Free Market versus Regulation: How to Improve the Efficiency of Standby Power Appliances

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Synopsis

Which is the best way to improve energy efficiency of brown goods: compulsory energy standards and labelling, voluntary agreements with manufacturers, or to do absolutely nothing?

Abstract

In many European countries domestic electricity consumption is rising despite saturation in ownership of major white goods. Part of the reason for this growth is the increasing proliferation in the home of brown goods, mainly TVs, videos, hi-fi equipment and other electronic appliances that nearly all use standby power.

This paper looks at policies for reducing standby power loss in brown goods. Although European researchers have identified a large technical potential for reduction, the main problem is getting manufacturers to adopt 'best practice'. One approach favoured by some governments is to overcome 'market failures', through provision of information and voluntary agreements with manufacturers. Another solution, advocated by more interventionist governments, is regulation, through introduction of mandatory efficiency standards and labelling schemes.

This paper first surveys the EU policies put forward for improving efficiency in brown goods. It then questions whether voluntary agreements can be effective in the existing highly competitive EU market, which is facing increasing challenge from low cost Asian producers. Finally it questions whether policies based on overcoming 'market barriers' can be successful, and argues that these policies are just a reflection of some European Government's political ideology of 'free markets'. It concludes that the policy of relying on competition to produce energy savings produces a very uncertain result.

1. Introduction

An unknown but significant proportion of domestic (or household) electricity consumption in the European Union (EU) comes from the use of 'brown goods', that is TVs, videos, hi-fi equipment and other small electronic appliances. A particular feature of these goods is their continual consumption of electricity (or power use) even when switched 'off'. This power use is commonly called standby power loss or more popularly 'leaking electricity' (Meier 1993, Sandberg 1993).

This power loss has attracted the attention of EU officials concerned with promoting energy conservation. In 1995 the CEC DG XVII commissioned the Dutch energy agency NOVEM to carry out a study on standby power in TVs and videos. The Final Report by NOVEM (Wajer 1996) showed that the standby power loss of TVs sold in 1995 in the EU varied widely, from between 0.1 and 20 Watts (W), with an average of 7-8 W. For videos the range was not so great, between 3 and 15 W, with an average of about 9 W.

The NOVEM Report looked at the possibilities for reducing standby power loss. It concluded that a decrease to less that 3 W was technically feasible, with a low cost to manufacturers if changes were implemented during redesign. The extra cost per set for industry for a 3 W loss would be only 3 to 5 ECU, and manufacturer's costs would be easily outweighed by consumer savings from reduced electricity use.

There is thus a large technical potential for reducing standby power loss in TVs and videos, which could result in significant and worthwhile savings to EU consumers. The question is how to achieve it. What can be done by the EU to ensure manufacturers adopt the most energy efficient technology. Is the answer compulsory (or mandatory) energy standards and labelling, or voluntary agreements with manufacturers? Or is the answer, as some economist argue, to do absolutely nothing: believing global market competition will ensure improved energy efficiency.

The main bulk of the paper reviews the policies used to improve energy efficiency in brown goods. Then drawing on the work of Elizabeth Shove, a sociologist, it questions whether the concept of a 'technical potential' for appliance efficiency is meaningful in the context of the existing highly competitive and rapidly changing global market in brown goods. Finally it questions whether policies based on overcoming 'market barriers' can be successful, and argues that these policies are just a reflection of the political ideology of some 'free-market' Governments, such as the United Kingdom.

1.1. Background

Brown goods is a term traditionally used to describe home entertainment equipment, chiefly televisions (TVs), video cassette recorders (videos) and audio equipment (hi-fi equipment, portable radios, CDs etc). Recently with the tremendous increase in the range of consumer electronic appliances, it has also broadened to include communication and information appliances, of which the most important are telephone equipment (answer-phones, cordless phones and faxes), satellite TV receivers and cable TV decoders, personal computers, and clock radios.

Apart from TVs and videos there is little data on EU ownership and energy consumption of these other brown goods.

