Topten – Best of Europe. How do best products perform and why aren't they sold across Europe?

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Abstract
The web-based Topten system was launched in Switzerland in 2000 with the goal of facilitating Swiss consumers' access to information on the most energy-efficient products (including performance, price, functions, pictures). Six years later, Topten attracts 1 million visitors annually and enjoys significant media attention. The concept has grown to include market research; a broader range of products, including household appliances, office equipment, consumer electronics, lighting, and cars; and cooperation with large public and private buyers and incentive programs has expanded.

Topten has also grown geographically to include nine national Topten websites in Europe (thanks to an Intelligent Energy – Europe project). The association Topten International Group (TIG) was created in 2006 to support this development and oversee the quality of the Topten concept in the various national implementations – including in the USA and China.

The initial focus of Topten was on technical issues related to testing protocols and the establishment of coherent national Topten systems. Now that a critical mass of countries host functioning Topten systems, Topten is now in a position to better support policy processes and to that end has established Topten "Best of Europe". This new concept identifies the most energy efficient products in Europe, stating countries where they are marketed (see **www.topten.info**). It makes explicit and transparent the *status quo* of efficient technologies on the European market and can thus serve as the European reference on energy efficiency to further negotiate with government and manufacturers.

Thanks to professional dissemination activities, this Topten reference can be used as a basis for environmental policy design, labeling strategies, dissemination programs, mandatory minimum efficiency requirements, and specifications for multinational buyers. "Best of Europe" and TIG offer the opportunity to coordinate a common understanding and empower decision makers to launch new initiatives promoting efficient products. Expanding globally to Topten "Best of the World" can occur as soon as additional countries bring their national Topten systems online.

Background and History
A major barrier to broad dissemination of more energy efficient and environmentally friendly equipment, products and services is that consumers do not have quick and easy access to relevant independent product information tailored to their needs. The purpose of Topten is to provide consumers and energy professionals with credible, up-to-date information on the most efficient products available on their local markets. The selection is much narrower than typical labeling systems, making it easier for consumers to choose from among the thousands of products available.

With a simple click, the Topten website displays information on the top (most energy efficient) products, including short lists of the approximately 10 best products available in each category, key functional specifications of interest to buyers and a photo of the product. Consumers can also use Topten to compare the most energy efficient equipment on the basis of initial purchase price or on the basis of lifecycle cost (purchase price

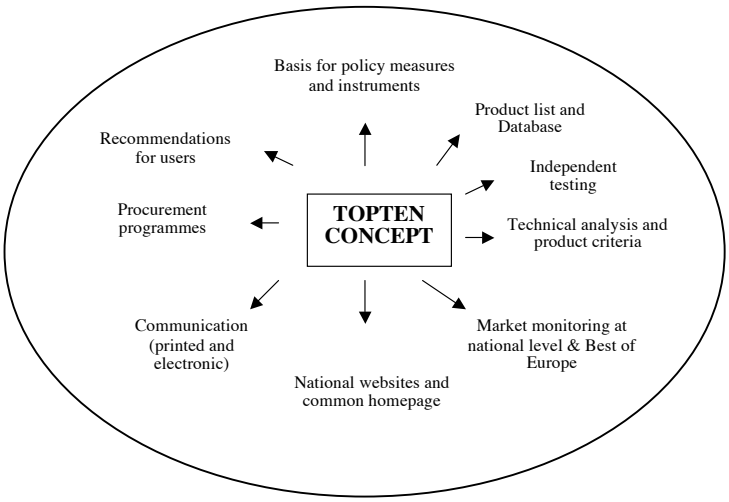

Figure 1: The Topten Concept

plus electricity cost over the lifetime of the product), and they can also compare the best products with an "average" product available on the market.

However, Topten goes beyond consumer information and should also be a tool for policy makers. Topten undertakes market research on energy using products to determine which product categories should be targeted given the national market characteristics. Topten defines benchmark criteria for top energy efficiency for each product category in cooperation with national standard and labeling organizations. The selection is different for each product category and is based on widely-accepted industry testing procedures, if available, or on a testing procedure defined by Topten. Topten works in cooperation with manufacturers in order to obtain as accurate product data as possible. Topten initiates dialog with responsible government officials and private sector procurement officers on use of Topten for procurement. Therefore, it makes explicit and transparent the *status quo* of efficient technologies on the European market and can thus serve as the European reference on energy efficiency to further negotiate with government and manufacturers.

EUROPEAN BACKGROUND

In its Green Paper ('A European Strategy for Sustainable, Competitive and Secure Energy', 2006) the Commission of the European Communities has put high priority on energy efficiency. The Green Paper highlights that – to guide consumers and manufacturers – more focus will need to be put on rating and displaying the energy performance of the most important energy-using products, including appliances, vehicles and industrial equipment. The Topten approach responds directly to this goal.

The Council and the European Parliament adopted a Commission proposal for a Directive on establishing a framework for setting Eco-design requirements (such as energy efficiency requirements) for all energy using products in the residential, tertiary and industrial sectors. Topten can support various Eco-design projects by providing real-time data on the efficiency level of the best products currently available on each national market, thus giving policy-makers confidence to propose ambitious levels for new and updated standards.

THE VARIOUS TOPTEN PROJECTS

Topten was launched in 2000 in Switzerland by the Swiss Agency for Efficient Energy Use (S.A.F.E.) to overcome the barrier for consumers to find the most energy efficient and environmentally friendly equipment, products and services available on the market. The Swiss internet site www.topten.ch attracts more than 1.5 million visitors with 34 million hits per year. Important impact results also from a high attention from the media (13 million media contacts); the participation of 20 partner organizations; and multipliers such as large buyers, producers, consumer and environmental associations, and electric utilities. Today, Topten Switzerland offers 120 product ranking lists (approx. 1 200 products), in 41 categories, covering domestic appliances (12 categories), office equipment (6), consumer electronics (2), building technology (8), lighting (3), mobility (6), green electricity (2) and leisure activities (2).

