Energy Charter Secretariat 2009

Policies that Work

Introducing Energy Efficiency Standards and Labels for Appliances and Equipment

Disclaimer

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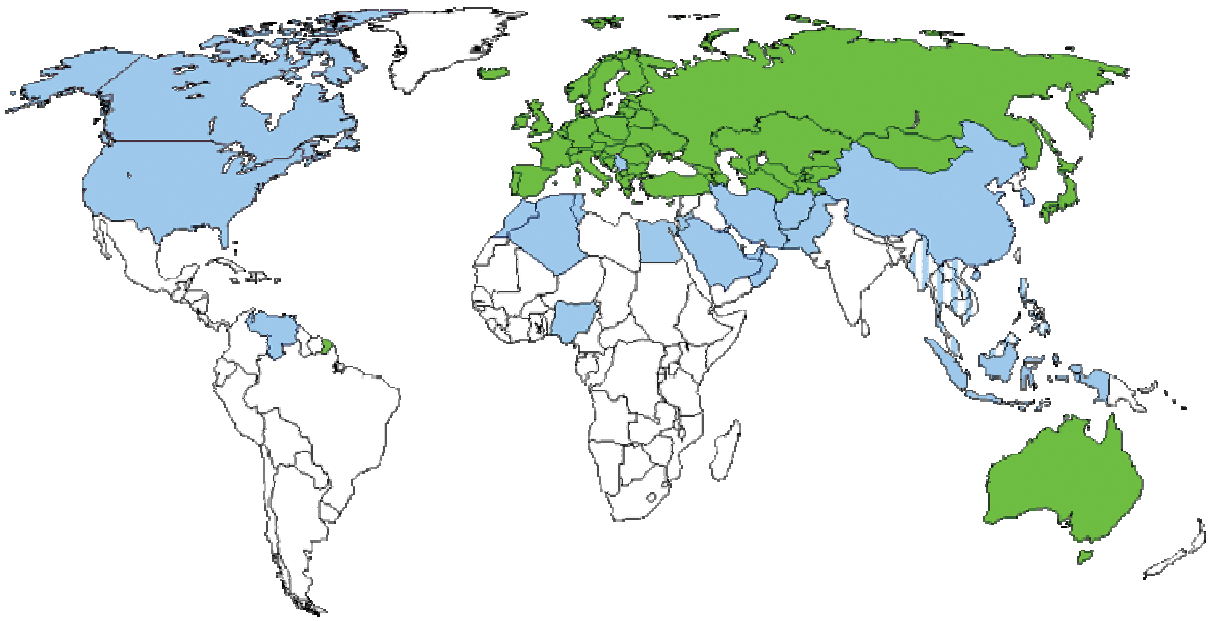
The Energy Charter Treaty

The Energy Charter Treaty is a unique legally-binding multilateral instrument covering investment protection, liberalisation of trade, freedom of transit, dispute settlement and environmental aspects in the energy sector. It is designed to promote energy security through the operation of more open and competitive energy markets, while respecting the principles of sustainable development and sovereignty over energy resources. The Treaty is the only agreement of its kind dealing with intergovernmental cooperation in the energy sector, covering the whole energy value chain (from exploration to end use) and all energy products and energy-related equipment.

Based on the Energy Charter of 1991, which was a political declaration signalling the intent to strengthen international energy ties, the Energy Charter Treaty was signed in December 1994 and entered into force in April 1998. To date, the Treaty's membership covers fifty-one states plus the European Communities, which together represent nearly 40% of global GDP. There are also twenty-three observers, as well as ten international organisations with observer status.



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Foreword

Improving energy efficiency is the best way to simultaneously meet all of our sustainable development goals in the energy sector. It helps economies grow, frees resources for other objectives and reduces negative environmental impacts, including greenhouse gas emissions. The Energy Charter places a high priority on improving energy efficiency in all countries – developed, transition and developing. Through more than 10 years of experience, the Energy Charter has shown how international cooperation can promote better outcomes for individual countries and for the planet.

This publication identifies the benefits of standards and labelling programmes for appliances and other equipment. These programmes ensure that consumers are aware of energy performance when making purchases and that manufacturers produce relatively high-efficiency products. Such programmes are now widespread around the world, and this report summarises the large economic and environmental benefits that have been achieved.

But not all countries have yet put them in place. In part, this is due to a lack of awareness and capacities, since these programmes require particular skills and knowledge.

The report also identifies steps that countries could take to set up such programmes, including suggestions on how international cooperation can improve outcomes and reduce costs. While focused on Energy Charter countries, it would be helpful to any government considering such a programme. Case studies are included from Russia, Turkey, Romania and Australia, demonstrating a diversity of issues and approaches.

This report is made publicly available under my authority as Secretary General of the Energy Charter Secretariat and without prejudice to the positions of Contracting Parties or to their rights or obligations under the Energy Charter Treaty or the Protocol on Energy Efficiency and Related Environmental Aspects.

André Mernier
Secretary General
June 2009

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Executive Summary

This study provides background on the benefits of, and steps needed to support introduction of Energy Efficiency Standards and Labelling (hereafter EE S&L) programmes. This includes providing an understanding of different approaches used their strengths and weaknesses, areas for policy development and possible areas for future national or cooperative international work. The study focuses on the countries who are signatories to the Energy Charter Treaty and its Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA). In particular, it identifies steps that could support introduction of EE S&L programmes in Energy Charter countries where they don't yet exist, principally CIS countries. However, the analysis and proposals are generally relevant to countries considering EE S&L as part of their policy mix.

The Case for Standards and Labels

Energy efficiency standards and labels (EE S&L) are sets of procedures and regulations that, respectively, prescribe the minimum energy performance of manufactured products and the informative labels on these indicating products' energy performance. They are meant to help the market recognise energy efficiency and act on it. Without the information provided by labels, consumers and other end-users are often unable to make an informed decision about the true cost of a product, and manufacturers lack the incentive to improve the energy performance of it as there is no way for the market to recognise and value this aspect. Standards can be set to ensure that obsolete and inefficient technology does not continue to dominate the market, much more effectively than is possible by the actions of individual end-users.

Consumers are often inclined to buy the cheapest product on the market. This burdens them with much higher running cost for years to come, and countries with the need to invest much more in energy supply networks than would be needed if all products would comply with minimum energy performance requirements. Neither one customer nor one manufacturer alone can alter this situation. Governments, however, with technical support, can implement standards and labelling programmes that protect the population from such expensive 'cheap products', at a limited cost, and protect manufacturers of highly efficient products from competitors saturating the market with these expensive 'cheap products'.

Standards and labels work best as part of a holistic market transformation strategy. Standards ensure that the worst performing products are removed from the market, while labels encourage consumers to purchase increasingly more efficient products. These can be further supported by direct incentives to support the introduction of leading-edge products through R&D support, subsidies, procurement, etc. However, standards and labels are fundamentally different in that labels support consumer choice in the market and provide manufacturers with benchmarks for product performance, while standards limit the choices available to manufacturers and consumers. A key decision facing policy makers is the appropriate mix between these and other measures This will be influenced by factors including domestic market sizes, manufacturing capacities, economic conditions, energy costs, and international developments.

The USA and Australian experiences demonstrate the huge net economic gains of investing in more efficient appliances and equipment, via the introduction of EE S&L. It has not been possible to estimate potential benefits of EE S&L programmes for this study. However, extrapolation from international experience suggests that indicative benefits in CIS countries could amount to savings of some 50 TWh and $5 billion per year. The pricing structures in

CIS countries mean that the *distribution* of costs and benefits between the public and private sectors may vary from other countries' experience.

Since energy-using products are increasingly traded globally, there is an increasing tendency to harmonise elements of product policy between countries and major trade blocks. Countries can benefit from this trend by taking advantage of the product energy efficiency policies applied in major trade blocks of the world, by harmonising their policies with those of their trade partners.

The effectiveness of standards and labels and of product policy in general, relies on the unambiguous classification of product groups and of product energy performance classes. Specific verification procedures are needed to properly check compliance, typically consisting of two components:

- For the various types of appliances and equipment on the market: to check that the energy performance of these products is stated correctly;
- For retailers and other sales channels: that only allowed types of products are offered and that these are labelled correctly.

S&L in Energy Charter Countries

Energy efficiency standards and labels are common for the main energy-using products in most OECD economies, including those in the Energy Charter.

The **EU** labelling scheme and minimum energy performance standards (MEPS) began in 1992 and now covers the main household appliances and some other products and are implemented in the 27 EU Member States and seven other Energy Charter countries (**Iceland, Norway, Switzerland, Liechtenstein, Croatia, Turkey and Macedonia**). EU EE S&L have seen significant changes in the market. By 2006, the average energy consumption of washing machines and refrigerators had fallen by 40% and almost 60%, respectively. The EU is currently developing and implementing MEPS for a wide range of household, commercial and some industrial products and extending its energy-labelling scheme.

Australia has an elaborate S&L programme developed over 20 years, and has set standards and introduced labels for a wide range of household, commercial and some industrial products. Standards and labels have been upgraded over the years, as the efficiency of products on the market has risen. The programme has been estimated to deliver by 2020 some $A4.8 billion in economic benefits and more than 200 million tonnes of greenhouse gas abatement. The result is significant abatement at a net benefit (not cost) of around $A23 per tonne.

Japan does not have MEPS; instead it operates the Top Runner standards programme, which sets target values for energy efficiency performance in a future year based on the current highest efficiency level for each type of product. When the target year arrives, new target levels can be established. The programme so far has been quite successful, with most manufacturers gearing up to meet the targets. Estimates for the savings achieved and expected with the programme total more than 200 PJ/year in the residential and commercial sectors, and between 200 and 350 PJ in the transport sector. The programme relies on a high level of trust and cooperation between government and a relatively small number of domestic manufacturers. This cooperative approach is hard for most countries outside Japan to emulate.

The **Russian Federation** adopted a number of standards in the period 1983-1999, which became voluntary after the introduction of the Federal law on technical regulation in 2002. Due to its voluntary status, the absence of specific requirements for the energy classes for

different products and the lack of an implementing government institution, the standard has not yet been put into practice up to now.

No energy efficiency labels and standards currently operate in **other** CIS countries.

Examination of international experience, especially in transition economies, identifies six **key lessons** for transition countries considering implementing EE S&L programmes:

1. Regulations only deliver when these are properly mandated and well implemented.
2. Access to testing laboratories is essential.
3. Leading market parties ask for well-implemented EE S&L.
4. Manufacturers can benefit from introducing EE S&L.
5. Energy efficiency standards and labels deliver.
6. An appropriate mix of standards and labels is needed.

A Framework for Implementing EE S&L

International cooperation among Energy Charter countries can assist in the implementation of EE S&L and their regional harmonisation, by supporting the adoption of good-quality S&L developed in one country, by more countries in the region. It will link regional activities to national initiatives, by means of the inclusion of national practitioners in regional training and information exchange activities, and via activities in the participating countries directly targeting government policy decision makers.

Taking into account the experiences of previous appliance standards and labelling development projects in the Europe & CIS region, an Energy Charter framework could be built on a holistic approach addressing the main policy, strategic, technical, modelling, and market issues related to developing, adopting, implementing, maintaining and enforcing energy efficiency standards and labels. Whereas some aspects, like national stakeholder discussions and the initiation of a political process, are best conducted in a national project, other aspects like cross-country exchange of information and lessons, will be much more effective when structured and made available to all national experts. Possible regional activities under such a framework consist of:

- Creating awareness of national policy decision makers about the benefits of and requirements for appliance and equipment energy efficiency programmes, to stimulate their adoption and the mobilising of resources for national activities on the development or improvement of energy efficiency standards and labels and compliance enforcement;

- Enhancing the capacity of national experts to develop and implement energy efficiency standards and labels through a training programme, better access to the latest international information, exchange of information and experiences between countries and technical support during the design and initiation of national plans and as second opinion during their implementation;

- The development of a regional standards and labels strategy and the adoption of harmonised appliance and equipment standards and labels in the Europe and CIS region, or parts thereof. This includes the development of testing capacity and the regional acceptance of test results, and information of regional suppliers of the opportunities provided by harmonised procedures and requirements.

1. Introduction

EE S&L are key mechanisms to promote energy efficiency, especially in relation to household appliances, lighting products, automobiles and other mass-produced consumer and commercial energy-using equipment. They can also play an important role in making consumers aware of the importance of energy efficiency.

With this study, we aim to:

- Identify approaches used for EE S&L in Energy Charter countries, including policy, legislation and implementation;
- Assess the effectiveness of these approaches in improving energy efficiency in these countries, including in comparison with the approaches of other countries or regions, and suggest how this information could be used to improve policy development and implementation in Energy Charter countries;
- Suggest areas where international cooperation on standards and labelling could improve implementation and/or reduce costs, including linkages with other international or regional initiatives;
- Based on the above, make suggestions on possible future activities to improve the use of EE S&L to improve energy efficiency, with a focus on Energy Charter countries that currently do not have EE S&L programmes, particularly CIS countries.

Approach of this study

In order to analyse the approaches used for EE S&L, data were collected on:

- The choice of products covered by standards and labelling;
- Definition and verification of performance levels, including the capabilities of testing facilities and relationship with international standards;
- Evolution of performance levels over time;
- Enforcement of labelling and standards;
- Metrics of performance for labels and standards (e.g., economic, energy, emissions) and choice of information to be provided on labels;
- Relationship of EE S&L with local manufacturing and imports and economic impacts, including economic benefits of energy savings;
- The role of EE S&L in making consumers more aware of the importance of energy efficiency and steps they can take to limit energy use.

Geographically, the study includes all Energy Charter countries, but specifically considers the use of EE S&L in the Energy Charter countries that are economies in transition in Eastern Europe and Asia.

Data collection included the circulation of a questionnaire among the members of the PEEREA working group, the circulation of the same questionnaire among experts and UNDP

country offices via the assistance of UNDP, accessing international databases and other data sources and consultation with international experts.

Data collection via international sources (and in particular the APEC-ESIS/CLASP database) has resulted in a reasonably complete overview of EE S&L in the OECD economies. Further information provided by UNDP has resulted in a good overview of the situation in the Russian Federation, Turkey and Romania; this is reported in case overviews. Information about the CIS-countries, however, is extremely scarce (with the exception of the Russian Federation). No information for any of these countries was received via the PEEREA working group (although we did receive information on Latvia and Switzerland, and the UK and European Commission contacted the authors to ask if more information about their situation was needed). Three questionnaires, for Armenia, Georgia and Uzbekistan, were received via UNDP; these informed us that EE S&L are virtually non-existent in these countries. This view is confirmed by (the lack of) information about existing EE S&L in international databases.

Given that the available information points to a lack of EE S&L in the focus countries for this study, only a summarised overview of existing standards is provided and the report concentrates on the key role of and possibilities for EE S&L, how countries could benefit from each other's experiences and how international cooperation could facilitate next steps in the introduction of EE S&L.

