Smart Power Toolkit

Volume 3: The Policies

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GREENPEACE

Smart Power Less is More

Smart Power Toolkit

Volume 3: The Policies

Contents

1 Introduction and Overview

Energy efficiency is one of the two big answers to the climate problem, the other being renewable energy sources. The CO_2 emission reductions through smart energy use, energy efficiency or Smart Power can be substantial; we can almost halve our projected energy demand in 2050. But in order to make Smart Power happen we need ambitious and effective policy measures. This need is urgent, since for example electricity consumption in the EU has continued to grow - despite a variety of energy-efficient policies and programmes at the EU and national level. In the time period 1999-2004, the percentage of electricity consumption in the residential sector of EU-25 has grown by 10.8% (from 690 TWh in 1999 to 765 TWh in 2004)- at almost the same rate as the economy's gross domestic product (GDP).[1] This underlines the need for even tougher measures in all parts of the world.

In this section of the Smart Power Toolkit we summarise the global policies in place in this area today. Section 2 provides Greenpeace's primary principles on all types of energy efficiency, from supply-side to demand-side efficiency, and from fuels to electricity. These principles form the basis for the efficiency chapter in the Energy [R]evolution Scenario report (2008).

The rest of this analysis focuses on electrical efficiency, and this background allows Greenpeace to provide an ambitious and relevant alternative to both coal-fired and nuclear power plants. We assume that improved policies for electrical efficiency will have a positive effect on the ambition level and speed of other efficiency policies and measures, as in many cases most of the methodology can be copied to other products.

This volume of the toolkit provides:

- an overview of electrical energy efficiency policies that have been implemented in the past or are currently in use;
- an analysis of their effectiveness (sometimes in their regional context);
- the necessary background for international campaigners to be inspired by, and to form an idea of, what worked well in what context and what can be improved.

Section 2 looks at minimum efficiency performance standards (MEPS) that act on manufacturers and retailers, and Section 3 provides a detailed analysis of labelling schemes that are directed towards consumers and therefore indirectly influence the supply by manufacturers and retailers.

Based on this analysis we have drawn conclusions on what Greenpeace generally considers to be the most appropriate policies to demand from politicians, and on what is needed to make them work.

1.1 Current Policy around the World

Every OECD country has policies and measures in place that stimulate energy-efficient appliances and electronics. However, there are large variations between them in their scope, assumptions, targets and whether they are mandatory or voluntary. Some are aimed at influencing users, others are aimed at manufacturers. The most common types are energy and information labels, mandatory MEPS and voluntary efficiency agreements (VAs). These are the most popular measures, and are predominantly being implemented at national and regional level. At sub-national, state/provincial and local levels, financial incentives such as rebates and promotion campaigns are being put into effect.[2]

The best policy agreements usually contain two elements, those that *push* the market and those that *pull* the market. Examples of *push policies* are MEPS, which have the effect of getting the biggest energy wasters in their class off the market.

Examples of *pull policies* are incentives for voluntary measures. These can be divided into those that encourage either the consumer or the manufacturer. *Endorsement labels* help the manufacturer by identifying products with exceptionally high energy efficiency, which could make them more appealing to consumers. *Rating labels* make consumers aware of differences in energy efficiency, but do not specifically endorse higher efficiency products.[3] The Energy Star label is a voluntary endorsement label, while the EU labelling scheme is a mandatory comparative labelling incentive.[4]

This review shows how different policies and measures to regulate the energy efficiency of energy using products do not exist in isolation from one another. In all of the respective geo-political areas (e.g. Japan, the US, the European Union) policies like labelling and mandatory minimum efficiency standards often exist next to one another or complement each other. Against the backdrop of an ever-increasing global market, there is an immediate challenge to harmonisation or "joining up" of different policies.

The issues for considering how effective these incentive schemes are broadly:

- how strict the specifications are;
- whether they are up to date and continuously improve over time;
- how voluntary standards can progressively shift to mandatory standards;
- how product bans work in the overall context.

Specifications

Specifications identify what energy use levels the product has to have to display a certain brand or label. In this area the Energy Star label is the most detailed, and involves a complex process for products to get their labels, even though it is voluntary. The process involves ongoing negotiations with concerned industries and manufacturers. However, the industry often insists on lower standards. A positive outcome is that Energy Star does gather detailed information and set specifications in anticipation of future development of more energy-efficient equipment.

Current Energy Star specifications are in some cases stricter than the ‘”Top Runner” levels, a mandatory scheme in Japan. But the Japanese programme has an ongoing review process so its minimum efficiency levels could become stricter again than Energy Star specifications.

Up-to-date specification

For labelling schemes set up to guide consumers, it is an inherent challenge to make them totally up-to-date. This is currently not the case with the European energy labelling system: the ratings and standards are partly outdated and need to be adjusted to allow for the most efficient products, which have developed past the top rating level. (The A level of efficiency needs to get tougher, as at the moment it has become the average level for a group of products.) Otherwise, the rating-criteria are not very dynamic and, in this case, do not keep up with the product developments in specific market segments. Therefore, timely updates need to be ensured to avoid outdated provisions.

Progression from voluntary to mandatory

A big question for Smart Power is whether voluntary programmes can be the first step towards regulation, or whether they are an altogether separate mechanism in energy policies. Voluntary programmes seem to be able to address energy and environmental problems that regulation cannot tackle as easily, due to legislative processes, which can often be time-consuming. But the conversion of voluntary programmes to mandatory standards could also impair the previous programme: manufacturers might refuse to participate if they saw a mandatory standards programme looming on the horizon. Mandatory standards are nevertheless necessary, if manufacturers do not regard voluntary initiatives as binding principles.

Bans

Product bans based on technology (i.e. incandescent lighting) are difficult to install. The World Trade Organisation will only allow technical product bans if it can clearly be demonstrated that they are not discriminatory towards a country or a group of countries, and this is hard to prove. In the case of EU countries, there is also the problem of hierarchy in legislation. In the absence of EU legislation, national governments can ban anything they like. If EU legislation for a special product is in place already, there are two possibilities:

1) if the legislation has a legal basis in the European Commission (EC) Treaty article on environment, member states can do whatever they like;

2) if the legislation has a non-environmental legal basis, and the EU internal market is affected, the European Commission has to approve the ban.

In the case of banning the ordinary incandescent light bulb, there was no existing EU legislation on incandescent light bulbs until the end of 2008, so national governments were able to ban the old lighting product quite easily. In order for it to become EU law, national bans on the incandescent light bulb could have eased the way for a EU-wide ban. But the EC tried to influence the pioneers (such as Ireland who wanted to phase out all incandescent bulbs by 2009) to freeze the process until things were arranged at EU level. The UK found a way around this by phasing out the first inefficient light bulbs in 2011 through a voluntary retailer agreement.

To improve the efficiency of lighting, many countries have discussed a ban on incandescent lamps. Incandescent light bulbs will be phased out in Australia, Canada and the Philippines by 2010, and in the United States by 2014 (from 40 watt up). A number of European countries have also made attempts to ban incandescents from their markets through mandatory minimum standards, with Ireland as the pioneer. The European Commission has slowed these individual attempts down, and at the time of writing this toolkit their proposal is to phase out incandescents between 2009 and 2012. Over the first months of 2009 this could still be amended by the European Parliament.

One thing that becomes clear from the policies and measures listed in this volume is that the legislative tactic of banning a product should only be the first step in advocating energy-efficient appliances, not the only activity. Just banning a product does not pave the way for the introduction of more energy-efficient standards for appliances in general, or for the development of more energy-efficient products.