In 2004 Topten France was launched by the environmental organization WWF France, the consumer organization CLCV (Consommation, Logement et Cadre de Vie) and technical expert Sowatt with support from the Agence de l'environnement et de la maîtrise de l'énergie (ADEME) and Topten Switzerland. Presently, Topten France is online at www.guide-topten.com with cold appliances, dishwashers and cars. Topten France has been referred to more than 140 times in media (major TV, newspapers, magazines, radio) and has had a good response from manufacturers, including increasing proposals for partnerships. Communication tools are going to be developed.

The Austrian Energy Agency launched www.topprodukte.at in 2005. Important partners are the "Lebensministerium", WWF Austria, the province of Lower Austria, and some web-companies. There is an interesting cooperation with retailers (Cosmos) and also a high media response. Topprodukte.at is online with about 1 000 products in over 40 categories in the fields of domestic appliances, office equipment, lighting and cars. In 2006 it attracted 150 000 visitors.

In 2006, the Euro-Topten project was launched in the framework of the "Intelligent Energy – Europe" program (IEE). The project aims, at European level, at encouraging consumers to ask for and choose energy efficient products (consumer awareness), but also at getting retailers and large buyers involved, and at creating multinational pressure to orient manufacturers toward more energy efficiency across their range of products. The project short term goal is to establish nine Topten websites efficiently networked in order to share experience and reach a critical mass able to help shift the market towards higher energy efficiency. It will complement existing schemes promoting energy efficient devices and hopefully serve as a basis for further instruments and initiatives. Each of the national Topten systems (Austria, Belgium, Czech Republic, France, Germany, Hungary, Italy, The Netherlands, Poland, Switzerland) has its own web site, which can be accessed through the common portal www.topten.info. Euro-Topten also aims at monitoring market evolution of targeted appliances.

In 2006, the association Topten International Group (TIG) was founded to launch, support and coordinate national Topten projects. A Topten charter defines key principles that implementing partners have to respect in order to ensure quality.

With increasing global internet usage, Topten can reach a vast pool of consumers worldwide. Beyond Europe, TIG is assisting other teams – notably in China and in the United States, the two countries with the greatest share of internet users – with establishing National Topten projects that meet the requirements for full integration into the international Topten platform. In China, which has 132 million internet users, growing at the breathtaking rate of nearly 500 % from 2000 – 2006 (Internet World Stats, 2007), the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) has made the implementation of Topten China (as part of its plans for a broader product comparison system) a priority for 2007, and TIG is working with the China Standard Certification Centre to make this happen. In the United States – with 207 million internet users (Internet World Stats, 2007), a Topten USA Board is being formed, with a launch anticipated in the first half of 2007. As more national Topten projects are completed, it will be possible for the first time to achieve quasi real-time international benchmarking of the most efficient products available worldwide, and we therefore encourage the remaining "top 15" markets (Japan, India, UK, South Korea, Brazil, Russia, Mexico, Indonesia) to join TIG. The UN Environment Program and the UN Development Program are preparing a Global Environment Facility Proposal to transform markets for consumer appliances in developing countries, which could support implementation of Topten worldwide.

Topten "Best of Europe"

Until today, Topten has been concentrating on national markets. Thanks to its growth, it can now consolidate its political impact by establishing "Best of Europe". This new concept targeting researchers and decision makers identifies the most energy efficient products in Europe (with reference to the countries in which these top products are sold). It makes explicit and transparent the status quo of efficient technologies on the European market and can thus serve as the European reference on energy efficiency to further negotiate with government and manufacturers. Thanks to professional dissemination activities, this Topten reference will be used as a basis for environmental policy design, labeling strategies, dissemination programs, mandatory minimum efficiency requirements and specifications for multinational buyers. Presently, "Best of Europe" concentrates on four product categories: cold appliances, heat pump tumble driers, energy saving lamps, and cars. For each product category specific recommendations regarding policy design have been formulated.

"Best of Europe" and TIG offer the opportunity to coordinate a common understanding and empower decision makers to launch new initiatives promoting efficient products. As more national Topten projects are launched, we will be in a position to offer a global "Best of the World" comparison.

COLD APPLIANCES

Introduction

In 2003, the electricity demand of EU-15 countries' refrigerators and freezers exceeded 100 TWh (Green paper on Energy Efficiency, 2005) – equivalent to the production of around 15 nuclear power plants. Cold appliances still represent the largest share of total electricity consumption (40 %) among the large appliances in households (including TVs, cold appliances, wet appliances) (2007, Odyssée). High efficiency A++ cold appliances consume 45 % less electricity than Class A appliances, and 60 % less than appliances of Class B. Replacement of the total stock in European households by A++ cold appliances holds the potential to save 60 TWh per year.

Methodology

Best of Europe (at www.topten.info) presents the most energy efficient cold appliances of Europe. In order to be selected, the energy class of the appliance according to the EU energy label must be A++. The following categories and subcategories of cold appliances are displayed:

- 1-door refrigerators (Freestanding and Built-in)
- 2-door refrigerator-freezers (Freestanding and Built-in)
- Upright Freezers
- Chest freezers

Data Sources:

- Producers' declarations (according standards of EU energy label)
- National data-bases and Topten-sites as e.g. www.topten.ch, www.topprodukte.at, www.guide-topten.com, www.ecotopten.de, www.uspornespotrebice.cz, www.energielabel.nl, and www.hvidevarepriser.dk
- Encodex data base. Encodex (Nürnberg, Germany) is a subsidiary of the GfK Group and is present in over 50 countries worldwide. Encodex is specialized in product market studies.