2. The Case for Standards and Labels

Energy efficiency standards are a set of procedures and regulations that prescribe the minimum energy performance of manufactured products. Energy efficiency labels are informative labels affixed to manufactured products indicating products' energy performance and efficiency in a way that allows for comparison between similar products or endorses the products' use. Energy Efficiency Standards and Labels (S&L) are complementary policy tools that are instrumental in promoting a sustainable energy path, in all economies.

Standards and labels are meant to help the market recognise energy efficiency and act on it. Without the information provided by labels, consumers and other end-users are often unable to make an informed decision about the true cost of a product, and manufacturers lack the incentive to improve the energy performance of it as there is no way for the market to recognise and value this aspect. Standards can be set to ensure that obsolete and inefficient technology does not continue to dominate the market, much more effectively than is possible by the actions of individual end-users. Households on a low income are often inclined to buy the cheapest product on the market. This burdens them with much higher running cost for years to come, and countries with the need to invest much more in energy supply networks than would be needed if all products would comply with minimum energy performance requirements. Neither one customer nor one manufacturer alone can alter this situation. Governments, however, with technical support, can implement standards and labelling programmes that protect the poor from such expensive 'cheap products', at a limited cost, and protect manufacturers of highly efficient products from competitors saturating the market with these expensive 'cheap products'.

The implementation of standards and labels results in the reduction of required investments in additional power plants and reduces total fuel consumption for electricity generation. The result is economic gains (e.g., freeing up capital for investments in non-energy social infrastructure like schools, roads or hospitals) and environmental benefits (e.g., avoiding carbon emissions). For example, the U.S. experience with S&L programmes clearly demonstrates the enormous economic benefits. By the year 2020, efficiency standards will have helped avoid 20% of the country's planned new power generation with expected savings of more than $100 billion, a net saving of $1000 per household[1].

Similarly, the Australian equipment energy efficiency programme (essentially standards and labels) delivers significant economic benefits to Australia, estimated at $4.8 billion by 2020. In addition, environment benefits through significant greenhouse gas emission savings will be realised: recent estimates suggest greenhouse gas emission savings of almost 204 million tonnes of CO_2 below business as usual between 2005-2020 will be achieved. These savings are being achieved at a net present value of minus Australian $23/tonne of CO_2: Australians actually save money by buying the more efficient products mandated under the programme[2].

The benefits from more energy efficient products extend beyond the direct impact on household and business energy bills. The reduction of peak demand improves grid reliability, affording better and more stable power to marginal users. The harmonisation provided by S&L in the face of appliance globalisation reduces trade barriers, thereby reducing appliance

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1 S. Meyers, et.al., "Impacts of US federal energy efficiency standards for residential appliances." Energy: Volume 28, Issue 8, LBNL-49509, March 2003.

2 NAEEP, "Equipment Energy Efficiency Programme, Achievements 2006", May 2007.

prices to consumers relative to other commodities and making energy services more affordable to poorer people. Reducing trade barriers benefits manufacturers by providing them with a better access to markets, and local manufacturers might also benefit from a larger market, including many well-off customers, for their products. It can be burdensome, however, for those that lack the capacity to innovate and/or find themselves in difficult situations. The global shift to open markets and increasingly competitive markets for products might drive out inefficient manufacturers anyway, but harmonising a market (by introducing standards) could increase the speed of that process. Support programmes for local manufacturers can offset possible negative effects on the participating countries' economies, as was demonstrated by the experience of Tunisia: the introduction of standards combined with support helped the local manufacturer to reduce its production cost whilst meeting the new standard – thus increasing its competitiveness.

Since energy-using products are increasingly traded globally, there is an increasing tendency to harmonise elements of product policy between countries and major trade blocks. Countries can benefit from this trend by taking advantage of the product energy efficiency policies applied in major trade blocks of the world, by harmonising their policies with those of their trade partners. This is probably best demonstrated by the Australian policy of adopting the world's best standards for their own use. Because the Australian market (consisting of some 20 million relatively wealthy customers) is too small to induce the development of more efficient products, Australia decided some years ago to focus their attention on aligning national policies with those of their most ambitious trade partner. The success, so far, has been remarkable: this new policy has ended years of stagnation in their market transformation policy, and resulted in a rapid increase in energy efficiency levels for a range of products[3].

2.1 Role of S&L within Product Policy

Energy consumption typically is a result of using products, providing a service to the end-user. That service may be the delivery of torque for a motor, or the provision of cold storage for a refrigerator. Product policy, in an environmental context, aims to reduce the environmental impact of that service, while preserving the primary function of it, by means of increasing the environmental efficiency of products, focusing on energy efficiency when aiming to curb energy use and related greenhouse gas emissions.

A Market Transformation Strategy, developed and refined in the past 30 years in many OECD countries, is typically an integrated set of policy tools for governments wanting to improve the energy efficiency of traded products. Traded products, in this context, are appliances, equipment and lights that are mass-manufactured and distributed across nations, regions or the world. Due to the typical sales volumes and prices of appliances, it would be overly burdensome to implement policies for each appliance that is purchased in a country. It is also not needed, as mass-manufactured products differ only between types, and individual products of the same type share the same characteristics. Thus, market transformation strategy targets the market as a whole, and not the single products that compose this.

A Market Transformation strategy, or product policy in general, typically includes a range of instruments, each targeting a segment of the market. These segments, and typical instruments are:

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[3] Matching World's Best Regulated Efficiency Standards – Australia's success in adopting new refrigerator MEPS, Lloyd Harrington, Energy Efficient Strategies, Australia & Shane Holt, Australian Greenhouse Office, ACEEE, 2002.

- The low-efficiency end of the market: the strategy aims to reduce or eliminate sales of these products. Most common instruments are minimum energy performance standards and negotiated agreements with market parties;

- The medium-efficiency segment of the market: the strategy aims to shift the energy efficiency of these average products to a marginally higher energy efficiency class. Most common instruments are categorical energy labels, sometimes in combination with incentives and/or retailer programmes;

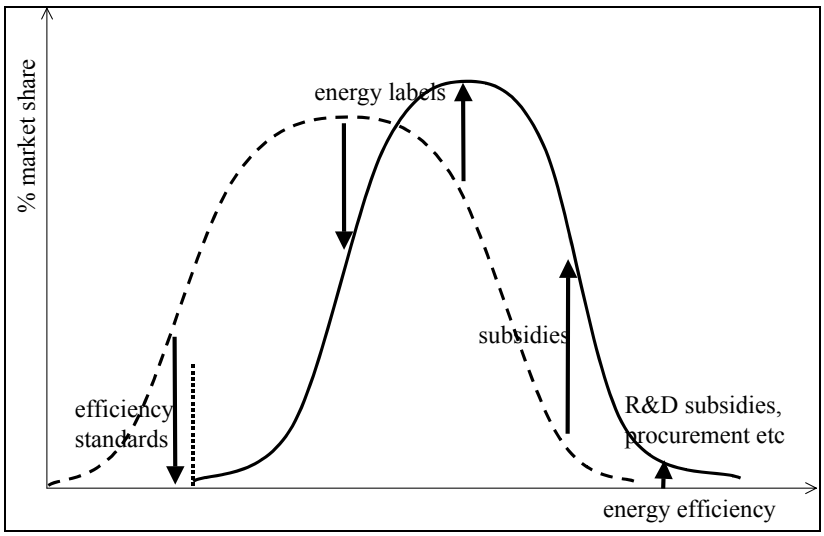
- The high-efficiency end of the market: the strategy aims to increase the sales of these products. The strategy typically builds on labels (categorical labels like the EU label, or simple marks like Energy Star) to identify products and incentives (like product subsidies) to promote sales;

- The state of the art: the strategy aims to bring new products with higher energy efficiency to the market. Possible instruments are R&D support and a government or utility procurement programme for such high energy efficiency products.

A market transformation strategy can include many more policy instruments, targeting one or more segments of the market, and depending on the national context, the institutional and financial options, and other factors. Communication with market parties (manufacturers, importers, retailers) and end-users (consumers, businesses, government end-users) is always an essential part of a programme.

In particular, care is needed in introducing regulatory elements of the policy mix to ensure these operate with a net benefit to society and do not impose undue burdens on industry or consumers. While labelling schemes impose some costs on manufacturers or retailers, for example, these are generally low and allow consumers to exercise an informed choice in product selection. Minimum standards impose more direct controls on the market by limiting consumer choice and can have significant impacts on manufacturers if introduced without appropriate economic impact analysis or consultation with industry. Therefore, policies must be supported with the appropriate analytic and consultative mechanisms.

Figure 2.1: Market Transformation Policy Instruments



2.2 Retail Price of Efficient Appliances

Prices of appliances differ in different countries due to a number of reasons. Once national market differences (e.g., exchange rates, fiscal measures) are accounted for, the main difference in prices between products is due to the features and the value of these to consumers. Before standards, and especially mandatory comparison (or endorsement) labels are introduced, the energy efficiency of products is not usually a feature that consumers will pay a premium for. Consequently, the supply chain does not specify energy efficiency, and there is little correspondence between efficiency and price of the products.

Retrospective analyses in various countries suggest that the introduction of efficiency standards and labels shows an increase in the efficiency of products on the market. Only the most efficient products command a premium price, and these are in part due to manufacturers at the 'expensive' end of the market positioning their products. There is a perception that high efficiency products, labelled A (EU) or 6-star (Australia) are high quality products. Over time the efficiency point at where there is a premium appears to increase: for example, in the UK in the mid-90s, an A-rated refrigeration appliance would have cost more than a B and other products. Several years later, it is now A+ rated products and better that are more expensive to purchase.

A paper by Ellis[4] explores this further, especially how economies of scale can drive down the cost of efficient appliances if these are required for all products, and not just a niche top-end requirement. It is not uncommon to find products with the same price but very different energy performances on the market, if there is no energy efficiency programme. Even after the introduction of EE S&L, prices for products with varying energy performances may not differ a lot. An analysis of the European market for refrigerators demonstrated that the price for products in all energy classes varied only marginally, with the exception of the highest energy class[5]. Further, prices of energy-efficient products tend to reduce over time. This shows that it is possible to achieve large energy savings at little initial cost to consumers and important financial benefits over the lifetime of products.

2.3 Benefits of EE S&L Programmes

Well-designed and implemented S&L programmes compare favourably to other governmental energy policies. Some advantages are:

a. They have a potential for very large energy savings, estimated to be worth $4.8 billion for Australia and $100 billion for the USA by 2020;

b. They are extremely effective mechanisms for delivering energy savings, reductions in greenhouse gas emissions as well as significant financial gains to consumers and society;

c. They require change in the behaviour of a manageable number of manufacturers rather than the total consuming public;

d. They create a level playing field, treating all manufacturers, distributors and retailers equally and allow governments to impose performance requirements instead of prescribing specific technologies;

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[4] Ellis, M. et al, "Do energy efficient appliances cost more?", Proceedings of the ECEEE 2007 Summer Study, ECEEE, 2007.

[5] Soregaroli M., "Latest trends in major domestic appliances in CEE" at EC JRC workshop 'Effective Policies for Improving Energy Efficiency in Buildings', Krakow 2007, published online at: http://sunbird.jrc.it/energyefficiency/.

e. They are enacted internationally, increasingly harmonised between major trade blocks and part of a global approach; and

f. The resulting energy savings are comparatively assured and can be readily and easily verified.

Setting standards and providing information to consumers will mean all consumers obtain appliances which save money over its lifetime, and in most cases at little or no additional purchase costs to the household. This leads to a better use of resources, resulting in a more efficient economy and lower costs to households.

2.4 Potential Savings with EE S&L in CIS Countries

International reference information suggests that EE S&L can lead to huge potential savings in CIS countries. In the absence of detailed information about the current market for appliance, equipment and cars and the products in use, it is impossible to provide sound projections for these potential savings.

Reference information, however, provides some guidance about the savings that could be possible if CIS countries would implement similar EE S&L programmes as currently in place in other Energy Charter countries. Savings achieved or projected in other countries are:

- Efficiency gains of 20 to 50% on most major appliances, representing well over half of all residential and commercial electricity demand (expert estimates, based on various preparatory studies for and evaluations of EE S&L);
- In the UK, the introduction of EE S&L for refrigerators and freezers alone is projected to deliver savings of approximately 3.5 TWh of electricity per year by 2020, equal to a 2% reduction in the residential electricity demand. During this period, purchase prices for these products also dropped notably;
- Very significant savings have been reported in Australia and the USA (see previous sections) – for Australia, these indicatively amount to 6-7% of all electricity demand;
- Calculations by LBNL indicate that Pakistan could save 20% of its projected national energy demand over a period of 25% years[6];
- Calculations by UNDP for a planned EE S&L project in Russia indicate potential savings of 30-35 TWh/year, equivalent to approximately 6% of all electricity demand.

Based on this, it would be reasonable to assume that CIS countries could save some 6% of all electricity demand by means of implementing effective EE S&L programmes for appliances and equipment, and further savings if the programmes would extend to heating equipment and cars. This savings percentage has been projected on the current electricity demand in some CIS countries[7], in terms of electricity demand and monetary savings[8]:

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[6] Energy Efficiency Labels and Standards – A Guidebook for Appliances, Equipment and Lighting, Wiel and McMahon, CLASP, 2005.

[7] Electricity statistics at IEA website, http://www.iea.org/Textbase/stats/prodresult.asp?PRODUCT=Electricity/Heat.

[8] For this indicative projection, an energy price of $0.10/kWh was applied. In the second half of 2007, Eurostat reported average household electricity prices in the EU-27 (without taxes) was €0.18/kWh ($0.25/kWh) which should be a rough reflection of cost of provision to households (where most EE S&L savings are made). Electricity prices in many CIS countries are lower, which may reflect both lower cost structures and social pricing policies. Therefore, $0.10 seems a

Table 2.1: Indicative Savings Potential from EE S&L in CIS Countries

Country	Indicative projections of EE S&L savings	
	Annual electricity savings	Annual monetary savings
Armenia	250 GWh	$25 million
Azerbaijan	1100 GWh	$110 million
Belarus	1,700 GWh	$170 million
Georgia	370 GWh	$37 million
Kazakhstan	2,200 GWh	$220 million
Kyrgyzstan	560 GWh	$56 million
Moldova	300 GWh	$30 million
Mongolia	160 GWh	$16 million
Russian Federation	33,000 GWh	$3,300 million
Tajikistan	880 GWh	$88 million
Turkmenistan	380 GWh	$38 million
Ukraine	7,400 GWh	$740 million
Uzbekistan	2,400 GWh	$240 million
TOTAL	**50,700 GWh**	**$5,070 million**

2.5 Requirements for a Successful S&L Programme

The policy instruments of a product policy are underpinned by a means to identify good and bad products. Without a reliable way to classify products, no effective policy is possible. The elements of such a classification are a:

1. Reliable, repeatable and representative test method for product energy performance, for example a test procedure for refrigerators describing the conditions and duration of a test;
2. Ranking methodology of product energy performance, for example an algorithm describing an energy efficiency index for refrigerators based on energy consumption during a test, the size of the product and its functions;
3. Classification of products in energy performance classes, for example a definition of seven energy efficiency classes for the EU energy label;
4. Means of communicating the energy performance of products to the market, for example the EU energy label or the US Energy Star label.