Standby Power

A particular feature of many brown goods is their continual consumption of electricity (or power use) even when switched 'off'. This feature is called standby power and is the power drawn by appliances when they are not in 'use' (or turned 'off') but are still plugged in, and consuming electricity to power internal circuits.

An important feature of TVs, videos and hi-fis is the use of a 'remote controller' to operate them. When these devices are in a state in which they can be turned 'on' by using a remote controller they are in 'standby mode', ready to respond to a signal. This requires some of the electronic circuits in the appliance to be operating, requiring some electric power. The amount used varies according to the design of the circuitry.

For TVs and hi-fis there is usually an off/power button on the set, and thus there is a choice for users whether to switch off using the remote controller or the button on the set. Again using the remote controller involves standby losses, using the button on the set does not. For videos there is no choice because there is no off button - they are always in standby mode when not in full operation. Thus for TVs the amount of standby power use depends upon user choice and habit, and could be influenced by education. In some households the TV set is switched off only using the controller (thus on standby mode all the time), in others it is always switched off at the set. The most common behaviour is to only switch off at the set when going to bed, day time switching off is via the controller.

The standby power of a video may only be 10 watts but it is on continuously, amounting to 90 kWh a year. However this cost is less than 15 ECU a year, not a noticeable sum on most householder's electricity bill.

Energy Consumption

Standby power is the fastest growing element of domestic electricity consumption. It is forecast to continue expanding, mainly due to the growth in multiple TV and video ownership, and the fact that all new products use standby power. Practically all (99%) of TVs sold now are operated by remote control, as are all videos. Also fuelling standby consumption are the devices associated with the proliferation of new products like satellite and

cable TV, and interactive computer networks such as the Internet.

EU electricity consumption in 1995 for standby mode for TVs and videos is estimated at 4.8 TWh and 9.6 TWh respectively (Lane 1996). Together this accounts for about 14 TWh. Standby consumption in the EU is rapidly growing; in the period 1990-95 it increased 53% for TVs and 44% for videos.

Based on current trends the average standby power, in the year 2010, of new TVs will 6-7 W, or less than 1 W lower than it is today; for videos the improvement is much greater, and their power use will be halved, to less than 5 W (Wajer 1995). Thus standby power consumption in the EU is forecast, for the period 1995-2010, to nearly double for TVs, but rise only by a quarter for videos. This is partly due to the rapid rise in multiple ownership of TVs to between 1.7-1.8 sets per household and VCR ownership of 0.9-1.1 sets per household in the year 2010 (Lane 1996). Also the proportion of time spent by TVs in the standby mode is projected to rise from 55% now to 75% in the year 2010, due to the replacement of old TVs without standby feature with new models with standby.

Little is known about the domestic ownership and electricity consumption of other brown goods, such as satellite TV receivers, cable TV decoders, hi-fis, faxes, computers, and clock radios. There is some data from a NOVEM study (Fuente and Zwaard 1995) together with a Swedish report by NUTEK (Sandberg and Molinder 1994) based on a survey of 500 homes. There has also been some work by this author on hi-fi ownership and associated remote control usage, based on small scale surveys and some metering (Herring 1996).

The NOVEM report estimates auxiliary TV equipment, like satellite receivers and decoders used about 3-4 TWh in 1995 in EU households. A study by this author found that standby power consumption in TVs and videos accounted for about 70% of total standby consumption, with satellite TV receivers and cable TV decoders accounting for 11%, hi-fi 9%, and other small appliances 10% (Herring 1996).

If these results held true across the EU, then total standby power consumption in 1995 in the EU is 20 TWh. This is equivalent to a third of the electricity consumption of Czech Republic, or more than that used by Ireland.

The EU Brown Goods market

The European brown goods market is very competitive. The 29 EU manufacturers of TVs and videos face an increasing challenge from low cost Asian producers. The total EU market is static, and is down in terms of value due to a polarisation of the market into two sectors. The dominant one, with two-thirds of the market and increasing, is for low cost small screen models, with very low margins. According to EACEM, the European trade association of manufacturers, EU manufacturers who incur higher costs by reducing standby power loss will loose market share to non-European manufacturers in this segment of the market.