The reasons for promoting energy-efficient appliances and/or setting up minimum efficiency standards – whether they are voluntary or mandatory - should be clearly defined from the start. For a campaign or for an authority developing a standard this means deciding:

- What is the main aim? Reduction of CO_2 emission levels, transforming markets so that energy-efficient appliances become the norm, a decrease in total energy consumption or promoting sustainable production and consumption?
- Who are they aiming at predominantly, or who is the target audience? Manufacturers or consumers?
- To what extent is the respective target group supposed to be involved in ongoing negotiation processes, or in setting up standards or labels?
- Are the current products on the market guiding this process or possible innovations to come?

Interactions between schemes

All the policies and labelling programmes outlined below come with specific benefits as well as drawbacks. An important aspect to bear in mind is the socio-political framework in which these policies are enacted. There is a Japanese tradition of close co-operation between the industry and the government, which eases the implementation of their "Top Runner" scheme, and it is questionable whether such a scheme could be as easily employed in the European Union. However, Japanese Top Runner targets are also set for importing energy-using products. To apply this on to a European level would instantly affect the dynamics of markets outside the European Union, and could impact on the international trading of specific goods. Another example is the Energy Star labelling programme, which is enacted in the US and is also licensed to Japan, to the EU and to other countries, making it the largest international voluntary labelling programme.

1.2 Summary of Global Policy Measures

Along with the product-labelling policies of the EU, **compulsory minimum efficiency requirements** for household appliances were also set up, to make producers lower the actual energy consumption of the respective products.

For **standby power,** Australia is the only country considering mandatory minimum energy performance standards.

Lighting is regulated in the following regions: Europe (MEPS);UK (voluntary retailer agreement); Ireland (import ban based on MEPS); Philippines (ban, base not clear); Argentina (ban, base not clear); Cuba (free compact fluorescent light bulb distribution scheme and incandescent import ban),Venezuela (similar to Cuba);Australia (MEPS); US (staged MEPS); Japan and New Zealand.

Refrigerators and freezers are in most cases regulated through MEPS in combination with labelling. Mandatory MEPs are in place in 22 countries, in six voluntary MEPs are set up. In a lot of Asian and South-American countries regulation is simply by labelling. This, of course, leads to large numbers of very inefficient refrigerators on the market. However, even the MEPS + labelling combination is not always effective. The reason for this is that the MEPS are not ambitious (any more) and the labelling system does not continuously improve (see Chapter 6). Where initially "A class" meant "very efficient", technology has improved quite a lot, and "A class" now means "not very efficient", and "A+++" means efficient. Of course this leads consumers to believe that buying an "A class" appliance is a smart choice, when it is not.

Set-top boxes are regulated in just a few countries. Mandatory minimum energy performance standards are already in place in the Republic of Korea and planned for Australia (12/2008) as well as New Zealand (04/2009). Voluntary minimum energy performance standards are in place in India, and voluntary labelling is in place in the Group for Energy Efficient Appliances (GEEA) member countries, India and the UK:

Air-conditioning equipment consists of different components: central air-conditioning, central air-conditioning with heat pumps, and split-system central air-conditioning. We are only mentioning a few selected programmes in this review. **Air-conditioning equipment** is regulated in Canada through the Energy Star labelling requirements. Italy also provides energy labelling for air-conditioners. Fleet average targets for room air-conditioners are employed in Japan. Mandatory MEPs on central air-conditioners have been realised in Mexico and the People's Republic of China. Mandatory MEPs on central air-conditioning and heat pumps have been implemented in Canada, Australia and New Zealand.

In the case of **computers**, voluntary labels are in place in 21 countries, followed by mandatory MEPS in the Republic of Korea, and are currently under consideration in the People´s Republic of China. Voluntary MEPs are prevalent in Russia and Switzerland. As mentioned above, Japan has applied its Top Runner programme for computers as well. **Servers** are relatively unregulated, because they are not a consumer good - and hence the retailer labelling systems do not apply. However, as the server market expands at rocket-speed and awareness about their inefficiency grows, regulations begin to emerge.

1.3 Greenpeace Principles for Smart Power Policies

Greenpeace has seven basic policy demands to enable the realisation of the Energy [R]evolution:

- phase out subsidies and other support measures that encourage inefficient energy use and/or support fossil fuel use and nuclear power production;
- set ambitious and ever-improving efficiency and emissions standards for all energy-consuming appliances, buildings, power plants and vehicles;
- establish legally binding targets for renewable energy and combined heat and power generation;
- reform the electricity markets to allow better integration of renewable energy technology on the market;
- provide defined and stable returns for investors through fixed-price mechanisms for renewable energy;
- develop and implement market transformation policies that overcome current barriers and other market failures to reduce energy demand;
- support innovation in energy efficiency, low-carbon transport systems and renewable energy production.

To make Smart Power a reality, policy–makers need to take a set of principles on board, in order to bring about the level of energy efficiency required for a safe and sustainable energy scenario.

- Set ambitious, mandatory and ever-improving minimum efficiency standards, and ensure compliance by tough market surveillance and high financial penalties.
- Set ambitious and mandatory efficiency standards for all electronics, appliances and white goods that constantly improve, encouraging the adaptation over time of new technological innovation, and phasing out the most inefficient products.
- Set up systems that compel retailers and manufacturers to inform consumers about the energy (in)efficiency of the products they use and buy; and invest in awareness-raising and educational programmes to promote energy efficiency and energy conservation.
- Set up financing systems to remove the initial investment barriers for smaller businesses and consumers.
- Introduce a system of mandatory energy labelling to encourage both manufacturers' performance and consumers' choice.
- Implement a market surveillance system and a penalty system for non-compliance.

1.4 In this Report

In this toolkit, we summarise mandatory efficiency standards in Section 2, labelling and consumer information in Section 3, financing systems in Section 4. Section 5 gives more detail on what it means for policy to be ambitious, mandatory and ever-improving, and provides recommendations for future policy demands for Greenpeace's Smart Power campaigns.

In this volume, the following schemes provide examples of policy operating in practice, and are analysed in some detail in Sections 2 and 3.

Scheme	Type	Objective / Background	Target
Top Runner (Japan)	MEPS –mandatory	Encourage continuous improvement of the use-phase energy efficiency of products within selected market segments.	Manufacturers and importers
Ecodesign (EU)	MEPS – mandatory	A regulation that sets minimum energy efficiency standards and other environmental criteria, based on a life-cycle approach	Manufacturers
MEPS in Australia	MEPS - mandatory	Applied to appliances through the Australian Standards	Manufacturers
European Community Energy Labelling (EU)	Labelling - mandatory	Make consumers aware of the real energy use of appliances. Set up to counteract an increase in energy consumption	Consumers
Ecolabel (EU)	Labelling - voluntary	Stimulate the supply and the demand for products and services with reduced environmental impacts. Part of a broader strategy to promote sustainable consumption and production.	Consumers and manufacturers
Energy Star (USA and others)	Endorsement - voluntary	Guide consumers on the purchase of energy efficient products	Consumers
Industry Loans (China)	Financial incentives	Start-up money given to industry to become more efficient.	Industry
Consumer finance (Netherlands)	Financial incentives	A programme to cover the cost of energy efficient bulbs that is paid back via energy bills.	Consumers

2 Minimum Energy Performance Standards

2.1 The Principle of MEPS

Minimum Energy Performance Standards are among the most effective instruments to achieve Smart Power use. They set minimum standards in terms of the amount of energy used in relation to their functionality.