Standards and labels are core elements of a market transformation policy, and most other policy instruments are based on one of these two. The reason for this is that standards and labels, unlike many other instruments, include all four of the listed steps of classifying products.

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conservative estimate of the economic benefits, although these may be divided between savings to households and savings to providers where there is an element of social pricing.

A standard, or minimum energy performance standard, provides a classification of products to distinguish between banned and allowed products (step 3 in the above), based on a standardised test (step 1) and algorithm (step 2), and typically indicates that suppliers of products must show compliance with the standard when placing products on the market (step 4).

An energy label provides the market with an unambiguous identification of the energy performance of products (step 4), based on a classification (step 3), that itself is derived from the result of a standardised test (step 1) and the calculation of a ranking order (step 2).

The effectiveness of standards and labels, and of product policy in general, relies on the unambiguous classification of product groups and of product energy performance classes. The product energy performance classification can be verified by a specific verification procedure, often including a test according to a specified test procedure. Such S&L specific procedures, however, rely also on general market surveillance for aspects such as the unambiguous identification of product types, and the enforcement of product bans (by standards) and reliable labels. If that is not available in a country, product policies are likely to fail.

2.6 Compliance Checking for EE S&L

Checking compliance with S&L requires sufficient attention by state authorities, to ensure that the energy performance of a product is declared correctly, that only products allowed by minimum performance standards are on the market and that all products that should have a label do so. Effective enforcement procedures are needed for cases where market parties do not comply with the rules. Effective compliance and enforcement is essential to the operation of EE S&L schemes. This allows manufacturers to invest in energy efficiency confident of receiving the appropriate market return, and it ensures consumers that the information they receive is accurate and will lead to real savings.

Product policies, like S&L, deal with mass-marketed goods for which it is impossible to check every single item. Specific verification procedures are needed to properly check compliance, typically consisting of two components:

- For the various types of appliances and equipment on the market: to check that the energy performance of these products is stated correctly;
- For retailers and other sales channels: that only allowed types of products are offered and that these are labelled correctly.

More information about verification procedures is available in various guidelines[9]. In short, procedures need to be reliable, transparent, draw a balance between the cost of compliance checking and the severity of the impact of non-compliance, and treat all market partners equally. Product compliance checking further depends on adequate testing procedures, which must be reliable, repeatable and representative of the actual usage of a product. Two examples of effective compliance checking mechanisms are described here:

> Australia: Recognising the importance of accurate energy performance information, Australia requires that technical energy information about the energy performance of products is logged with the Government before products are brought into the country or placed on the market otherwise. This allows authorities to verify the information on

[9] See for example the CEECAP Guidelines for information about compliance checking procedures for the EU energy label http://www.ceecap.org/cntnt/ceecap/library/l6.html.

which energy performance declaration is based, e.g., to assess whether the information is complete and whether energy performance declarations are backed up by test results from reputable laboratories. In addition, Australia has a check-testing programme, in which appliances are purchased from retail outlets or obtained anonymously and tested in NATA-accredited[10] independent laboratories to verify the claims associated with the energy label for six appliance types and minimum energy performance standards where applicable. This system allows a country to effectively verify energy performances without undue disturbance of free trade.

Tunisia: When Tunisia introduced standards and labels for refrigerators, it decided to require strict controls on energy performance declarations for these products. The Government has built its own test laboratory and requires that all products imported in Tunisia are first tested in this government laboratory. In addition, it checks the production facilities of the single local manufacturer and the premises of importers to verify compliance with regulations. The cost of tests must be born by the importer. This system may work well for smaller countries with underdeveloped markets largely depending on imports from a variety of sources, but countries should also keep in mind that a balance must be found between the cost of compliance checking and the goals it aims to achieve: compliance checking requirements that are too intrusive may stifle competition or stop the entry of new suppliers on markets, which can be counterproductive for transforming the market towards more energy efficient products.

[10] NATA is the National Association of Testing Authorities, Australia's national laboratory accreditation authority.

3. EE S&L in Energy Charter Countries

3.1 Increasing Use of EE S&L

Nations around the world are increasingly recognising the power of energy efficiency standards and labels. The first mandatory minimum energy efficiency standards in modern times are reputed to have been introduced in Poland for a range of electrical appliances as early as 1962. The French government set standards for refrigerators in 1966 and for freezers in 1978. Other European governments, including Russia, introduced legislation mandating energy efficiency performance standards throughout the 1960s and 1970s. Much of this early legislation, however, was weak and poorly implemented, had little impact on appliance energy consumption, and was repealed in the late 1970s and early 1980s under pressure to harmonise European trading conditions. The first energy efficiency standards that had a dramatic impact on manufacturers and significantly reduced the consumption of energy were introduced in the U.S. by the State of California in 1974 and became effective in 1978. Since then, S&L have been used successfully to affect manufacturers and significantly reduce the consumption of energy.

Driven by greenhouse gas abatement as well as energy conservation goals, more than 57 countries have now applied standards and/or labels to a total of 46 products. Products subject to standards or labels cover all end-uses and fuel types with a focus on appliances, information technology, lighting, heating and cooling equipment, and other energy-consuming products used in homes and offices, as well as the commercial and industrial equipment, such as motors and electric transformers[11], and also for cars and even buildings.

A recent adopter of standards and labels is Tunisia. It recently introduced a minimum energy performance standard and an energy label for refrigerators and freezers. The Tunisian project has made an extensive analysis of the Tunisian appliance market, after which it was decided that Tunisia would benefit most from adopting the European appliance policy for refrigerators, with minor adaptations.

Since September 2004, Tunisian law requires the display of an EU-style energy label (with eight classes, the top one representing the recently added EU A+ and A++ classes) in a bilingual version (French and Arabic, and the numbers 1-8 indicating classes instead of letters). From July 2006 onwards, the lowest two energy classes (7 and 8) have been banned from the Tunisian market, followed in July 2007 with the banning of classes 5 and 6. It is planned that class 4 will be banned from 2010 on. In addition to introducing the energy label and the standard based on this, Tunisia has provided technical support to national appliance manufacturers for bringing their production in line with the requirements. Anecdotal evidence indicates that this has resulted in a 20% improvement of the energy performance of national production, at a 20% reduction in the cost of production.

The Republic of Korea has also quickly developed an extensive and successful EE S&L programme. From its start in 1992, this programme now includes minimum energy performance standards for some 20 products, including detailed verification, testing and compliance procedures. The programme also includes energy efficiency labels for a range of

[11] Energy Efficiency Labels and Standards – A Guidebook for Appliances, Equipment and Lighting, Wiel and McMahon, CLASP, 2005.

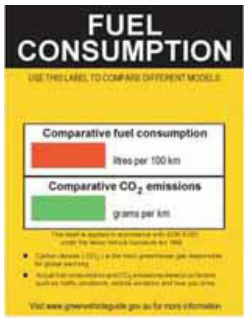
products, including automobiles and windows, with a product rating of 1 using 30-40% less energy than a rating of 5. Some appliances are also able to carry endorsement labels signifying "high-efficiency" products. Standards and labels are complemented by financial incentives for purchasing high efficiency products, government procurement policies and requirements for use of high efficiency appliances in new large apartment blocks and schools. From a recent start, Korea has developed one of the world's leading EE S&L programmes, and estimates the savings from efficient motors alone at around $1.4 billion[12]. Korea was able to build a comprehensive programme in such a short time by building on the work of other countries and close cooperation with a range of international partners.

EE S&L programmes are also actively being developed in India and in regional forums in the Asia-Pacific, North American and South American regions.

3.2 Standards and Labels for Cars and Buildings

Standards and labels are used for appliances and equipment, but also for cars and even buildings. Labels for cars are not as well known as those for household appliances, but the same principles apply as cars are also mass-manufactured products for which the fuel demand determines a huge share of their life-cycle cost. It is also difficult for a buyer to assess the energy performance (fuel efficiency) of a car unless these are equipped with reliable and comparable information about that, in other words an energy label.

Many Energy Charter countries have introduced energy labels for cars in recent years, although there is, unfortunately, not much harmonisation in their approaches yet. Some examples:



- Australia: A Fuel consumption label was introduced to promote consumer demand for vehicles with good fuel efficiency. All vehicles up to 3,500 kg must carry an energy label on their front windscreen when offered for sale. The label indicates the fuel consumption in litres per 100 km and the CO_2 emissions per km.

- European Union: The European Union has introduced legislation that enables Member States to introduce car energy labels. Various EU countries have introduced (national versions of) an energy label. The European Commission has negotiated an agreement with car manufacturers about their voluntary compliance to CO_2 emission limits for cars. This agreement is now being replaced by a (mandatory) standard.

- Japan: Japan introduced, as part of its Top Runner programme, fuel economy standards for vehicles. The standard covers petrol, diesel and LPG passenger cars and busses and requires that the fuel economy of these vehicles must improve by 7 to 22% between 1995-2004 and 2010-2015 (percentage and target year dependent on the category).

- Switzerland: Switzerland introduced energy labels for cars, indicating fuel consumption (litres per 100 kilometres), CO_2 emissions (grams per km), and relative consumption expressed by category (A to G).

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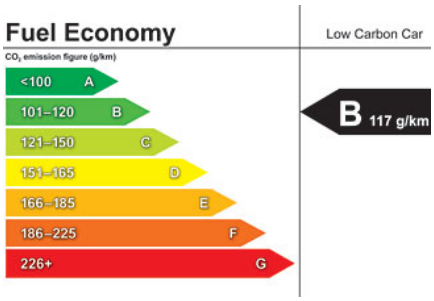
[12] Korea's Energy Standards and Labelling: Performance Improvements during the First Fifteen Years and a Vision for the Future, Ministry of Commerce, Industry and Energy and Korea Energy Management Corporation, 2008.

- United Kingdom: The UK introduced an energy label for cars indicating their CO_2 emissions (grams per km), in numbers and on an A-G scale, to facilitate consumer choices for lower carbon emitting cars. The label also indicates the estimated fuel cost for travelling 12,000 miles and the Vehicle tax per year. It was introduced voluntarily by the car industry under auspices of the Low Vehicle Carbon Partnership.



- Standards and labels for cars are also in place in countries outside the Energy Charter, for example in the USA (CAFE standard for cars and energy label) and Canada (EnerGuide fuel consumption label).

3.3 EE S&L in OECD Countries

Energy efficiency standards and labels are common for the main energy-using products in most OECD economies, including those in the Energy Charter. (see Table 3.1 and Annex B)

The EU labelling scheme (framework directive 92/75/EEC and its implementing directives) and MEPS cover the main household appliances and some other products and are implemented in the 27 EU Member States, Iceland, Norway, Switzerland, Liechtenstein, Croatia, Turkey and Macedonia. In addition to the mandatory labelling some countries have introduced voluntary labelling for certain types of products (see details in Annex 1). The European Commission has negotiated voluntary agreements with the European Federation of Domestic Appliance Manufacturers (CECED), the European Association of Consumer Electronics Manufacturers (EACEM) and other manufacturers to improve the energy efficiency performance of washing machines, dishwashers, TVs, audio equipment, motors and water heaters. The European Union is currently in the process of developing and implementing minimum energy performance standards (MEPS) for a wide range of household, commercial and some industrial products (under a framework Eco-design directive) and a revision and extension of its energy-labelling scheme.

EU EE S&L have seen significant changes in the market. For example, the energy performance of washing machines has improved from on average 0.30 kWh/kg (class C/D) in 1993 to 0.24 kWh/kg (class B) in 1998, and further to 0.18 kWh/kg (class A/A+) in 2006, representing in total a 40% reduction in the specific energy consumption. For refrigerators, the energy efficiency index improved from an average of 102 (class E) in 1992 to 79 (class C) in 1999, and further down to 42 (class A+) in 2006, representing in total an almost 60% reduction in specific energy consumption.

Australia has an elaborate S&L programme, and has set standards and introduced labels for a wide range of household, commercial and some industrial products. Standards and labels have been upgraded over the years: If standards and labels are successful, as in Australia, then most models on the market will tend to be classified at the efficient end of the label, which will mean the label becomes less useful to consumers and the supply chain. To achieve a better spread of energy efficient products a re-grading of the scale is required. This has happened in Australia on a few occasions. To facilitate the first change they set up a steering committee consisting of selected government, industry and consumer representatives to oversee initial studies and prepare the ground for work on the label transition process. An evaluation of the

experience shows that this process happened relatively smoothly. Further details are included in the case report on Australia.

Japan does not have MEPS; instead it operates the Top Runner standards programme, which sets target values for energy efficiency performance in a future year based on the current highest efficiency level for each type of product. Manufacturers and importers have to ensure that the average (sales weighted) efficiency of all their appliances meet this standard by a specified date (the target year). When the target year arrives, new target levels can be established. The Top Runner standards are voluntary as there is no minimum level, however penalties can be evoked if the average efficiency target is not met.

The programme so far has been quite successful with most manufacturers gearing up to meet the targets. Estimates for the savings achieved and expected with the programme total more than 200 PJ/year in the residential and commercial sectors, and between 200 and 350 PJ in the transport sector. The programme relies on a high level of trust and cooperation between government and a relatively small number of domestic manufacturers. This cooperative approach is hard for most countries outside Japan to emulate.

3.4 EE S&L in CIS Countries

The Russian Federation adopted a number of standards in the period 1983-1999, which became voluntary after the introduction of the Federal law on technical regulation in 2002. In the year 1999 a standard GOST P 51388-99 “Provision of Information for consumers about energy efficiency of products for household application” was developed, setting the framework for a energy efficiency labelling scheme broadly harmonised with the European one and to be implemented across a wide range of products. Due to its voluntary status, the absence of specific requirements for the energy classes for different products and lack of an implementing government institution, the standard has not been put into practice up to now. Further details are included in the case report about Russia. Armenia has also developed a national standard based on GOST P 51388-99, which has the same low application.

No energy efficiency labels and standards currently seem to exist in other CIS countries. Information about EE S&L is extremely scarce, which signals that, even if S&L have been introduced, these are not well-known in the countries. There are no apparent technical barriers to the adoption of EE S&L in the other CIS countries, or technical reasons for the change from mandatory to voluntary standards in Russia. Questionnaires circulated for this report did point to a lack of knowledge of the potential of standards and labels, and also a lack of consideration of EE S&L as a policy tool. It is assumed that the unfamiliarity with S&L, and with product policy in general, is an important reason for their lacking in most CIS countries.

