

# **ENER BULLETIN**

## **20.97**

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# **ENER**

**The European  
Network  
for Energy  
Economics  
Research**

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**THE EUROPEAN NETWORK FOR  
ENERGY ECONOMICS RESEARCH**

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**EUROPEAN NETWORK FOR ENERGY ECONOMICS RESEARCH**

*The 23rd ENER Joint Seminar was held in Antwerp on 29-31 January 1997 and hosted by STEM. The theme of the meeting was Voluntary Agreements.*

- **Dr Menanteau and Dr Colombier (IEPE)** discuss the influence of retailers on the final choice of consumers when buying an energy efficient appliance. It argues that energy efficient labelling should not be seen as a sufficient policy instrument on its own in persuading customers to buy energy efficient products. The distribution sector may usefully amplify the signal given by the energy efficient labelling.
- **Edoardo Croci & Giulia Pesaro (IEFE)** provide a thorough discussion of voluntary agreements - its definition - and the extent to which they exist in Italy. The authors conclude that voluntary agreements are increasingly used as effective environmental and industrial policy instruments and that they can be used to improve the relationship between the public administration and firms.
- **Dr Martins and Dr Rodrigues (CEEETA)** explain the situation of VAs in Portugal. According to two European Commission studies, Portugal has ten of around 300 VAs, none of them in the Energy Sector.
- **Dr Morthorst (RISO)** discusses the extent to which voluntary agreements exist in Denmark, given that the Danish power sector is so strongly regulated by the Government.
- **Dr Gruber (FhG-ISI)** reviews the efficacy of the use of voluntary and regulatory instruments implemented under the Swiss Energy 2000 energy conservation programme and examines the lesson and implication for other EU status.
- **Professor Verbruggen and Dr De Jonghe (STEM)** describe the regulatory climate in the Belgian Electricity sector. They then discuss the extent to which negotiated agreements would be successful in implementing a policy which would reduce electricity demand and reduce CO<sub>2</sub> emissions.
- **Dr Balaguer (GIEE)** provides an overview of the factors pressing for environmental change in the electricity industry. He then describes the voluntary measures adopted by the Spanish electrical industry. He concludes that their legal status needs to be resolved if they are to be used as a useful and legitimate means for the implementation of environmental objectives.
- **Mr Huber (IEW)** analyses the possibility of voluntary agreements under different property rights situations and the implications for pollution, from an economic and mathematical perspective.
- **Lena Jeij (LUND)** describes and evaluates the Swedish approach to the promotion of more energy efficiency technologies through Government-sponsored voluntary technology procurement programmes.

- **Mr Ton van Dril (ECN)** discusses the voluntary agreement policy for energy efficiency which has been established by the Dutch Government and industry. The aim is to aid the national requirement to reduce CO<sub>2</sub> emissions. In the first part of the paper, the policy and its results are outlined. In general, these results show that voluntary agreements are achieving their objectives. The second part of the paper addresses some of the weaknesses of this policy and makes suggestions for future improvements. Problems include a focus on energy *efficiency* rather than overall energy *use*, the exclusion of some processes which produce CO<sub>2</sub> and an inaccurate evaluation of on-site industrial electricity production. In conclusion, some consideration is given to the application of this type of voluntary agreement policy at a European level.
- **Peter Helby (LUND)** reviews regulatory tradition in Denmark, and in this context explains the emphasis on voluntary agreements. The present combination of energy taxes and voluntary agreements is reviewed. It also reviews the position of the European Commission in regards to the energy tax rebates, which are associated with voluntary agreements in Denmark.