For each product selected in the Topten Best of Europe shortlist, the field "availability" displays in which countries the product is available for purchase according to producers' declarations, national Topten sites and data bases as Encodex. The considered countries are all EU member States, plus Croatia, Norway and Switzerland. However, the availability is sometimes difficult to define precisely depending on arbitrary selling by retailers (not by official distributor) or if the supply is rather theoretical if there is no marketing for specific products in some countries.

Results

Best of Europe shows that there are 114 A++ cold appliances sold under 18 different brands available in Europe. Even though this number is rather small compared to the total number of appliances sold on the market, these products cover a large variety of requirements concerning volume, type of construction (freestanding and built-in) and size of freezing compartments. Unfortunately, many of these high efficiency appliances are available in only few countries.

Conclusions

Research and development has done its job by providing high efficiency cold appliances. Nevertheless, for a real market transformation strong efforts are still necessary:

- Revision of the energy label scheme:

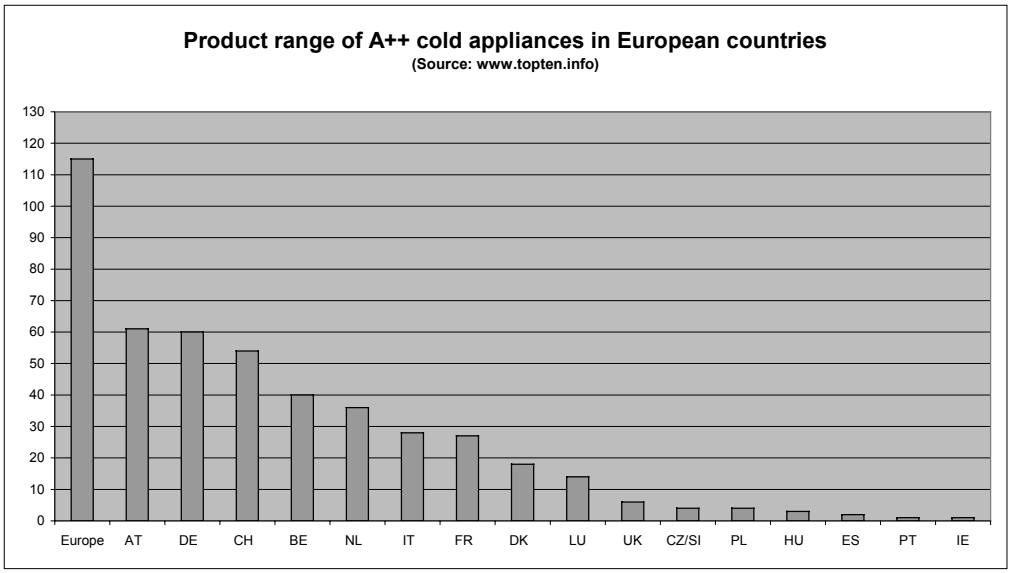

Figure 2: The availability of high efficiency cold appliances depends very much on countries. Austria, Germany and Switzerland are the front runners.

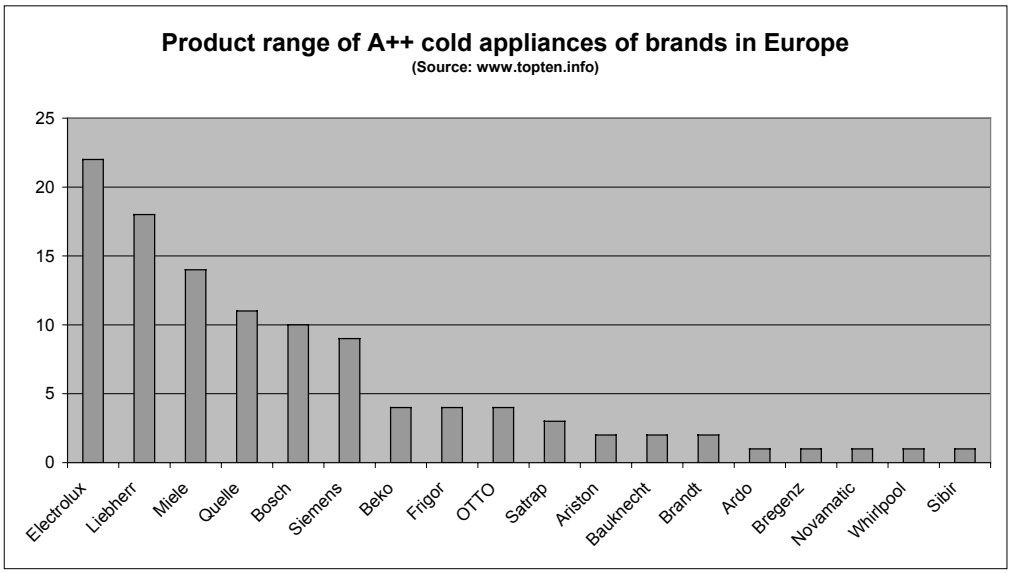

Figure 3: Electrolux and Liebherr provide the largest product range for high efficiency cold appliances.

These efficiency improvements were encouraged by EU projects such as energy+ and the updating of the energy label by the new classes A+ and A++. However, 'A' is still understood by consumers as the best class, and the added classes only have a limited promotional effect. The energy efficiency classes should be rescaled according to the initial scheme A to G, where D stands for the standard energy consumption (100 %), while A is defined by the technical limits and thus stands for the very best. According to the Action plan for Energy Efficiency of the European Commission (2006), maximally 10-20 % of the models should have an A-label status. A regular rescaling (e.g. every 5 years) to guarantee the effectiveness of the energy label is part of the Action plan's priority action 1. The proper usage of labels (i.e., making sure all products are labeled and that the class indicated is the correct efficiency class) should be controlled. According to the European Committee of Manufacturers of Domestic Equipment (CECED) this is not sufficiently the case today; therefore they ask for strict national enforcement of legislative measures (CECED, 2007).