For example: a traditional incandescent light bulb has an efficiency of (11 or) 12 lumen per watt. This means that for every watt it consumes, it produces 12 lumen (light units). A normal halogen lamp has an efficiency of 18 lumen per watt, and a compact fluorescent light bulb (CFL) has an efficiency of 60 to 70 lumen per watt.

Installing a minimum efficiency standard of 15 lumen per watt in a particular country would then effectively ban all incandescent light bulbs from that market. If the MEPS increased to 20 lm/W, standard halogens would also be prohibited. This would lead to a market shift towards all efficient light bulbs (mostly CFLs, light-emitting diodes – LEDs - for the consumer market).

Table 3: Energy efficiency of different lamp types

Lamp type	lumen/watt
Incandescent light bulb	11-12
Halogen, high voltage	17
Halogen, low voltage	18
Halogen, low voltage, infrared coated	26
CFL with integrated electronics (“screw in”)	60

Likewise, this can be applied to all appliances, for example the efficiency of a television can be determined by setting a MEPS for the ratio watt per square centimetres, or whatever efficiency measure applies to the product.

It must be noted that the governments that have banned incandescent light bulbs so far have used more complicated methodology and staged timelines. For more details see 3.2 of this volume and Volume 1: Campaign Examples.

2.2 The Japanese Top Runner Model

MEPS can come in many forms and settings, and perhaps the most interesting example of a MEPS system is the Japanese Top Runner Model. It has been very effective, and in this section the advantages and setbacks of the model will be analysed.

2.2.1 Characteristics of the Top Runner Model

The Japanese Top Runner standards scheme[5] is the centrepiece of Japan’s appliance and equipment efficiency programme, which emerged out of the 1998 revisions to the Energy Conservation Law. This ambitious scheme was implemented to promote progress towards the targets of the Kyoto Climate Change Protocol, while concerns of national energy security also played a major part in its realisation.[6] It is important to note, though, that the Top Runner scheme “does not address actual energy use as such”.[7] So neither the actual energy-use of appliances nor the prospective energy-savings effects are being addressed by the programme. It is nevertheless expected that the scheme is contributing to the general energy-saving ambitions of Japan.[8]

The main purpose of the regulatory scheme is to encourage **manufacturers and importers** of energy-consuming equipment to continuously improve the use-phase energy efficiency of products within selected market segments. The scheme focuses on the supply-side of the product market; it is not aimed at retailers, product owners or users. Only manufacturers and importers are obliged to comply with Top Runner regulations, and companies which do not comply with the standards can be publicly pilloried.[9] Commentators say that there is a Japanese tradition of close co-operation between the industry and the government, which makes this scheme easier to implement.[10] The organisation responsible for the implementation and running of the programme is the Agency for Natural Resources and Energy. The Energy Conservation Centre Japan is the public information point, and they circulate all the relevant information and make it publicly available.

The Top Runner programme is **continuously revised**, the product categories and target values being continuously modified. The programme sets out specific energy performance requirements for each product. The use-phase energy performance of the best technology on the Japanese market at the time of revision sets the baseline for the next revisions of the standards.

The standard levels and target years are decided in negotiation with various stakeholder groups, mostly four to eight years ahead per product. The target time allows for product development, equipment investment and a future technical development outlook. The different target fiscal years for products differ, depending on the relation between[11] current energy consumption efficiency, target standard value, and degree of past energy consumption efficiency improvements

The standard setting procedure operates in a cycle: standard setting is followed by a compliance period and then an evaluation and revision period, which leads to further inclusions and exclusions of products and revised timelines. After the target values have been announced by the regulator, they become mandatory targets for all manufacturers in, and importers to, Japan.

The scheme is a **modified fleet average standards scheme**[12] with two important features. First, the averages apply to pre-defined categories of products. Second, today's best models on the market set the levels for future standards, i.e. the efficiency levels of the most efficient products available at the time of revision are chosen as prospective efficiency standards including future technological development.

Starting in the late 1990s, the scheme allowed only the most efficient appliances on the market to be sold from 2003 to 2007 or 2010, depending on the appliance type. Until the next target year, all products need to achieve the standard of the so far most energy-efficient product.

At the start of the programme in 1998, ten product categories were set, and have now increased to 21. For some of the products (such as fluorescent lights and electric toilet seats) the target years have been reached. Because of the programme time schedules, updates of fulfilled and expired standards are still being developed. A discontinuation of the programme is not expected, but some product categories may be taken out.

The target of the programme is to improve appliances and equipment by 15 to 83% (of 1997 levels) by 2003 to 2007 or 2010. Murakoshi et al. (2005)[13] estimate that the Top Runner programme will decrease residential energy use in Japan by 10% by 2010.

The Top Runner scheme is expected to make total savings between 16 and 25% of the entire national savings target by 2010, a total of about 2,000 to 2,500 PJ.

The following items are included in the Top Runner programme.[14]

Passenger vehicles
Electric refrigerators
Microwave ovens
TV sets
Video cassette recorders (VCRs)
Freight vehicles
Electric freezers
Fluorescent lights
DVD-recorders
Magnetic disc units
Gas water heaters
Vending machines
Copying machines
Oil water heaters
Transformers
Computers
Space heaters
Gas cooking appliances
Air-conditioners
Electric rice cookers
Electric toilet seats

Certain criteria are being applied to select the designated Top Runner categories and to assess the energy importance of products. The products should:

- be commonly used in Japan;
- require a sizeable supply of use-phase energy;
- have a potential for energy efficiency improvements;
- not be subject to the standards for equipment;
- have a highly specialised use;
- have unconfirmed measurement;
- have unconfirmed efficiency evaluation methods;
- possess low market penetration rates.

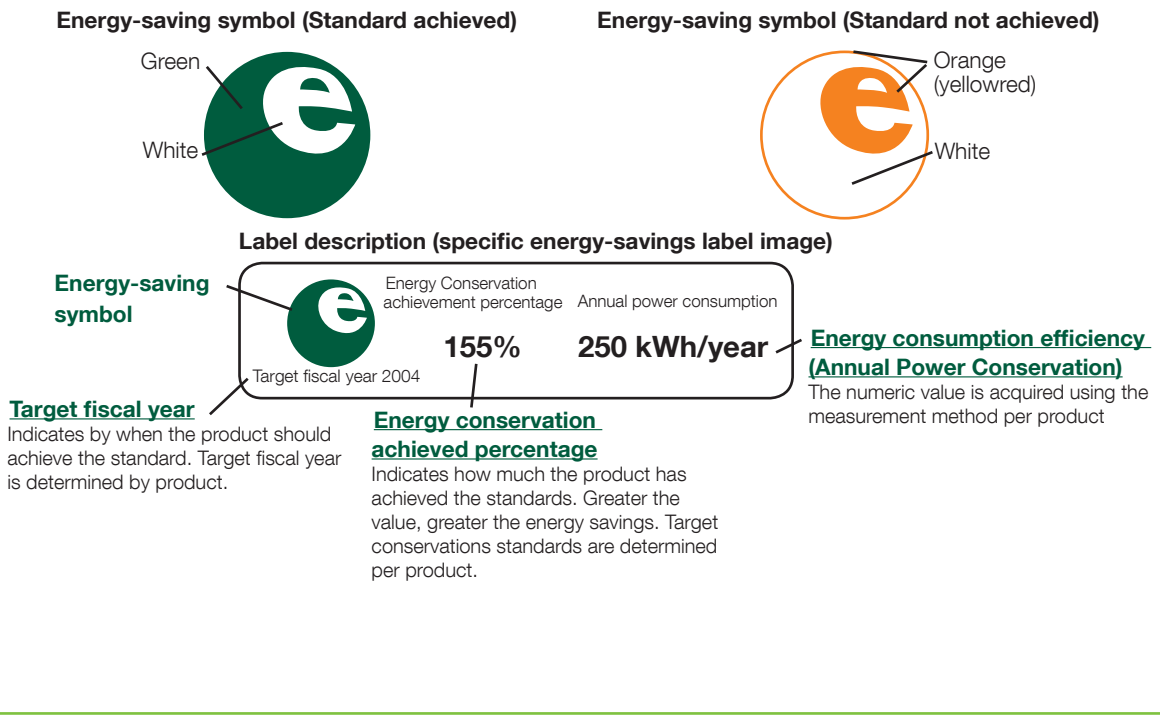
The targets are set according to categories of

- types,
- configurations,
- capacities of the products.

