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INSTITUT D'ECONOMIE ET
DE POLITIQUE DE L'ENERGIE
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CAHIER DE RECHERCHE N° 28 BIS

**Can negotiated agreements
replace efficiency standards as an instrument
for transforming the electrical appliance market?**

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Mars 2002

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Abstract:

Without reinforced energy saving policies, residential consumption of electricity will increase sharply over the next twenty years, in particular as a result of expected growth in the specific uses of electricity. The main problem is not a lack of energy efficient technologies, which do indeed exist for electrical appliances, but one of slow diffusion of existing technologies due to the weakness of the price signal and the purchasing behaviour of consumers. In association with energy labelling, minimum efficiency performance standards have proved to be very effective in stimulating technological progress and organising market transformation. But standards also suffer from long and often difficult implementation periods because of the resistance of the industrial sector. For manufacturers, similar results could be obtained more easily and more rapidly with voluntary agreements because they introduce flexibility margins in the achievement of commitments. This paper analyses the specific advantages of voluntary agreements for improving energy efficiency in the domestic appliances sector. We conclude that voluntary agreements may be an effective instrument for market transformation in certain conditions, but the alternative of regulatory measures must remain a credible, realistic threat if voluntary agreements are to have a really significant impact on performance improvement.

1. INTRODUCTION

Worldwide electricity consumption has displayed a remarkably stable growth profile over the last twenty years (Bourdaire, 1999), making control of electricity demand, along with that of transport sector energy consumption, one of the main stakes in the prevention of climate change.

A slowing down in the growth of the consumption of electricity is not incompatible with continued development of its uses, but there must be greater focus on energy-efficient technologies. At the moment, because firms are offered little incentive to innovate, technical progress has not kept abreast with the environmental stakes. Policies to combat climate change must thus place particular emphasis on promoting innovation and encouraging the diffusion of energy efficient technologies in the electric power sector.

The strategy adopted by the European Union has been to accelerate the diffusion of energy efficient technologies by associating a consumer information device - a labelling programme - with a regulatory device in the form of minimum energy efficiency standards. Energy labelling of domestic cold appliances¹ thus became compulsory in all the European member states in 1995. This was followed in 1999 by minimum energy performance standards designed to eliminate the least efficient products from the market.

This combined approach was effective in transforming the household appliance market, with labelling acting as an incentive to innovate and thereby complementing the regulatory approach which is generally not very effective in stimulating innovation. However, regulations raise a lot of opposition among manufacturers and consequently often require considerable time for implementation. The more flexible solution of voluntary agreements (or negotiated agreements, to use the terminology adopted by the Commission) thus emerges as a possible alternative that is easier to implement while remaining just as effective.

This paper examines the effectiveness of policy instruments aimed at accelerating the diffusion of more energy efficient appliances on the consumer goods market. Traditional theoretical analyses have generally emphasised the limitations of regulatory approaches which provide solutions which are overall not very effective, and which do not provide the same incentive to promote technological change as economic instruments (Milliman and Prince, 1989). We shall show how efficiency standards can be associated with labelling programs to create an effective "technology forcing" instrument. Similarly, the principle of negotiating energy efficiency improvements in the framework of voluntary agreements introduces an element of flexibility (differentiation of objectives) which can help limit the risks of ineffectiveness of regulatory measures.

In the first part of the paper, we review the reasons for the expected rise in domestic electricity consumption and the influence of consumer preferences on the improvements in energy efficiency of electrical appliances. We then examine the impact of labelling programmes and efficiency standards on the transformation of the cold appliance market. This example illustrates how by combining different instruments it is possible to go beyond the usual limits of regulatory approaches in stimulating technological change. Finally, in the third part of the paper, we discuss the theoretical advantages of negotiated approaches and the questions raised by their actual implementation (sharing of the burden, cooperation between

¹ Energy labelling subsequently became compulsory for other domestic appliances, in particular, washing machines, dishwashers, clothes dryers, and residential lighting equipment.

firms, freeriding, etc.) based on recent agreements signed by the European Commission. Our discussion concludes that negotiated agreements cannot be considered an alternative to efficiency standards since such agreements can be truly effective only if there is a constant, credible threat of regulations.