- Mandatory minimum efficiency requirements (also called MEPS Minimum Energy Performance Standards):

  The energy efficiency of products has improved over time, thanks to technical innovations by manufacturers. Accordingly, energy efficiency limits should be continuously adapted to the changing state-of-the-art. In its Action plan for Energy Efficiency (2006), the European Commission formulates the need for dynamic energy efficiency standards: future efficiency requirements should be bindingly determined, based on expected technical improvements. This proceeding lets manufacturers act in advance and be prepared for new

requirements. Accordingly it is possible to set ambitious goals. A stepwise, binding schedule can lead to the goal to have only A++ and better appliances on the future market. This recommendation is in accordance with what the European Committee of Manufacturers of Domestic Equipment (CECED) has asked for in March 2007: it favors strictly enforced legislative measures over its voluntary agreement from 2002 (CECED, 2007 and 2002).

- Promotion:

  There are numerous possibilities to promote A++ cold appliances and to encourage manufacturers to offer them more broadly: Information campaigns, rebate programs, private and public procurement programs, fee-bate schemes, white certificate schemes, etc. Manufacturers: Many brands should enlarge their product range for high efficiency.

TUMBLE DRIERS

Introduction

Drying laundry in the open air is ecologically the most efficient solution. However, especially in northern countries, there is a trend towards drying laundry with tumble driers, even though this contributes consistently to higher energy consumption in households. Reasons include a modern lifestyle, with little time for extensive housework, air pollution and increasingly dense living conditions in cities.

Thus, tumble drier use in European countries has increased considerably: in 2005, 4.9 million tumble driers for residential use were sold in the EU. Strong differences exist between Western Europe (4.84 million) and Eastern Europe (0.06 million), as well as between northern and southern countries.

High-efficiency heat pump driers consume only about half the electricity of conventional condenser driers. Their efficiency exceeds the EU A-label threshold by far, while usual resistance heating machines are hardly better than energy label Class C.

There are an estimated 40 million tumble driers in European households. Replacing the entire stock by high-efficiency heat pump driers represents a savings potential of approximately 15 TWh per year. This corresponds to annual savings of more than 6 million tons of carbon dioxide (assuming an electricity generation mix with a CO_2 intensity of 400 g CO_2/kWh).

Methodology

Topten Best of Europe displays the most energy efficient household electric tumble driers of Europe. In order to be selected, the energy class according to the EU energy label must be A. In general, only heat pump tumble driers attain Class A. Two tumble drier categories are presented on Topten: driers for residential use (designed for one apartment) and driers for semi professional use (designed for several apartments, with a load of about 5 times the load of residential driers).

Data Sources and national availabilities are analogous to those described above for cold appliances.

Results

The investigations of Topten demonstrate that some manufacturers have expanded their product lines to include heat pump driers: three brands now offer models for residential use and three brands offer semi-professional models.

The technical and market development of heat pump driers on the Swiss market was described in a paper by Bush and Nipkow (2006). In 2001, the first heat pump drier in Switzerland was launched. In the meantime, many open questions about heat pump driers could be clarified, and laboratory tests and evaluations of consumer satisfaction have lead to improvements in the handling and overall performance of all models available on the Swiss market.

Heat pump tumble driers result in significant energy savings, and, with market shares below 5 %, the potential aggregated energy savings in Europe are huge. Furthermore, wasted heat and humidity loss in the operation room are significantly lower compared to air condenser driers, and there is no smelling and steaming exhaust air as with conventional air vented driers. Life cycle costs are hardly higher than with conventional driers and even significantly lower in the case of semi-professional use – due to 50 % energy savings.

The positive experiences with heat pump driers convinced the city of Zurich, which equips 10 000 apartments: Since 2003, the city of Zurich officially favors heat pump driers. Furthermore, Zurich launched a rebate program in 2005 to encourage the purchase of heat pump driers and thereby their market uptake on the national level. From 2004 to 2005, the market share of heat pump driers in Switzerland increased from 1.7 % to 4.4 %.