**Energy Efficiency Labelling for Appliances :  
a New Use of an Old Instrument in the French Region "Nord /  
Pas de Calais"<sup>1</sup>**

**by Philippe Menanteau, Institute of Energy Policy and Economics (IEPE-CNRS)  
and Michel Colombier, International Consulting on Energy (ICE)**

**Abstract**

The lack of information regarding unit consumption and the relative performances of appliances on sale is often highlighted as a reason for the low interest of consumers in energy efficiency. As a consequence, several energy labelling programmes have been implemented in different countries in order to facilitate the dissemination of more efficient appliances, and these have had mixed results. In general, there is a lack of evidence to prove that labelling schemes strongly influence the purchasing behaviour of a large number of consumers. The influence of retailers on the final choice of the consumer choice may explain this limited impact.

Our analysis of a French pilot programme in the Region "Nord - Pas de Calais" shows that retailers may greatly improve the efficiency of a labelling scheme. If they integrate the labelling scheme in their commercial strategy, modify their products on sale according to the efficiency criteria and give active support, the salesmen can strongly boost the message of the energy label and orientate the consumers towards more efficient appliances.

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<sup>1</sup> This paper is based on work carried out as part of a Coordinated Research Action financed by the CNRS ECOTECH programme and the French Agency for Environment and Energy Efficiency (Ademe). This paper has initially been prepared for ECEEE 1997 Summer Study (Spindleruv - Czech Republic).

## **1. Introduction**

A European Directive adopted in early 1994 introduced the mandatory display of the energy consumption of appliances in the Member States of the Union. Cold appliances (refrigerators and freezers) were the first goods to be effected by this regulation which has been recently extended to laundry appliances and will later be generalised to all household appliances.

This regulation was set up in Europe after numerous studies had shown that the consumers, lacking information concerning the energy consumption and characteristics of the appliances, had little concern for this criteria in making their purchase decision. Better informed by the label, the consumer could bear this criterium in mind and thus the dissemination of more energy efficient appliances was facilitated.

This text establish the conditions in which an improvement in information may lead to a change in purchasing behaviour which is more favourable for energy efficient goods.

The first part of the text describes energy labelling programs and their results which have been implemented at the international level. The second section discusses a pilot program on labelling introduced in the Nord-Pas-de-Calais Region (France) and evaluates the possibility of improving purchaser's behaviour through the active participation of the retailers.

## **2. Purchase Behaviour and Energy Labelling : Assessment of the International Experience**

### *2.1. The Information Gap, a Barrier to the Dissemination of Efficient Technologies*

According to the economic theory of consumer behaviour, the consumer is supposed to be perfectly informed, receptive to the price signal, and rational in his/her choices. In other words, the consumer is supposed to have all the necessary information concerning product cost and characteristics in order to make an informed choice that minimises the global cost (taking into account the equipment price and its running costs). Finally, he/she is supposed to know where to buy the selected equipment which furthermore must be available without extra-costs.

In practice, consumers consider many different criteria in order to choose their electric appliances, so that the final result largely differs from the theory. The customers are not concerned with the running costs, which are often considered insignificant, and they generally react to the price. However, the real or supposed quality of the product as well as the proposed characteristics, aesthetics, brand name and sales advice are also significant factors in customer decision.

In reality, the hypothesis of perfect information is not verified either. The signal transmitted by the electricity bill (which aggregates the different uses of electricity (lighting, heating, electrical appliances) does not inform the consumer of the relative importance of each use. The consumer has only a vague idea of the running costs of the various appliances, and is not interested in the related energy savings. The technical information provided by manufacturers generally does not allow a comparison of the energy efficiency of equipment of different sizes or different categories .

This information gap is generally identified as one of the main factors explaining why purchasing behaviour is unfavourable to efficient technologies and the reason for limited innovation policies from the industrial sector.

## 2.2. *Energy Labelling Programmes*

The lack of a spontaneous dynamic in favour of efficient technologies has led to the implementation of public policies in order to stimulate new technologies or promote their adoption. Among the latter, several countries have established energy labelling programmes for household appliances. The "EnerGuide" label appeared in Canada in 1978 (modified in 1992), "Energy Guide" was launched on a national basis in the USA in 1980, "Energy Rating", was set up in Australia in 1986 (in the most important States). More recently, the European Label Directive was adopted in 1994 and its implementation in the Member States followed a few months later.