Table 3.1: S&L for Major Product Groups in the Main Groups of Energy Charter Countries

	EU[13]	Australia	Japan	EU candidate (Croatia, Turkey, FYROM)	Balkan countries (B&H, Albania)	Russia[14] Armenia[15]	Other CIS
Cooling appliances (refrigerators; freezers and combinations)	Sm Sv Lm Lv	Sm Lm Lv	Sv Lv	Sm Lm	-	Sv, Lv	-
Washing machines and dryers	Sv Lm Lv	Lv Lm	-	Lm	-	Lv	-
Dishwashers	Sv Lm Lv	Lm Lv	-	Lm	-	Lv	-
Cooking	Lm	-	Sv Lv	Lm	-	Sv, Lv	
Lighting	Sm Lm Lv	Sm Lv	Sv Lv	Sm Lm	-	Lv	-
Home entertainment	Sv Lv	Lv	Sv Lv	-	-	Sv,Lv	-
ICT	Lv	Lv	Sv Lv	-	-	Sv, Lv	-
Space heating	Sm Lv	Sv Lv	Sv Lv	-	-	Lv	-
Space cooling	Lm	Sm Lm Lv	Sv Lv	-	-	Sv, Lv	-
Water heating	Sv Lv	Sm Lv Sv	Sv Lv	-	-	Lv	-
Motors	Sv Lv	Sm	-	-	-	-	-
Cars	Sv Lv	Lm	Sv Lm	-	-	-	-
Index: Sm – standard mandatory Sv – standard voluntary Lm – label mandatory Lv – label voluntary							

[13] 27 EU member countries and Norway, Iceland, Liechtenstein and Switzerland.

[14] A standard GOST 51388-1999, setting general requirements for introduction of an energy label (based on EU labelling scheme) for a list of products in 1999, no practical implementation and specific requirements set. Voluntary standards for some product types.

[15] A standard adopted in 2005(based on Russian GOST 51388-1999).

3.5 Case Studies in EE S&L

Individual countries have different experiences with implementation of EE S&L programmes. Appendix A to this report contains Case Studies of four Energy Charter Countries – the Russian Federation, Turkey, Romania and Australia. These countries are at different stages of implementation, have differences in approach and different economic and social contexts. But there are lessons for all countries already implementing or considering EE S&L programmes. Key lessons emerging from these studies are summarised below.

Russia

- *Regulation only delivers if it is properly mandated and well implemented.* MEPS for a wide range of appliances have existed for a long time in Russia, and a framework for energy efficiency labelling was introduced in 1999. Both MEPS and labels, however, have not been really implemented so far, and the impact of these S&L is marginal. The voluntary status of the standards, lack of specific requirements for labels and lack of proper mandate to a government institute to actually implement requirements are contributing factors to this lack of impact.

- *The ability to test products needs to exist.* There is one big testing facility in Russia that can test for the EU performance standards for washing machines. Further testing capacities are needed to make EE S&L a success in Russia, as well as test standards for other products preferably in line with international test procedures.

- *Introducing EE S&L can help local manufacturers.* Local manufacturers currently lack any incentive to improve the energy performance of their products. The competition, imports and local production by subsidiaries of major European manufacturers, has innovated to meet the requirements of other major markets (particularly the EU). This has put local manufacturers at a disadvantage, and the introduction of EE S&L, especially when combined with training or technical support to manufacturers, could help them catch up with the competition.

- *The market needs time to adjust to EE S&L.* The Russian market is still far behind EU markets (including new member states) in the energy performance of products. Due to the lack of standards and labels, Russian consumers cannot select products based on their energy performance. The price difference between average and better energy performing appliances is also quite substantial, which could indicate that the better products are still considered to be premium products (at a premium price).

Turkey

- *Procedures and budgets for compliance checking are needed.* Turkey has adopted the EU energy labels for appliances and has assigned a government institute for its implementation. There are, however, no provisions for checking the compliance with the energy labelling regulations, and insufficient human and financial resources have been made available for these activities.

- *Not all manufacturers are similar.* Turkish manufacturers are among the world-leading producers of high-quality products, exporting most of their best products to Europe. Turkey, however, is also hosting the production of low-quality energy using equipment that is exported to other parts of the world and sold domestically. Specific activities may be needed to support those small manufacturers to improve their production towards more efficient appliances.

- *Leading manufacturers ask for the proper introduction of EE S&L.* Leading Turkish manufacturers have recognised that they would benefit from the introduction of well-implemented EE S&L, and have offered their support to the Government for this. Properly implemented, well-enforced standards and labels would allow them to benefit from their investments in improving the energy performance of their products on the domestic market.

Romania

- *Proper mandates and procedures bring results.* During its EU Accession process, Romania, for the first time, introduced EE S&L. It also established an institutional framework for their introduction. In recent years, the government agency in charge of this has developed comprehensive retailer compliance checking procedures. The importance of effective compliance checking is demonstrated by the significant decrease in non-compliance of shops: non-compliance started at 64% in 2004, dropped to 39% in 2006 and dropped further to 18% in 2007.

- *The market asks for compliance checking of products.* Despite its success in improving the compliance of retailers with EE S&L, Romania has not yet succeeded in setting up the necessary procedures for checking the energy performance characteristics of products. Lack of access to testing facilities is one of the reasons for this omission. Major manufacturers present in Romania have insisted that the government should check energy performance declarations.

- *EE S&L deliver.* A comparison of sales trends for refrigerators and washing machines, from 2003 to 2007 by energy class, demonstrates that consumers are gradually purchasing more and more energy efficiency appliances. The sales of A+ refrigerators has grown from 3.1% in 2004 to 28.7% by mid-2007 and the sales of A-class products have grown from 33.5% in 2003 to 62.6% in 2007.

Australia

- *EE S&L programmes are very effective in delivering more efficient and lower running cost appliances to households*. A recent review of sales data by Harrington (2007) showed domestic refrigeration appliances had improved in efficiency by over 30% in the previous 13 years of labelling scheme in Australia.

- *They are a very cost-effective method of reducing greenhouse gas emissions.* The Australian Greenhouse Office estimated the cost of abatement to be minus $23/tonne of CO_2, which means Australians are saving money by buying the more efficient appliances.

- *Effectiveness can be enhanced by working with retailers and the supply chain.* The retailers and the supply chain are key drivers to delivering the appliances, and have a significant influence over consumers, so the success of labelling can be improved by developing promotional material, websites, and appropriate targeting to different types of consumers.

- *Compliance and check-testing are important components of a programme.* Products that do not meet the claims on the label, or have no label information, pose a risk to delivering the energy savings. The Australian Greenhouse Office's checking programme has found products which do not confirm, thus compromising the scheme. These products have been removed from the market, and in some instances fines imposed. Thus compliance checking improves the effectiveness of S&L programmes.

- *Where possible, it is more efficient to build on evidence, approaches and performance standards in other countries and regions.* Australia has not developed all the evidence and policy tools itself; it has made use of research in other countries. In addition, it has not always developed its own target performance levels, instead it has worked with its neighbours and supply chain to reduce programme costs and developed and implement more appropriate and successful measures.

3.6 Lessons Learnt in Economies in Transition

The case reports of EE S&L in the Russian Federation, Turkey and Romania point to a number of important lessons for the implementation of standards and labels:

1. **Regulations only deliver when these are properly mandated and well implemented.** Standards that lack a sound legal basis or are not properly governed by a government institute have little chance of having an impact on the market. This is especially true for compliance checking, which requires well-designed procedures and sufficient resources. When implemented properly, however, EE S&L can quickly improve the presence of labels in shops.

2. **Access to testing laboratories is essential**. It is impossible to check whether products meet energy performance requirements without adequate test facilities. Many countries lack access to test laboratories, and thus cannot test appliances and equipment. It is necessary to build new test facilities, or to arrange access to existing test laboratories in other countries.

3. **Leading market parties ask for well-implemented EE S&L.** Leading manufacturers see the benefits or well-implemented EE S&L, as this allows them to compete on the energy performance of products and thus capture the benefits of their investments in product quality. Market parties increasingly stress the need for effective compliance checking, to prevent undue competition from fraudulent parties that would undermine the market for well-intended manufacturers.

4. **Manufacturers can benefit from introducing EE S&L.** Local manufacturers in unregulated markets lack an incentive to improve the energy performance of their products, as there is no way to reap the benefits of investments in better products. International competitors do benefit from such an incentive in other markets, putting local market parties at a disadvantage. Some manufacturers may not be ready for a more competitive market, however, and may benefit from assistance in learning to improve their products and production.

5. **Energy efficiency standards and labels deliver.** The introduction of EE S&L can result in rapid improvements of the energy efficiency of products on the market, and in some cases a market transformation in just a few years. This can be visible in higher sales of efficient products, but also in reduced prices for efficient products, as the market develops and more suppliers offer better-performing appliances.

6. **An appropriate mix of standards and labels is needed.** EE S&L must be implemented in ways that allow manufacturers and markets to respond in a timely manner, taking into account product development cycles. Not all countries will balance mandatory and voluntary elements in the same way, although alignment with international efforts is helpful. Effective cooperation between industry and governments supports the effectiveness of the programme in the long run.

4. Supporting the Implementation of EE S&L

Standards and labels are meant to help the market recognise energy efficiency and enable actors to deliver higher efficiency products to the market. Labels allow consumers to make informed decisions about the true cost of a product, and manufacturers with the opportunity to differentiate their offerings. Standards can be set to ensure that obsolete and inefficient technology does not continue to dominate the market, much more effectively than is possible by the actions of individual end-users. Households on a low income are often inclined to buy the cheapest product on the market. This burdens them with much higher running cost for years to come, and countries with the need to invest much more in energy supply networks than would be needed if all products would comply with minimum energy performance requirements. Neither one household nor one manufacturer alone can alter this situation. Governments, however, with technical support, can implement standards and labelling programmes that protect the poor from such expensive 'cheap products', at a limited cost to government, and protect manufacturers of highly efficient products from competitors saturating the market with these expensive 'cheap products'.

Key elements of any EE S&L framework are[16]:

- Policy development: A national policy framework for EE S&L, including:
  - Policy objectives and targets;
  - Legal framework for setting standards and labels and enforcing compliance;
  - Defining organisational mandates and responsibilities;
  - Approach to international harmonisation of testing procedures, performance standards and label categories;
  - Mutual recognition of test results in a region.
- Market introduction: A national strategy for the introduction of EE S&L in the market, including:
  - Information and education of supply chain parties: manufacturers, importers and retailers;
  - Information and awareness raising of consumers and other end-users of appliances and equipment;
  - Promotional activities, by the government or in collaboration with market parties, utilities and NGOs.
- Verification and enforcement: Organisations and procedures to check compliance with EE S&L legislation, including:
  - Testing infrastructure for verifying the energy performance of products, by setting-up national test laboratories or establishing access to laboratories in other countries;

[16] Based on: CEECAP Guidelines 2004 (www.ceecap.org), CLASP Guidebook Energy Efficiency Standards and Labels (www.clasponline.org) and various UNDP/GEF project designs (www.thegef.org).

- Establishing procedures for verifying the energy performance of products, including rules about obtaining products for testing, allowed test tolerances and the legal follow-up to non-compliance;

- Establishing procedures for verifying the sales of products (allowed by standards and properly labelled) in shops and other retail channels;

- Training of (state) inspectors in verifying shops and other retail channels.

4.1 Objectives of Energy Charter Activities for EE S&L

While EE S&L programmes can have significant national benefits, they also require government capacities and resources that are challenging for some countries, especially in the introductory stages. In particular, experience shows that programmes work best where there is a lead agency with relevant capabilities and a strong mandate. Institutional mechanisms that allow for effective compliance and enforcement are also necessary to give credibility to the programme and ensure it delivers real energy savings. It is possible, even for countries in transition, to develop effective programmes, as experience in Romania, Tunisia, Korea and other countries demonstrates.

However, regional cooperation can be an important support to national activity. It allows for sharing of information, as well as potential joint implementation of some elements of programmes. It also can ensure that national approaches are well linked to regional and international initiatives, providing more certainty and lower costs for governments and affected industries.

International cooperation could assist countries in the regional harmonisation of energy efficiency standards and labels, by supporting the adoption of good-quality S&L developed in one country, by more countries in the region. Obvious candidates for such an approach are the energy labels and MEPS in place and in development in the EU, for those CIS countries that trade mainly with the EU. Further, the new UNDP/GEF S&L initiatives in the Russian Federation could provide a focal point for regional harmonisation. Adopting such standards and labels, and the underlying international test procedures, would harmonise S&L for many products across the region as well as with Europe, give a boost to the regional market for energy efficient products and lead to significant energy savings in the countries involved.

Taking into account the experiences of previous appliance standards and labelling development projects in the Europe & CIS region, any proposed actions should be built on a holistic approach trying to address the main policy, strategic, technical, modelling, and market issues related to developing, adopting, implementing, maintaining and enforcing energy efficiency standards and labels. Experience in Energy Charter and other countries revealed that there often is a need for specific support, including the training of experts[17], mobilisation of national technical experts, and improvement of the regional markets for energy efficient products.

Whereas some aspects, like national stakeholder discussions and the initiation of a political process, are best conducted in a national project, the aspects targeted here typically require a level of technical support and institutional back-up that often cannot be made available for one national project. The cross-country exchange of information and lessons, typically an ad-hoc activity benefiting mainly those that already have experience with EE S&L development,

[17] In the context of this chapter, "training" is broadly interpreted to include sharing of technical, policy and administrative experience in a variety of formats and forums.

will be much more effective when structured and made available to all national experts. The harmonisation of test procedures and product requirements can only be achieved in a regional project, as this requires cross-country cooperation.

A possible framework for action is discussed below. This framework links regional activities to national initiatives, by means of the inclusion of national practitioners in the training and information exchange activities, and via activities in the participating countries directly targeting government policy decision makers.

Possible regional activities under such a framework could consist of three components:

- Creating awareness of national policy decision makers about the benefits of and requirements for appliance and equipment energy efficiency programmes, to stimulate their adoption and the mobilising of resources for national activities on the development or improvement of energy efficiency standards and labels and compliance enforcement;

- Enhancing the capacity of national experts to develop and implement energy efficiency standards and labels through a training programme, better access to the latest international information, exchange of information and experiences between countries and technical support during the design and initiation of national plans and as second opinion during their implementation;

- The development of a regional standards and labels strategy and the adoption of harmonised appliance and equipment standards and labels in the Europe and CIS region, or parts thereof, the development of testing capacities and the regional mutual acceptance of test results, and information of regional suppliers of the opportunities provided by harmonised procedures and requirements.

4.2 Preparing the Ground for National Programmes for the Implementation of EE S&L

Policy decision makers are often not aware of the benefits of appliance and equipment energy efficiency standards and labels to the country, local industries and consumers. Policy makers should be made aware of this, and be assisted to develop an understanding of the requirements and the implementation process of standards and labels. Experience so far shows that policy makers often underestimate the development work, the need to develop linkages with various institutions and organisations in the country and the requirements of the implementation process, leading to an underestimation of the required resources and time, a prolonged development process, and the failure to achieve the full potential of energy efficiency standards and labels for the country, industry, residents and the global environment. It is also important to recognise that programmes require ongoing maintenance in terms of effective compliance and monitoring, updating of standards as needed, extension to new products, and effective communications with consumer, retailers and manufacturers. EE S&L is not a "set-and-forget" policy, and ongoing resources will be required, not unlike most other policies.