2. USING PUBLIC POLICIES TO STIMULATE ENERGY EFFICIENCY IN THE HOUSEHOLD APPLIANCE SECTOR

The possibility of controlling growth in electricity consumption, especially in the residential and tertiary sectors, is one of the conditions for reducing greenhouse gas emissions in virtually all the industrialised countries. The technological opportunities for improving the energy efficiency of electrical appliances are numerous (IPCC, 2001), but because of market risks these opportunities have not been sufficiently explored by manufacturers. Public policies introduced in this field are designed to accelerate the penetration of more energy efficient technologies and to inject more momentum into the process of technological change.

2.1 A steady rise in electricity consumption

In the European countries, electricity consumption has risen much more sharply over the last few years in the domestic and tertiary sectors than it has in the industrial sector. Between 1990 and 2000, electricity consumption in the former increased by 2.6%/yr, while in the industrial sector it rose by only 1.4%/yr. This steady rise is due essentially to the growth in consumption for so-called specific uses, such as lighting, electrical appliances and consumer electronics, and to the growth in the market for new types of equipment.

Electricity consumption for specific uses is likely to continue to rise at a similar rate over the next few years. In fact, even though the growth in consumption for large electrical appliances (washing machines and refrigerators) has slowed down due to the fact that ownership has gradually reached a saturation level², the same is not true for other household appliances (dishwashers, microwave ovens, clothes dryers and small appliances) where ownership levels are much lower³.

Similarly, consumption for lighting is still rising due to the increase in the number of households and the number of light sources in each home (Cahiers du CLIP, 1997). As regards brown goods, vigorous sales of equipment associated with the development of audio-visual technologies (multimedia computers, TV, video cassette recorders, DVD players, satellite receivers, etc.) show quite clearly that the market is undergoing a period of strong growth, with saturation not foreseeable at present.

A prospective study commissioned by the French government for the years 2010 and 2020 indicated that electricity consumption for specific purposes is likely to virtually double over the period 1992 – 2010, while total electricity consumption in the residential sector over the same period is expected to increase by only 40% (CGP, 1998).

² The electricity consumption of domestic cold appliances nevertheless accounts for 17.4% of consumption in the residential sector in the European Union, for a total of 107 TWh (CEC, 2000).

³ Certain needs are still far from being satisfied; dishwasher ownership should thus increase by 50% between 1995 and 2010 while ownership of clothes dryers is expected to double in the same period.

2.2 Consumers preferences and energy efficiency gains

This expected rise in electricity consumption for specific uses need not be inevitable. It could at least be slowed down through the increased use of energy efficient technologies in the household appliance sector. This would require sustained technological progress aimed at improving energy efficiency in this sector.

It is true that general advances in scientific and technological knowledge have led to a steady improvement in the performance of components and a reduction in the unit energy consumption of appliances. For example, the electricity consumption of domestic cold appliances decreased by about 40% between the beginning of the 1970s and the early 1990s, while over the same period the average power consumption of washing machines fell from 3.4 kWh to 1.7 kWh for a long wash program (GIFAM, 1994). However, in the absence of special policies, the energy price signal is not strong enough to motivate consumers or incite manufacturers to set up research programmes aimed at improving energy efficiency.

Until recently, consumers did not give preference to the energy efficiency factor when choosing household appliances. The reasons for this lack of interest are known: insufficient information, apparently limited monetary savings, lack of awareness about running costs, preference for present rather than future savings, etc. Consequently, there was no evidence of a market structure based on energy efficiency. In fact, the energy efficiency of some top-of-the-range appliances was worse than that of appliances which cost two or three times less. Since consumers were not interested in energy performance, manufacturers did not include this factor in their product development strategies.

In fact, until special policies were introduced to stimulate the adoption of energy efficient technologies, innovation in energy efficiency was insignificant and concentrated mainly in those European countries that have a stronger tradition of environmental awareness. Innovations have been reserved for certain markets, or market niches, where they could enhance the value of the products (top-of-the-range appliances from some manufacturers), or for the Northern European markets in general.