The aim of the labelling regulation is to compensate for the information gap observed in this sector, to draw consumer attention to the electricity consumption of specific appliances, and to reveal the differences between different models. Well-informed, the consumer should be more attentive to the energy efficiency of the appliances and, in general, should choose the more efficient ones.

The label format differs from one country to another, but the following elements can be systematically found :

- an estimation of the energy consumption of the appliance, measured in standard conditions : generally the consumption is indicated in kWh/year (exceptionally in kWh/month), but some labels indicate the annual operating costs. (Energy Guide, first period in the USA).
- a comparison of the equipment efficiency with other comparable appliances (category, volume) ; Energy Guide (USA) and Energuide (Canada) position the equipment on a scale that goes from the more efficient to the less efficient ones (same category, same volume). Australian (Energy Rating) and European labelling schemes respectively indicate stars or colours<sup>2</sup>, in order to provide the relative efficiency of the product .

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<sup>2</sup> In the European label, the products are classified on a scale going from G (the less efficient) to A (the most efficient). This classification is completed by a colour code which gives the red for the letters E and G, and green for the letters A, B and C.

In certain countries (Europe, Australia), the comparison between different products is made easier through the use of an efficiency index which takes into account the volumes (fridge and freezers) of the appliances. In other countries, the calculation methods used postulate that only appliances which have the same volumes are compared.

The option of indicating the energy consumption instead of the running costs introduces an important distinction in the label formats. The indication of the annual running costs may be more understandable and have more influence on the consumer's choice. On the other hand, the kWh would remain a very abstract notion to most of them, all the more so since electricity prices are not well known. On this particular point, the programmes evaluations do not give a clear answer on the respective impact of the different label formats, even if the consumers seem to prefer the reference to the running costs<sup>3</sup>.

### 2.3. *The Main Results of Labelling Programs*

An assessment of labelling experiences would require a precise follow-up of the dissemination of efficient appliances, of innovation dynamics and of purchase behaviours. In fact, very few studies have been conducted on a long-term basis<sup>4</sup>. The impact of energy labelling is not well known and is difficult to isolate from other market transformation actions. In the USA where the experience is older, the impact on cold appliances is difficult to dissociate from that of the energy efficiency standards, mandatory since 1987. In Europe on the other hand, the experience is too recent. Moreover, the labelling impact will also be disturbed by the efficiency standards under preparation for the late nineties.

The few available assessments of the past experiences show contrasting results. According to an American study quoted by J.P. Harris and N. Casey-McCabe, 50% of refrigerator buyers aware of the "Energy Guide" label, declare that this information has influenced their purchase<sup>5</sup>. A more recent study, ordered by the American Department of Energy shows that three-quarters of the consumers who noticed the label, did use it to choose their appliances<sup>6</sup>. The pilot program in Denmark has also produced positive results : the consumers consider that their choice was influenced by the label, and the salesmen observe that the turnover of efficient models has increased and that the demand has shifted toward this kind of product<sup>7</sup>.

This sparse information cannot be confirmed by systematic and large-scale monitoring of purchasing behaviours. The estimation of impacts thus remains essentially qualitative. One of the few quantification attempts of labelling effects estimates the savings resulting from the "Energy Rating" programme in Australia at 11% of the total consumption of the electrical appliances, compared to a reference situation without any label<sup>8</sup>.

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<sup>3</sup> This reference to costs raises operational problems and obliges the manufacturers to modify the labels according to the products' destination or to utilize, like in the USA, an average electricity tariff, which may confuse the consumers whose tariffs differ from the average one.

<sup>4</sup> J.P. Harris and N. Casey-McCabe (1996).