One key element of this stage is developing strong and effective links with industry and other major stakeholders. An understanding of likely impacts on any domestic manufacturers and the possible need for complementary measures to address these impacts must be considered. Experience shows that a programme including an active partnership with industry from the start is more likely to be successful.

Seminars and workshops, regional and national, can help deliver this message to key government decision makers. As part of the framework, national governments would conduct a systematic

review of the national standards and labels in their country (as far as these exist), and plan for improvements, making use of the available technical resources in the framework. As a last step, countries could be invited to implement EE S&L and earmark funding for the development, implementation, and/or updating of standards and labels by national technical experts.

4.3 Enhancing the Capacity of National Experts for the Development and Implementation of EE Standards and Labels

Implementing standards and labels in a country is impossible if there is a lack of well-trained experts that understand the core aspects of EE S&L development and can manage an EE S&L programme. In the past, many projects have underestimated the amount of development and implementation work needed for standards and labels, and assumed that national experts could set-up a national strategy without much training. Local experts often have a good understanding of the technical aspects of product performance, but typically have little knowledge of international appliance and equipment markets, product development strategies as employed by leading manufacturers and of the mechanics of standard and label development and implementation.

Within this framework, a regional programme could enhance the capacity of national experts, by facilitating specific training and information exchange on these issues of energy efficiency standards and labels development, and by providing better access to state of the art information, technical support and international practice in this field. This enables countries to continue with the development or adoption of standards and labels in their country, without having to rely on outside experts for every step. This can reduce the cost for countries to move ahead with an EE S&L programme, and give countries more control over its course.

This part of the framework should include the provision of guidelines and background materials to national experts; training programme for government, energy agency and university experts; establishment of a regional, multilingual Internet platform for access to quality information and the exchange of experiences; thematic workshops for national experts; and technical support for the definition and initiation of national projects. Cooperation can be established between individual experts in the Europe and CIS region, but also with experienced international experts, particularly from European technical institutions.

4.4 Regional S&L Strategy and Harmonisation of Appliance and Equipment EE Standards and Labels

Since energy-using products are increasingly traded globally, there is an increasing tendency to harmonise elements of product policy between countries and major trade blocks. More and more, products are also designed for the requirements of major markets, tailored to the specific demands of their test procedures, minimum energy performance standards and energy label classifications. This limits the scope of smaller economies to effectively set their own standards, as these may not solicit the same response from appliance and equipment manufacturers as a regionally or internationally coordinated effort could achieve – thus rendering uncoordinated national programmes less effective.

Countries can benefit from this trend in several ways:

- By harmonising their test procedures and appliance and equipment energy efficiency requirements with their main trade partners, they can benefit from product improvements already developed for other markets;

- The same mechanism allows product manufacturers, established in the country, to take increased advantage of their investments in more energy efficient products, as they can sell these as easily, a recognised energy-efficient product, in other countries that have adopted the same procedures and requirements;

- By adopting test procedures, standards and labels of other countries in the region, countries can benefit from the analysis and development work already done, and reduce their need to invest significant resources in the development of national standards and labels.

A regional programme could analyse the regional appliance and equipment markets, to create an overview of the products sold and the trade patterns between countries in the regional market, including an analysis of the countries of origin of products, typical product designs that are common on national and regional markets and which international standards or labels influence product design. A second in-depth analysis, of appliance and equipment energy efficiency test procedures, test laboratories and practices, would provide countries with a good overview of the test standards and performance criteria that can be adopted relatively easily (as performance criteria relate to test procedures). This analysis would allow countries also to compare themselves with their neighbours and with international best practice for EE S&L.

Based on these analyses, a regional framework could facilitate the countries in cooperatively establishing a regional S&L strategy for Europe and CIS countries, or parts thereof, including the selection of appropriate test procedures and product energy efficiency requirements for the countries involved. Mutual recognition of test results should be arranged, to allow for products once tested to be marketed as such in all countries in the region. As a last step, the suppliers of appliances and equipment should be informed of this, and be stimulated to make use of these procedures for the production and marketing of energy efficient appliances and equipment.

4.5 Help, Don't Tell

A regional programme can assist further the development of EE S&L, not by telling countries that such programmes are beneficial, but by helping governments to adopt and implement good standards and labels. The actions listed above can be important steps towards that goal.

Annex A – Case Studies

Case Report 1: Russian Federation

Key lessons

- *Regulation only delivers if it is properly mandated and well implemented.* MEPS for a wide range of appliances have existed for a long time in Russia, and a framework for energy efficiency labelling was introduced in 1999. Both MEPS and labels, however, have not been really implemented so far, and the impact of these S&L is marginal. The voluntary status of the standards, lack of specific requirements for labels and lack of proper mandate to a government institute to actually implement requirements are contributing factors to this lack of impact.

- *The ability to test products needs to exist.* There is one big testing facility in Russia that can test for the EU performance standards for washing machines. Further testing capacities are needed to make EE S&L a success in Russia, as well as test standards for other products preferably in line with international test procedures.

- *Introducing EE S&L can help local manufacturers.* Local manufacturers currently lack any incentive to improve the energy performance of their products. The competition, imports and local production by subsidiaries of major European manufacturers, has innovated to meet the requirements of other major markets (particularly the EU). This has put local manufacturers at a disadvantage, and the introduction of EE S&L, especially when combined with training or technical support to manufacturers, could help them catch up with the competition.

- *The market needs time to adjust to EE S&L.* The Russian market is still far behind EU markets (including new member states) in the energy performance of products. Due to the lack of standards and labels, Russian consumers cannot select products based on their energy performance. The price difference between average and better energy performing appliances is also quite substantial, which could indicate that the better products are still considered to be premium products (at a premium price).

National policy and legislation

No legislation currently exists in Russia mandating energy efficiency labelling or minimum energy performance requirements for energy using products. In 1996 a Federal Energy conservation law was introduced, which regulates the activities in the field of energy saving, but no specific references were made to the energy efficiency of products. [1]

A number of technical standards has been introduced for different types of equipment during the years 1983-1999, setting general requirements for products including their energy consumption.[2] These technical requirements were mandatory up to the adoption of the Federal law on technical regulation in 2002, which determined that the standards had voluntary status. In 1999 a standard GOST P 51388-99 “Provision of Information for consumers about energy efficiency of products for household application” was adopted. This standard sets out the framework for an energy efficiency labelling scheme broadly harmonised with the European one. It envisages labelling for a wide range of products such as gas and electric appliances, lamps, insulation products and cars. Further specific requirements

for the energy classes have been developed only for refrigerators and freezes – GOST 51565 – 2000. The standard introduces seven energy efficiency classes A-G and the information to be included in the energy label. Further, it requires that refrigerators of class G cannot be manufactured after 2002 and of class F not after 2004. No further standards were developed for the products listed in GOST 51388, which is most probably due to its voluntary nature and the absence of a delegated government institution responsible for its implementation. [1]

Table A.1.1: Existing Voluntary Standards and Energy Labels in Russia

	Standard	Label
Air Conditioners (window, split-type and ducted)	x	
Air conditioners Room	x	x
Audio – Domestic sound frequency signal amplifiers	x	
Computers	x	
Dishwashers	x	x
Freezers	x	
Graphical input devices	x	
Monitors	x	
Printers	x	
Electric Ovens	x	x
Refrigerators and/or refrigerator-freezers	x	x
Televisions	x	
Water heaters Electric	x	x
Microwave ovens		X
Washing machines		x
Combined washer-dryer		x
Dryers		X
Household Lamps		x
Fluorescent lamps		x
Luminaries		x
Heating systems		x
Water heaters gas		x
Gas ovens		x

Implementing authorities

There are few Federal institutions of the Russian Federation managing different activities in the field of energy efficiency – the Ministry of economic development, the Ministry of fuel and energy, the Ministry of education and science, the Ministry of natural resources, the Ministry of regional development, the Federal Agency of science and innovations, the Federal Agency of house building and municipal economy and the Federal Agency of technical regulation and metrology. However, no single institution is currently delegated as the implementation body for the energy efficiency labelling programme in the country. [1]

Test standards and capacity

In 1999 GOST 51380 introduced the general requirements and the methods for the verification of energy efficiency indicators for energy consuming products listed in GOST 51388 – a manufacturer declaration, certification testing procedure and statistical data analysis. No further detailed test procedures for the various types of equipment have been developed, nor were international performance test procedures adopted.

Rostest in Moscow is the only testing organisation in Russia with the technical capacity for conducting performance tests of household appliances in accordance with IEC/EN International Standards. The laboratory of research and endurance tests, part of the Testing

Centre, can test the following appliances on quality, reliability, consumer properties and performance characteristics: washing machines, tumble dryers, dishwashers; refrigerators, freezers; vacuum cleaners, washing vacuum cleaners; kitchen appliances (food processors, coffee grinders, toasters, etc.); heaters and water heaters (irons, convectors, etc.) The laboratory have been carrying out various tests for more than 12 years and its clients include major manufacturers like Miele, Electrolux, Zanussi, Bosch-Siemens, Whirlpool, Arcelik, Henkel, Reckitt Benckiser, the German Institute for consumer information Stiftung Warentest as well as domestic consumer associations. Recently some results of comparative performance tests according EN 60456 for washing machines have been published in Rostest's regular bulletin – Moskovsky test. [4]

Impact on manufacturers and imports

The Russian market for industrial energy-using equipment (pumps, air conditioners, ventilation units) is dominated by imported products (average 70% import), typically from major manufacturers like Grundfos, York and Trane. Due to the strong growth of the market for such products some of the manufacturers (York, VTS Clima) have established their local manufacturing capacities, with technologies for advanced products. The market for highly efficient local brands like Veza, Korf and Mara is also increasing. [1]

The situation is similar for household appliances with a 50% import share for refrigerators, 70% for washing machines and more than 80% for air-conditioners. There are around 10 local manufacturers of refrigerators, with some 80% of the market for locally produced products dominated by two manufacturers, Stinol and Birusa. The washing machines market is dominated by major European manufacturers like Indesit, Electrolux, Candy Arcelik, which have invested in high-quality local manufacturing plants. The energy efficiency of locally produced brands is still far below that of the European ones. [1]

The local manufacturing capacity for high efficient lighting sources is thought to be relatively small (2006 information), but some foreign manufacturers are starting to build production facilities for household and fluorescent lamps. The CFL market is dominated by cheap low-quality products, imported from Asia. [1]

National market of appliances

The market share of high-efficiency household appliances in Russia is (2006 data) still relatively low, compared to Western and Central European countries. 37% of refrigerators sold are of energy class A or A+, compared to more than 83% for Western Europe and 78% for CEE countries. Data from early 2007 show, however, that the market is slightly moving towards more efficient appliances. Reported prices for A and A+ refrigerators in Russia are almost twice the average price in the EU, thus limiting the potential for a wider penetration in the market of these products. [3]

Figure A.1.1: Refrigerators – Sales by Energy Class, 2006 [3]

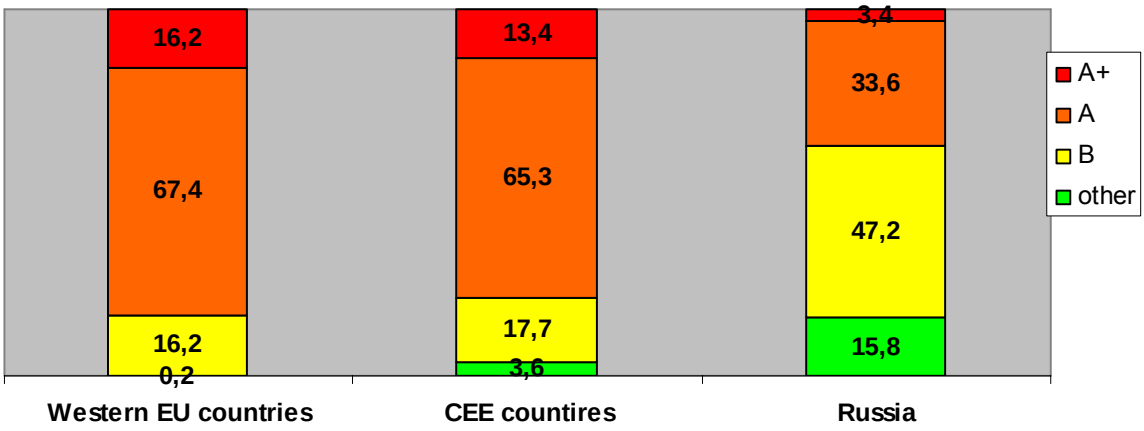


Figure A.1.2: Refrigerators – Sales by Energy Class [3]

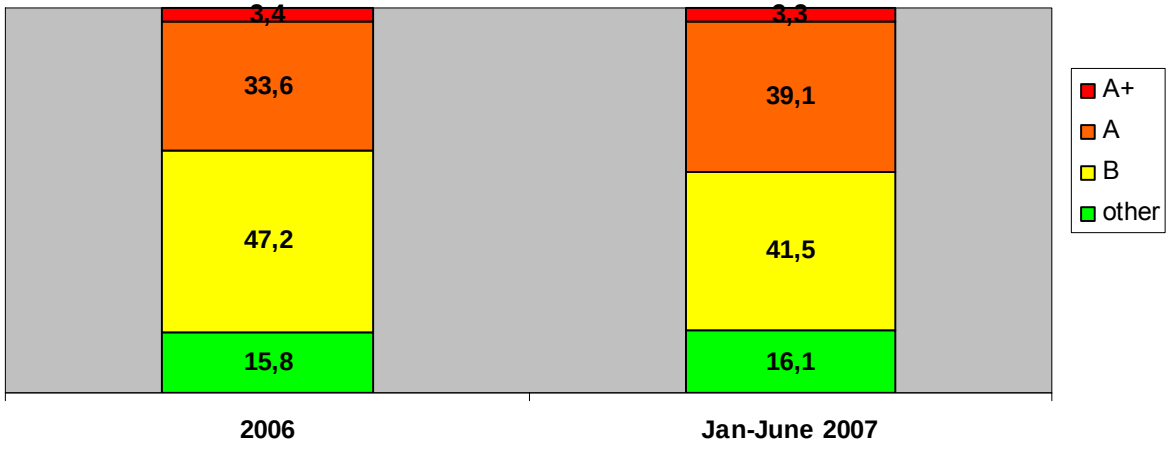


Figure A.1.3: Average Price of Refrigerators [3]