The publication of the European Directive on energy efficiency labelling followed by the introduction of minimum energy performance standards⁴ has considerably transformed the European domestic appliance market and stimulated innovation driven by the energy efficiency factor.

3. THE COMBINED EFFECTS OF LABELING AND EFFICIENCY STANDARDS IN STIMULATING TECHNOLOGICAL CHANGE

The European policy concerning transformation of the domestic appliance market was implemented essentially through two complementary measures: labelling programs to improve consumer awareness and minimum energy performance standards. This combination may seem paradoxical in that minimum performance standards are supposed to replace ineffective economic instruments, whereas the primary purpose of labelling is to stimulate the manufacture and purchase of energy efficient appliances. Experience in the European Union over the last few years has proved, however, that these two instruments can co-exist very

⁴ Directive 92/75/EEC of 22 September 1992 on energy labelling and Directive 96/57/EC of 3 September 1996 on the minimum energy efficiency of domestic cold appliances.

effectively and have very interesting characteristics where stimulating technological change is concerned.

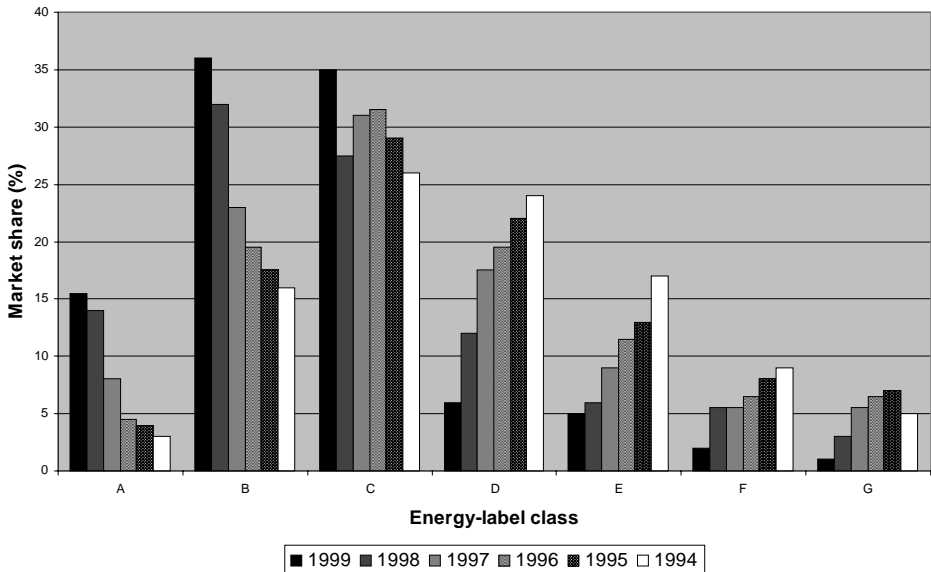
3.1 Impact of energy labelling on purchasing behaviour

Lack of information for consumers is generally considered to be one of the main barriers to improving energy efficiency through the adoption of more energy efficient technologies. Comparison labels and endorsement labels are two ways of solving this problem by providing information on the energy efficiency of appliances, thereby encouraging consumers to compare products and choose the most efficient.

Comparison labels enable consumers to compare the energy efficiency of all the products in a particular category (refrigerator/freezers, clothes dryers, washing machines, etc.). The European Label –EUR- or EnergyGuide – USA are examples of such labels. Endorsement labels simply identify appliances which are particularly energy efficient. An example is the Energy Star program in the USA. The first type generally apply to all the products on the market, whereas endorsement labelling is a voluntary scheme in which manufacturers may participate.

Following the example of the USA and Canada, Europe introduced a framework for energy labelling in 1992 (comparison labels). The program became effective in 1995 for domestic cold appliances and has gradually been extended to cover other household appliances. This measure has undoubtedly contributed to transforming the domestic appliance market even if its impact is difficult to distinguish from the general trend in improved energy efficiency resulting from improved knowledge (cf. supra). An analysis of sales from 1994 to 1999 shows a clear trend towards greater overall energy efficiency in the domestic cold appliance market in Europe, with a significant shift in sales towards more efficient appliances (classes A, B and C) at the expense of the less efficient classes (E, F and G). By the end of the 1990s, there was a 30% improvement in average energy efficiency compared with the beginning of the decade (COLD II, 2001).