If the features of electric appliances comply with the voluntary targets of the programme, they receive a green label. If this is not the case, electric appliances receive an orange label.

Product	Period	Expected %	Actual %
TV receivers	1997-2003	16.4	25.7
VCR	1997-2003	59.7	73.6
Room air-conditioners	1997-2004	66.1	67.9
Refrigerators	1998-2004	30.5	55.2
Freezers	1998-2004	22.9	29.6
Vending machines	2000-2005	33.9	37.3
Computers	1997-2005	93.0	99.1
Magnetic disk units	1997-2005	78.0	99.2
Fluorescent lights	1997-2005	16.6	35.6

Results of Introducing the Top Runner Program
Source: http://www.eccj.or.jp/top_runner/index_contents_e.html



2.2.2 Assessment of Japanese Top-Runner Standards Scheme

Under the Japanese Top-Runner Standards scheme today's best energy-efficient models on the market set the levels for future standards. Including both importers and manufacturers of products is quite a unique approach. Considering the speed – in some parts of the industry - with which new models are constantly being developed, this dynamic and flexible assessment system can keep up with the product changes and the best energy-efficiency targets for the future. But there is no requirement for the top of the domestic market to take a highly ambitious approach to energy-efficiency. In this regard, it remains to be seen whether the Japanese Top Runner Standards scheme is focusing too much on what the market can achieve by itself, when it may be better to set ambitious and desirable energy-efficiency targets based on technological possibilities to market towards better performance.

Rather than starting off from only the current Japanese market, the scheme could focus on future technological possibilities of chosen products and potential innovations in the field, to set desirable energy-efficiency targets. By only looking at the current Japanese products, this misses the standards set by energy-efficient products on other markets. But for a campaign targeting manufacturers, this approach seems to be suitable since the primary stakeholders are fully involved in setting the target. The approach encourages high levels of involvement and commitment and could possibly turn the free-rider effect[15] into an advantage. The free-rider effect is when actors who already do well at the beginning of a cycle need to invest less in the following compliance period to keep up.[16]

For an ad hoc approach, the Japanese Top Runner standards scheme allows for quick implementation and realisation due to firmly set targets for predefined categories of products, and it has relatively low analytical and administrative requirements. In order to meet CO_2 emission reduction requirements at a feasible cost, Japan's Top Runner programme was implemented relatively rapidly.

Benefits

This approach has some notable strengths:

1. Ambitious targeted efficiency levels for most products; making significant energy savings and CO_2 emission reductions likely.[17]
2. The targeted efficiency levels are clear, firmly set and analytically simple (just making a statistical evaluation of efficiency of products currently on the market).[18]
3. It is quick to develop and implement due to targets based on clear and immutable principles, low administrative burden, and low analytical requirements;[19] the flexible, dynamic and adaptive nature of the programme is the opposite of a static assessment system.[20]
4. It is easier and quicker to implement than a least life-cycle cost approach - at least in Japan.[21]
5. Primary stakeholders are involved in setting the targets, leading to high levels of involvement and commitment, while energy-efficiency is perceived as a competitive advantage. This can also turn the so-called free-rider effect into an advantage, i.e. actors need to invest less in the following compliance period.[22]
6. The scheme needs to be considered in a specific Japanese setting, where industrial stakeholders work in close collaboration with national regulators. This may be a more difficult undertaking in other socio-political contexts, where stakeholders and government take different roles.[23]
7. Domestic actors tend to dominate regulated markets, which does in some cases reduce the risk of complaints by outside stakeholders.[24]

Drawbacks

Since the Top Runner method sets targets corresponding to special market circumstances and not in accordance with other methods of analysis (i.e. such as the formal engineering-economic analysis), some drawbacks are nevertheless associated with the model:

1. If only products imported to and from Japan are taken as a basis, more energy-efficient products on other markets could be neglected.

2. The target values could be stricter with a least life-cycle cost approach.[25]

3. The scheme could be gamed, i.e. manufacturers could either collude to slow down efficiency improvements or attempt to set targets which could only be reached with proprietary technologies.[26] This is only a cautious assumption though, there is no relevant evidence for this kind of industry behaviour to date.

4. The scheme focuses on the voluntary activities of the manufacturers and relies heavily on manufacturers' discretion. The validity of manufacturers' original data is not verified by a third, independent party.

5. The standard values rely heavily on manufacturers' discretion, which becomes obvious in the shipment volumes by category. This means a target value can be achieved by shipping a product with higher efficiency in the same category together with products of lower energy consumption efficiency.[27]

6. There is a risk that functionality or quality concerns are not included in the criteria. The discussion emerged in Japan and raised doubts about whether energy savings potential could harm the actual function of the appliances, i.e. of rice cookers to cook rice properly.[28] Even though this point seems a little strange, it nevertheless highlights the kind of concerns than can emerge when setting up standards in programmes, and that need to be kept in mind.[29]

7. One of the most widespread critiques of the approach is that it promotes step-by-step technical improvements but does not encourage novel innovations.[30]

8. Regarding adoption of the Japanese Top Runner approach on the European market, some alterations of the model would be necessary, that is:

    - adapting the sanction system to respective local conditions;
    - taking into account the large amount of products on the European market that are manufactured by international companies already participating under other national schemes - requirements and energy-efficiency measurement methods would have to work in conjunction with those already existing;
    - whether European manufacturers would participate in such a demanding programme as the one in Japan.

9. The questions arise whether the standard setting phase might need to be made more suitable to a European market, and also how the incentives for stakeholder awareness and commitment can be altered to have as much impact as they do in Japan.[31]

10. The full economic implications of accepting a given target level which is not based on an engineering-economic analysis are not completely known.[32]

11. The top of the domestic market (at the time the targets are set) is not necessarily consistent with a least-cost approach to energy use, CO_2 emission reductions or other policy goals. From a least-cost perspective, targets could be too low or too strict.[33]

It is important to note, however, that the Japanese Top Runner programme is **used in combination with the Energy Star programme** in Japan.[34] In this regard, the launches of parallel energy efficiency policies which are closely coordinated with a Top Runner approach also need to be considered to encourage further technological development.[35]

2.3 European Ecodesign Process

A major effort has been undertaken in the European Union, where so-called ecodesign standards are being developed for 20 types of energy-using equipment. Most of them will be finished in 2009. Information on the scheme can be found http://www.inforse.org/europe/eu_ecodesign.htm.

The EU is in a process of covering almost all energy using products on the markets of the EU countries with ecodesign regulation, a regulation that sets minimum energy efficiency standards and other environmental criteria, based on a life-cycle approach. In progress are 25 pieces of regulation covering 23 product types and 2 horizontal measures (standby consumption and electric motors). For each type of regulation an implementation measure will be adopted that will be agreed by a special committee of EU countries. One to two years after the decision of this committee, all products sold in EU countries will have to follow the regulation.