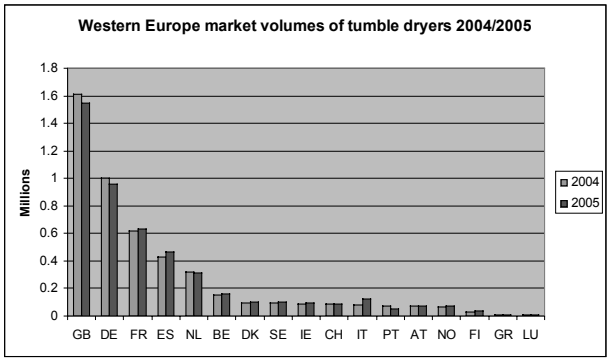

Figure 4: Western Europe market volumes of tumble dryers 2004/2005

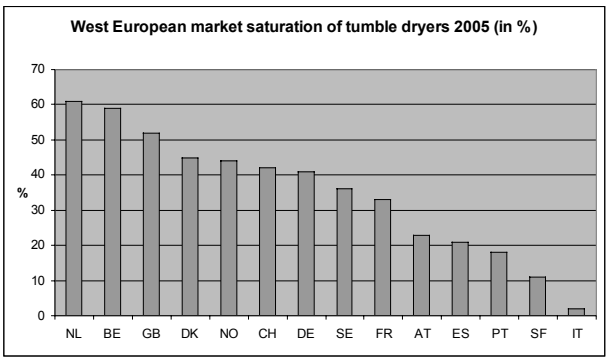

Figure 5: West European Market saturation of tumble dryers 2005

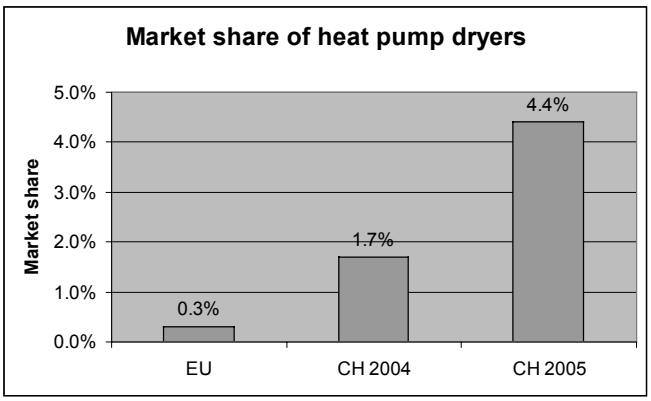

Figure 6: West European and Swiss market share of heat pump driers 2005: Promising market introduction in Switzerland

Conclusions

Heat pump driers have been on the market for several years, but so far they have not reached a breakthrough in any country. However, there are good chances that the situation improves in Switzerland (Bush, Nipkow 2006).

In view of the large saving potentials in energy and carbon dioxide, as well as the positive development of sales and demand in Switzerland, Topten suggests the following supporting measures:

- Revision of the energy label scheme for tumble driers:

  The energy efficiency values of heat pump driers are much better than the A-limit value of the EU Energy label for tumble driers, while the most conventional and wide-spread air vented and air condenser tumbler are classified C. It is not perceptible to consumers that a condenser drier of the label category B uses twice as much electricity as a heat pump drier of category A. In order to increase the label's effectiveness, the entire scheme should be shifted to lower values and allow a distinction between highly and less efficient heat pump driers. Additionally, the stand-by losses should no longer be excluded from the energy label. The new classification scheme would also give manufacturers incentives to further develop efficiency of driers. Stricter enforcement of the energy labeling has been asked for by the manufacturer's association and should guarantee correct consumer information.

- Energy efficiency requirements:

  The goal is to ban conventional inefficient tumble driers from the European market. Announcing future legislative minimum efficiency requirements bindingly and in time lets manufacturers act in advance, and it is possible to set ambitious requirements. Tumble driers that are less efficient than today's heat pump driers (category A) could be announced to be banned from the market in five to ten years.

- Promotion:

  Active promotion of high efficiency heat pump driers accelerates the effects of the measures mentioned above. Promotional activities include: dissemination of basic information and procurement recommendations for energy agencies and other relevant bodies; launch of rebate programs and supporting activities by energy agencies, governments, utilities, industry associations fitted to their individual needs; launch of an international competition for the most efficient condenser laundry drier – accounting for overall economic and ecologic benefits. Different categories with respect to capacity and/or intensity of use could be considered.

ENERGY SAVING LAMPS

Introduction

The International Energy Agency's 2006 publication 'Light's Labour's Lost: Policies for Energy-Efficient Lighting' identified that lighting accounts for 19 % of global electricity consumption, more than is provided by hydro or nuclear power, and gives rise to 1 900 Mt of CO_2 emissions. The analysis further demonstrated that at least 40 % of this energy use could be saved cost-effectively through the systematic adoption of higher efficiency solutions in all the main end-use sectors: non-residential indoor lighting, residential indoor lighting and outdoor lighting.

In February 2007, Australia's minister for the environment and water resources Turnbull announced that the country will reduce CO_2 emissions by 4 million tons by 2012 by banning inefficient light bulbs from 2009 (http://www.environment.gov.au/minister/env/2007/pubs/mr20feb07.pdf). Other countries are discussing similar steps.

Methodology

To be selected by Topten, producers have to provide a complete declaration, including wattage, luminous flux, energy label, average lamp life, switching on/off cycles, color temperature, length and diameter, availability in countries, location of manufacturing, confirmation of compliance to the RoHS (Restriction of the use of certain hazardous substances in electrical and electronic equipment)[1].

All energy-saving lamps on www.topten.info (Best of Europe) meet the following requirements:

- Energy efficiency: Energy-label A
- Average lamp life: minimum 10 000 hours
- Switching cycles: minimum 100 000 switches
- Color rendering index: Ra >= 80 (group 1B, very good)

Results

Topten Best of Europe presents an overview on best energy saving lamps in Europe. Over 30 high quality lamps are displayed of various shapes and with different properties: Compacts, tubes, globes, spots, E14-, E27-, GU10- and GX53-bases, dimmable lamps etc.

Important specifications, including luminous flux, watts and lifetime are included on the European energy label. However,

1. It is intended to include warm-up time, but so far there was not enough feedback.

it is confusing that there are energy saving lamps and halogen lights both of Class B, although the energy saving lamps consume less than half of the energy. Besides the somewhat confusing scheme of the energy classes, important quality specifications are missing on the label, especially:
maximal number of switching on/off cycles
warming up time of lamps

Even though these properties are standardized, information by manufacturers is not satisfying. Searching thoroughly in producers' catalogues and homepages, Topten found interesting information declared by many (but not all) producers on switching on/off cycles. Astonishing differences regarding the number of switching cycles were found. As for the starting time of lamps, not enough information is declared by manufacturers. The results are displayed on www.topten.info.