Fig. 1: Cold domestic appliance sales in Europe



Source: COLD II, 2001

Energy labelling thus led to a transformation of the cold appliance market but, paradoxically, this transformation seems to have stemmed less from a change in consumer preferences than from changes in the marketing strategies and in resulting structure of sales (ECU, 1998). The influence of labelling on the innovation strategies of manufacturers can be interpreted as follows: anticipating changes in consumer preferences or future regulations, manufacturers discontinued certain models that had become difficult to sell (expensive and not energy efficient), improved - sometimes marginally - the appliances destined to remain on the market⁵ and gradually introduced new more efficient products. In 1998 at the Confortec electrical appliance show, all the manufacturers had introduced new more efficient models into their product ranges, and some had focussed on energy efficiency by presenting mainly class A and B appliances.

Labelling is thus a powerful instrument for differentiating products, and one which can promote innovation among manufacturers who wish to use this device to improve their competitive position or to gain an edge in new market niches.

But labelling programs clearly have their limits. Their success depends to a great extent on the differences in efficiency between appliances and the related financial stakes for purchasers. Furthermore, labelling does not prevent the least efficient models from remaining on the market nor consumers from buying them. For this reason, programs imposing minimum energy performance standards for household appliances generally accompany labelling programs.

3.2 Labelling and efficiency standards: a necessary complementarity

By definition, efficiency standards are based on a regulatory process which affects all the manufacturers⁶ in a particular country or economic region. In the USA, the National Appliance Energy Conservation Act (NAECA) of 1987 established the first federal standards for refrigerators and freezers, boilers and furnaces, air conditioners and several other household appliances. More recently, Australia and the countries of the European Union also decided to set minimum energy performance standards. The aim of such standards is to complement labelling schemes or to replace them in cases where the energy price signal is not strong enough to encourage consumers to purchase the more efficient appliances, which may happen even though comprehensive information is supplied.

In Europe, domestic cold appliances were the first to be subjected to performance standards⁷. The standard was chosen so as to obtain an improvement of 10 to 15% in the average energy efficiency of new appliances. Appliances not belonging to efficiency classes A, B or C could

⁵ P. Waide observes that "...very large peaks in sales were found to occur for energy efficiency indices coincident with the minimum requirement of the higher efficiency classes... partly due to a manufacturer response to the label that seems to have involved making the minimum modifications necessary to position products in the higher efficiency class". In "Monitoring of energy efficiency trends of European domestic refrigeration appliances: final report", PW consulting for Ademe, 1999.

⁶ Directive 96/57/CE of the European Parliament: "Member States shall take all necessary measures to ensure that refrigeration appliances covered by this Directive can be placed on the Community market only if the electricity consumption of the appliance in question is less than or equal to the maximum allowable electricity consumption value for its category as calculated according to the procedures defined in Annex I."

⁷ Energy efficiency standards for refrigerator/freezers have been in force since September 1999 in France; only appliances in energy efficiency classes A, B and C can be sold.

no longer be sold, which meant that 40 % of the appliances on sale in 1996 had to be withdrawn from the market.

The effectiveness of the regulations is evident from an examination of the new products introduced on the market: “all D, E, F and G appliances have been removed from the market, with the exception of chest freezers, for which E-class appliances can still be sold” (Appliance Efficiency, 2000). Are we to understand that labelling has just been a preparatory step to the introduction of legislation on energy efficiency, the latter being ultimately the most effective instrument for transforming the market? Does labelling still have an impact or can such schemes be discontinued to leave efficiency standards to do the job alone?