A technical study is done for each regulation. Each study has a website, where reports are made available as they are finished. Before the final report of the study an open meeting is called to discuss the study, and possible regulation for the product group is covered. Then the EU Commission develops a short overview of proposed regulation, which is discussed in a consultation forum with representatives of EU countries, industry, and non-governmental organisations (NGOs).

The ecodesign process covers the following product categories: public street lighting; batteries, chargers and power suppliers; computers; televisions; standby and off-mode losses; office lighting; domestic refrigerators and freezers; washing machines and dishwashers; boilers; water heaters; imaging equipment; commercial refrigerators and freezers; air-conditioners; electric motors, pumps and fans; domestic lighting.

2.4 MEPS Regulations in Australia

MEPS programmes are made mandatory in Australia by state government legislation and by regulations which give force to the relevant Australian Standard.[36] Regulations specify the general requirements for MEPS for appliances, including offences and penalties if a party does not comply with the requirements. Technical requirements for MEPS are set out in the relevant appliance standard, which is referenced in state regulations.

The products to which these MEPS apply are: refrigerators and freezers, electric storage water heaters, air-conditioners, ballasts for linear fluorescent lamps, linear fluorescent lamps, distribution transformers, commercial refrigeration, and most recently domestic lighting.

3 Energy Labelling Schemes

The creation of the Single European Market in 1992 aimed to overcome inter-community trade barriers within the European Union. New regulatory policies for tradable goods included the establishment of MEPs, VAs, and appliance labels, which were all developed at EU-wide harmonised levels.[37] Mandatory comparative energy labels for household appliances were passed in the European framework energy-labelling directive in 1992.[38]

Individual implementing directives were set up from 1994 to 2003 to put in place labelling specifications, standard product information for energy consumption, and technical standards for each product type. The responsibility for promoting the label in combination with specific information campaigns rests with public authorities (at local and national level) as well as utilities and retailers.

The EU comparison labels are category-type labels, which rank the product models according to predetermined, open-ended efficiency-scales based on energy consumption (kWh/year). The labels also display the energy use (kWh/year) and performance of the product. The intention of the EU energy labelling of household appliances is to make consumers aware of the real energy use of household appliances, to counteract the increase in energy consumption. Compulsory Minimum Efficiency Requirements are supposed to be an incentive for producers of household appliances to lower the actual energy consumption of the product in question.

An important aspect is the variety of endorsement labels being used in Europe. The EU is a formal partner of the International Energy Star programme and uses its label mostly for information technology (IT) products. Ecolabelling schemes also exist. This voluntary endorsement Ecolabel can be provided for products adhering to a firm set of ecological criteria (ECO 2002). In this regard, the energy-efficiency of the product sets the baseline for the ecological requirements, as is the case with some household appliances and lamps.

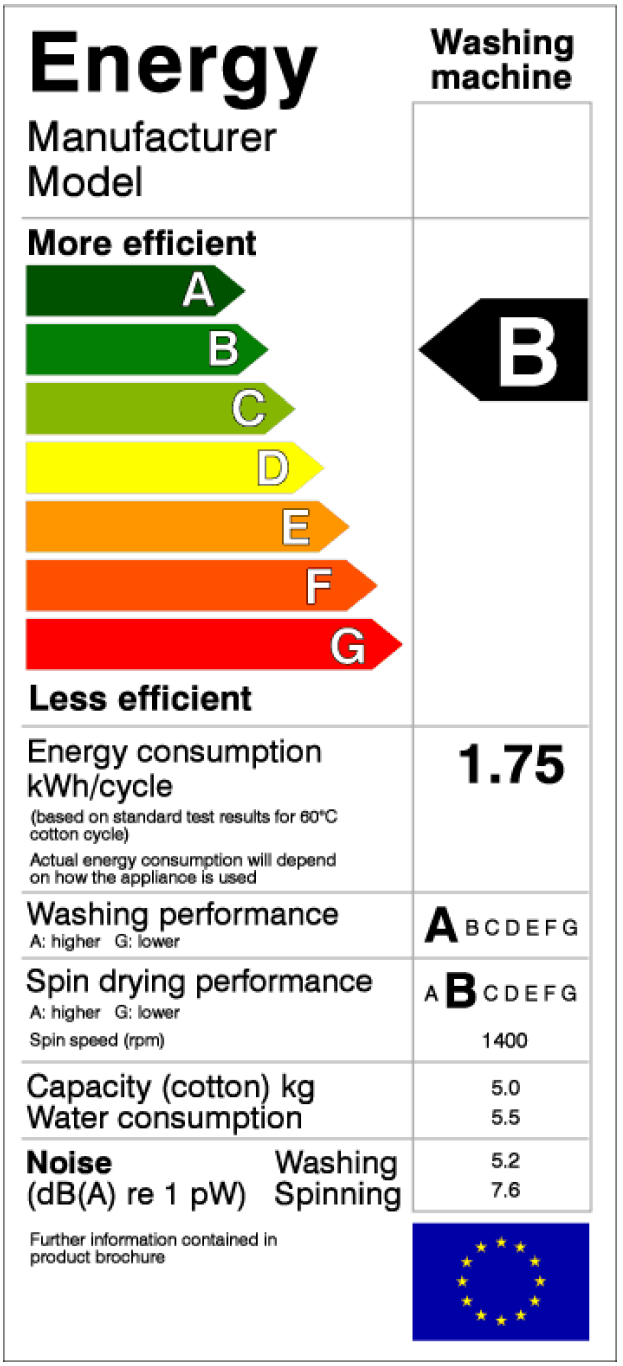
3.1 European Community Energy Label

The European Community Energy Label needs to be displayed on all new household products of the following type:

Refrigerators, freezers and fridge-freezer combinations
Combined washer-dryers
Electric ovens
Washing machines
Dishwashers
Air-conditioners
Electric tumble dryers
Lamps

A label of A to G refers to the main energy efficiency rating of the product, which is based on European standards. A characterizes the best performance and G the worst.

The EU Energy labelling scheme is a mandatory scheme, unlike the Energy Star, which is a voluntary endorsement label.



3.1.1 Example: European Community Energy Label for Household Lamps

The Commission Directive 98/11/EC of 27 January 1998 applies the energy labelling requirements to household electric lamps supplied directly from the mains (this refers to filament and integral compact fluorescent lamps) and to household fluorescent lamps (this includes linear and non-integral CFLs), also when they are marketed for non-household use. Excluded are lamps with a luminous flux of more than 6,500 lumens; those with an input power of less than 4 watts; reflector lamps; those which primarily use other energy sources (such as batteries) and others.[39]

The requirements for the design and content and colours of the label are determined in the directive. The following information concerning the lamp must be included on the label:

- its energy efficiency class (A to G);
- the luminous flux in lumens (light output);
- the input power (wattage);
- the average rated life in hours.

The classification of efficiency of lamps for household use is rather complex, and not really transparent - a description of the calculations are in Annex 1. The technical procedure and measurement methods to determine the energy-efficiency of lamps are outlined in EN 50285 – Energy efficiency of electric lamps for household use - measurement methods.

Of course, now that incandescent bulbs will be banned soon, the lowest classes will no longer exist and the labelling system will need to be revised.

3.1.2 Assessment of European Energy Labelling System

Benefits

1. The label is easy to read and understand – it gives consumers correct and well-balanced information about the product's consumption and performance rate.

2. By informing consumers of the appliances´ consumption and performance rate, they can make well-informed choices for less energy-consuming appliances, and therefore help to decrease energy-consumption if they are replacing products with higher consumption levels.