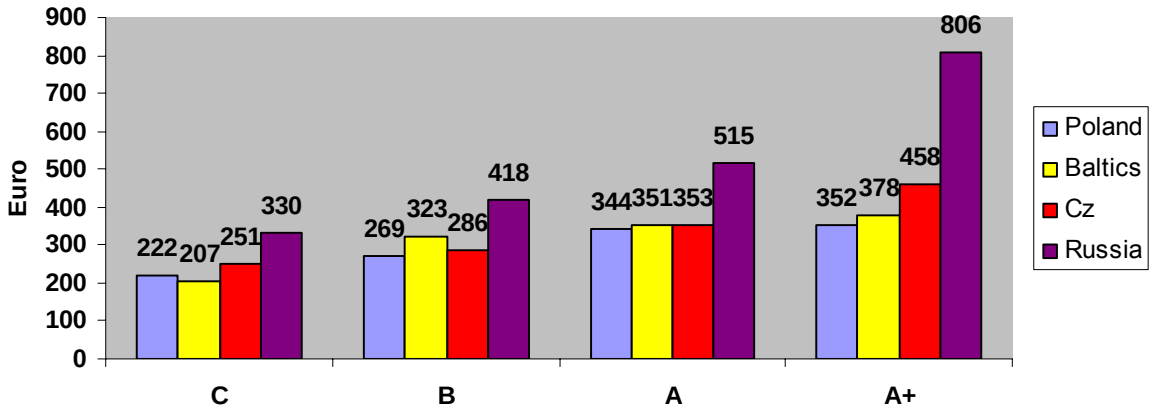
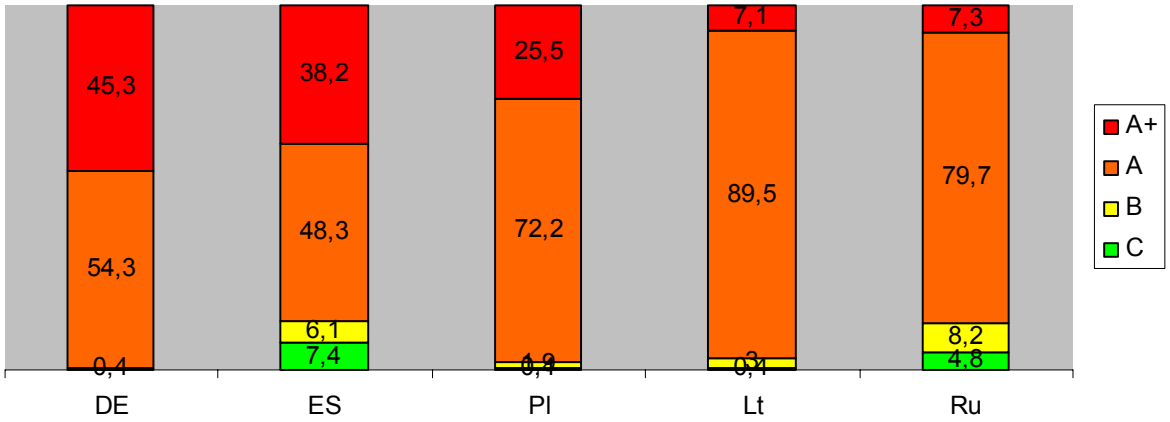


Figure A.1.4: Washing Machines – Sales by Energy Class [3]



Consumers

There is no research available on consumer awareness of the benefits of high-efficiency products. Expert observations indicate that there is an increasing interest in big Russian cities for purchasing appliances with good energy classifications. There are some ongoing municipal and regional energy efficiency programmes and, although these do not specifically target energy-using equipment, most of them include consumer awareness and educational components about this.

Reference – Russian Federations:

[1] "Standards and Labels to Promote energy Efficiency in Russian Federation", UNDP/GEF, final report

[2] Energy labelling and standards programmes throughout the world, The National Appliance and Equipment Energy Efficiency Committee report, Australia, 2004

[3] Matilde Soregaroli, GfK, Italy, Latest Trends in Major Domestic Appliances in CEE Focus on energy consumption, Krakow, September 2007

[4] Rostest website – www.rostest.ru

Case Report 2: Turkey

Key lessons

- *Procedures and budgets for compliance checking are needed.* Turkey has adopted the EU energy labels for appliances and has assigned a government institute for its implementation. There are, however, no provisions for checking the compliance with the energy labelling regulations, and insufficient human and financial resources have been made available for these activities.

- *Not all manufacturers are similar.* Turkish manufacturers are among the world-leading producers of high-quality products, exporting most of their best products to Europe. Turkey, however, is also hosting the production of low-quality energy using equipment that is exported to other parts of the world and sold domestically. Specific activities may be needed to support those small manufacturers to improve their production towards more efficient appliances.

- *Leading manufacturers ask for the proper introduction of EE S&L.* Leading Turkish manufacturers have recognised that they would benefit from the introduction of well-implemented EE S&L, and have offered their support to the Government for this. Properly implemented, well-enforced standards and labels would allow them to benefit from their investments in improving the energy performance of their products on the domestic market.

National policy and legislation

Turkey introduced the EU energy efficiency labelling scheme in the early 2000s. The legal basis is the Law on the Preparation and Implementation of the Technical Regulations on Products" ("Framework Law no: 4703"), adopted in 2001 to transpose EU Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances.

Eight implementing regulations have been adopted in the period 2002-2006, setting requirements for the energy labelling for refrigerators, freezers and combination; washing machines; combined washer-driers; household lamps; electric tumble driers; dishwashers; electric ovens and air conditioners. In 2002-2003 minimum requirements for the energy efficiency of refrigerators, hot-water boilers fired with liquid or gaseous fuels and ballasts for fluorescent lighting were introduced in separate regulations.

Implementing authorities

The Ministry of Energy and Natural Resources (MENR) is responsible for the formulation and implementation of the national energy policy, while the Ministry of Industry and Trade (MIT) is responsible both for the transposition of EU legislation in the area of energy labelling as well as its actual implementation. The General Directorate for Protection of Consumers and Competition under MIT is responsible for market surveillance and controlling the conformity with the existing legislation for energy efficiency labelling. This is governed by the 'Law on the Preparation and Implementation of the Technical Regulations on Products' (Law No: 4703).

The principles and the procedures relating to the surveillance and inspection of a product at points of sale are set in the Regulation on Procedures and Principles of Market Surveillance of the Products to be performed by the Ministry of Industry and Trade. These procedures however are too general and are not tailored specifically to the legislation for appliance

energy efficiency labelling. Though the General Directorate for Protection of Consumers and Competition has offices in Ankara as well as in 81 provincial cities, the initial analysis shows that the financial and human resources assigned to compliance checks of retailers and products are not enough and additional government efforts are needed to set up efficient operational procedures for conducting these checks.

Test standards and capacity

Turkey has adopted the EU performance test standards, but there is no accredited laboratory for performance testing (as of 2006). Major manufacturers like Arçelik and Vestel have their own laboratories for quality control purposes and these laboratories may be upgraded to the level where the test results would be consistent with the ones from accredited test laboratories.

Impact on manufacturers and imports

Turkish manufacturers are among the world-leading producers of high-quality products, exporting most of their best products to Europe. Turkey, however, is also hosting the production of low-quality products that are exported to other parts of the world and sold domestically. More than 90% of all appliances sold in Turkey are domestically produced; imports make up only a small share of the market.

The Turkish manufacturer Arçelik has an important role in the household appliances sector with a share of 50% of the local market, being Turkey's top company and one of the five largest appliances manufacturers in Europe. The company provides products and services to consumers in more than 100 countries with its 9 brands, with around 35% of the production going to the EU countries. Arçelik is a member of the European Committee of Domestic Equipment manufacturers (CECED) and the national Association of White Goods Manufacturers. The company has high manufacturing technical capacity and is not producing appliances with an energy class lower than C (EU scheme).

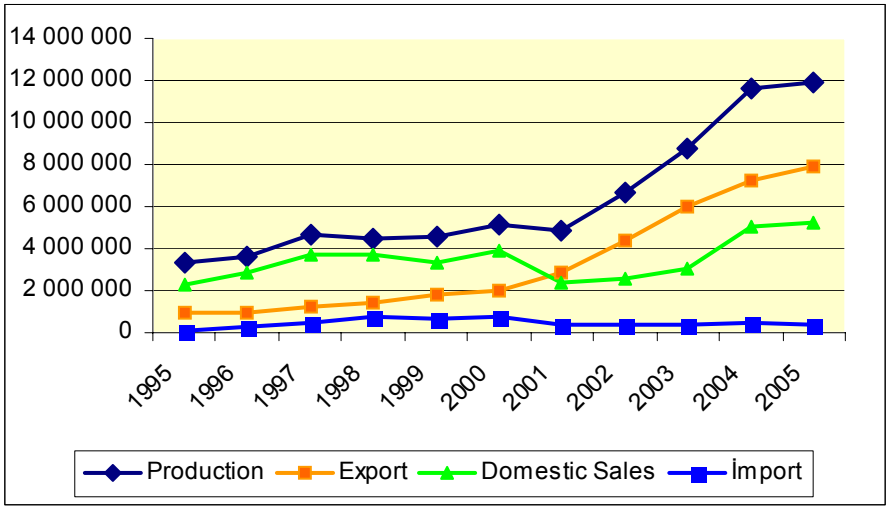
Vestel group is another major local manufacturer of energy using products, including consumer electronics, digital technologies, and white goods. The household appliances produced (refrigerators, freezers, washing machines, dishwashers, ovens and air conditioners) fall into the A-C energy class range, with only dishwashers being exported to EU countries. BSHG also has manufacturing facilities in the country, producing high efficiency appliances with energy class A-C, with the exception of freezers where 50% of the production is in D-G energy classes.

Apart from these big manufacturing companies, a number of small and medium-sized enterprises exist in Turkey, producing a wide range of energy-using equipment, e.g., refrigerators, electric ovens, gas ovens, electric stoves, mini kitchen equipment, irons. These firms are primarily focused on producing appliances as cheaply as possible to sell in markets driven by competition on price. Experts indicate that most of the companies are family-businesses with small factories and without advanced technological capacities.

National market of appliances

According to data supplied by the Turkish association of white good manufacturers the total production of household appliances in Turkey reached almost 13 million units in 2005. Five million units were sold on the Turkish market and around 8 million were exported. The total import of domestic appliances in 2005 was 400 000 units, which is only 3% of the production of local manufacturers and only 8% of domestic sales.

Figure A.2.1: Production, Export, Domestic Sales and Import (units)



Even lower shares of imports compared to local production are observed for different types of appliances like refrigerators, washing machines and ovens (details shown in the table below). Imports are more important for dishwashers, with approximately 32% of the domestic market in 2005.

Table A.2.1: Imports Compared to Local Production for Different Types of Appliances (units)

	Domestic Sales	Export	Production total	Import	Import vs local production	Import vs domestic sales
Refrigerator	2 092 728	3 620 280	5 713 008	63 155	1%	3%
Washing machine	1 827 998	2 699 563	4 527 561	113 258	3%	6%
Dishwasher	631 827	366 152	997 979	200 224	20%	32%
Oven	636 581	1 102 172	1 738 753	49 563	3%	8%
Total	5 189 134	7 788 167	12 977 301	426 200	3%	8%

There are scarce data about sales per energy efficiency class. Available data about the sales of refrigerators are shown below, compared with the average sales per energy class in West European and CEE countries [2]. Almost 45% of the sales of refrigerators in Turkey fell in C or lower energy class (2004 data). The same study from 2004 shows the average price for the different energy class refrigerators, indicating that Turkey has on average the highest prices for energy class A and B refrigerators compared to both Western and CEE countries.

Figure A.2.2: Refrigerators – Sales by Energy Class, 2004 [2]

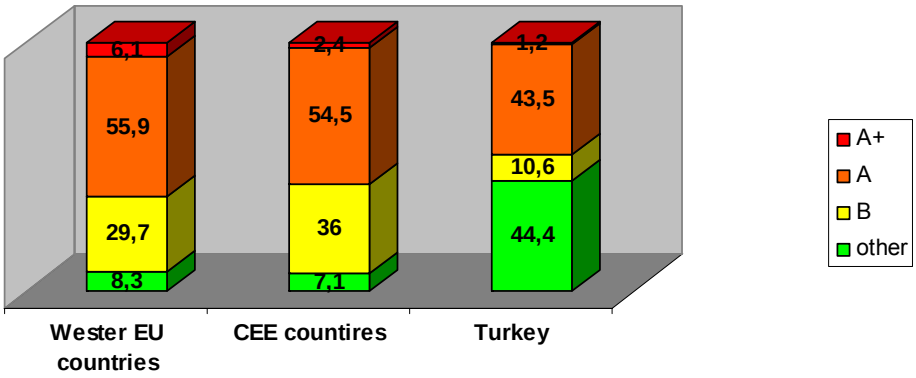
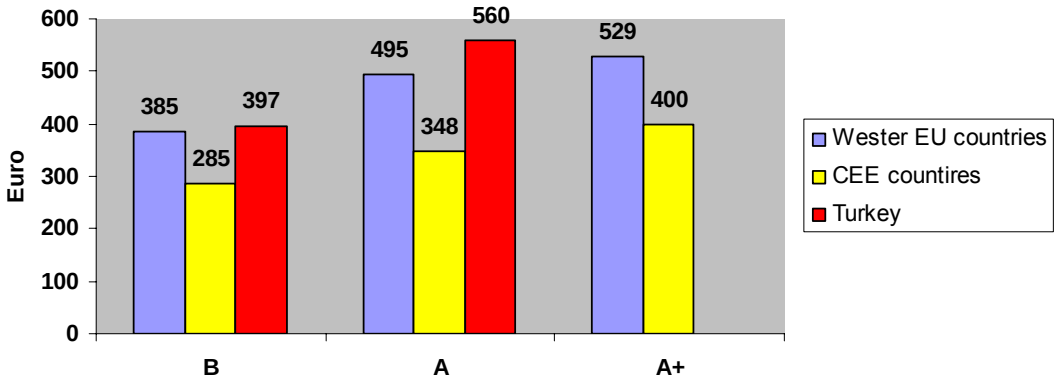


Figure A.2.3: Average Price of Refrigerators [2]



Consumers

Expert observations (in 2006) indicate that Turkish retailers do not offer a large range of efficient equipment, as demand for these appliances is still low due to a low consumer awareness of energy efficiency issues. There is no research available about consumer awareness, nor more recent data about the evolution of sales of energy efficient appliances in the country.

References – Turkey:

[1] GEF/UNDP project "Capacity-Building Programme for the Removal of Barriers to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling in EU Candidate Countries", National report Turkey

[2] Matilde Soregaroli, GfK, Italy: "Overview of sales and trends for main appliances in year 2004", Tallinn, 2005

Case Report 3: Romania

Key lessons

- *Proper mandates and procedures bring results.* During its EU Accession process, Romania, for the first time, introduced EE S&L. It also established an institutional framework for their introduction. In recent years, the government agency in charge of this has developed comprehensive retailer compliance checking procedures. The importance of effective compliance checking is demonstrated by the significant decrease in non-compliance of shops: non-compliance started at 64% in 2004, dropped to 39% in 2006 and dropped further to 18% in 2007.