In fact, what is most important is the catalytic effect of the instrument, in other words the extent to which it can stimulate technological progress and create a sustained effort to improve energy efficiency. It should be borne in mind that when efficiency standards are introduced, manufacturers are encouraged to improve their products so as to comply with legislation, but it does not necessarily encourage them to develop new highly efficient products if they are not required to do so by the consumers. To promote innovation, very stringent energy efficiency levels must be imposed, so that manufacturers will be compelled to innovate, or provision must be made for a gradual tightening up of regulations taking into account the improvements already made. But without additional incentives, the energy efficiency of appliances would remain overall much the same, since (most) manufacturers would simply ensure that their products were positioned just beyond the regulatory performance level. Manufacturers can in that case oppose the introduction of new more stringent standards by arguing that the new targets are not realistic from a technological or economic point of view.

The advantage of labelling programs is not simply that they facilitate the introduction of standards by defining efficiency classes that can be used to determine the authorised efficiency levels. Labels also have a very important role in encouraging differentiation and are thus an incentive to technological progress. With minimum efficiency standards alone, most manufacturers would simply ensure that their products were positioned beyond the authorised performance level. With labelling, manufacturers have the possibility of differentiating their appliances from standard products, something they can achieve through innovation. This will gradually have an impact on all the appliances on the market and ultimately lead to higher efficiency standards.

By stimulating the arrival of new more efficient products on the market, labelling schemes thus condition the effectiveness of regulations. Such schemes must be constantly reviewed if they are to remain a way of differentiating between products. If efficiency classes are not redefined regularly, the combined result of labelling and standards will be that most appliances will be positioned in the highest efficiency classes and it will be impossible to identify new appliances that are even more energy efficient. A labelling scheme which can evolve and which operates in conjunction with minimum performance levels that are periodically revised thus seems to be a particularly effective method and one that appears well suited to the transformation of the household appliance market.

The main disadvantage is that manufacturers in general are not very open to this type of approach, so that the effectiveness of programs can be limited by long delays and

implementation problems (P. Bertoldi, 1999). Negotiated agreements between manufacturers and public authorities can then be a more effective alternative to regulations.

4. VOLUNTARY AGREEMENTS: AN ALTERNATIVE TO REGULATIONS?

Since the early 1990s, voluntary agreements have been considered an instrument of environmental policy in their own right (S. Baecke and alii, op. cit.). They are no longer limited to certain sectors such as waste management, electricity generation, or the high energy-consuming industries but have been gradually extended to other sectors, including fairly recently to the home appliance market.

Recently the European Commission negotiated agreements with manufacturers of televisions and video cassette recorders, as well as with washing machine manufacturers, with the aim of improving the energy efficiency of these appliances (CCE, 2000). Reflecting the position of certain member states and a large majority of manufacturers, the Commission is showing a growing interest in such negotiated agreements, which are increasingly seen as an alternative to what are felt to be overly restrictive regulations.

4.1. More effective than regulations from a theoretical point of view

In theory, voluntary commitments have a number of features which, in economic terms, make them more effective than regulatory measures.

In reality, when it comes to defining efficient environmental objectives in economic terms, public authorities are penalised by their poor knowledge of existing technical options and the cost of implementing them. There is thus information asymmetry between manufacturers, who are very well informed about technologies and costs, and the regulating authority. The consequences have two aspects:

- it is in the interest of firms subjected to the regulations to overestimate pollution abatement costs to encourage the regulating authority to define less restrictive overall objectives.
- it is impossible to impose differentiated objectives to take into account the particular situation of each firm. This means that marginal pollution abatement costs differ for each firm, which for the economist characterises an inefficient solution.

Voluntary agreements have a theoretical advantage in this respect in that distribution of the objectives among the different firms is left to the firms themselves. Pollution abatement objectives can thus be allocated among the firms according to their particular technical possibilities and implementation costs. Cost minimisation is reached if the allocation leads to the equalisation of private marginal abatement costs; the distribution of objectives is then optimal (Glachant, 1999). In reality, burden sharing is not necessarily optimal, but the principle of negotiating individual commitments introduces an element of flexibility not found in the regulatory approach.

Furthermore, the inter-firm negotiations and cooperation that are necessitated by voluntary commitments in any given sector can contribute to a collective learning process that is beneficial to each individual firm: "When using voluntary agreements, intense collective learning improves information of the firms and allows them to implement their private pollution abatement objectives at lower cost" (M. Glachant, 1999). This works for a relatively

homogeneous business sector and in a context of general uncertainty : all the firms are in the same situation of uncertainty concerning available techniques and related costs, and are more encouraged to co-operate with one another to make up for the lack of information (C. Defeuilley, 2000).