3. Manufacturers are indirectly encouraged to track down and consequently develop appliances that are more in line with consumers' choices.[40]

4. The scheme creates a distinct progression towards more efficient appliances.[41]

Drawbacks

The most recent study of the European consumer group Anec highlights some of the major shortcomings of the labelling system.[42] Those criticisms have already been raised by other groups and NGOs –such as the Bund für Umwelt- und Naturschutz Deutschland (BUND)- as well.[43] For the most comprehensive and up-to-date summary of criticisms, Anec is used as the main source here. Anec´s main recommendation is that the scheme "needs better policing", since the efficiency improvements achieved under the scheme "are being undermined by lack of enforcement action by member states".[44] The main criticisms levelled against the EU-labelling system are:

1. Supervision is not always guaranteed.
   There are irregular inspections of retail shops, and hardly any independent verification of industry's claims. This undermines efficiency improvements already achieved through the scheme.[45] Anec recommends annual minimum targets for inspection developed at a European level, and testing of appliances by a third party. General market surveillance should be enacted by European member states and supervised by the European Commission.

2. There is a need to revise the labelling system.
   Because of improving standards, the ratings are becoming dated. For example, A+++ ratings have been added for fridges and washing machines in the A sector. Rather than introducing new labels to the current A-G system or making certain labels superfluous, the established energy-efficiency categories need to be revisited and re-calibrated to the current range of technical standards.

3. Criteria are not dynamic.
   The criteria for rating the different products do not necessarily keep up with the product development in a specific market segment. In order to be up-to-date with product developments and to "push" the industry, the criteria for ranking a specific product should be more dynamic. A timely update needs to be ensured to avoid outdated provisions.

4. Standards are outdated.
   The measurement tolerance of 15% for some European standards should be removed to guarantee an effective implementation of the labelling directive. In addition to that, testing standards should be tailored to real-life situations and be simplified.

5. Labelling needs to be extended to other products.
   In order to achieve improvements in the energy-efficiency of products, the labelling should be extended to cars and "products that influence energy consumption but do not use energy themselves". [46]

6. There needs to be regular adaptation to technical progress.

Good Practice in Ghana

In Ghana an energy efficiency standard programme, connected to a labelling programme for some appliances, was put in place as a voluntary measure in June 2005. It was made mandatory from June 2006.

The programme requires that importers and retailers of room air-conditioners and CFLs import and sell only products that satisfy the minimum energy efficiency standards.

- For room air-conditioners a minimum Energy Efficiency Ratio (EER) of 2.8 watts of cooling per watt of electricity input is required.
- For CFL lamps a minimum light production of 33 lumen per watt is required. Besides, CFLs should have a minimum lifetime of 6000 hours.

Only products with these minimum performances receive a label, showing stars that indicate how efficient the product is.

Estimated energy savings from efficient room air-conditioners are at least worth 8 million US-dollars, with 132,000 tons of CO_2 emissions and power-generation capacity savings of approximately 29 MW by 2010.

3.2 The European Ecolabel

Some products are also awarded the European Ecolabel, which may be displayed on the label or elsewhere. The European Ecolabel was set up in 1992, and is part of a broader strategy to promote sustainable consumption and production, i.e. to stimulate both supply and demand of products and services with reduced environmental impact. The scheme is voluntary.

The establishment of criteria for different product groups goes beyond energy consumption alone, and includes life-cycle considerations (LCC) of the environmental impact of a specific product group (e.g. it takes into account the extraction of raw materials, the production process, distribution, use phases and disposal after use).

To define product groups and ecological criteria, proposals are either made by the European Union Ecolabelling Board (EUEB) or by the Commission. A mandate is given to the EUEB by the Commission to develop and review those criteria. Ecolabel criteria, assessment and verification requirements are drafted by a EUEB member who is supported by a working group and the Commission. The results of feasibility, market studies, life-cycle considerations and an improvement analysis are then considered by a competent body, while a regular feedback process to the whole EUEB is guaranteed. The Regulatory Committee of national authorities votes upon the finalised criteria. If the Committee accepts the proposal, the Commission enacts its adoption and publication. If the proposal is rejected, it is submitted to the Council of Ministers for decision. The label is only awarded to products with the lowest environmental impact in a product range. The European Ecolabel demonstrates that the product has been independently assessed and meets strict environmental criteria. Its flower is "an assurance of European green authenticity".[47] Nowadays, the EU Ecolabel scheme is part of a wider approach on Integrated Product Policy (IPP) within the new Action Programme.

These are the currently established seven product groups:[48] cleaning products, appliances, paper products, home and garden products, clothing, tourism and lubricants.

The appliances that it addresses are: dishwashers, heat pumps, light bulbs, portable computers, personal computers, refrigerators, televisions, vacuum cleaners and washing machines. Ecological criteria for a product group are normally established for a period of three years. The criteria for the following appliances will not be renewed: refrigerators, vacuum cleaners and washing machines.[49]

3.2.1 Example: The European Ecolabel for Light Bulbs

The European Ecolabel for light bulbs was set out in the Commission Decision 2002/747/EC of 9 September, 2002. Its criteria were valid until 31 August 2007. As a prerequisite to qualifying for the label, light bulbs had to be both energy-efficient and guarantee a longevity of more than 10,000 hours (20,000 hours for double-ended long-life bulbs), and a performance of more than 70% beyond this time (90% for double-ended long-life bulbs).

The Ecolabel applies only to long-life and energy-saving bulbs, e.g. compact fluorescent bulbs with electronic ballast and double-ended tubes.

The Ecolabel does not apply to:

- compact fluorescent lamps with magnetic ballast;
- projector lamps;
- photographic lighting;
- solarium tubes.

The EU Ecolabel is awarded to light bulbs which meet strict ecological and performance criteria determined in a thorough life-cycle analysis.

3.2.2 Assessment of the European Ecolabel

The European Commission is currently revising the European Ecolabel, and has launched an external evaluation study on its label.[50] On the benefit and drawback side, these were the major findings.

Benefits

1. It contributes to setting targets for better environmental performance.
2. It creates demand for suppliers to meet high environmental standards.
3. The EU Ecolabel is preferred to national labels.

Drawbacks

1. Relatively low awareness of the label, not taken up in every European region.
2. Product categories are still insufficient.
3. Bureaucratic set-up of the scheme impedes its extension and rapid response qualities.
4. The fees and costs are barriers to obtaining the label.
5. Purchasing benefits for the public are not being perceived.

3.3 Energy Star Labelling

3.3.1 Characteristics of Energy Star Labelling

The Energy Star product labelling of energy-saving products is intended to guide consumers in the purchase of energy-efficient products. It is a voluntary endorsement label. The Energy Star labelling programme´s stated mission is the reduction of emissions and energy consumption by constantly transforming markets, so that energy-efficient products become the norm.

The US Environmental Protection Agency (EPA) initiated Energy Star labelling in 1992, and it is now the largest voluntary energy efficiency programme worldwide. These days it is operated jointly with the US Department of Energy (DOE). The programme is a voluntary partnership between the EPA, DOE, product manufacturers, distributors, utilities, energy-efficiency advocates, consumers and other relevant organisations.[51] The Energy Star trademark has already been licensed to various countries such as Australia, Japan, New Zealand and Taiwan. An agreement between the EU Council and the government of the USA officially introduced the label Energy Star for office equipment in Europe in 2003,[52] and now many products endorsed by Energy Star are available on global markets and produced by global corporations. Therefore, a multinational programme appears to be the most effective approach.[53]

Products for the Energy Star programme are selected on the following grounds:[54]

- potential for significant energy savings;
- the receptiveness of the industry;
- the potential for co-operation with other partners;
- the visibility of the product for consumers.