The competitive nature of the market, driven by the consumer's desire for low prices, is further intensified by price competition between major retailers in some countries like the UK. Here 3 or 4 retail chains account for over half of sales (Herring 1996). These compete solely on price, and beat down manufacturers' profit margins.

However the NOVEM report looking at the EU market as a whole found that there is no correlation between standby power loss and price: some of the cheapest models tested by consumer organisations had the lowest standby power loss (Wajer 1996). Nor did they find any loss of consumer choice, level of performance, extent of features or ease of use caused by withdrawing models with high standby power loss from the market.

At the other end of the market is large screen, high cost models with many features. Here margins are higher, and manufacturers can, and have already, reduced standby power loss, and many have models with a loss of only 1 W (Wajer 1996).

Apart from some mention in consumer magazines there is negligible knowledge of standby power loss amongst consumers, and thus it is a non existent priority in purchase decisions. Business and government purchasers who might be more informed account for less than 3% of sales of TVs and videos (Wajer 1996).

Government involvement

The European Commission wishes to promote energy efficiency in electrical appliances, and hence reduce CO_2 emissions. The best way to do so is, however, subject to some dispute. A key question is the political acceptability of possible solutions to member governments.

Mandatory appliance standards and the use of financial incentives, such as tax benefits and cash rebates, are blocked by some states opposed to intervention in the 'free market'. Even information schemes like appliance labelling only command support if they are voluntary. The only policies that currently command majority support are those to overcome 'market barriers'. Even these are questioned by some economists, who deny the existence of 'market barriers'.

2. Energy Efficiency Polices

Some energy economists hotly dispute the existence of 'market barriers' and do not believe there is an energy efficiency 'gap' ie a divergence between socially (and perhaps privately) optimal levels of investment in energy efficiency and the levels actually seen in practice. A complete issue of the journal Energy Policy in October 1994 was given over to this debate, mainly drawing on US experience. As the editors (Huntington et al 1994) of this issue asked *what is the nature, extent and severity of the so called 'market barriers' to energy efficiency?*

In the UK this debate surfaced at the British Institute of Energy Economists' Conference at Warwick in December 1995. At the session on energy efficiency Eric Price (Price 1995) disputed all the arguments put forward to justify Government intervention. He concluded that *arguments based on imperfect market structures, imperfect knowledge, and learning curve advantages of encouraging innovative energy efficiency products are no more valid in the energy sector than elsewhere*

2.1 Are there market barriers?

Huntington and his colleagues summarise the debate thus:

> *Given the nature of the debate, there emerged a somewhat unexpected common ground on what the key issues were:*
> - *obstacles to investment (market barriers) are widespread and exist in all markets, including energy;*
> - *some market barriers (market failures) cause resources to be misallocated and justify government intervention; others do not;*
> - *information problems taking different forms are the principal source of market failures that account for the 'gap' in energy-efficient investments;*
> - *where cost-effective, policy might address other market failures unrelated to the 'gap'; divergence of average and marginal pricing in utilities, energy security, and environmental externalities;*
> - *neither the economists' nor the technologists' concept of economic potential correctly represents society's best outcome.*

But these general points should not mask important differences on what should be the role of government in promoting energy efficiency.

Consumer attitudes

While there is considerable debate over the role of government in promoting energy efficiency, there is widespread agreement among researchers and manufacturers that there needs to be a more positive attitude by consumers towards energy efficiency before they will buy energy efficient appliances and their efficient use. The reason for this changed attitude is frequently given as environmental or 'green' awareness together with the marketing of such products.

2.2 Behavioural factors

So what makes consumers have a more 'green attitude'? Veronica Strang of the DECADE project in Oxford, UK, emphasises the importance of behavioural factors. She states that energy behaviour is multi-factoral, emerging from - and combining - a wide range of influences, some tangible and readily measurable while others are wholly intangible, but can be deeply influential (Strang 1996). She believes in the importance of socio-cultural factors in understanding energy decision making, such as the centrality of personal roles and identity; the vital role played by early socialisation, the importance of community attachment and the influence of symbolic meaning in both objects and behaviour.

