe that were more than ten years old. The energy and water consumption of these appliances is unnecessarily high. By comparison, the latest generation of refrigerators are, on average, 70 percent more efficient than the average refrigerator of ten years ago.[11]

2.2 Comments on Introducing Labels and Standards

Interestingly, many of the labelling and standards programs started because of trade issues: for Canada and the United States, it was because of inter-provincial or inter-state trade. Many provinces and states had their own specific requirements and programs, which in turn created a confusing mosaic for consumers, manufacturers and distributors. For the EU, the introduction of labels was largely to help develop the internal market. In all cases, the policies also influenced international trade, since imported goods were required to meet national requirements for either labels or MEPS.

For fuel efficiency standards and labels for passenger cars, most member governments of the IEA had standardised test procedures to measure fuel efficiency when the IEA conducted its first survey in 1984.[12] However, the test procedures were significantly different for Europe, North America and Japan. The 1984 report was able to develop a correction factor to allow the three methods to be compared. This comparison was not for trade considerations, but rather for analysts to assess which country or region was making the most progress in fuel efficiency.

The issue is how these national or regional initiatives interconnect from a trade perspective. Do they encourage trade or provide a barrier to trade? What forms of harmonisation are taking place? And what is motivating this harmonisation? Are there countries or groups of countries that are losing out because they will not or cannot develop, implement or harmonise their own standards? What is the form of that "losing out" and if they are losing out, what can they do?

The next chapter provides that examination in more depth.

3. TRENDS IN THE DEPLOYMENT AND TRADE OF ENERGY–EFFICIENT PRODUCTS

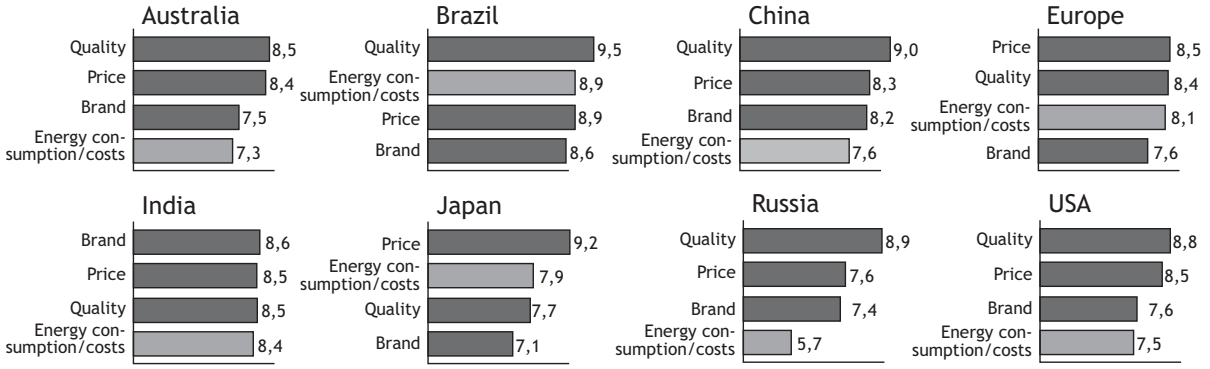
The use of energy-using products has risen almost exponentially over the past two decades. Many new energy-using "gadgets" are invented and sold every year. Homes and offices employ many more energy-using products than a generation ago.

There is a wide range of products that can be considered energy-using, though whether they are actually energy-efficient is relative. Refrigerators sold 10 years ago would not generally be considered an energy-efficient product today, even though it may have been the best performer at the time. But a compact fluorescent light bulb will most likely in the foreseeable future be considered an energy-efficient product, even if more efficient lighting is coming onto the market.

The policies affecting trade need to be assessed in the context of whether they are even viewed as relevant to energy efficiency policy. The previous chapter described the policies. Now it is necessary to see if the policies affect consumer decisions, market transformation and whether they have any bearing on trade.

Figure 5 shows the relative importance that consumers place on energy efficiency when purchasing appliances.[13] The importance of energy efficiency as a factor in the purchase of a good is quite pronounced, even though it may not be the largest factor. Thus, labelling and standards must have some bearing on trade issues, given that many of these products are traded internationally. The following sub-section shows that "energy efficiency" is a factor in the purchase decision and that labels help the consumer to choose energy-efficient options.

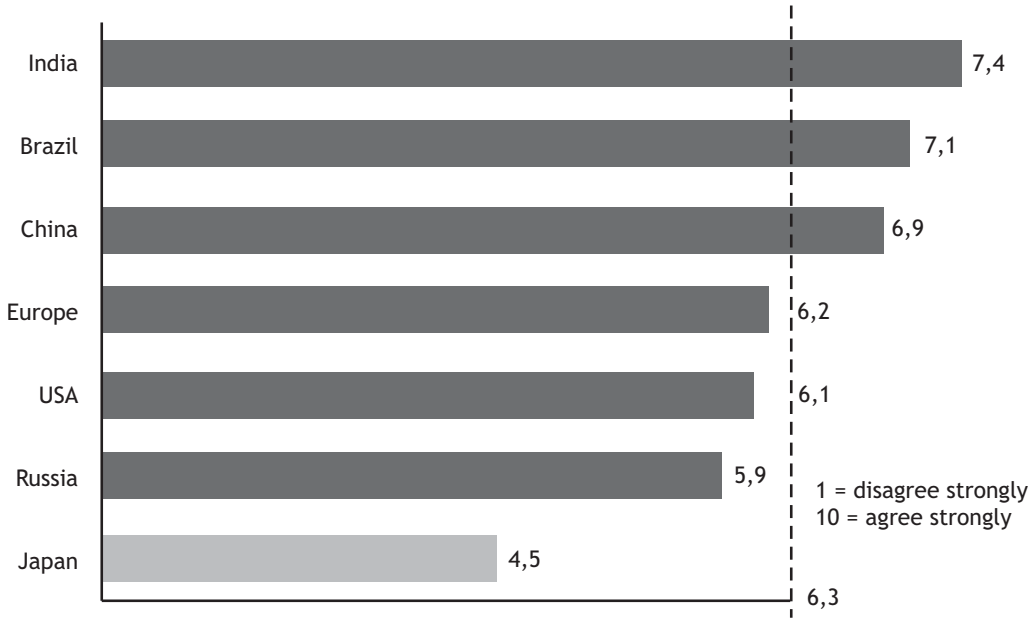
Figure 5: Energy efficiency is most relevant to consumers in Japan and Brazil when purchasing a new appliance



Source: 1 represents very unimportant and 10 represents very important. Eckl presentation at EEDAL 09, http://www.eedal.eu.