The establishment of energy-efficiency specifications for existing, proven technologies follows a set procedure for nearly every product: First, products with a large energy-saving potential are identified by Energy Star staff. Second, minimum efficiency specifications are set up. Third, all products that meet the specification are certified. In this regard, the Energy Star performance specifications mean that the top 20% to 25% of office equipment models,[55] or the top of the market, qualifies for certification.

The Energy Star label identifies:

- products that exceed these specifications;
- products that exceed minimum efficiency standards by a certain amount;
- products, especially office equipment ones, that have special features so they use less energy than corresponding products.[56]

Other criteria of Energy Star are the following:

- An automatic switch-off for the appliance, or a component of that appliance that needs to be switched back on after a certain period of time.
- The output during the standby mode should not exceed a certain value, which is defined specifically.

Furthermore, the set specifications should fulfill two obligations: one is to save energy, the other to be cost-effective. The whole process is undertaken with ongoing negotiations with the specific industries, and industry often insists on lower standards. However Energy Star staff collect detailed information and can set higher specifications in anticipation of future development towards more efficient equipment.

When a small number of products qualify, the process for setting specifications can take place in two phases. The first phase is less strict, and allows for a large amount of products to qualify. The second phase is very strict, with possibly no current products on the market fulfilling the set specifications. The intention is to engage producers, and then make demands on them to develop significant efficiency improvements so they can participate in the programme in the future.[57]

An Energy Star label certifies that appliances fulfil the EPA's energy-saving criteria. Any manufacturer can give his/her product an Energy Star label if they think their product fulfils the clearly set procedures for the criteria, and provide a sole notice to the EPA. There is no investigation of companies, although the DOE might conduct secret tests on products referred to as Energy Star qualified.

Energy Star is at its heart an information and branding campaign to guide consumers in the identification and purchase of energy-efficient products. Its stated mission is the reduction of emissions and energy consumption by constantly transforming markets, so that energy-efficient products become the norm. One of the programme's stated aims is to link the Energy Star brand with the concept of environmental protection and with savings in energy bills.[58]

This is the official label of the Energy Star programme:

According to the US EPA, in the US in 2007, 500 million Energy Star products were sold across 50 product categories, and 120,000 homes have been built with the Energy Star label (bringing the total to 840,000). EPA estimates that the Energy Star programme prevented 40 million tonnes of greenhouse gas emissions in 2007.

Energy Star first targeted computers and other office equipment. Nowadays, it covers over thirty product categories. The major product areas covered by Energy Star in the United States and elsewhere are:

Appliances Battery chargers Clothes washers Dehumidifiers Dishwashers Refrigerators and freezers Room air-conditioners Room air-cleaners	**Heating & Cooling** Air-source heat pumps Boilers Central air-conditioners Ceiling fans Dehumidifiers Furnaces Geothermal heat pumps Home sealing (insulation) Light commercial Programmable thermostats Room air-conditioners Ventilating fans
Home Envelope Home sealing (insulation and air sealing) Roof products Windows, doors, and skylights	**Lighting** Compact fluorescent light bulbs Residential light fixtures Ceiling fans Decorative light strings (DLS)
Office Equipment Computers Copiers and fax machines Digital duplicators External power adapters Notebook/tablet personal computers Mailing machines Monitors Printers, scanners, and all-in-ones Water coolers	**Home Electronics** Battery charging systems Cordless phones Combination units Digital-to-analog converter boxes (DTAs) DVD products External power adapters Home audio Televisions VCRs
Commercial Food Service Commercial dishwashers Commercial fryers Commercial hot food holding cabinets Commercial ice machines Commercial solid door refrigerators and freezers Commercial steam cookers	**Other Commercial Products** Battery charging systems Exit signs External power adapters Roof products Vendi

3.3.2 Example: CFL Bulbs

In 1999, Energy Star included screw-in compact fluorescent lamps in its programme. The energy efficiency criteria are based on the following characteristics:

- input wattage;
- lamp efficacy (lumens per watt);
- lumen maintenance;
- average rated lifetimes.

To qualify for Energy Star, CFLs must have a minimum rated lifetime of 6,000 hours or greater. Currently, the average rated lifetime for Energy Star qualified CFLs is 8,000 hours.

The specification procedure is highly complex and modelled on several variables, including lamp power, colour rendering, correlated colour temperature and lumen maintenance. The full list of original requirements is listed on the Energy Star website: http://www.energystar.gov/ia/partners/product_specs/program_reqs/cfls_prog_req.pdf

For residential use, Energy Star qualified CFLs with a specific rated lifetime of 6,000 hours based on 3 hours operating time per day should last for five years, while those with a rated lifetime of 8,000 hours should last for 7 years, etc. The products must also comply with power and operating characteristics and meet safety and reliability guidelines.

3.3.3 Assessment of Energy Star Programme

Benefits

- Ongoing negotiations with the industry can push manufacturers to develop more energy-efficient appliances.
- Consumers can identify energy-efficient appliances and can take action to decrease energy-consumption by replacing appliances with high energy use.

Drawbacks

One major critical issue for the Energy Star programme is that it does not have a strongly defined goal. Is it trying to save carbon or to increase efficiency? The reduction of greenhouse gases is its stated mission, but all its performance specifications are expressed in energy use.

This creates some inconsistencies, namely:

- Where both electric and gas versions exist of the same product (e.g. boilers and water heaters).
- In the performance specifications, which have absolute values, irrespective of the product's size or features - this **constant-efficiency approach** can be biased towards larger products.

To overcome these issues, Energy Star could apply a **variable-efficiency strategy**, in which efficiency criteria become progressively stricter with increases in size.

There is also a problem with Energy Star's original approach of just testing one feature to determine the product's energy performance. Originally, this was done while the product was "performing the primary service". But new products also exhibit other operating modes such as standby, sleep and active. When the standby mode is the most common mode, this is not captured in the performance specification.[59] So, if the annual energy usage is to be determined and adequately demonstrated, the approach needs to be broadened to include several criteria and operating modes (e.g. for dishwashers and computers this so called multi-criteria approach has been initiated, and standby power was added).

If Energy Star wants to be a truly international programme, this will only succeed if countries apply the same energy test procedures.[60] Japan's Top Runner programme includes some of the same office products and consumer electronics as Energy Star. Currently, the mandatory Top Runner levels are less strict than current Energy Star specifications, but their suggested minimum efficiencies could become stricter than Energy Star specifications because of the dynamic nature of that scheme.

In this regard, Energy Star will need to change its minimum levels above those allowed by the Japanese Top Runner programme, so it does not become irrelevant for the Japanese products that are covered by the scheme.

4 Pre-Financing of Smart Power Investments

4.1 Smart Financing of Smart Power

The paradox of energy efficiency is that, in most cases, switching to smarter systems costs money before it generates money savings. Many efficiency measures pay themselves back very fast, but in the cases where the payback times are longer, it becomes a problem. Businesses often have policies against investments whose returns are longer than five years, and are sometimes even reluctant to look further ahead than one or two years. Economical write-off times of machinery often determine when, for example, motor systems are replaced - when half-way through their write-off time replacement by smarter equipment might be much more economical due to large energy savings.

This initial investment barrier also influences consumer behaviour. An individual household can often save substantial amounts on its energy bill by buying a new, more efficient refrigerator, but this is very expensive, and it is hard to determine how fast such an efficient appliance pays itself back.