Conclusions

Possible measures and actions that could improve market transformation in favor of energy saving lamps:

- Phase out incandescent lamps: The substitution of incandescent lighting by energy saving lamps (compact fluorescent lamps CFL) comprises huge saving potentials. Improving quality, producers' declarations and labeling of CFLs would support consumers' acceptance and thus the diffusion of energy saving lamps. A future ban of inefficient incandescent light bulbs should be bindingly set, following Australia's example. Discussions about taking the same measure in Europe have been launched by Germany's environmental minister Gabriel and should be continued.
- Update the energy label scheme: the energy classes should visibly and unambiguously communicate the differences in energy consumption between halogen and energy saving lamps. Additionally, quality differences between different energy saving lamps should be reflected. Furthermore switching on/off cycles and warm-up time should be included in the energy label.
- Price policy: Energy saving lamps are still too expensive, the interest margins too high. Rebate programs or fee-bate schemes could improve the attractiveness of energy saving lamps.
- Initial assembly and sale of luminaries with energy saving lamps help promoting them effectively.

CARS

Introduction

About one third of total final energy consumption is due to motorized road transport, mostly automobiles. According to the European Commission, passenger cars in the EU contribute about 12 % to the overall CO_2 emissions. Eighteen million cars are sold each year in Europe. Although there are new, better performing cars on the market, improvements in fuel economy are nullified by the effect of increased passenger kilometers and motor size. In February 2007, the European Commission abandoned the initial target of 120 g CO_2/km in favor of the compromise of 130 g CO_2/km for the average new car fleet, which has to be reached by the manufacturers with technological improvements by 2012 (Strategy to reduce CO_2 emissions by the European Commission, 2007).

Methodology

Topten identifies the 10 most environmentally friendly automobiles available in European countries for seven different size categories, from minis to vans. The Topten determination is based on type-testing-specifications and the ecological rating system for automobiles that was developed by the Institute for Energy and Environmental Research (IFEU) in Heidelberg, Germany. This analytical framework was commissioned 10 years ago by the Swiss Association for Transportation and Environment (ATE), together with its sister organizations in Germany and Austria, as well as the German Federal Environmental Agency in Berlin. Since then it has been repeatedly updated, most recently in 2004 (in co-operation with specialists from the Swiss Federal Office for the Environment and from the laboratory of atmospheric chemistry of the Paul Scherrer Institute in Villigen, Switzerland), to improve the calculation of the climatic impact of particles from diesel engines. This ecological rating system for cars has been used since 1997 by ATE and the traffic associations of Germany (VCD) and Austria (VCÖ), which are members of the European Federation for Transport and Environment (www.transportenvironment.org).

The ecological rating system is a multi-criteria analysis that ranks cars according to their impact on environment and human health, on the basis of current scientific knowledge. Five types of environmental impacts have been defined and weighted in order to form a ranking for each car:

- 40 Percent: Impact of CO_2 and particles – greenhouse effect
- 20 Percent: Impact of traffic noise on human beings – health
- 15 Percent: Impact of carcinogenic substances on human beings
- 20 Percent: Impact of nitrogen oxides, hydrocarbons and particles on human beings
- 5 Percent: Impact on nature
- The smaller a car's overall negative impact on the environment and human health, the higher is its rating.

Results

Gasoline or diesel motors: Diesel motors are more efficient than gasoline motors and thus emit somewhat less CO_2 per kilometer. However, they emit many more substances that are harmful to human health than do petrol motors (e.g. carcinogenic soot particles and up to six times more contagious nitrogen oxides). Therefore Topten excludes diesel automobiles without particle filters from its ranking. In the ecological ranking, top models with petrol motors reach values up to 79.5, while the most ecological diesel car with particle filter gets 75.2 points.

Natural gas motors: The main advantage of gas consumption lies in lower CO_2-emissions, compared with gasoline or diesel motors, and an automobile driven on biogas produced from green waste emits no CO_2 at all. Overall, natural gas has only half the harmful impact on the environment compared to

gasoline and 70 % less than diesel (with biogas-fueled vehicles performing even better, with no greenhouse gas emissions). The best-ranked models driven with gas have values as high as 90 points.

Hybrid motors: Vehicles with this kind of motor are working with two engines, a combustion one and an electric one. Therefore they are fuel-efficient and emit less harmful substances. By driving downhill the combustion engine is being turned off. The electric motor serves as a generator, the batteries are filled up and furthermore the speed of the car is being decelerated. The best-competing hybrid model reaches 83.5 points in the environmental ranking.

CO_2-emissions

Cars with diesel motors emit about 10 % less CO_2 per km than gasoline fueled cars, and gas motors, about 25 % less (not including biogas, which is essentially CO_2-free). The climate is even less harmed by the two hybrid models that are on the market: their CO_2-emissions are only slightly above 100 g/km.

On www.topten.info, the most ecological models on the European market are listed, divided into seven categories by car- size. The five categories listing mini till middleclass cars and vans with five seats contain between two and nine models emitting less than the European fleet-target of 130 g CO_2 per km. One of the vans with six seats emits only little more (134 g CO_2 per km), while the best-performing model of the upper middleclass has a value of 158 g CO_2 per km.

Conclusions

- Topten encourages European and national policies to introduce mandatory measures aiming at an intense and effective promotion of hybrid and bio gas fuelled cars on the European market.
- The – compromise – average car fleet target of 130 g CO_2/km by 2012 must not be missed. Introduction of a legislative obligation for car manufacturers would ensure that this minimal reduction target is achieved.
- At the same time, measures reducing the motorized individual mobility, and favoring public transport and human-powered vehicles instead are equally necessary to ensure a sustainable mobility in Europe and a steady reduction of transport emissions.