While the survey shows that energy efficiency is an important factor, it is harder to measure the influence that endorsement or comparative labels have on buyer behaviour. Consumers generally understand energy labels though:

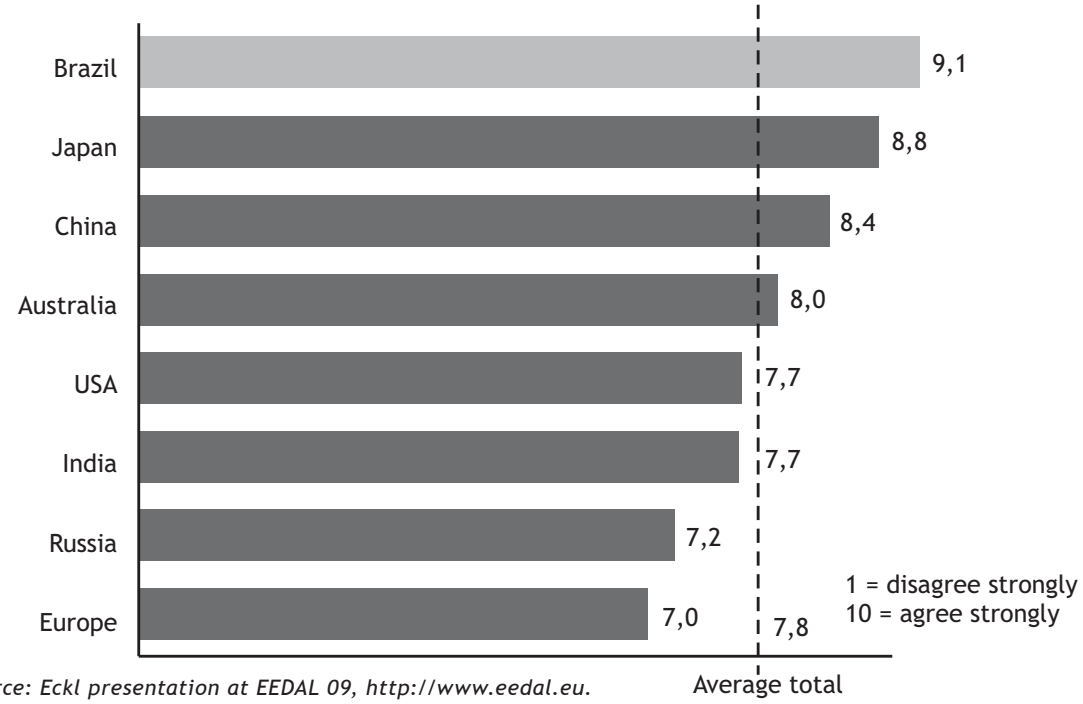
Figure 6: Is the energy label understood by the consumers?



Source: Eckl presentation at EEDAL 09, http://www.eedal.eu.

Interestingly enough, consumers actually use the labels the most in Brazil, Japan and China.

Figure 7: Does the energy label support the sales of energy-efficient appliances?



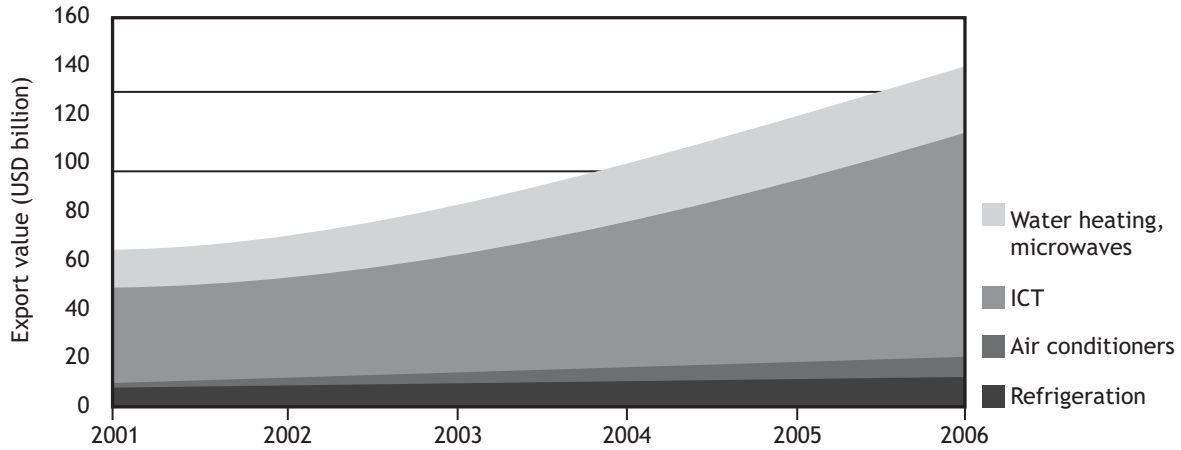
Source: Eckl presentation at EEDAL 09, http://www.eedal.eu.

Governments around the world use a range of information, awareness creation programmes, financial incentives and promotion from energy companies to encourage consumers to purchase relatively energy-efficient appliances. There are also international initiatives, such as the Efficient Lighting Initiative (ELI), which try to achieve market transformation on energy-efficient lighting, in part through greater harmonisation efforts. Industry itself also helps. For example, the European Committee of Domestic Equipment Manufacturers (CECED) gives considerable attention on its website to energy-efficient products in order to help consumers choose wisely.[14] There are also non-governmental consumer associations that help provide guidance to consumers.

3.1 Trade in Energy–efficient Products

In only five years, exports of household appliances in terms of value grew 250 percent, most significantly in information and communication technologies.

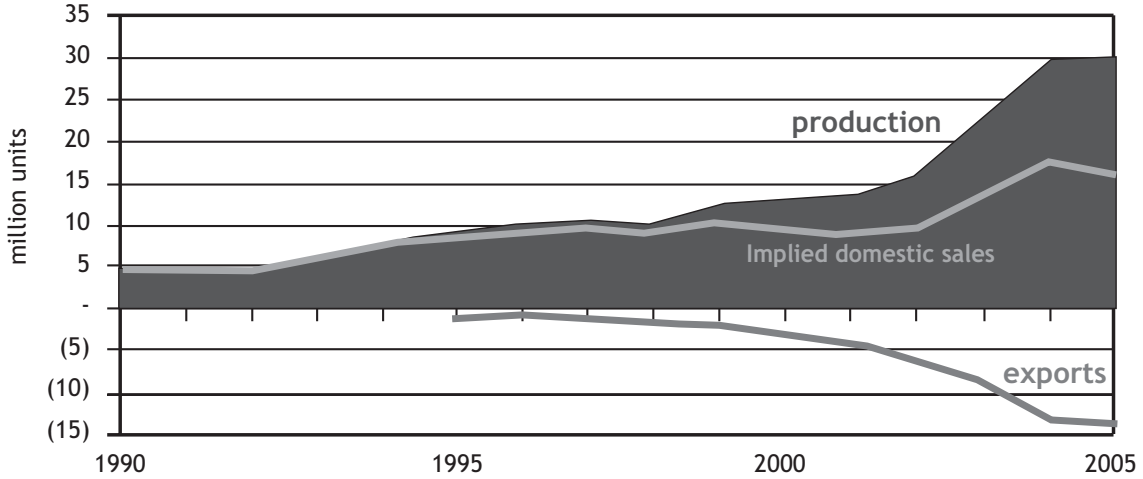
Figure 8: Value of trade in major household appliances, 2001-2006



Source: IEA, Gadgets and Gigawatts, OECD, Paris, 2009, p. 248.