Thus there seems to be two strands to any government intervention: first changing or influencing consumers behaviour (the demand pull) and secondly altering markets or products (the supply push). The former is generally done through education, the latter through regulation or purchasing policies. The three most important policies that could be used to promote energy efficiency in brown goods are energy labelling, energy standards, and procurement.

2.3 Information schemes: Advice & Labelling

The least interventionist of all policies is the provision of information (or consumer education). Manufacturers are of course at the same time extolling the virtues of their products through advertising, and it may be difficult for the consumer to get unbiased advice particularly if government (or its surrogate agencies) do not wish to offend manufacturers by drawing attention to the inefficiencies of their products.

The problem for government is often trying to satisfy conflicting policies, such as promoting energy efficiency and national industry. Hence a policy of just championing the best, through an 'award' label, is judged inoffensive but have far less impact than warning of the worst, through a mandatory label.

Independent organisation, like consumer advice associations, are often perceived as more credible and effective information sources than Government.

Retail Advice

Retailers can be an effective means of giving consumer advice and promoting sales of energy efficient products. However, results from a Danish and a Dutch pilot studies indicate that provision of just information seems insufficient ,and there is little evidence of the relationship between training and consumer information on one hand and increased demand for energy efficient product on the other (Fuente 1996).

Still a conscious effort by the retailer to promote energy efficient appliances in combination with energy labels can produce dramatic effects, as is evident from the success of the UK utility Scots Hydro-electric (see below).

Labelling

A key policy in the provision of consumer information is energy labelling, and this is one of the few European Union policies to be implemented after many years of discussion. Energy labels became mandatory for refrigerators and freezers in January 1994, and for washing machines and tumble dryers in April 1996.

The effectiveness of labels is debatable. Hans Nilsson, of NUTEK has pointed out that *labels are very efficient in visual and textual description of the product performance* but disregard two simple facts (Nilsson 1995):

- One is that people are very seldom interested in energy performance per se;
- The other is that a sizeable part of the population are functionally illiterate, which means that complex descriptions are not easily understood.

However there is some evidence from Danish and Dutch studies of a positive relationship between the introduction of a label and the increased supply of energy efficiency products. The existence of a labelling scheme appar-

ently stimulates the manufacturers desire to offer more efficient appliances but appears to have a minor effect on consumer behaviour (Fuente 1996). Similar results are reported for the Swiss E-2000 label, an award label, which has stimulated manufacturers to supply energy efficiency products, and corporate purchasers to buy them (Wajer 1996).

Scots Hydro-electric scheme

Energy labels in combination with a conscious effort by the retailer to promote energy efficient appliances can produce dramatic effects. This is illustrated by the case of Scottish Hydro-electric, a UK electric utility, who launched a labelling scheme in June 1994 (six months before being required to by UK law in January 1995)

Scottish Hydro-electric trained their staff to promote energy efficient models, through making use of the energy label to draw attention to efficiency and to explain the difference in running costs, and pressed manufacturers to supply more efficient models. The result was that Scottish Hydro-electric sales of more efficient models (classes A-D) rose within 4-6 weeks, and they sold out of most efficient fridge-freezer. The composition of sales changed dramatically, with more efficient models accounting for 60-85% of sales compared to 15-50% a year earlier.

Energy star label

Another type of label can be a pass/fail label, instead of a graded one like the energy label. An example is the US Energy Star scheme for personal computers and printers which are awarded for low power consumption when on stand-by. Some 80% of US computer sales are now energy-star compliant.

Further details on energy efficient office equipment were available at a seminar organised by NUTEK on *Energy Efficiency in Office Equipment and Consumer Electronics*, held 11-13 September 1996 in Stockholm, Sweden.