Another advantage of voluntary agreements compared with regulations is that the negotiation framework gives firms the chance to participate directly in defining the objectives and the target dates for implementation. It is true that public authorities may also consult industry when drawing up regulations, but it is the regulator that has the final word. In the case of voluntary agreements, the objectives are defined jointly by manufacturers and the public authority.

Voluntary agreements also have a number of advantages for public authorities:

- Similar environmental objectives can be reached in a shorter time and at a lower cost than in the case of regulations because of the voluntary nature of manufacturers' participation.
- Where there is asymmetry of information (general case), negotiating with companies can provide the regulating body with the opportunity to obtain information about technologies and implementation costs.
- Finally, since commitments are partly self-monitored by participating companies, public administration and monitoring costs are reduced.

But voluntary agreements have different limits. When a few firms make a voluntary commitment, the others may feel that they do not have to make any significant effort to reduce pollution and the overall impact on pollution abatement may be limited. Voluntary agreements must therefore involve a large majority of manufacturers in the market if there is to be any effective benefit to the environment.

Moreover, the real environmental impact of a voluntary agreement cannot be measured simply in terms of achieving objectives. The objectives themselves must correspond to a real effort on the part of firms and not simply be part of a general trend in energy efficiency improvement. Since such agreements are by definition the fruit of negotiations where each party does not have the same information, the regulating authority does not know the real effort that will be required from the firms involved. The objective agreed upon may correspond to the general trend in energy efficiency improvement and require no additional effort from the manufacturers. In this case the agreement would have no environmental impact in itself.

Finally, voluntary agreements can be upsetting for individual markets. Where a limited number of companies are signatory, non-participating firms benefit from short-term advantages (continued use of high-pollution, low-cost technologies, limited R&D investments, etc.) compared with those who agree to contribute to a joint effort to respect pollution abatement commitments (freeriding behaviour). On the other hand, an agreement limited to a few firms with a certain technological lead could give them a strong market position and end up creating unfair competition.

Table 1: Effectiveness of regulations and voluntary agreements

	Regulations	Labelling and regulations	Negotiated agreements
Participation of firms	-	+/-	++
Implementation time	-	-	++
Administrative costs	-	-	+
Incentive to innovate	-	+	+/-
Environmental impact	+	++	+/-

4.2. Voluntary agreements in the household appliance sector

A number of basic conditions must be met for voluntary agreements to be implemented and for them to have a certain impact in environmental terms. These conditions can be examined using the example of the voluntary agreements negotiated by the European Commission to improve the energy efficiency of household appliances.

In 1997, the EACEM (European Association of Consumer Electronics Manufacturers) approached the European Commission concerning a voluntary agreement to reduce the energy consumption of televisions and video cassette recorders in standby mode. In this agreement, the manufacturers agreed that from 1st January 2000⁸ they would market only televisions and video cassette recorders with standby mode energy consumption of no more than 10 watts. In addition, the average energy consumption of all the appliances sold by a single manufacturer must not exceed 6 watts.

In 1996, the European Committee of Domestic Equipment Manufacturers (CECED) submitted a proposal to the Commission for a voluntary agreement to improve the energy efficiency of washing machines. This proposal resulted in an agreement approved in December 1998 whereby manufacturers agreed:

- To improve the energy efficiency of washing machines sold in the countries of the European Union: overall reduction in energy consumption of 20% for the period 1994-2000,
- To gradually cease production and import of the least energy efficient models (energy label classes D (partially), E, F and G) in two stages (Dec. 1997 and Dec. 1999),
- To provide consumers with information on energy efficiency (how to save energy and water by means of proper use of the washing machine), conduct research programmes on low temperature washing techniques, and co-operate closely with detergent manufacturers.