The centre of gravity of manufacturing has significantly shifted in the past two decades towards Asia, where labour costs have been lower. One country that has especially benefited is China. Its refrigerator exports reached 14 million units in 2005, as shown in Figure 9. This represented 46 percent of total production. Imports have not been more than 0.1 million per year since 1996.[15]

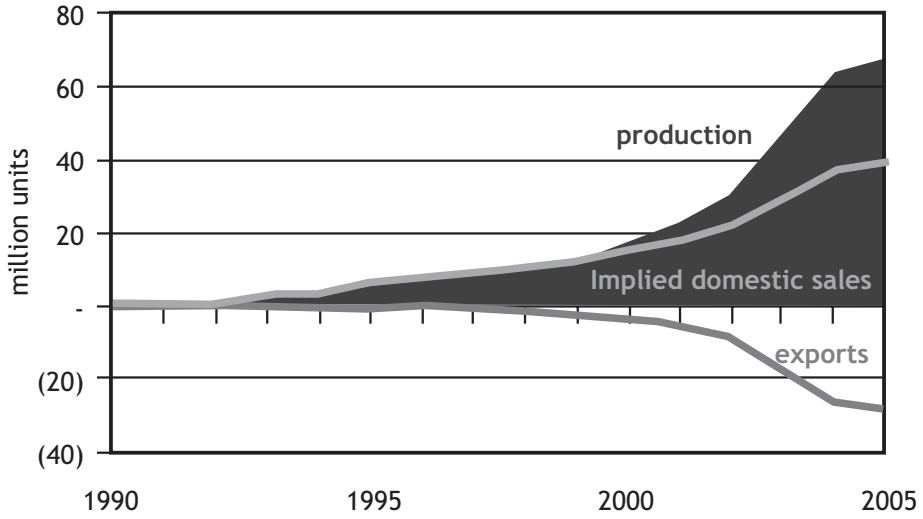
Figure 9: China's annual refrigerator production, sales and trade, 1990-2005



Source: LBNL report, Impacts of China's Current Appliance Standards and Labelling Program to 2020, March 2007.

The trend is even more dramatic in China for air conditioners. The air conditioner market went from 240,000 units to 68 million units in 15 years, as shown in Figure 10.

Figure 10: Annual room air conditioner production, sales and trade, 1990-2005



Source: LBNL report, Impacts of China's Current Appliance Standards and Labelling Program to 2020, March 2007.

The LBNL study shows that room air conditioner production grew at an average annual rate of 26 percent between 1995 and 2005. In 2005, exports represented 42 percent of domestic production in China.

3.2 Comments on Deployment and Trade

Energy efficiency standards and labelling have increased in importance in the more than 30 years since they were first introduced. After considerable attention in the late 1970s, with several countries introducing labels (Canada, France and the United States, to mention a few), testing methods were needed to ensure the labels' credibility for comparison purposes. Vehicles in the United States (mandatory) and Canada (voluntary, with the threat of being mandatory) were among the few efficiency standards. In Europe, for the most part, there were negotiated targets for passenger cars. MEPS really started in the 1990s.

The major players were the manufacturers and their associations on the one side and the ministries responsible for either energy or consumer affairs on the other. Consumer groups and non-government organisations played a relatively small role in the beginning. In the 1980s there was also a political swing against any form of mandatory approach in OECD countries.

National and international standards bodies were involved in the development of test methods. In Europe, for example, the UN Economic Commission for Europe (UN-ECE) was involved in the vehicle test procedures used in Europe. Japan and North America took separate approaches.

International trade was a minor consideration, in large part because markets were less global. Trade did play a role, however, which the Canada example illustrates. The responsibility for labelling was at the provincial level, and at the time labels were seen as a barrier to trade. Federal labels helped, even though they were often combined with the provincial ones. This was also the case in the United States, with various states having their own related initiatives.

In the 1990s, there were big efforts in Europe, North America and the OECD-Pacific for labelling and for minimum energy performance standards. For example, in Europe, while climate change was starting to rise in priority, much of the rationale was that these policies would improve the functioning of the internal market, since many energy-using products were sold across Europe. A related motivation was to keep out inefficient products from the newly independent countries of central and Eastern Europe and the former Soviet Union.

Manufacturers were obviously concerned about the new requirements, though they were generally supportive of efforts to facilitate the development of the internal market. CECED was created in 1958 but did not open an office in Brussels until 1997, once it saw the activities of the European Commission in this area expand.

Throughout the 1990s and since then, other countries like Australia and China became much more active in labelling and MEPS. International organisations such as the International Energy Agency started undertaking more studies on labelling and standards. Since 2000, it has published a wide selection of detailed studies.

In 1999, CLASP, the Collaborative Labelling and Appliance Standards Programme, was created as an outgrowth of activities from the Lawrence Berkeley National Laboratory, to help provide technical assistance for the development of appliance standards and labelling programs. There were other not-for-profit initiatives in Europe and elsewhere as well.

4. DEVELOPMENTS UNDERWAY IN STANDARDS DEVELOPMENT AND HARMONISATION

There are many initiatives at the national and regional levels, as well as globally, to encourage standards development as well as to encourage the harmonisation of standards to various degrees.

A recent IEA report (Waide 2008) states that "Harmonisation of ... energy-performance standards helps:

- minimise product energy performance testing and verification costs for increasingly globalised energy-using equipment markets;
- enable energy performance to be compared on a common basis across broad economic and political groupings;
- facilitate adoption of more efficient product manufacturing; and
- accelerate transfer of best practice in policy settings.[16]

Some of the major developments are described below.

4.1 Global Efforts

- CLASP and the global Best Practice Network

CLASP has provided technical assistance with the national implementation of standards and labelling in over 50 countries. It aims at monitoring the full extent of both standards and labelling globally, the results of which are published on its website (http://www.clasponline). Since 1999, CLASP has assisted with the implementation of 24 efficiency standards or labels.

CLASP currently has a major study underway to:

- compare test procedures, efficiency metrics, thresholds, certification, accreditation and compliance procedures;
- estimate energy & CO_2 savings potentials from harmonisation or alignment of most promising products; and
- develop a strategic work plan around harmonisation and alignment, and their associated risks/benefits.

The study will be available in 2010.