Eco-label

Another type of label is the eco-label, which rates products on their environmental impact based on life cycle analysis, with only the top 10-20% of products in any category qualifying. The Blue Angel scheme in Germany is an example. For appliances energy in use is among the two most important factors over their lifetime.

2.4 Standards and Targets

The second type of policy used to promote appliance efficiency is energy efficiency standards, either voluntary or compulsory (or mandatory). In the USA compulsory standards for a wide range of appliances were introduced in 1987. However in the EU progress in defining standards has been slow, if not static, due to opposition from some member states opposed to mandatory measures, which they believe effects the competitiveness of industry and are thus in conflict with the EU goal of an internal market.

The objective of standards is to eliminate the most inefficient models on the market. However this process creates conflicts between manufacturers and government and one commentator believes that *unfortunately much of the discussion about the benefits of standards gets linked to the interest of industry and protectionism* (Nilsson 1995)

It takes about two years for manufacturers to design and introduce new models of brown goods, and the lifetime of models is 5 years, a total time of 7 years. Thus about 1/7 or 14% of models are replaced each year on the retailers shelves (but not necessarily in consumer households).,Therefore the proportion of TVs and videos for sale on the EU market with a loss of 3W could be increased from 10% in 1996 to over 50% by 1999 (Wajer 1996).

If a target is set, then existing models on the market which fail to reach it, would have to be sold at a discount of 50 ECU per set before the target date. This would involve manufacturers in a loss of 2 million ECU for TVs and 1 million for videos (Wajer 1996).

Voluntary Standards

Voluntary standards, or an agreement between government and manufacturers, have proved easier to negotiate than mandatory standards. Voluntary standards were used to raise efficiency levels for refrigerators and freezers in Germany in the early 1980s and have been used in Denmark, the Netherlands and North America to achieve a variety of environmental and energy efficiency goals. The type of agreement does however vary widely, reflecting the differences in the political traditions in the respective countries.

The EU Commission is in favour of voluntary standards if they meet certain conditions (DECADE1996):
- commitments by manufacturers accounting for most of the appliances sold on the market (say 80-90% at least)
- quantified commitments to significant improvements in the energy efficiencies of the appliances they produce over a reasonable timescale;
- an effective and independent monitoring scheme of improvements in energy efficiency.

Hence the NOVEM Report on standby power in TVs and videos recommends a EU wide voluntary agreement with well defined targets, and only advocates mandatory standards as a last resort (Wajer 1996). This is in line with the pioneering Swiss example.

Swiss targets

The Swiss government has set a series of targets for the energy consumption of most household and office appliances, including TVs and videos, such that 95% of sales have to achieve the target value. If the industry does not meet these targets by a given deadline, the government will introduce compulsory standards. There is also a voluntary labelling system whereby an award label, the E-2000, is given to the best 20-25% of the models available on the market

For TVs the target for stand-by power was 5W by end of 1995 and is 3W by end of 1997; for videos it is 6W by end of 1996 and 3W by end of 1998 (Schmitz 1996). In January each year the manufacturer have to report the energy consumption and sales number for each model. Only a third of TVs and an eighth of videos sold in 1994 meet the target values for stand-by power loss, and there are complaints that the target values are too ambitious.

Critics of such schemes say that it is easy for a country, such as Switzerland, which does not manufacture such products to impose targets; the cost does not fall on domestic industry. Dr. Schmitz of the Federal Swiss Office of Energy, defends the scheme and argues that *the procedure chosen in Switzerland indicates that a modern and innovative solution that is supported by all involved parties is realisable at low financial cost and administrative effort* (Schmitz 1996).

Even though Switzerland is not in the EU, its policy will affect the EU since Europe is seen by manufacturers as a single market. Thus, as the NOVEM report concludes, the Swiss targets will lead to a decrease in standby power consumption in EU countries, and its targets have set a benchmark for the proposed voluntary agreements by manufacturers within the EU (Wajer 1996).