External parties can ease this investment barrier. It can even be profitable for a third party to pre-finance smart power investments. These companies can stimulate, facilitate and inform companies and consumers, by providing the calculations, the system, the service and the investment money. The companies can make a profit, the consumer can save money in the long term and the climate benefits, too. This is really a win-win-win situation.

Below are two examples of these financial incentives for energy savings.

4.2 Incentives for Industry: Chinese Example

A different approach to smarter power use is to give financial incentives. China introduced an energy conservation programme in 1980 that comprised a loan programme for heavy industry that committed 7% to 8% of total energy investment to efficiency. This has so far been the largest energy-efficiency investment programme ever undertaken by any developing country. The programme had a great impact on the energy intensity of China's economy; between 1980 and the early 1990s it caused a drastic decline.

These successful programmes and policies, however, were implemented during a different era in China - a time when there was nearly complete government control over the nation's major industrial producers. Today China faces a new situation: as it moves toward a market-based socialist economy, government control is weakening and enterprises are privatising or becoming much more heavily influenced by market pressures. Issues related to domestic and international competitiveness are growing in importance. Entry into the World Trade Organisation (WTO) introduces new rules and new challenges for China's industries. At the same time, production of industrial materials is growing faster than ever experienced before.

While tremendous energy conservation and environmental protection achievements were made in the past, there is still a great gulf between China's current level of energy efficiency and that of the advanced countries of the world. Sustainable development of China will be confronted by many obstacles. On the one hand, due to the large population, China possesses a relative lack of resources, especially oil resources, and the tension between oil supply and oil demand is becoming increasingly obvious. On the other hand, there is a great deal of wasted energy, and many examples of low energy efficiency. At present, China's energy consumption per unit of GDP is more than two times higher than world average, and energy consumption for production of the main energy-intensive products in China is 40% higher than international consumption. Thus, sustainable use of natural resources has become a strategy for safeguarding the nation's long-term economic development (NDRC, 2004; Price et al., 2003).

Benefits:

1. Targeting heavy industry has huge energy saving potential.

2. Putting requirements on loans removes investment barriers for companies.

3. Helping with up-front costs stimulates longer-term energy efficiency investments.

Drawbacks:

This approach might be less successful in countries where government influence is weaker.

4.3 Pre-Financing for Consumers: Dutch Example

For individual consumers it can be expensive in the short run to buy smart products. The Dutch utility Nuon jumped on the hype around energy-saving light bulbs, by providing their clients pre-financing through their "Immediate Savings" campaign.

The concept is that the utility makes the initial investment, and the consumer pays it back through their energy bill. The utility takes a small percentage, and the consumer doesn't have to overcome the barrier of the initial investment.

It works like this:

The consumer can order any type of CFL for free, ranging from simple to fancy. At first, they keep paying for the same amount of energy, even though their actual consumption will have decreased due to the energy-saving light bulbs, and Nuon takes the difference as a payback.

For the cheaper CFLs this takes one year, for the more luxurious bulbs it's two or three years. After the bulbs have paid for themselves, the consumer has a substantially decreased energy bill over the rest of the life of the bulbs, which can be around ten years.

Of course, this same principle can also be applied to other energy-saving devices, such as on/off plugs, timers, or insulation materials.

5 Greenpeace Recommendations for Smart Power

As listed in Section 1, Greenpeace has a number of recommendations for energy-using products to reach the targets set in the Energy [R]evolution scenario, to be followed by governments:

- Set ambitious and mandatory efficiency standards for all electronics, appliances and white goods, that are ever-improving and that incentivise and adapt over time to new technological innovation, phasing out the most inefficient products.
- Set up financing systems to remove the initial investment barriers for consumers and smaller businesses.
- Set up systems that compel retailers and manufacturers to inform consumers about the energy (in)efficiency of the products they use and buy, and invest in awareness-raising and educational programmes to promote energy efficiency and energy conservation.
- Introduce a system of mandatory energy labelling to encourage both manufacturers' performance and consumers' choice.
- Implement a market surveillance system and a penalty system for non-compliance.

Doing all this means creating a Smart Power future. The principles inherent in these demands are that action for greater energy efficiency be mandatory, rapid, ambitious and ever-improving.

Mandatory

Experience shows that voluntary measures are far less effective in achieving energy conservation goals. Further, voluntary schemes put forward by industry can in fact delay real efforts to make savings.

A striking example occurred in 1998, when European car manufacturers introduced a voluntary agreement to reduce the emissions of fleet average to 140 g/km by 2008. By 2008 the industry had missed their target by a wide margin – the emissions were at an average level of 158 g/km. The voluntary agreement did not produce a significant improvement in their cars' efficiency; in actual fact it delayed any serious action. It was only in 2007 that the European Commission started to develop plans for car efficiency standards.

Mandatory measures should be implemented in conjunction with other measures that suit the (geo-) political circumstances to achieve real reductions in electricity consumption. These could be labelling or other forms of consumer information, and incentives for manufacturers and retailers.

Rapid

If we want to maximise Smart Power potential, any measure that can be implemented immediately must not be delayed another day. If governments allow themselves to have year-long discussions and go through lengthy bureaucratic procedures, much of the Smart Power potential is lost.

A good example is light bulbs. In principle, it is possible to ban all incandescent bulbs immediately. They have an average lifespan of one year, meaning the vast majority of incandescent bulbs can be replaced within one year. With other products, such as refrigerators, this is more complicated. Firstly because they can last for ten years or longer, secondly because they have a lot of embedded energy. This means that if after five years there are much smarter fridges, it might make economic sense to replace your old one, even if it's still working. However, you would want to calculate how the energy that was used to produce the new fridge weighs against the energy that you save with it, compared to the old one.

Governments can decide to develop mechanisms for this that encourage people to, for example, bring back their old fridge for recycling before the end of its life and trade it for a super-smart one, when this means significant energy savings. Of course, the energy and other environmental aspects of the recycling should also be taken into account.

Ambitious

Setting ambitious standards means ensuring the best available technology becomes the norm and is thus promoted, providing incentives for technical innovation. This is a big step forward from just getting the very worst products off the market. If, for example, the European Commission had wanted to set ambitious standards for lighting, they would have chosen to eliminate *all incandescent and halogen lights* from the market by 2009. This would mean all incandescents would have to be replaced with CFLs, and halogens either by CFLs or LEDs.

What the Commission has done instead is allow transition times for all categories, allowing a lot of time for halogens to be phased out, while also leaving room for many exceptions and loopholes. This is not an ambitious policy measure.

Ever-Improving

If we set an efficiency standard now, it might be outdated next year. Technological improvements are developing fast, and if we want to ensure maximum Smart Power potential over a longer time-span, we need to ensure the measures are ever-improving.

An example of an ever-improving system is the Top Runner model. Although this model has some drawbacks and cannot be copied instantly in other countries, it can be a great source of inspiration for those countries who aspire to a dynamic system of ever-improving standards that maximises Smart Power potential for all electrical products.

Overall Recommendations

All the above principles form the basis for a Smart Power future. When campaigning for Smart Power, they can help to build the foundation.

The key lessons learned from the analysis in this volume are:

- that the best policy agreements usually contain a *push* and a *pull* element, for example a labelling system that supports MEPs;
- that the influence of the socio-political framework should be taken into account when developing or demanding Smart Power measures;
- that there are creative ways to overcome barriers to Smart Power, such as pre-financing systems.

Bearing all the above in mind should enable Greenpeace's global energy campaigners to develop harmonised and effective methodology for Smart Power campaigns. Hopefully it will also inspire us to expand our work on efficiency, and strengthen our voice when we talk about Smart Power.

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