CLASP, which is global in reach, has teamed up with ClimateWorks, a California-based foundation, to set up a best practice network on standards and labelling in North America, China, India, Europe and Latin America. It will help with the technical analyses necessary for further standards development in these regions and it will share the lessons learned among the regional networks. CLASP has also been working in China for more than ten years in collaboration with Lawrence Berkeley National Laboratory

- ENERGY STAR

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. It started in 1992 as a voluntary labelling programme trying to promote energy-efficient products and to reduce greenhouse gas emissions. Computers and monitors were the first products to be labelled. The label's use has since expanded to include a wide range of appliances, office equipment, lighting, home electronics, and more. The label also covers new homes and commercial and industrial buildings. It is described above in the first section.

Importantly, several other countries including Australia, Canada, Japan, New Zealand, Taiwan and the European Union now use the label for some product groups. The countries develop partnership agreements with the ENERGY STAR programme and there are agreements on specifications in order to achieve consistency across voluntary labelling programs and to "avoid a patchwork of varying country-specific requirements ..."[17]

In 2001, the European Union signed an Agreement with the US EPA to introduce the ENERGY STAR label in Europe as well (only for office/ICT equipment), thereby recognising each other as partners in the ENERGY STAR Programme.[18] This new scenario allows potential partners in the European Union to sign up through the European Commission, who is responsible for the EU ENERGY STAR Program. A recent European regulation (106/2008) now requires all EU Member State governments and EU institutions to buy only Energy Star-qualifying ICT equipment as part of their public procurement.

The EU ENERGY STAR Programme recognises three kinds of partners: those who manufacturer and produce energy-efficient office equipment; retailers, resellers, importers and exporters selling or otherwise bringing onto the market ENERGY STAR-labelled products; and organisations that would like to show their support to the ENERGY STAR Programme. These partners can be schools, communities, private organisations, etc.

Australia participates in ENERGY STAR in order to use the label on copiers, computers and monitors, printers and fax machines, scanners, consumer audio and DVD, multifunctional devices in the home and televisions and VCRs.[19]

Canada uses ENERGY STAR for a wider range of products than the European Union or Australia.[20] ENERGY STAR specifications are endorsed for major appliances; residential heating, cooling and ventilation equipment; office equipment; consumer electronics; windows and doors; lighting; and commercial equipment. Notably, some equipment is also subject to Canada's mandatory labelling programme. EnerGuide provides comparative information on the energy performance of products for different models. ENERGY STAR identifies the most energy-efficient models that meet or exceed premium levels of energy. There are some products (refrigerators, clothes washers, dishwashers and room air conditioners) that are qualify for both the EnerGuide and ENERGY STAR programmes.

The Canadian website explains that the manufacturer must pay for the costs of demonstrating that the product meets ENERGY STAR specifications. The manufacturer must also provide proof that the product meets the ENERGY STAR specifications.

- International CFL Harmonisation Initiative[21]

This initiative was launched at a conference in Shanghai in 2005, supported by Australia, China, the European Union, the United States, the Efficient Lighting Initiative (ELI), and several manufacturers. Its goal isto harmonize standards between the major markets in order to improve quality, reduce compliance costs, reduce manufacturer costs and lower consumer prices.

- Efficient Lighting Initiative (ELI)[22]

ELI started in seven countries (in Argentina, the Czech Republic, Hungary, Latvia, Peru, the Philippines and South Africa) to help in the market transformation of efficient lighting. The original programme tested the quality certification and labelling concept. ELI was operated by the International Finance Corporation (IFC) and was funded by the Global Environment Facility (GEF). In 2005, the China Standard Certification Centre (CSC) was commissioned by the IFC to develop and expand the ELI certification and branding system globally. Now a new body, the ELI Quality Certification Institute, operates the expanded ELI programme.

The Institute is currently promoting the voluntary technical specifications for energy efficient lighting: self-ballasted compact fluorescent lamps; double-capped fluorescent lamps, fluorescent lamp ballasts, street lighting, indoor lighting systems and first-generation LED products.

ELI describes their standard as turnkey; the standards and certifications are constructed by ELI and awarded in a ready-to-use condition. The ELI certification process is based on international standards for energy-efficient lighting.

ELI Quality Certification Institute determines the need for developing new or revised Voluntary Technical Specifications by conducting market assessments. The Institute also determines the need for specifications from the perspectives of market aggregators, end-users and geographic areas to be covered by the specifications.

Each Voluntary Technical Specification is accompanied with a rationale explaining:

- the need for the new or revised specification from the various perspectives of the stakeholders;
- the geographic areas that have been considered in developing the specifications;
- the test methods used and their issuing authorities; and
- which test facilities are qualified to conduct the tests;
- International Energy Agency.

The IEA is involved in policy development for its member countries and increasingly focussing beyond its member countries. It has undertaken many studies for the Group of Eight (G8) countries, for example. The IEA has, however, also been involved in standards development in various ways.

- Standby initiative[23]

In 1999, the IEA proposed that all Member countries reduce standby power requirements to no more than one watt per device. Standby power is the electricity consumed by appliances while switched off or not performing their primary functions. The proposal contained 3 elements:

- participating countries would seek to lower standby power demand to below 1 watt in all products by 2010;
- each country would use measures and policies appropriate to its own circumstances; and
- all countries would adopt the same definition and test procedure.

The International Electrotechnical Commission developed an international definition and test procedure for Stand-by power (IEC 62301) in 2005. This test procedure is now widely used.

- IEA Implementing Agreement (also known as Multilateral Technology Initiatives): Efficient Electrical End-Use Equipment (4E)[24]

The 4E Implementing Agreement focuses on electrical end-use equipment from the residential, commercial and industrial sectors. 4E focuses on equipment that contributes the most to the total end-use electricity consumption, such as electric motors and lighting, and will include technologies with fast growing markets shares such as set-top boxes. Standby consumption is also a relevant topic for this Implementing Agreement. Countries participating so far include: Australia, Austria, Canada, Denmark, France, Republic of Korea, The Netherlands, Switzerland, the United Kingdom and the United States

For motor systems, the goals of the 4E Motor Systems Annex are to advocate for the harmonisation of standards and electric motors, in order to promote the most efficient electric motors. This implementing agreement replaces SEEEM (Standards for Energy Efficiency of Electric Motor systems), International Harmonisation Initiative (http://www.seeem.org), which began in 2006. As this agreement's website states,

industrial electric motor systems use 40 percent of global electricity. They are used in industry, infrastructure and large buildings to drive pumps, fans, compressors, traction systems and industrial handling & processing. With using best practice energy efficiency can be improved by 20 percent to 30 percent on average. Most improvements have a pay back time of 1 to below 3 years. This means a big potential impact on reduction of global greenhouse gas emissions.[25]

Other annexes on benchmarking and on standby power also have aspects that will support harmonisation.

- The International Energy Conservation Code (IECC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards

Both the IECC and ASHRAE recommend that energy-efficiency standards for buildings being refurbished be incorporated into building regulations.[26] A specific code for improving energy efficiency by refurbishment has been developed by the International Energy Code Council. This standard is called the International Existing Building Code (IEBC) and it covers the same type of buildings as the IECC, i.e. mainly small residential buildings. The standards for large residential and commercial buildings are set directly in the ASHRAE standards for large and commercial buildings.