Proposed EU Targets

The Swiss target values have been used by the EU study group, which involves manufacturers and the EU, as the maximum achievable policy. The NOVEM report outlines four targets for standby power in TVs and videos (Wajer 1996):

a. 3W max by 1/1/1998 for TV and by 1/1/1999 for videos
b. 3W max by 1/1/2001 for TV and by 1/1/2002 for videos
c1. 6W max by 1/1/2000 for TV and videos
c2. c1 as an intermediate target and a final target of 3W by 1/1/2009 for TVs and videos.

These 3W targets are a substantial improvement over the trend rate, which would result in a 6-7W loss for TVs

and about 5W for video by the year 2010 (Wajer 1995). NOVEM estimates that the 3W target for TVs and videos (in scenarios a, b and c2) would save 8 TWh in the EU in the year 2010, but delays in implementing it, such as in scenario b and c2 ,will reduce cumulative savings. As the NOVEM report comments the more strict the target values are the more difficult it is to have an agreement signed by all the manufacturers.

2.5 Procurement Policies

The third policy widely used to promote energy efficient appliances is technology procurement. This can help bring new technologies to market especially where it is judged there is a big gap between current efficiency levels and the technical potential. Procurement creates an initial guaranteed market for a new or improved technology and therefore reduce the risks associated with new product development.

Procurement can be funded by electric utilities, as in the USA with the Super-efficient refrigerator programme (SERP or the Golden Carrot programme). In Europe the best known programmes are by the Swedish energy agency NUTEK.

However for brown goods less than 3% of sales are to non-domestic consumers, mainly hotels, and manufacturers feel that procurement policies will have little impact on the EU market, though they could be influential on national markets.

3. Technical Innovation

Appliance markets vary in their rate of technical innovation, white goods are slow, but brown goods fast due to rapid advances in electronics. Hence manufacturers of audio-visual and computer equipment are accustomed to rapid technical change and are willing to introduce new features, such as remote control, if they believe there is consumer demand.

With such rapid technical change there are obviously going to be market 'leaders' and 'laggards' in the use of new techniques. Nokia, for example, have introduced TVs with very low stand-by loss of 0.1 Watt based on use of infra red (IR) designs. Other manufacturers use the traditional designs using partial secondary stand-by which can use 12 watts (Wajer 1995).

If all manufacturers were to adopt Nokia's design there would be a 95%+ saving. Thus the 'technical potential' is enormous. But does this 'technical potential' illustrate the existence of 'market barriers' and hence justify policymaker's 'interference' in the market? What proportion of this technical potential' can be achieved and on what timescale? Is it worth policymakers bothering about, or will the rapid pace of technical change ensure that all manufacturers will adopt this new design within a few years thus rendering policies superfluous?

These questions cannot be answered unless there is a very good understanding of the forces behind technical change in the brown goods market. This understanding must rely on an inter-disciplinary approach, particularly on the extensive literature of sociology of technical change.

3.2 A sociotechnical theory of energy efficiency

A powerful critique of current policies based on the idea of 'technical potential' and 'market barriers' was put forward by Elizabeth Shove, at the last ECEEE Conference. (Shove 1995). Drawing on recent studies in the sociology of science and technology which suggest that technologies, including technologies of energy conservation, imply a certain set of social relations, she argues that the conventional view of technology transfer is flawed and inaccurate.

Shove argues that policies to encourage technology transfer (such as one to overcome 'market' or other barriers) lack an appreciation of the social context of energy saving action and of the socially situated character of technical knowledge. She thus rejects the idea that *energy related choices are made by free, more or less knowledgeable indi-*

viduals whose rational economic actions may be clouded by a variety of "non technical", social or psychological barriers

Having arrived at the notion that there are no barriers and obstructions to overcome, she then looks at the practical implications for government policy and research activities. As she admits:
...it is difficult to discern a ready justification for the direction and extent of government involvement. Justifications framed in terms of basic research and development, technology transfer and market failure carry much less weight when technical change is viewed as an inextricably social process

However she still sees a role for government supported research, only *that different languages are required*. As she says *At the very least, this implies a significant re-ordering of disciplinary interests within the research world.*

Policy ideology

The formulation of energy efficiency policy is, like all policies, influenced by the prevailing government ideology. In some EU countries, such as the UK, this is heavily influenced by classical free market theory with emphasis on choice, competition and rational decision making. Under this view choices are made (or should be made) by free knowledgeable individuals but (regretfully) their rational economic actions may be clouded by a variety of barriers, such as apathy, ignorance, traditionalism and idleness. What is needed (to overcome these barriers) is information and incentives.