<sup>5</sup> R. Dyer and T.J. Maronick (1988)

<sup>6</sup> US Department of Energy (1995)

<sup>7</sup> DTI Energy (1994)

<sup>8</sup> G. Wilkenfeld (1993)

At the same time, other studies suggest that energy labelling was not well adapted to the consumers and of a limited help in the choice of appliances<sup>9</sup>. These counter-references are in part explained by the inadequate format or information provided by the label. For example, the "Energuguide" label (Canada) was modified after a first trial, because its round shape recalled a quality label and was interpreted as such by the consumers, independently from the appliances efficiency. In the same manner, the "Energy Guide" label (first period) was seen to be confusing and having too much information<sup>10</sup>. More generally, the introduction of energy labelling and the availability of reliable and complete information (at least in theory) does not seem to have radically changed purchasing behaviour.

#### 2.4. *Technical Information and Purchasing Behaviour*

Theoretically, the label permits a choice between price, efficient appliances and future savings. In fact, one can observe that the consumer uses the label as a stamp<sup>11</sup>, which distinguishes between different models, but not as an optimisation instrument. The model classification on a performance scale (colour or number of stars) is then the most important information compared to the absolute consumption (in kWh or in price) of the appliance<sup>12</sup>.

In a more general manner, energy labelling appears well-adapted to reveal the existing performance differences and to establish a rating between appliances. However, its real use is not well known. It is observed that the label user is generally favourably predisposed to it : more sensitive to the information, s/he tries to look for further information sources (price lists, newspapers, magazines, advertising...) before making his definite choice<sup>13</sup>. In this case, energy labelling offers a new opportunity to differentiate the products, and allows an objective appreciation of their relative qualities. On the other hand, it has not been established that the label incites consumers who buy on impulse or have complete trust in the salesman to take more care of the energy efficiency criteria.

These mixed results raise some questions about the true influence of information on purchasing behaviour and its possible limits. An American study has shown that, in front of two absolutely identical refrigerators, with the exception of their prices and efficiency, the consumers act as if their implicit discount rate was greater than 35%, or even 60% in some cases<sup>14</sup>. In a "complete" information situation, the consumer does not necessarily choose the most efficient appliance, even if this choice seems to be the most rational one.

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<sup>9</sup> Bonneville Power Administration (1988)

<sup>10</sup> JP. Harris and N. Casey McCabe, 1996.

<sup>11</sup> Endorsement labelling is a peculiar form of labelling which distinguishes the quality of certain products according to specific criteria. The "Energy Star" label is an example of endorsement labelling utilized for office equipment using a low energy consumption stand-by mode. Endorsement labelling has a slightly different function from that of a comparison labelling because the former preselects the products when the latter leaves the choice in the hands of the consumers. Cf. N. McCabe and J. Harris (1995).

<sup>12</sup> G. Wilkenfeld (1993)

<sup>13</sup> J. McMahon (1991)

<sup>14</sup> A. K. Meier and J. Whittier (1983)

## 2.5. *A Key Actor for the Success of Labelling Programs : the Retail Sector*

Theoretically informed by the label, the consumer's choice remains limited by the goods supplied by the retailer. Generally, and even in presence of a label, the consumer is only informed about the products available at the retailers, where s/he has decided to purchase.

With the possible exception of some “wise” consumers who inform themselves before buying and have made their choice beforehand, the purchase involves an actor who may influence the final choice : the salesman. It can be argued that the consumers turn to the salesman to guide them through the diversity of the proposed models, the contact, the exchange. Thus, the arguments put forward by the salesman are more important for those purchasing without any preconceived intention, than the written information which is often not very reliable or too technical and too complex.

It was precisely to analyse this type of purchasing behaviour and to learn to use the potential action of the distributors to augment the effect of energy labelling, that the experience in the Nord-Pas de Calais region was undertaken.