The latest IEBC standards were finalised in 2006 and amended in 2007. The IEBC sets requirements when existing buildings are refurbished or changed:

> The Code shall apply to the repair, alteration, renovations or change of occupancy, addition, and relocation of existing buildings. A building or portion of a building which has not been previously occupied or used for its intended purpose shall comply with the provisions of the International Building Code for new construction. Repairs, alterations, change of occupancy, existing buildings to which additions are made should also comply with the Code.[27]

The IEBC code relates closely to building markets in the United States, but it is adjusted so that it can also be used internationally, with local adaptations. In the United States, implementation and enforcement of this set of standards is up to individual state governments.

- CEECAP

The CEECAP - Implementing EU Appliance Policy in Central and Eastern Europe project –is aimed at supporting Central and Eastern European (CEE) countries in creating suitable conditions for implementing appliance labelling and efficiency policies in accordance with EU appliance efficiency legislation and programmes. The project started in early 2006 and lasted for 30 months. It was carried out in six CEE countries (Czech Republic, Bulgaria, Lithuania, Poland, Romania and Slovakia). Its main activities included identifying and training national experts and decision makers; designing and preparing national appliance labelling and efficiency actions; identifying key problems and initiating actions to solve them in collaboration with the project target groups; and transferring international and local knowledge. Under the project, awareness of major stakeholders on correct labelling has been strengthened, and close cooperation with retailer and consumer associations as well as public authorities and energy utilities has been established. On the other hand, the verification procedures still remain to be strengthened in the CEE countries. The project is complete but was an important capacity building tool for new Member States of the European Union.

- The Asia-Pacific Partnership on Clean Development and Climate[28]

The Asia-Pacific Partnership on Clean Development and Climate is an innovative new effort to accelerate the development and deployment of clean energy technologies. APP partners Australia, Canada, China, India, Japan, Korea, and the United States have agreed to work together and with private-sector partners to meet goals for energy security, national air pollution reduction, and climate change in ways that promote sustainable economic growth and poverty reduction.

From the Buildings and Appliances Task Force Action Plan:

Project 1—Harmonisation of Test Procedures

In an effort to eliminate a major barrier to developing successful standards and labelling programmes, this project will develop harmonised test procedures for a number of agreed products using a "communities of practice" model. The project includes the evaluation of existing test procedures, and revisions to existing or the development of new test procedures in an internationally harmonised manner. Data will then be amassed using the resulting test procedure and potential mandatory and or voluntary efficiency levels will be developed for use by various countries, as desired. In developing harmonised test procedures among the Partner countries, all products that use standby energy should be considered in coordination with activities under Project 2 (Standby Power). The project outputs will include harmonised test procedures for at least four products from a priority list, robust data sets including comparison test data in each test facility for each of the four products using the test procedure, a list of additional products for BATF to pursue in the future, and a screening method for prioritising these products.

As a result of this project, all governments will have access to internationally harmonised test procedures and can individually or in groups propose to develop potential performance levels upon which to base mandatory or voluntary requirements or labelling schemes for these products as projects to fall under the Partnership at a later date.

- International Organisation for Standardisation[29]

The ISO is a standards making body that is recognised globally. ISO standards:

- make the development, manufacturing and supply of products and services more efficient, safe and clean;
- facilitate trade between countries and make it fairer;
- provide governments with a technical base for health, safety and environmental legislation, and conformity assessment;
- share technological advances and good management practice;
- disseminate information on innovation;
- safeguard consumers, and users in general, of products and services; and
- make life simpler by providing solutions to common problems.

For trade officials, international standards create "a level playing field" for all competitors on those markets. The existence of divergent national or regional standards can create technical barriers to trade. International Standards are the technical means by which political trade agreements can be put into practice.

For developing countries, international standards that represent an international consensus on the state of the art are an important source of technological know-how. By defining the characteristics that products and services will be expected to meet on export markets, international standards give developing countries a basis for making the right decisions when investing their scarce resources, so that they can avoid squandering them.

- International Electrotechnical Commission

The IEC is the world's leading organisation that prepares and publishes International Standards for all electrical, electronic and related technologies. Amongst other things, the IEC is active in developing test procedures that are used for product programmes. The IEC is one of the bodies recognised by the World Trade Organisation and entrusted by it to monitor

the national and regional organisations that have agreed, as part of the WTO's Technical Barriers to Trade Agreement, to use the IEC's international standards as the basis for their national or regional standards.

- Some Regional/National Efforts related to harmonisation:

4.2 European Union

The European Union has the appliance labelling directive and the Eco-design Directive. It also has a new Directive for the labelling of the energy performance of car tyres.

- Appliance Labelling

In 1992, the European Union introduced a labelling scheme for a range of household appliances. This plan was introduced to help implement the internal market, because until that time certain Member States already had their own voluntary schemes for energy labelling: one member state had formally proposed the introduction of its own compulsory labelling scheme, and other member states were considering such an introduction. It was believed that the existence of a number of compulsory national schemes would create barriers to intra-Community trade.

The labelling directive covers: refrigerators, freezers and their combinations; washing machines, dryers and their combinations; dishwashers; ovens; water heaters and hot-water storage appliances; lighting sources and air-conditioning appliances. Some additional products for which MEPS are being introduced under the Eco-design Directive's product regulations will also be labelled, for instance TVs.

- Eco-design

The EU Eco-design Directive was adopted in 2005 and revised in 2010. It originally covered only energy using products, but the revised Directive now allows energy performance standards for energy-related products, for instance windows and water faucets (although the criteria for these have not yet been developed). It establishes a framework under which manufacturers of energy-using or energy-related products will, at the design stage, be obliged to reduce the energy consumption and other negative environmental impacts occurring throughout the product life cycle. The Directive has provisions for the introduction of so-called implementing measures, which can be MEPS or other mechanisms. The Directive ensures free movement of products across Europe.

Mechanisms of the Eco-Design Directive

The Eco-design Directive is a framework directive. This means that, in practice, binding eco-design requirements are set by implementing measures specific to each product group. The Directive itself only lays down the conditions and criteria for introducing implementing measures: they may be adopted for a particular product, provided it has a significant impact on the environment, coupled with a high volume of sales and trade on the internal market and clear potential for improvement without entailing excessive costs. Implementing measures are considered when no valid self-regulatory initiative has been taken by industry. Self-regulation by industry, including voluntary and unilateral commitments, may indeed produce quick progress, due to rapid and cost-effective implementation, and allows flexible and appropriate adaptation to technological solutions and market sensitivities.