Hence it is no surprise that, in countries that espouse free market ideology, energy conservation policies place much emphasis on overcoming market barriers and on decision making by individuals rather than social groups.

Thus Shove's criticism of policies based on 'market failure' are perhaps more a criticism of policies based on free market ideology than the failure of the the classic model of technology transfer. However she is right to stress the social and organisational context of individual (and collective) decision making, and study of this may explain inter-country differences in uptake of energy efficiency technologies. As she points out *what qualifies as reliable, cost effective, worthwhile energy savings measure in one socio-cultural domain might count for nothing in another*

Implications for brown goods

There is a very large technical potential for reducing stand-by losses in TVs and videos, if all manufacturers adopted the most efficient technology. But will they? What may be economic and market sense for TV manufacturers in one country may be commercial suicide for manufacturers in another country.

There is no guarantee that best practice will over time be adopted by the least innovative manufacturers. The simple model of technical diffusion of best practice spreading to all, and of government help needed to overcome '-barriers' to adoption may indeed be flawed.

4. Conclusion

A European Commission study produced by NOVEM (Wajer 1996) has shown that there is a very large technical potential for reducing standby power losses in TVs and videos, if all manufacturers adopted the technology used by the most efficient. The cost to manufacturers is very small, 3-5 ECU per set, it is cost-effective to consumers, and does not interfere with freedom of choice. Furthermore it would provide a modest, but useful, contribution to the EU goal of reducing carbon dioxide emissions by producing electricity savings throughout the EU of 8 TWh by 2010.

The question is what government policies can best achieve this potential: mandatory standards, voluntary agreements or simply doing nothing? Will the 'free market' based on competition, rather than government intervention, ensure energy efficiency?

4.1 Market pressures

The EU market for brown goods (TVs, videos, hi-fis etc) is intensely competitive with a large range of products and manufacturers. It faces increasing competition from low cost Asian producers. About half of consumers purchase solely on the basis of price, and considerations (and knowledge) of energy consumption are completely lacking.

When a consumer is spending 500 ECU on TV or Video, what is the significance of 15 ECU a year running cost for standby power? Manufacturers claim that by offering a more efficient, but more expensive, product in the absence of consumer demand they would simply loose sales in a market dictated solely by price. However research by consumer organisations indicates that there is no correlation between price and standby power loss.

The NOVEM study concludes that a 3W target for standby power loss in TVs and videos is technically feasible, and could be implemented within a few years. This is because there is a rapid turnover of models. New, more efficient, designs can be on the market in 2 years, and existing models only have a life of 5 years. The problem for manufacturers is getting rid of models that fail to meet a specified target value by the target date. These have to be sold at a discount, but the cost to manufacturers is only a few million ECUs, a small amount compared to normal redesign costs.

4.2 Efficiency policies

The range of policies available to the EU to promote energy efficiency in brown goods is limited. The most effective policy compulsory (or mandatory) energy standards are viewed by some countries with hostility, and as a barrier to ‘free trade’. Even those proposed for refrigerators and freezers, where potential savings are very large, have encountered years of delay and the end result has been a standard level weakened by compromise and likely to be overtaken by the steady progress of technical improvements. Besides political opposition there is the argument that the rate of technical change in brown goods is too rapid for mandatory standards.

Another policy, procurement seems unwarranted in most EU countries since there are already highly efficient models available on the market. Also non-domestic consumers, who would be the target for procurement policies, only account for a very small proportion, less than 3%, of the EU market.