- *The market asks for compliance checking of products.* Despite its success in improving the compliance of retailers with EE S&L, Romania has not yet succeeded in setting up the necessary procedures for checking the energy performance characteristics of products. Lack of access to testing facilities is one of the reasons for this omission. Major manufacturers present in Romania have insisted that the government should check energy performance declarations.

- *EE S&L deliver.* A comparison of sales trends for refrigerators and washing machines, from 2003 to 2007 by energy class, demonstrates that consumers are gradually purchasing more and more energy efficiency appliances. The sales of A+ refrigerators has grown from 3.1% in 2004 to 28.7% by mid-2007 and the sales of A-class products have grown from 33.5% in 2003 to 62.6% in 2007.

National policy and legislation

The introduction of energy standards and labels for appliances started in Romania with the EU accession process; no legislation or voluntary programmes existed before 2000. During 2000-2006 the Romanian Government harmonised the Romanian legislation with the Directives of the European Commission on household appliances energy efficiency. As a first step, in 2000, the Law on Energy efficient utilisation (Law no. 199/2000, republished in 2003, modified and completed by Law 56/2006) was adopted. This law transposes the requirements of Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances [1].

Consequently a number of government decisions were introduced, adopting the requirements of European Commission Implementing Directives for refrigerators, freezers and combination; washing machines; combined washer-driers; household lamps; electric tumble driers; dishwashers; electric ovens and air conditioners. The requirements for energy efficiency of hot-water boilers fired with liquid or gaseous fuels ballasts for fluorescent lighting were adopted in 2002 and 2003 and government decisions were introduced in 2002-2005 regarding the establishment of the criteria for the Ecolabel for refrigerators, washing machines, dishwashers, electric lamps and televisions. [1]

Implementing authorities

Several government institutions have responsibilities for the implementation of appliance S&L in Romania – the Ministry of Economy and Finance – MEF, via its specialised departments (energy policies, industrial policy and European accession) and mainly through its subordinated Romanian Agency for Energy Conservation – ARCE; the Romanian Standardisation Association – ASRO and the National Authority for Consumers Protection – ANPC. [1]

The Ministry of Economy and Finance is the authority responsible for the development and implementation of legislation regarding energy efficiency. ARCE and ANPC are the authorities in charge of the control of the implementation of the legislation regarding labelling and standard product information (labels in the shops, product fiches, technical documentation, the accuracy of information, testing of appliances). [1]

Regular inspections of retailers and importers of household appliances started in Romania in 2004. Periodically, unexpected or scheduled verifications checks have been carried out, during which labels that did not correspond to those required by the legal provisions as well as missing standard technical information forms were identified. In 2004, 301 of 470 retailers were found not to comply with the legal provisions and 119 warnings and 182 fines totalling about 19,000 Euro were issued. These verifications underlined the fact that the legislation in the field is not well-known. [1].

In later years the Romanian authorities have developed efficient verification procedures. It also established a good cooperation between manufacturers, importers and retailers covering the introduction of (new) standards and labels as well as cooperation between state officials about activities related to the legislation, verification & enforcement aspects of appliance labelling and energy efficiency policy. ARCE and ANPC now have their own legislation for compliance checking, which establishes the control procedures; the location of the inspections; staff of the control team; and the documents used in inspections: mandate, thematic, report, notification address, register reports, etc. As a result of these efforts the compliance checking activities in the last 4 years show a gradual increase of retailer compliance with the energy efficiency labelling legislation in the country. [2]

Test standards and capacity

Romania has adopted the major EU performance test standards for electricity-using appliances.

Table A.3.1: EU and Romanian National Performance Test Standards

Product	EU standard	National standard
Refrigerators, freezers and their combinations	EN 153	SREN 153
Washing machines	EN 60456	SREN 60456
Combined washer-dryer	EN 50229	SREN 50229
Dishwashers	EN 50242	SREN 50242
Tumble dryer	EN 61121	SREN 61121
Electric oven	EN 50304	SREN 50304
Household lamps	EN 50285	SREN 50285
Air conditioners	EN 814-1	SREN 814-1
	EN 255-1	SREN 255-1
	EN 14511-1	SREN 14511-1
Ballasts for fluorescent lamps	EN 50294	SREN 50294

No test laboratory exists in Romania that can conduct appliance performance testing and no such tests have been contracted to a test laboratory outside the country. Some manufactures of appliances reportedly have invested in their own (limited) test facilities that may be used for quality control and product development research. With some modifications and upgrading of these facilities, the performance of these laboratory facilities may be brought up to the level where the test results would be consistent with or comparable to test results from accredited test laboratories. In these cases, manufacturers may be able to declare the performance of their products reliably. [1]

Impact on manufacturers and imports

The market of household appliances in Romania is dominated by the local manufacturer Arctic, which has an about 30% share of the market. Arctic is part of Turkish Arçelik A.S and is producing high-efficiency appliances, 50% of which are exported to large European countries – Great Britain, France, Spain and Germany. All major EU brands are imported in the country, with some EU manufacturers (Indesit, Whirpool, Gorenje, Electrolux) having local representatives. The manufacturers and importers of electrical household appliances are well aware of the existing S&L legislation and are generally supportive towards the government verification and awareness activities. However some of them are insisting on actions to check the energy class declarations of products. [1]

Consumers

No research was identified about consumer awareness or market sales of efficient appliances in Romania for the period before the EU accession started. Consumer awareness of the energy efficiency of appliances was, in 2006, considered to be relatively low in the country, with high prices of efficient appliances being a major barrier towards their purchase by consumers [1]. ARCE has, in the last two years, worked actively to promote efficient appliances among final consumers (next to their verification activities). They have printed and distributed promotional leaflets through retailer's shops and their regional branches in the framework of EU funded project CEECAP. [2]

A comparison of sales trends 2003-2007 for refrigerators and washing machines by energy class demonstrates that consumers are gradually moving towards purchasing higher efficiency appliances. The sales of A+ refrigerators has grown from 3.1% in 2004 to 28.7% in mid-2007 and A-class sales have grown from 33.5% in 2003 to 62.6% in 2007. Data for 2006 show that sales of washing machines by energy classes in Romania are comparable with countries like the UK and France, which both have been working actively in the past to promote high-efficiency products to consumers.

National market of appliances

Figure A.3.1: Refrigerators – Sales by Energy Class [3]

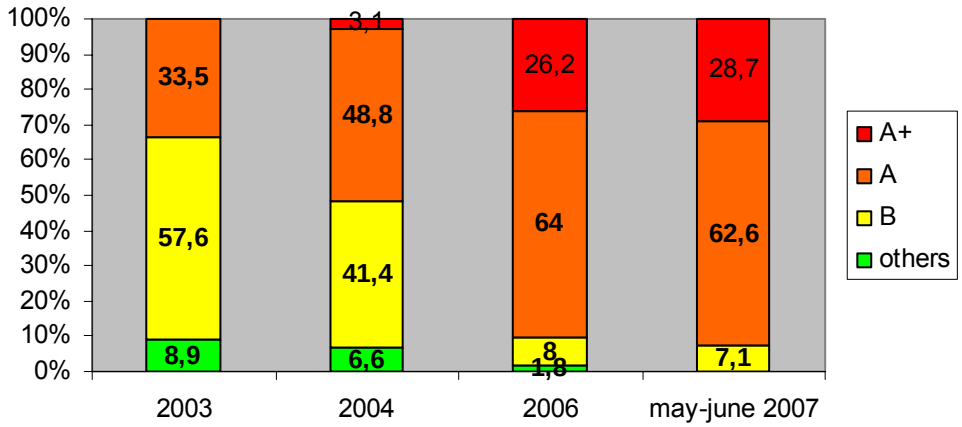
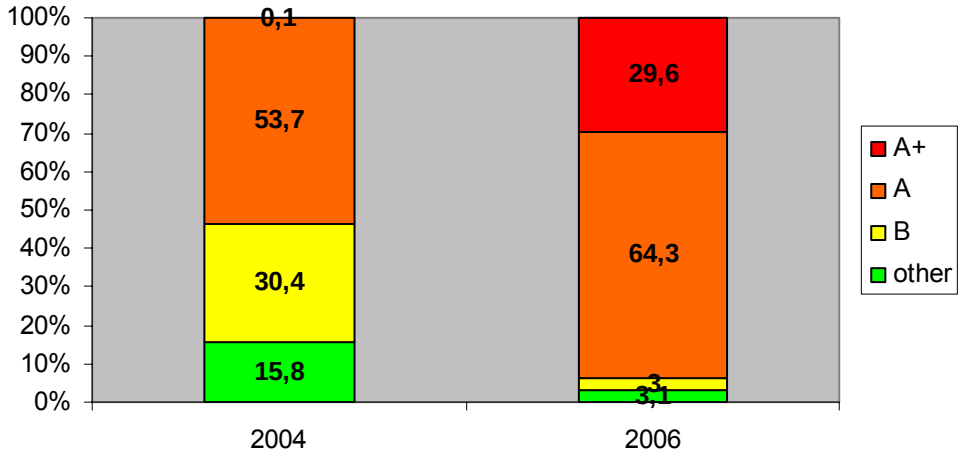


Figure A.3.2: Washing Machines – Sales by Energy Class [3]



References – Romania:

[1] GEF/UNDP project "Capacity-Building Programme for the Removal of Barriers to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling in EU Candidate Countries", National report Romania

[2] Reports from IEE Project "Implementing EU Appliance Policy in Central and Eastern Europe – CEECAP"

[3] Sources: Matilde Soregaroli, GfK, Italy: "Overview of sales and trends for main appliances in year 2004", Tallinn, 2005; "Latest Trends in Major Domestic Appliances in CEE" Focus on energy consumption, Krakow, September 2007

Case Report 4: Australia

Key lessons

- *EE S&L programmes are very effective in delivering more efficient and lower running cost appliances to households*. A recent review of sales data by Harrington (2007) showed domestic refrigeration appliances had improved in efficiency by over 30% in the previous 13 years of labelling scheme in Australia.

- *They are a very cost-effective method of reducing greenhouse gas emissions.* The Australian Greenhouse Office estimated the cost of abatement to be minus $23/tonne of CO_2, which means Australians are saving money by buying the more efficient appliances.

- *Effectiveness can be enhanced by working with retailers and the supply chain.* The retailers and the supply chain are key drivers to delivering the appliances, and have a significant influence over consumers, so the success of labelling can be improved by developing promotional material, websites, and appropriate targeting to different types of consumers.

- *Compliance and check-testing are important components of a programme.* Products that do not meet the claims on the label, or have no label information, pose a risk to delivering the energy savings. The Australian Greenhouse Office's checking programme has found products which do not confirm, thus compromising the scheme. These products have been removed from the market, and in some instances fines imposed. Thus compliance checking improves the effectiveness of S&L programmes.

- *Where possible, it is more efficient to build on evidence, approaches and performance standards in other countries and regions.* Australia has not developed all the evidence and policy tools itself; it has made use of research in other countries. In addition, it has not always developed its own target performance levels, instead it has worked with its neighbours and supply chain to reduce programme costs and developed and implement more appropriate and successful measures.

Summary

As a country, Australia is increasingly a net importer of products, hence can set ambitious standards with little impact on its own producers; though as it is also a small market, it needs to work internationally to ensure delivery of higher specification products. Australia has made extensive use of product standards and labels, being one of the earliest to adopt these measures (1986), and has helped develop product policy internationally. These programmes have delivered significant energy savings from improved efficiency. Australia is a signatory to PEEREA, but has not yet ratified (as of May 2007).

National policy and legislation

At a federal level, the Department of Environment, Water, Heritage and the Arts coordinate the activity of product standards and labels programmes, specifically, under the Equipment Energy Efficiency Programme (E3).

It is currently mandatory for all of the following electrical products offered for sale in Australia to carry an approved energy rating label:

- Refrigerators and freezers
- Clothes washers
- Clothes dryers
- Dishwashers
- Air conditioners (single phase mandatory, three phase voluntary)

In addition to mandatory energy labelling, the products listed in the table below are also regulated on the basis of Minimum Energy Performance Standards (MEPS).

Table A.4.1: Products Regulated on the Basis of MEPS

Product with MEPS	MEPS effective date
Refrigerators and freezers	1 October 1999, revision 1 January 2005
Mains pressure electric storage water heaters	1 October 1999
Small mains pressure electric storage water heaters (<80L) and low pressure and heat exchanger types	1 October 2005
Three phase electric motors (0.73kW to <185kW)	1 October 2001, revision April 2006
single phase air conditioners	1 October 2004, revision 1 April 2006 and 2007 and 2008
Three phase air conditioners up to 65kW cooling capacity	1 October 2001, revision 1 October 2007
Ballasts for linear fluorescent lamps (which also have to be marked with an energy efficiency index (EEI))	1 March 2003
Linear fluorescent lamps – from 550mm to 1500mm inclusive with a nominal lamp power >16W	1 October 2004
Distribution transformers – 11kV and 22kV with a rating from 10kA to 2.5MVA	1 October 2004
Commercial refrigeration (self contained and remote systems)	1 October 2004

The following products are proposed for regulation in the future, subject to normal regulatory processes and approval by the Australian Ministerial Council on Energy.

- External power supplies (from 1 October 2008);
- Set top boxes (from 1 October 2008);
- Televisions;
- Home entertainment products: (Audio and video equipment) (from 1 October 2008);
- Boiling and chilled water dispensers;
- Vending machines;
- Commercial icemakers;
- A range of lamp types;

In addition, the Australia Energy Star provides a voluntary international standard for energy efficient office equipment, including computers, printers and photocopiers, and home electronics such as TVs, audio products and DVD players (http://www.energystar.gov.au/).

The Ministerial Council on Energy (MCE) has resolved that Australia will expand its commitment to reducing excessive standby by formulating coordinated product-specific plans to address excessive standby over ten years, 2002-2012, under the IEA "One Watt" initiative.

Implementing authorities

Australia has a federal system of government, comprising of states and territories, and it coordinates its appliance standards and labels policy with New Zealand, especially via the E3 Programme.

The Equipment Energy Efficiency Programme (E3) is a collection of coordinated programmes that implement standards and labels for appliances. The E3 programme, which is co-funded by the Australian state and territory Governments and New Zealand Government, focuses on initiatives that require a nationally consistent framework to improve energy efficiency and reduce greenhouse emissions from household appliances and equipment, and commercial and industrial equipment.

E3 covers the technical, legal, and administrative aspects of national appliance and equipment energy efficiency initiatives, in particular mandatory minimum energy performance standards and energy efficiency labelling.

The E3 Work Plan and Policies is updated regularly: the latest update in the annual report was published in 2007 (NAEEEC, 2007).