Each implementing measure is preceded by preparatory studies and an impact assessment conducted by external experts and the Commission with the aim of identifying cost-effective solutions to improve the overall environmental performance of products and incorporates participatory and delegated decision-making processes. Implementing measures are eventually adopted by the Commission under the regulatory procedure with scrutiny and become effective in all EU Member States at the same time. Non EU members such as Norway and Switzerland are also adopting these requirements.

Source: COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT, Establishment of the working plan for 2009-2011 under the Eco-design Directive, Brussels, 21.10.2008 COM(2008) 660 final.

The Eco-design Directive today applies in principle to all energy-using products (except vehicles for transport) and covers all products for different energy sources (for instance, the regulation for cold appliances covers both electric and gas-fired cold appliances, and the boiler requirements will stipulate requirements for electricity and gas, and take solar heated equipment into account). The following energy-using products are considered priorities when implementing this directive: heating and water-heating equipment, electric motor systems, lighting in both the domestic and tertiary sectors, domestic appliances, office equipment in both the domestic and tertiary sectors, consumer electronics and HVAC (heating/ventilating/air conditioning) systems. Feasibility studies are underway to look into what energy-related products may be adequate for inclusion.

Criteria for Implementing Measures to the Eco-design Directive:

a) there shall be no significant negative impact on the functionality of the product, from the perspective of the user;
b) health, safety and the environment shall not be adversely affected;
c) there shall be no significant negative impact on consumers, in particular as regards the affordability and the life-cycle cost of the product;
d) there shall be no significant impact on the industry's competitiveness;
e) in principle, the setting of an Eco-design requirement shall not have the consequence of imposing proprietary technology on manufacturers;
f) no excessive administrative burden shall be imposed on manufacturers.

- National and regional standards bodies

The ISO and others, described above, are already working on standards development. However, this task is also being undertaken at the regional and national levels.

In Europe there is European Committee for Standardisation (CEN) and the European Committee for Electrotechnical Standardisation, CENELEC.[30] Both are heavily involved in this matter. For the sake of brevity, only a short description of CENELEC is given here.

CENELEC's mission is to prepare voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services by removing barriers to trade, creating new markets and cutting compliance costs. It supports the International Electrotechnical Commission in achieving their mission: "To be globally recognised as the provider of standards and conformity assessment and related services needed to facilitate international trade in the fields of electricity, electronics and associated technologies".

Working Group 3 of TC 111X "EuP standardisation programme" deals with standardisation aspects of the EU Eco-design Directive. The European Commission issued a mandate to CEN/CENELEC/ETSI for "Programming of Standardisation Work in the Field of Eco-Design of Energy Using Products". The objective of this mandate is to draw up a comprehensive standardisation programme with the goal of producing standards aimed at improving the environmental performance of energy-using products. Such standards are designed to help manufacturers comply with the requirements of the future Implementing Measures under the directive.[31]

The CENELEC Working group follows a two-step approach: (i) stock taking of relevant existing EuP standards and (ii) 'preliminary' gaps analysis of current standards. The data collection started in December 2005 and includes all type of standardisation products, from guides and informative specifications to normative documents. Document sources include the broadest possible range of interested groups (international and European level associations, manufacturers and installers of EuP, SME, consumers, environmental NGOs, the waste treatment industry, the competent authorities of the Member States and members of the scientific community), although the feedback to the two-month public consultation held in 2005/2006 has been rather disappointing (in terms of number of replies).

Source: European Environmental Citizens Organisation for Standardisation (ECOS) http://www.ecostandard.org.

- Other countries

Throughout this report, examples from other countries have been given. The most prominent national programme that has had international ramifications is ENERGY STAR, as described above.

Countries such as Australia have been getting involved in Asia in order to help with their regional efforts on harmonisation, also described above.

4.3 Policy work promoting harmonisation

Since 2000, the IEA has produced a wealth of analysis on standards and labels, many of which have dealt extensively on harmonisation. These are listed in the bibliography. In 2008, the IEA hosted a major international conference on the topic.

The next section on assessment will integrate some of the messages coming from the IEA analyses.

5. ASSESSMENT

5.1 Introduction

As shown throughout this report, harmonisation of standards for energy-efficient products is taking place at both the regional and global levels, with the greater share happening at the national or regional levels. What is striking about the policies being implemented and the harmonisation underway is how few developing countries participate. Particularly, there are very few of these policies in Africa.

It is important to understand the benefits of harmonisation and what is driving the harmonisation efforts today. Finally, it is important to assess what the trade implications are and, particularly, what this means for the greater share of developing countries that do not have the capacity to develop and implement standards and labels but who are increasingly importing products that can have an effect on their overall energy use patterns.

5.2 The Benefits of Harmonisation

The European Council for an Energy Efficient Economy (eceee) states in a policy brief on the EU's Eco-design Directive that:

> [The] over-riding priority of the European Union ... is to create a single economic market allowing free movement of goods and services. The Commission aims, therefore, to eliminate disparities between the laws of Member States, which can create barriers to free trade and distort competi¬tion, and to encourage the development of common legal frameworks. Coherent EU-wide rules for eco-design are intended to ensure that disparities among national regulations do not become obstacles to intra-EU trade.[32]

It also adds that Eco-design could prevent nearly 200 million tonnes of CO_2 from entering the atmosphere – an amount equivalent to the total emissions of the Netherlands.

CLASP states in its guidebook on standards and labelling that the benefits from harmonisation are:[33]

- reducing programme costs by adopting programme elements from trade partners;
- avoiding or removing indirect barriers to trade;
- avoiding the dumping of inefficient products on trading partners.

CLASP further asserts that effective standards can also make local businesses more profitable, make manufacturers more competitive in a global marketplace and make local markets more attractive for multinational commerce.[34]

Effective standards can help countries meet climate change objectives. For example, appliance standards currently in effect in the U.S. are projected to reduce residential-sector carbon emissions by an amount equal to 9 percent of 1990 levels by the year 2020.[35] With climate change strategies becoming increasingly global, harmonisation efforts have to be taken seriously.

It is asserted that increased harmonisation can reduce costs for product testing and design and can also enhance prospects for trade and technology transfer. This is some of the motivation in APEC work.

Furthermore, CLASP explains that countries participate in regional harmonisation activities in order to:

- improve energy efficiency;
- improve economic efficiency (improve market efficiency);
- reduce capital investment in energy supply;
- enhance economic development (enhance quality of life);
- avert urban and regional air pollution;

- help meet goals to reduce climate change;
- strengthen competitive markets (reduce trade barriers);
- reduce water consumption; and
- enhance energy security.

However, harmonisation must be both appropriate and effective. Some organisations, such as the IEA, have argued that there is "perhaps a greater need for and net benefit to be gained from encouraging the development of 'regional' regulatory standards, rather than global regulatory standards, given the different characteristics of products in each market".[36] Some products have global test protocols (e.g. micro-wave ovens) but other appliances, such as washing machines, clothes dryers and dishwashers, are difficult to harmonise because "the energy use of these appliances is heavily influenced by behavioural characteristics".[37] The IEA suggested that there could be the possibility of sharing tasks in their analytical efforts in those cases where global harmonisation may not make sense. This means that there may be limits to harmonisation, at least for certain categories of products.