Energy Labelling

The only policy that commands support is some type of energy labelling and voluntary agreements with manufacturers. Compulsory labelling (the EU Label) is supported by EU consumer organisations and by some EU governments but opposed by manufacturers. They prefer a voluntary label (the Award Label) which is only given to the best (most efficient) 20-30% of models or on demonstration models .

An analysis of the merits of various types of energy labelling by the NOVEM study found that the EU label would have a stronger effect than the Award Label in producing energy savings and influencing the supply of efficient models. Again European consumer groups when presented with a range of policy options to reduce standby consumption of TVs and videos, preferred mandatory EU energy labelling, rather than voluntary labelling.

Research, however, indicates that energy labels only have a weak effect on consumer purchasing decisions, but have encouraged manufacturers to supply more efficient models. Nevertheless experience of the UK utility, ScotsHydro, indicates that energy labels, in conjunction with a sales strategy to promote efficient models, can be very effective.

Voluntary Agreement

The prime example of a voluntary agreement with manufacturers to improve efficiency is the Swiss scheme. Their targets have set the benchmarks for a proposed EU voluntary agreement with industry on reducing standby power loss in TVs and videos. Three other weaker targets are also being considered. Which target is agreed on is sub-

ject to negotiation but as the NOVEM Report comments the more strict the target values are the more difficult it is to have an agreement signed by all the manufacturers. Nevertheless a voluntary agreement based on a 3W target achieved by the year 2010, or even better by the year 2002, would be a big improvement compared to the current trend in efficiency improvement.

Free market v Regulation

There are two philosophies behind energy efficiency policy: free market and regulation. The former, which is currently dominant in the EU, calls for the dismantling of barriers to free trade, and the removal of regulations that hamper competition and consumer choice. It is thus strongly opposed to any compulsory, or mandatory, policies like efficiency standards. Energy efficiency improvements, it believes, will come from global competition once 'market barriers' have been removed. The results may be unpredictable but consumer benefits are maximised and costs minimised.

The regulatory approach believes in regulation to achieve specified targets. There may be extra cost to manufacturers and consumers but these are outweighed by consumer savings. In contrast to the free market approach the results are predictable but consumer costs are uncertain.

The policies also differ in their attitude to innovation, a particularly important issue with brown goods. The former stresses the benefits of competition while the latter emphasises the importance of long term planning. However regulation may stifle the introduction of new product concepts , such as multimedia concepts, video on demand, digital television or new features like wide screen or flatscreen technology. There is also the danger of regulations being overwhelmed and made obsolete by such technical advances.

At the heart of the question of energy efficiency policies is the EU's targets for CO_2 emissions. Can a target be met by free market policies, with a high enough degree of certainty? And if it cannot be met with certainty what is the point of having it?

Who looses?

Obviously any policy produces winners and losers. The free market approach with emphasis on global competition is likely to favour the import of low cost models from Asia. They are unlikely to be energy efficient, or their manufacturers to agree to a voluntary standard with any teeth. Hence energy efficiency will have low priority and improvements will be slow. EU consumer's electricity bills and the environment will suffer from higher emissions but consumer choice may be expanded.

In contrast regulations on energy efficiency may act as a trade barrier, and keep out inefficient Asian imports. Regulations can ensure energy efficiency has a higher priority in consumer purchases. However it may by protecting EU manufacturers stifle the introduction of new products. The environment will benefit from lower emissions, as will consumers from lower electricity bills.

The arguments for and against free trade have been around for the last few centuries. The old debate about its costs and benefits for the consumer and industry is now joined by the new one of the environment.

Until environmental issues become important to consumers and hence EU policymaking, energy efficiency is likely to remain a low priority to manufacturers of brown goods. Energy efficiency may be, as in many manufacturing processes, simply a by-product of technical innovation. If this is the case attempts to promote energy efficiency per se may be futile. What may be more effective are policies to promote innovation or 'green' design that have as an (incidental) by-product the result of improving energy efficiency. Promoting superior performance and quality may be the route to promoting energy efficiency, and if the two can be linked in manufacturers minds so much the better.

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