Test standards and capacity

The test standards to provide the basis for labelling and MEPS to be undertaken are Australian, but usually done in conjunction with New Zealand, and based on international methodologies where possible. The appropriate testing standard for each product is listed in the table below.

Table A.4.2: Testing Standards for Labelling and MEPS

Product	Standard
Refrigerator and freezers	AS/NZS 4474
Clothes washers	AS/NZS 2040
Clothes dryers	AS/NZS 2442
Dishwashers	AS/NZS 2007
Room air conditioners (single phase)	AS/NZS 3823
Packaged air conditioners (three phase)	AS/NZS 3823
Electric water heaters	AS/1056
Three phase electric motors	AS/NZS 1359
Fluorescent lamp ballasts	AS/NZS 4783
Fluorescent lamps	AS/NZS 4782
Distribution transformers	AS/2374 & AS/2735
Commercial refrigeration	AS/1731
Standby (interim method)	AS/NZS 62301-2003

The E3 Committee conducts a national "check testing" programme to provide the quality assurance that ensures that the labelling and MEPS scheme maintains high levels of credibility both with consumers and manufacturers. Appliances are purchased from retail outlets or obtained anonymously and tested in NATA-accredited independent laboratories to

verify the claims associated with the energy label for six appliance types and minimum energy performance standards where applicable. NATA is the National Association of Testing Authorities, Australia's national laboratory accreditation authority.

E3 has included a check-testing programme since 1991. Units are selected for check testing, using selection criteria and market intelligence geared towards units more likely to fail.

Australian approach (to matching best practice)

Since 1999, Australia has pursued a policy of matching the world's best international practice for national MEPS (where matching means 'equivalent' efficiency levels with a time lag of up to three years). This was first implemented for refrigeration appliances, where the 2005 Australian MEPS were essentially the US 2001 MEPS.

This turns the debate from the feasibility of meeting a proposed performance level to the modification of those levels to take account of technical testing considerations. For refrigeration products this meant a detailed understanding of testing methodologies was required to ensure what was best international practice. This approach also requires other trading blocks to take the lead in setting appropriately rigorous standards (eg US or EU). For other products it is easier to identify best practice though still requires nations to set ambitious standards if this approach is to work (Harrington and Holt, 2002).

Upgrading energy labels

If standards and labels are successful, then most models on the market will tend to be classified at the efficient end of the label, which will mean the label becomes less useful to consumers and the supply chain. To achieve a better spread of energy efficient products a re-grading of the scale is required. This has happened in Australia on a few occasions. To facilitate the first change they set up a steering committee consisting of selected government, industry and consumer representatives to oversee initial studies and prepare the ground for work on the label transition process. Amongst other things the steering committee considered:

- Examined preliminary studies and evidence
- Formed an "Energy Label Review Committee" to develop and finalise the major policy decisions with regard to the programme.
- The need for market research, e.g., using focus groups
- The need for an international review of energy labels.
- The need for research into appliance usage patterns.
- The need for transitional arrangements to be planned.

These issues were addressed, along with consideration of communication strategies and evaluation procedures. Further details Australia's experience of this transition is given in a report by Energy Efficient Strategies.

Stakeholder interaction

Consumers: In addition to mandatory energy labels and Energy Star, information to consumers is provided through a product database (on website). In addition, there has been the Top Energy Saver Award Winner (TESAW), which highlights the most efficient product in a class.

Retailers are recognised as having an influence (on the sales of products) and to support them, retail information packs have been developed to help purchasing and interaction with consumers.

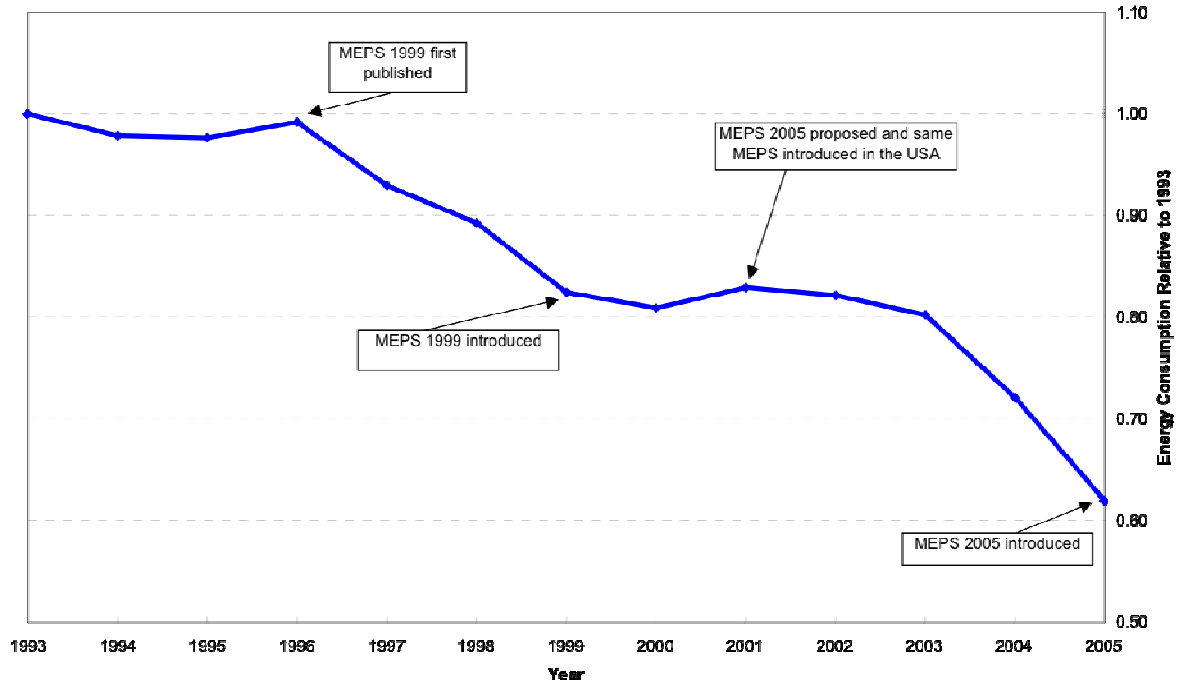
E3 Stakeholder Forums: The support and involvement of stakeholders is seen as essential for the success of the Equipment Energy Efficiency Programme (E3). The E3 Committee (formerly NAEEEC) hosts stakeholder seminars in Sydney or Melbourne every two years. They were originally held annually whilst the schemes were still in development.

Evaluation – impact on manufacturers and imports

Evaluation is increasingly an integral part of the programme. The E3 programme has been tracking trends in the efficiency of appliances on the market since 1993 in order to help in the evaluation of the impact of the energy labelling programme. Each year a report is prepared detailing these trends; the latest report is titled "Greening Whitegoods 2005" which includes data up to 2005. These reports are all available from the E3 Energy Rating website (Energy Rating, 2008).

A summary of the impact on efficiency indicators from product standards and labels over the last 13 years was recently provided by peer-review publication (Harrington, 2007). An example of the effect on the consumption of the average new refrigerator sold is shown in figure below. These impressive gains have been achieved even though the quality and functionality of refrigerators has been improving.

Figure A.4.1: Average Energy Consumption of New Refrigerators, Australia, 1993-2005



Source: Harrington (2007)

In addition to tracking the trends, retail stores are checked. The NAEEC Energy Rating Labelling Programme Audit 2004/2005 undertook surveillance of retail stores for MEPS and energy labelling compliance (white goods and air conditioners, NAEEEC reports 2005/07 and 2005/08).

In terms of evaluating the likely medium- to long-term energy savings from the standards and labels programmes, EnergyConsult (2006) provided an initial estimate of around 750 GWh per annum in 2005. The approach used has since been revised, though the savings will still be significant (Lane et al, 2007).

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Annex B – Products Covered by EE S&L in Energy Charter Countries

The following tables show the coverage of standards and labels for a range of products in Energy Charter countries. On these tables, the following indications are given:

Sm – standard mandatory

Sv – standard voluntary

Lm – label mandatory

Lv – label voluntary

Standards and Labels in Energy Charter Member Countries
General Overview

Country	Refrigerators	Freezers	Dishwasher	Washing machines	Washer dryer	Clothes dryers	Clothes dryers gas	Central AC split	RAC split	RAC packaged terminal	RAC window
Albania											
Armenia	Lv	Lv	Lv	Lv	Lv	Lv			Lv		
Australia	Sm; Lm; Lv	Sm; Lv; Lm	Lv; Lm	Lv; Lm		Lv;Lm		Sm, Lm	Lv;Lm		
Azerbaijan											
Belarus											
Bosnia and Herzegovina											
Croatia	Lm	Lm	Lm	Lm	Lm	Lm			Lm		
27 EC + Iceland, Lichtenstein, Norway	Sm; Lm	Sm; Lm	Sv, Lm	Sv;Lv;Lm	Lm	Lm			Lm		
Georgia											
Iceland											
Japan	Sv; Lv	Sv; Lv						Sv; Lv	Sv;Lv	Sv; Lv	Sv;Lv
Kazakhstan											
Kyrgyzstan											
Liechtenstein											
Moldova											
Mongolia											
Norway											
Russian Federation	Sv; Lv	Sv; Lv	Sv, Lv	Lv; Sv	Lv	Lv; Sv		Sv, Lv	Sv, Lv		Sv, Lv
Switzerland	Sv; Lm	Sv; Lm	Sv; Lm	Sv;Lm	Lm	Sv;Lm					
Tajikistan											
Macedonia	Lm	Lm	Lm	Lm	Lm	Lm					
Turkey	Sm; Lm	Sm; Lm	Lm	Lm	Lm	Lm					
Turkmenistan											
Ukraine											
Uzbekistan											
UK	Lv		Lv	Lv		Lv	Lv				
Austria	Lv			Lv							
Czech Republic				Lv							
France											
Germany	Lv		Lv	Lv		Lv					
Hungary	Lv										
Latvia											
The Netherlands	Lv										
Poland											
Slovakia	Lv			Lv							
Spain											

Standards and Labels in Energy Charter Member Countries
General Overview

Country	Electric oven	Gas Cook appliances	Motors	TV	VCR or DVD	Scanner	Copier	Vending machine	Fax machine	Computer	Harddisk drive	MFDs
Albania												
Armenia	Lv	Lv										
Australia	Sm		Sm			Lv	Lv		Lv	Lv	Lv	Lv
Azerbaijan												
Belarus												
Bosnia and Herzegovina												
Croatia	Lm											
27 EC + Iceland, Lichtenstein, Norway	Lm		Sv	Sv;Lv	Sv	Lv	Lv		Lv	Lv		
Georgia												
Iceland												
Japan	Lv	Sv; Lv		Sv;Lv	Sv	Lv	Sv;Lv	Sv	Lv	Sv, Lv	Sv, Lv	Lv
Kazakhstan												
Kyrgyzstan												
Liechtenstein												
Moldova												
Mongolia												
Norway												
Russian Federation	Sv;Lv	Lv		Sv								
Switzerland	Sv;Lm			Sv	Sv		Sv		Sv	Sv, Sm		
Tajikistan												
Macedonia	Lm											
Turkey	Lm											
Turkmenistan												
Ukraine												
Uzbekistan												
UK				Lv								
Austria							Lv					
Czech Republic												
France												
Germany				Lv			Lv		Lv	Lv		
Hungary												
Latvia												
The Netherlands				Lv								
Poland			Lv							Lv		
Slovakia									Lv			
Spain				Lv	Lv		Lv					

Standards and Labels in Energy Charter Member Countries
General Overview

Country	Monitor	Printer	Power transformer	Audio equipment	Power supply	Mains controllers	TV recorder	Set top boxes	Fluorescent and household	Electronic ballast	Magnetic ballast	CFL
Albania												
Armenia									Lv			
Australia	Lv	Lv	Sm		Sm				Sm	Sm	Sm	Lv
Azerbaijan												
Belarus												
Bosnia and Herzegovina												
Croatia									Lm			
27 EC + Iceland, Lichtenstein, Norway	Lv	Lv		Sv					Lv; Lm		Sm	
Georgia												
Iceland												
Japan	Lv	Lv	Sv;Lv						Sv; Lv			
Kazakhstan												
Kyrgyzstan												
Liechtenstein												
Moldova												
Mongolia												
Norway												
Russian Federation	Sv	Sv		Sv					Lv			
Switzerland	Sv	Sv										
Tajikistan												
Macedonia									Lm			
Turkey											Sm	
Turkmenistan												
Ukraine												
Uzbekistan												
UK						Lv	Lv	Lv			Lv	Lv
Austria						Lv						
Czech Republic											Lv	Lv
France												
Germany										Lv		
Hungary		Lv									Lv	Lv
Latvia											Lv	Lv
The Netherlands									Lv			
Poland											Lv	Lv
Slovakia												
Spain												

Standards and Labels in Energy Charter Member Countries
General Overview

Country	Halogen lamps	Luminaries	Electric kettles	Vacuum cleaners	Gas space heaters	El. Space heaters	Heat pumps	Hot water cylinders	Water heaters gas	Water heaters oil	Water heater electric	Water heater solar
Albania												
Armenia		Lv	Lv									
Australia					Sv;Lv	Sv;Lv			Sv;Lv		Sm;Lv	
Azerbaijan												
Belarus												
Bosnia and Herzegovina												
Croatia												
27 EC + Iceland, Lichtenstein, Norway				Lv			Sv				Sv	
Georgia												
Iceland												
Japan						Sv;Lv			Sv;Lv	Sv;Lv		Lv
Kazakhstan												
Kyrgyzstan												
Liechtenstein												
Moldova												
Mongolia												
Norway												
Russian Federation		Lv	Lv								Sv	
Switzerland												
Tajikistan												
Macedonia												
Turkey												
Turkmenistan												
Ukraine												
Uzbekistan												
UK	Lv	Lv	Lv					Lv				
Austria												
Czech Republic												
France				Lv								
Germany											Lv	
Hungary												
Latvia												
The Netherlands												
Poland												
Slovakia												
Spain				Lv								

Standards and Labels in Energy Charter Member Countries
General Overview

Country	Gas boiler	Central heating	Oil fired boiler	Boilers	LPG boiler	Electric toilet seats
Albania						
Armenia						
Australia		Lv				
Azerbaijan		Lv				
Belarus						
Bosnia and Herzegovina						
Croatia						
27 EC + Iceland, Lichtenstein, Norway			Sm			
Georgia	Sm					
Iceland						
Japan						Lv
Kazakhstan						
Kyrgyzstan						
Liechtenstein						
Moldova						
Mongolia						
Norway						
Russian Federation						
Switzerland						
Tajikistan						
Macedonia						
Turkey						
Turkmenistan						
Ukraine						
Uzbekistan						
UK			Lv		Lv	
Austria	Lv	Lv				
Czech Republic	Lv					
France						
Germany	Lv			Lv		
Hungary						
Latvia						
The Netherlands						
Poland		Lv				
Slovakia						
Spain						

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