5.3 What is Driving Harmonisation

There are two schools of thought on whether it is the "trade" community or the energy-efficiency community driving for greater harmonisation. Mark Ellis, former expert at the International Energy Agency, contends that:

> "[I]t is trade that is driving calls for harmonisation on energy performance test methods and specifications, rather than the other way around. The large product suppliers see these differing standards as barriers for their entry into markets and this view is shared to some extent by the WTO . . ."[38]

The energy efficiency community promotes such activities in order to have better regional or global harmonisation. But there is also interest in the energy efficiency community, as shown by Paul Waide's (also formerly of the IEA) statement:

> [M]any of them want to know where their markets stand relative to others... but these efforts seldom get much beyond the 'interest' level outside the large regional markets because the hurdles to be crossed are seen to be higher than the value attained given that most policy makers in the domain are completely overwhelmed already.[39]

In Europe, appliance labelling seems to have largely been driven, at least initially, by the need to complete the internal market. This does not appear to be the case for testing methods and MEPS, although that is far from certain. For example, a representative from the European Heat Industry (EHI), Martin Searle, notes that the EN 51316-4 standards for boilers allow for different calculation methodologies:[40]

- not all member states use EN 51316-4, for one;
- different product data are required by different countries;
- product standards allow for different efficiency test methodologies;
- differences in measurement tolerances and uncertainties result in variations in test results.

All this means that his industry is doing everything possible to harmonize standards and labelling in order to reduce their own costs and reduce consumer confusion. For his industry, further harmonisation is essential.

Many in the energy efficiency community see that there are benefits in arguing for greater harmonisation, though that does not necessarily mean this argument drives harmonisation forward. There is also concern, on the one hand, that harmonisation needs to avoid the lowest common denominator; however, Paul Waide contends that "there is equally a strong

interest among the efficiency and climate change community for harmonisation at ambitious levels".

5.4 The Trade Implications from Harmonisation

The abovementioned benefits show that harmonisation of standards can have many benefits. Earlier in this report, some trends in trade of energy-using products were described. Because of globalisation, industrial modernization and new consumer-friendly products, trade is a major issue. Consumers in all end-use sectors want access to new technologies and consumers want them as energy-efficient as possible. Entire economies need them for a variety of energy, environmental and economic development reasons. And this is true in the developed world and in developing countries. That being said, energy efficiency is generally not the highest priority in the purchase decision, but it is an increasingly important one, as shown above in Chapter 2.

As tradable goods, there are international rules to be considered. Many, if not most of these technologies can be considered environmental goods, because of their mitigating effects on climate change; also, at the Doha Round, ministers have called for the liberalisation of environmental goods. The OECD report cited in its introduction the need to "either standardise or harmonise product descriptions and energy-performance metrics or to develop algorithms that would allow simple conversion from one set of requirements to another without necessitating retesting".[41] Their report shows that much progress has been made on this subject.

Standards and labelling are covered by the WTO's Agreement on Technical Barriers to Trade (TBT), which deals with both mandatory technical regulations and with voluntary standards. There are also certain rules of the General Agreement on Tariffs and Trade that can have some relevance.

The TBT Agreement aims to ensure that technical standards do not act as an unnecessary obstacle to trade. There are two obligations under the TBT: the prohibition of discrimination against and between foreign productions; and the 'necessity' requirement which obliges WTO members not to adopt standards that are more trade-restrictive than necessary for achieving the objective of environmental protection, in this case.

GATT rules require a similar non-discrimination obligation.

From the evidence provided above from the energy efficiency community, there is little concern about overstepping the WTO obligations. Programmes such as Eco-design or ENERGY STAR place the same obligations on domestic manufacturers and distributers as they do on importers. Since the Eco-design Directive typically sets mandatory requirements, the regulations are checked by the WTO before being finally approved. There is no intention to discriminate. The driving force behind these regulations is the need to ensure that stricter and stricter energy efficiency targets are met, which are designed for both energy policy and climate change objectives.

Therefore, the requirement of necessity has clearly been met. In fact, in the case of the EU, there was a lull in the tightening of standards, along with concern within Europe that non-European standards were tighter, thus allowing more inefficient products to enter the EU market.

If countries do not keep up with the harmonisation process and implement their own range of energy efficiency policies, trade barriers will likely be the next option. The standards and labelling programmes, however, are designed to transform the market to more energy-efficient, climate-friendly products in order to

meet energy and climate change objectives (many of which are global obligations). With the right policy approach, those barriers can be overcome.

5.5 Harmonisation and the Effects on Developing Countries

As shown above, few developing countries have standards and labelling for traded energy-efficient products. Fortunately, many of the largest developing countries, in particular, Brazil, China and India, are moving more and more in this direction. Brazil and China have had active programmes for years. And several developing countries are participating in regional harmonisation efforts (for example, for compact fluorescent lamps).

Developing countries can benefit from access to energy efficient products. In the development process, there is an increased deployment of modern energy-using products – from mobile phones to computers to televisions to heating and cooling systems. There is obviously a need to ensure that these countries get technologies that reach the highest standards on the market.

Developing countries are increasingly involved in harmonisation of standards as they pertain to the ISO and IEC. Those international bodies are taking this need seriously and are working actively with national standards boards in developing countries to develop and adapt standards to their national circumstances. Many of these standards establish the foundation for national energy efficiency strategies. Test procedures play an important role in harmonisation. But, as Lloyd Harrington, a former expert at the IEA, states, work on test procedures is a low priority in many countries, and there is little guidance from senior policy makers.[42] Harrington surveyed, product-by-product, the use of international test procedures only to find a mixed record.

The ISO, in part through bilateral support from organisations such as the Swedish Standards Institute, are increasing their efforts to promote harmonisation. For traded goods, there are two main reasons why developing countries need to develop standards and labelling programmes for energy efficiency. First, there is the need to avoid dumping of inefficient products, which will only be possible if these countries have policies that allow only those products that are appropriate to their circumstances. This is a concern for all countries, developing and developed. Second, there is equipment that can specifically improve the energy efficiency of the economy (e.g. efficient motors, management control systems, efficient windows), which need to be encouraged. This project can be supported by the introduction of appropriate technical standards.

These will not happen, however, unless developing countries take energy efficiency strategies seriously as a major component of both energy and climate change policies. Without the policy framework, little progress will occur.

6. CONCLUSIONS

Harmonisation of standards for energy efficient products is happening. Most of this is at the national or regional levels, but there are examples of global efforts or efforts (for example, ENERGY STAR) that can go global.