Topten in the International Context

Topten is an opportunity to increase transparency on the market because it shows available products on the market with their main characteristics. Below we compare Topten with other initiatives distinguishing best products on the market and say a few words on the specific situation in China and in the US where Topten should be launched shortly.

Similar to the US Federal Energy Management Program (http://www1.eere.energy.gov/femp/procurement/) mandated by the Energy Policy Act of 2005, an attempt was made in Australia to establish a system to single out Energy Allstars for preferential treatment in the context of government procurement. The Energy Allstar program was designed to provide an added incentive to the top 10-25 % of products, based on meeting Top Energy Saver Award criteria linked to star ratings in the mandatory Energy Label Scheme. Although the website still exists (http://energyallstars.gov.au/), the program is essentially dead in the water. The main reason was a chicken-and-egg situation in which government would not commit to grant preference to Energy Allstars until industry supplied the necessary data, and industry refused to supply the data requested by the government without confirmation of tender preference.

Interestingly, Topten has managed to circumvent this difficulty, and manufacturers are now eager to be listed on the Topten website. By providing an incentive to the best products brought to market, Topten can complement existing programs like Top Runner and ENERGY STAR, by pointing consumers to the most efficient products and thereby providing a continuous incentive with virtually no lag time to manufacturers to innovate.

TOPTEN IN CHINA

Removing information barriers for energy efficient products is crucial in developing countries. China – with its huge domestic market and two decades of rapid GDP development – is now in a phase of new consumers entering the market for household appliances, office equipment, consumer electronics, and cars for the first time. This is a unique opportunity for a national product comparison system easily accessible over the internet. China has the advantage of a domestic industry that is able to manufacture products of high quality and very high energy efficiency standards. A considerable fraction of the top products is currently exported, but targeting the Chinese mass market can make the best products affordable to a much wider public. The China National Institute of Standardization implemented a mandatory energy label scheme similar to the EC system for household equipment in 2005 (refrigerators/freezers and room air conditioners). China also has a voluntary product certification system, administered by the China Standard Certification Center (CSC) covering 40 products, which also addresses energy use. CSC is in the process of developing a comprehensive product comparison system, in cooperation with TIG, which can be linked to Topten.

TOPTEN IN USA

The US market is similar to the European market, with a range of competing manufacturers and a high saturation rate of all types of domestic and office equipment. Most products are sold to relatively experienced consumers as replacement for old equipment. For decades, consumer organizations have actively advised buyers on better and more cost-efficient products. Voluntary national product qualification and labeling systems such as EPA Energy Star (see table above) or ACEEE's Green-Cars guide (http://www.greenercars.com/indexplus.html) and the mandatory FTC EnergyGuide label are in place. However, no easily accessible database for the full range of products that can point consumers to the most energy efficient products exists. Several of our co-authors are therefore cooperating with US colleagues to establish a national organization to launch in 2007 a new end user product selection system for the US market(s) on the basis of Topten.

Table1: Overview of Energy Star, Top Runner and Topten

Characteristic	ENERGY STAR	Top Runner	Topten
Application scope	USA (partnership agreements with the EU, Australia, Canada, Japan, New Zealand, and Taiwan)	Japan	CH, EU-10 (soon: China, USA, EU-25)
Program administrator	US Environmental Protection Agency and US Department of Energy	Government of Japan	Overall coordination ensured by the non-profit organization Topten International Group; program administration varies by country
Type of program	Voluntary label program, combined with information, tools & incentives	Legal requirement to achieve Top Runner Standard and display energy information	Online consumer information system
Legal basis	Federal Clean Air Act (section 103)	Energy Conservation Law	Non-governmental initiative
Objective / market function	Market pull to reduce greenhouse gas emissions and to make it easy for businesses and consumers to identify and purchase products, homes and buildings with enhanced efficiency that offer savings on utility bills while maintaining, if not enhancing, performance, features and comfort	Market push to require manufacturers achieve Top Runner Standard in specified timeframe (generally 4 to 8 years)	Market pull to increase consumer demand for highest-efficiency products & services, thereby providing continuous market incentive to manufacturers
Product scope	Over 50 product categories of household appliances, heating & cooling equipment, building technology and homes/buildings, home electronics, office equipment, lighting, commercial food service, other commercial equipment	Selected machinery and equipment meeting specified criteria. First set of targets to be achieved in 2003 (TVs, VCRs), 2004 (room air conditioners, electric refrigerators and electric freezers) and 2010 (gasoline passenger vehicles).	40 product categories of office equipment, household appliances, consumer electronics, lighting, mobility, leisure, electricity, building technology
Product selection criteria	Label specifications set based on the ability to effectively differentiate products that will provide significant energy savings on a national basis, while not unjustly favoring any one technology; product performance must be maintained or enhanced with increased efficiency; purchase of high efficiency product must be cost-effective. Energy consumption and performance must be able to be measured and verified with testing.	All manufacturers must aim to achieve target efficiency (Top Runner Standard) on a weighted average method (per manufacturer and product category)	Selection criteria are energy efficiency, impact on environment, health, and quality; harmonized internationally
Stringency of selection	Typically represent the top 25% of a product category in the market at the time the specification becomes effective. Products are 10–25% more efficient than required by federal standards, where established (e.g., National Appliance Energy Conservation Act (NAECA) minimum standards for energy consumption in refrigerators and freezers)	National Top Runner Standard set based on value of most energy-efficient products in each category available on the Japanese market at the time of value setting process and considering potential technological improvements; designation of discrete categories based on set of principles	Approx. top 10 products (cutoff point for “top 10” products depends on product availability on national market)
Updating timeframe	Existing product specifications re-evaluated every few years based on market penetration and emergence of new technologies and products. Specification development process to update existing standards takes 1-2 years. Specification finalized at least 9 months before effective date.	Initial process to establish standards (incl. WTO/TBT notification and amendments to government ordinances to formally add a draft Top Runner Standard to a target product's range) takes 1 to 2.5 years; updates can be made based on standard reviews	Continuous ranking, as new products become available
Testing	Testing standards included in specification, and self-tested by manufacturers or third party labs; compliance testing initiative (independent third-party testing) for best sellers in certain product categories	Testing specifications included in Ordinances	Mainly manufacturer data associated with standard & label schemes, and spot checking of self-declarations
Usage rate	More than 35,000 product models carry label; over 800 retail partners, about 450 utilities and 30 States promote label	Applies to all manufacturers	In 2006, Topten CH attracted 1.5 million visitors and 34 million hits (Swiss population: 7 million)
Source	www.energystar.gov	www.eccj.or.jp/top_runner/index_contents_e.html	www.topten.info