## **3. Energy Labelling and the Retail Sector : the Example of the Nord-Pas de Calais Region Program**

### 3.1. *The Background*

The Nord-Pas-de-Calais programme aims to promote the dissemination of efficient cold appliances (refrigerators/freezers), using the European energy efficiency label. The Programme is coordinated by the Regional Energy Agency (ARE) of the Pas-de-Calais Region for the group "DSM Nord-Pas-de-Calais", which is formed by the signatory partners of the regional DSM Convention (Ademe, EDF, the Nord-Pas-de-Calais Region, and the Urban Communities of Lille and Dunkerque).

This action is linked to the new European labelling scheme and could have simply been aimed at the consumers by advertising the instrument (label) or the product (refrigerator), to steer better informed consumers toward the more efficient products. However, the operation carried out in Nord-Pas-de-Calais has gone beyond this framework. When studying the household appliances market it is important to consider all the economic actors involved, from the manufacturers to the consumers. Moreover, it is important to understand and build on the motivations of each-one.

#### 3.1.1. Consumers

When a consumer buys a refrigerator, his/her prime concern is to buy an appliance which refrigerates. This commonplace consideration is often necessary to remind energy economists that their favourite topic is only, at best, of second importance for the consumers. For this reason, it is not effective to consider it as a key criterium in the choice of a product .

Marketing specialists know that any purchase, by intrinsic nature, generates fear : the consumer is confronted with a decision-making problem, which he is not certain to control. This insecurity factor is augmented when the product is not amusing, like a

refrigerator or a freezer, contrarily to a car, for example, for which a strong attraction (for a model, a brand name) is already a factor of security.

In order to avoid reinforcing this situation with destabilizing or guilt-inducing messages, an encouraging message ("the good choice") should be used and elements set up which confirm this state of mind. For example, the stock of models on sale must be modified, so that the increase in energy efficiency from one model to another is coherent with the increase in price, to comfort the customer in the idea that price and quality are linked, and that he "has obtained value for money".

### 3.1.2. Retailers

What kind of interest could energy labelling represent for the retailer's strategy ? One cannot expect retailers to commit, free of charge, the well-being of the society. However, they could find a personal interest in developing this kind of message. This implies finding a common ground between the interest of the collectivity, the aim of which is to improve well-being, and that of a private actor whose mission is to run and develop the business.

The label may represent, for the retailer, a means to provide security to the customer. Likewise, it may offer an opportunity to develop customer loyalty, in that it goes beyond the frame of the purchasing act and allows the retailer to initiate a wider dialogue on product durability. Retailers not only try to make sales at a given moment, but they hope above all that the customer will come back for a future purchase.

Energy efficiency rating is potentially a new element for market segmentation, which introduces new product differentiation criteria. It may limit price competition between retailers, this classical marketing weapon of which they are victims. Retailers which "specialise" in appliances and home electronics, or large stores which choose quality as their strategy would then be in a better situation to resist the offensive of discounters, by justifying their higher prices by a higher quality.

Labelling programmes have their drawbacks even though these different parameters can be used by a retailer who wish to outstrip competitors. Their first negative aspect is that they are mandatory, which does not create a positive image. Secondly, they raise material problems. Finally, their most important drawback is that certain products which normally sell well, are devalued and sell less well, with possible consequences on salespersons behaviour, relations with the suppliers and so on

Furthermore, retailers who try to be forerunners risk marginalisation. All retailers will not make the same analysis which consists of using the label as a commercial strategy instrument : a lack of information, a lack of time, the priority given to the main line of business, even a conservatist attitude in terms of exploring new opportunities by marketing departments, many reasons can explain a wait-and-see strategy. Moreover, it would be risky for a forerunner to propose, over a long period, an offer different from that of the competitors and from the customer's immediate expectations.

### 3.1.3 Appliance manufacturers

Market surveys carried out in Europe show that manufacturers already offer a wide range of products and that an important evolution is under way, notably as a

consequence of the campaigns carried out in northern Europe for the dissemination of efficient technologies.