Trade of energy-using products is increasing and there is an increase in the number and types of energy-using products. Homes and offices have more "gadgets" than ever before, and there is no sign of this changing. Developed countries, in the past two decades, have made great strides in their policy framework to encourage market transformation. That would not have happened, however, without a strong commitment to achieve both crucial energy (e.g. energy security) and climate change priorities.

While there can be some instances where WTO rules are broken, the basic point is that most active countries want to use WTO rules to promote even more trade in energy-efficient products.

Organisations such as the International Energy Agency provide policy support to make the policies more globally recognised and implemented. Organisations such as CLASP are providing technical assistance to develop standards and labelling of equipment. Standards bodies such as the ISO and IEC are helping national standards bodies to develop appropriate standards, but those efforts need to be supported by national policy frameworks to promote energy efficiency.

Developing countries are not being left out intentionally. Many are participating to some extent. Countries such as China and India have significantly increased their activities in this area. However, it takes resources to develop test procedures and to put labelling or MEPS in place. There are many international efforts, such as those mentioned above, which are helping developing countries to some extent. Increasingly there is support to help develop and implement such programmes. The best practice network, CLASP, is one non-governmental initiative working in many countries on all continents. But to be successful, there needs to be an effective policy commitment to energy efficiency with the necessary resources with it. This is still lacking in many countries. Without the policy commitment, however, the programmes will not fully succeed.

ENDNOTES

1 Ron Steenblik, Scott Vaughan, Paul Waide, *Can Energy-Efficient Electrical Appliances be considered "Environmental Goods"?,* OECD Trade and Environment Paper No. 2006-04, OECD, Paris, 2006, p. 6.

2 While beyond the scope of this report, there are many co-benefits from improved energy efficiency.

3 Other notable countries include Argentina, Brazil, Colombia, Costa Rica, Egypt, Hong Kong, India, Indonesia, Iran, Israel, Jamaica, Malaysia, Mexico, Peru, Philippines, Russia, Singapore, South Africa, South Korea, the former Soviet Union, Sri Lanka,Thailand, Taipei China, Tunisia and Venezuela. Source: http://www.clasponline.org.

4 Their website can be found at http://www.iec.ch.

5 IEA, *Gadgets and Gigawatts,* OECD, Paris, 2009, p. 144.

6 Canada has a similar program which is voluntary, but with the threat of becoming mandatory if objectives are not met.

7 IEA (2007), *Experience with Energy Efficiency Regulations for Electrical Equipment,* Information Paper, International Energy Agency, Paris, 2007, pp 50-51.

8 Ibid. p. 62.

9 IEA, Gadgets, *op.cit,* p. 93.

10 Energy Charter, *Policies That Work, Introducing Energy Efficiency Standards and Labels for Appliances and Equipment*, Brussels, 2009.

11 See the European Committee of Domestic Equipment Manufacturers website at http://www.ceced.org.

12 IEA, *Fuel Efficiency of Passenger Cars*, OECD, Paris, 1984.

13 Anton Eckl, GfK Retail and Technology, *Energy labeling in White Goods Worldwide*, Presentation at EEDAL '09, http://www.eedal.eu.

14 See www.ceced.org.

15 Fridley, David, Aden, Nathaniel, Zhou, Nan, Lin, Jiang, *Impacts of China's Current Appliance Standards and Labeling Program to 2020*, Lawrence Berkeley National Laboratory, March 2007, p. 15

16 Paul Waide, *International Standards to Develop and Promote Energy Efficiency and Renewable Energy Resources, A Common Position Paper*, IEA Information Paper, Paris, 2008, p. 3.

17 IEA, Gadgets, op.cit. p. 160.

18 For more information go to http://www.eu-energystar.org.

19 For more information go to http://www.energystar.gov.au.

20 For more information go to http://oee.nrcan.gc.ca/residential/energystar-portal.cfm.

21 http://www.apec-esis.org/www/cfl.

22 www.efficientlighting.net.

23 From www.iea.org.

24 See www.iea-4e.org.

25 See the 4E Electric Motor Systems website, http://www.motorsystems.org.

26 Further information on these model building codes, IECC and ASHRAE, are given in the IEA information paper on "Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings", IEA 2008.

27 For further details or included buildings and exceptions see the International Existing Building Code chapter.

28 See the Asia Pacific Partnership website at http://www.asiapacificpartnership.org.

29 See the International Organisation for Standardisation website, http://www.iso.org.

30 See the European Committee for Electrotechnical Standardisation website, http://www.cenelec.eu.

31 For more information, go to the European Environmental Citizens Organisation for Standardisation website at http://www.ecostandard.org.

32 ECEEE policy brief, *The Eco-design Directive for Energy-using Products,* June 2006, p. 2.

33 Wiel and McMahon, *Energy Efficiency Labels and Standards – A Guidebook for Appliances, Equipment and Lighting*, 2nd Edition, CLASP, 2005, p. 12.

34 Ibid., p. 14.

35 Ibid., p. 15.

36 IEA, *Cool Appliances, Policy Strategies for Energy-Efficient Homes,* OECD, Paris, 2003, p. 199.

37 Ibid., p. 199.

38 Email communication, November 2, 2009.

39 Email communication with Paul Waide, formerly of IEA, November 11, 2009.

40 Dr. Martin Searle, EHI, The Link Between Product Data and CEN-EPBD Standards, CENSE Workshop, Paris, September 25, 2009.

41 Ron Steenblik, Scott Vaughan, Paul Waide, *Can Energy-Efficient Electrical Appliances be considered "Environmental Goods"?*, OECD Trade and Environment Paper No. 2006-04, OECD, Paris, 2006, p. 6.

42 Lloyd Harrington, Global Test Procedures to Support Energy Efficiency: Obstacles and Opportunities, Presentation at IEA/IEC/ISO Workshop, Paris, March 2009.

REFERENCES

Energy Charter, *Policies That Work, Introducing Energy Efficiency Standards and Labels for Appliances and Equipment*, Brussels, 2009.

Fridley, David, Aden, Nathaniel, Zhou, Nan, Lin, Jiang, *Impacts of China's Current Appliance Standards and Labeling Program to 2020*, Lawrence Berkeley National Laboratory, March 2007.

IEA, *Gadgets and Gigawatts*, OECD, Paris, 2008.

IEA, *Experience with Energy Efficiency Regulations for Electrical Equipment*, Information Paper, International Energy Agency, Paris, 2007.

IEA, *Cool Appliances, Policy Strategies for Energy-Efficient Homes,* OECD, Paris, 2003.

IEA, Light's Labour's Lost *Policies for Energy-efficient Lighting*, OECD, Paris, 2006.

Ron Steenblik, Scott Vaughan, Paul Waide, *Can Energy-Efficient Electrical Appliances be considered "Environmental Goods"?,* OECD Trade and Environment Paper No. 2006-04, OECD, Paris, 2006.

Paul Waide, *International Standards to Develop and Promote Energy Efficiency and Renewable Energy Resources, A Common Position Paper,* IEA Information Paper, Paris, 2008.

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