- Similar to regulations, but more flexible

Voluntary agreements of this type have a great deal in common with the performance standards introduced for cold appliances. As happened in the case of refrigerators, voluntary

⁸ The manufacturers agreed to provide an independent expert with precise information on the sales and unit consumption of each TV model, to inform consumers of the energy consumption in standby mode of televisions and video cassette recorders, and to participate in ongoing research aimed at reducing the energy consumption of consumer electronics equipment.

agreements anticipate the gradual removal of the least efficient models from the market. A first analysis would therefore seem to suggest that they have no particular interest for manufacturers compared with regulations, where they can play for time to delay implementation.

However, the negotiation process includes a certain dimension of flexibility which the regulatory approach does not have. In the case of televisions, the agreement called for improved energy efficiency for new equipment but the objective was defined by a sales-weighted efficiency indicator. Rather than having to simultaneously improve the efficiency of all their appliances, manufacturers had the possibility of stepping up the introduction of new more efficient models on the more dynamic markets and delaying the discontinuation of less efficient models on other markets. In the case of washing machines, the low-efficiency models were written off in stages (end of 1997 then end of 1999) and manufacturers were able to maintain less efficient appliances⁹ on certain markets where they represented a significant proportion of sales. If all the washing machines sold in Europe had had to achieve the same improvement in energy efficiency, average prices would have increased by 1 to 2% in Northern Europe but by as much as 8 to 14% in Southern Europe and the United Kingdom where the proportion of machines in the low efficiency classes is highest (CEC, 2000). Negotiated agreements thus introduce a certain flexibility by differentiating the objectives of manufacturers according to the markets, in contrast to regulations which would be applied across the board in all member states and would upset markets to a much greater extent.

It should be noted that voluntary agreements do not explicitly identify different objectives among manufacturers, each being responsible for making a similar contribution to achieving the common goal. But the flexibility that they are allowed in relation to the markets concerned means that in effect there is differentiation. Manufacturers of household appliances do not all have the same opportunities to improve the energy efficiency of their products. Some companies have a technological edge compared with their direct competitors or, if they are manufacturers of high-end products, they can pass on the extra cost to the consumer. Furthermore, the European markets are extremely heterogeneous in terms of how consumers perceive the energy efficiency factor: At the time the agreements for washing machines were concluded, between 10 and 11% of machines sold in the European Union did not meet the new requirements, but for certain manufacturers this proportion was in excess of 30% of sales (CEC, 2000). It will be much easier for manufacturers operating mainly in areas where there is a greater tradition of environmental awareness (Northern Europe for example) to sell energy efficient products than for their counterparts in markets where there are no such traditions. Allowing a longer time for non efficient models to be withdrawn from Southern European markets amounts to granting certain manufacturers a longer period of adjustment. The flexibility inherent in negotiated agreements thus corresponds to a certain differentiation in objectives between manufacturers to allow for highly contrasting situations and significant differences in the costs to each company.

- Willingness of firms to cooperate

It may seem paradoxical to expect firms in sectors that are characterised by fierce competition to cooperate by accepting differentiated objectives. Borkey and Glachant (1999) point out that it is difficult to imagine that a firm whose pollution abatement costs are low will make an extra effort to save a competitor from having to take more costly measures. Thus, competition

⁹ Small models or those with low spin speeds in Class D.

remains a major obstacle to the efficient allocation of pollution abatement efforts among firms (Defeuilley, 2000).

On the other hand, cooperation is mutually beneficial to companies in sectors which are fairly homogeneous and when there is general uncertainty regarding available techniques. In the present case, the sectors are clearly not homogeneous in terms of national markets (cf supra) but they are probably characterised by strong uncertainty concerning the technologies that can be introduced to enhance energy efficiency. None of the players has a sufficient competitive advantage over its main competitors to be tempted to turn down a cooperative solution in favour of regulations (Aggeri and Hatchuel, 1996). On the contrary, it is in everyone's interest to share available information and benefit from collective learning when it concerns technological development judged to be non strategic¹⁰.