Conclusions: Topten from a Policy Perspective

Energy efficiency is the key to a sustainable global economy. Domestic markets are a high priority in contributing to lower energy demand increases and lower greenhouse gas emissions. All types of electric equipment in households, offices and industries together with automobiles are the prime area for a much needed market transformation.

Market transparency is the key to better product selection by conscious consumers and product innovation by manufacturers interested in the first-mover market. Our Topten approach has been developed and refined both for highly industrialized and saturated markets with a focus on replacement products and for new booming developing economies where masses of new consumers buy a piece of equipment the first time in their lifetime. It can even be implemented in countries with poor internet access through cooperation with retailers, media, utilities, and other partners.

Topten is a voluntary, market-based instrument that complements mandatory minimum energy performance standards, existing labeling schemes and corresponding manufacturers' declarations.

What is the impact, what are the main advantages of Topten, from a policy point of view? After six years of operation, the pioneer Topten systems in Europe have demonstrated their ability to:

- Increase market transparency and lower barriers for consumers to purchase the most energy efficient equipment, products and services. Topten reaches consumers directly, and the number of visitors has been constantly growing.
- Serve as a credible resource center for the media, informing many articles in newspapers, consumer and environmental magazines.
- Respond flexibly and in a timely fashion to market trends, since there are no additional information stickers on the product itself, new products can be added at any time and the criteria are easy to revise and strengthen according to the markets progress.
- Stimulate competition: as detailed data is published, manufacturers can compete to be "at the top" of the Topten lists (no threshold effect). As the website is very often updated, the competition on the energy efficiency criteria is continuous. It creates a market pull effect, beyond existing minimum performance standards or recommended labels.
- Provide specifications for public/private procurement programs to increase market demand for the most energy efficient products.
- Support ambitious mandatory standards by providing real-time data on the efficiency level of the best products currently available on each national market and around the globe for countries involved, thus giving policy-makers confidence to propose ambitious levels for new/updated standards.
- Encourage government and industry groups to achieve high code of conducts.
- Encouraging international harmonization initiatives and advancing testing procedures.

The success of Topten can be measured by the number of visits and hits: Topten Switzerland (www.topten.ch) – which serves the Swiss market with a population of 7 million inhabitants – attracted 1.5 million visitors and 34 million hits in the year 2006. Initial feedback suggests that this high usage rate clearly exceeds the one associated with other efficient product databases because the system 1) is widely advertised in partnership with the government, consumer organizations, NGOs and independent media and 2) was designed with the end-user in mind and is therefore attractive and simple to use, comprehensive (in terms of product range), very up-to-date (to ensure that consumers will find the listed products in retail outlets when they shop), and credible. The independence from manufacturers and retailers, as well as the quality and up-to-date product information are the distinguishing features of Topten.

References

Attali Sophie, Eric Bush. www.topten.info goes European - How to get Mr. Smith hooked to energy efficient appliances. ecee-proceedings Mandelieu. 2005

Bush Eric and Jürg Nipkow. Tests and promotion of energy-efficient heat pump driers. EEDAL Conference on Energy Efficiency in Domestic Appliances and Lighting, London. 2006

Bush Eric, Sophie Attali, Conrad U. Brunner, Anne Arquit Niederberger. Topten.info: Fast selection, best choice. EEDAL Conference on Energy Efficiency in Domestic Appliances and Lighting, London. 2006

CECED, 2002: Voluntary commitment on reducing energy consumption of household refrigerators, freezers and their combinations (2002 – 2010)

CECED, 2007:Top Executives Discontinue Voluntary Energy Efficiency Agreements for Large Appliances. Press release from 21 March 2007.

Commission of the European Union: Action plan for Energy Efficiency, 2006: Realising the Potential. Communication from the Commission. COM(2006) 545 final, October 2006

Commission of the European Union: Strategy to reduce CO_2-emissions from passenger cars and light-commercial vehicles, 2007. Communication from the Commission. COM(2007) 19 final.

Commission of the European Union. Green Paper - A European Strategy for Sustainable, Competitive and Secure Energy. 2006.

Commission of the European Union: Green paper on energy efficiency: Doing more with less. COM (2005), 265 final of 22 June 2005.

European Parliament and the Council of the European Union. Directive 2005/32/EC. Establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council. 2005

Internet World Stats. Internet Usage Statistics – The Big Picture (updated 29 December 2006). Sourced at http://www.internetworldstats.com/stats.htm on 7 January 2007.

Lambrecht Udo, Ulrich Höpfner. Aktualisierung der Bewertungskriterien der VCD-Auto-Umweltliste – Eine gutachterliche Stellungnahme des IFEU (Heidelberg, Germany) im Auftrag von Bundesumeltministerium und UBA Umweltbundesamt Berlin, Germany. 1997

Odyssee, Enerdata. Household energy consumption in the EU- 15, MURE, January 2007 update.

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