- The regulatory threat: a decisive factor

While the prospect of sharing certain costs and concerns about their public image have encouraged firms to negotiate agreements, the main incentive has been the desire to avoid the increasing threat of regulatory measures being imposed. The possibility of regulatory measures in the household appliance sector became very realistic following the introduction of minimum efficiency standards for domestic cold appliances. Since the bargaining power was then in the hands of the public authority (in this case the European Commission), it was able to impose goals very similar to those that would have been obtained by energy efficiency regulations, with the profession obtaining in exchange a certain flexibility regarding implementation periods and methods.

The possibility of regulatory measures must remain a realistic threat. The level of constraint imposed, and thus the type of incentive to be offered to firms, depends on the respective powers of the companies and the public authority. A very restrictive requirement (realistic threat of regulations) may result in ambitious objectives that force firms to make real additional efforts. On the other hand, if the threat of regulations is not really credible, the public authority's negotiating power is limited and companies have considerable room for manoeuvre, with the consequent risk of accepting commitments which are not very different from general market trends (Segerson and Micely, 1997).

The credibility of the regulatory threat depends directly on the information the public authority has regarding the firms' room for manoeuvre, the technological opportunities available and the implementation costs. Considerable preparatory work is thus essential so that the regulating body can obtain a maximum of information and negotiate ambitious targets (Krarup and Ramesohl, 2000). This means that negotiated agreements do not necessarily involve shorter implementation times or lower preparation costs than the regulatory approach.

¹⁰ The difference in electricity consumption between a standard washing machine and an energy-efficient washing machine is only about 20 to 30 kWh/yr whereas for a refrigerator the difference can be as much as 200 kWh/yr.

5. CONCLUSION

Negotiated agreements are effective instruments for market transformation in certain contexts characterised by uncertainty regarding technological developments and a willingness on the part of individual stakeholders to cooperate so that they can share certain costs. However, they cannot be considered a systematic alternative to regulations.

Regulatory measures that impose minimum energy performance standards for all available appliances have proved their effectiveness ; in association with energy labelling, which encourages consumers to differentiate products, they can be effective in stimulating technological progress. However, the regulatory approach assumes a strong commitment on the part of public authorities, and preparation times may be long because of opposition from manufacturers. Voluntary agreements, by virtue of their greater flexibility, which makes them easier to implement, can be an interesting alternative to regulations in certain conditions.

The first of these conditions concerns the level of the commitments undertaken by manufacturers and the reality of the claimed additional efforts compared with general trends in energy efficiency improvement. The example of washing machines showed that ambitious targets could be negotiated when the bargaining power was in the hands of the public authority, that is, when the threat of future regulatory measures was realistic.

The second concerns the sharing of the burden between the firms and, more generally, the effectiveness of the voluntary approach. Where there is mutual uncertainty regarding the technology to be used, it is preferable to opt for a collective learning solution so as to share certain costs (acquisition, processing of information). If, on the other hand, certain firms have a technological advantage over their direct competitors, it is preferable for the public authority to give priority to a differentiation strategy which would encourage the leaders to preserve their technological edge and the less advanced firms to try to close the gap, which is what has happened with the combination of energy labels and minimum standards. The voluntary approach cannot therefore be treated as a systematic alternative to minimum efficiency standards, without first analysing the competitive structure of the market and the technological prospects of the different firms.

Negotiated agreements are a more flexible option, which makes them attractive in certain situations, but they must be used as a complementary approach to that of regulatory measures. The situation is paradoxical, in that if the negotiated agreement becomes the standard approach, the regulatory threat will no longer be credible, and the negotiated agreement will be less effective. The regulatory threat must be permanent and credible to encourage companies to renegotiate stricter objectives and stimulate a process of steady improvements in energy efficiency. The conditions for renegotiating the first voluntary agreements to reach their term will provide an idea of the bargaining power of the public authority.

Finally, the effectiveness of negotiated agreements must be analysed from a dynamic standpoint. In the case of regulations, it is essential that existing standards be gradually tightened up so as to ensure an ongoing process of energy efficiency improvements. The question is whether such tightening up can be envisaged in the case of negotiated agreements. The answer is yes, provided the legislative threat remains credible. Regulatory measures and voluntary agreements must therefore not be presented as alternatives, as there is a risk of regulatory measures losing their impact if the negotiated agreement option is momentarily given preference.

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