On the other hand, analysis on the range of products in the French retail sector show that the diversity in manufacturers' supply is not transferred to the retailers' supply, the only one that is important for the consumer. The first operation was to address the retail sector to identify the reasons for this gap. The manufacturers were therefore not directly concerned by the Nord-Pas-de-Calais programme<sup>15</sup>.

### 3.2. *The Motivations of a Forerunner : the Retailer Boulanger*

The project set up in Nord-Pas-de-Calais involves several different actions. Contacts were notably made with all the retailers of the region, a presentation of the proposed approach, the drawing up of a Retailers-Charter, to allow the consumers to identify the participating retail chains, and the launching of information campaigns to present the energy label to professionals and consumers.

Nevertheless, the main part of the action consisted of: assisting the partner retailers in a global approach; to elaborate a new range of products, to reflect on the arguments to be developed by the salesmen; to prepare the price-list; advertising strategy<sup>16</sup>, and to materially set up the labels, and train the salesmen, etc.

After preliminary contacts, two specialised retailers finally agreed to commit themselves to the proposed approach : Boulanger and Cora. The first one was a forerunner, despite the importance of the task and its inherent commercial risks, because the proposed strategy was considered as being in perfect harmony with the firm's own strategy.

As a rapidly growing specialist, but still small compared with competitors such as the Darty group, Boulanger needed to assert an image. On this particular point, Boulanger has developed important efforts to draw customer loyalty, notably by putting forward the life-cycle of the product : warranties and after-sales service, purchasing advice based on the motto "you'll never regret it". A very strong campaign also allowed the group to develop the message of "the company - a citizen"<sup>17</sup>.

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<sup>15</sup> Contacts have been established with the last "French" household appliances manufacturer whose principal construction unit is in the Nord-Pas-de-Calais Region. These contacts have allowed the development of new more efficient models, whereas the usual models were rather expensive, and of good quality, but weak regarding energy efficiency.

<sup>16</sup> Sale place information ("Information sur le Lieu de Vente") (booklets, purchasing guides, informative boards, etc.)

<sup>17</sup> Boulanger has issued since two years a "partner products" campaign. The announced characteristic of these products is to be "better, not more expensive and manufactured in France".

The labelling project was perfectly linked with this strategy ; it became a new support for internal mobilisation by offering a new approach for purchasing advice ; it offered a new parameter of discussion with and possibly competition among the suppliers ; and, lastly, it permitted to renew the dialogue with the customers in two already explored directions : product life-cycle and “the company - a citizen”.

This certainly explains why the firm has invested a lot of human and financial resources on this subject<sup>18</sup>.

### 3.3. *The Global Strategy Set Up by the Retailer*

If the retailer agreed to go beyond the difficulties and the risks inherent to labelling, it is because he hoped that the benefit would justify the efforts to be made. He was faced with the necessity to set up an adapted and globally coherent strategy in a very competitive context which he sought to outstrip but which also set the limits of his action.

We will recall here the main parameters of this strategy (modification of the product line, development of a specific sales argumentation, information and training of the salesmen), as well as the general constraints inherent to each case.

#### 3.3.1 Evolution of the product line

Using the “energy efficiency” message to guide customers is only possible if the line of products on sale presents a globally coherent structure with regard to this new criterium. The coherence of the line can be assessed as follows :

- its composition : the "red" products (classified F or G) must obviously not be over-represented. Inversely, it is necessary to propose a generous supply of B and C products, and to introduce some A products. Even if the latter may only represent a small proportion of sales, they constitute a “high boundary”, which notifies the customer the existence of a “top-of-the-line” product, and make it easier to buy reasonable B products by comparison.
- the structure of the line : i.e. the hierarchy of products in relation to their price has to be coherent with an energy efficiency improvement, so that the dialogue on the “product quality” remains coherent.

In fact, an important restructuration operation appeared necessary. This restructuration was indispensable because the energy criterium was not until now a sale argument, and was therefore not taken into account by the retailers when negotiating their product selection with the suppliers. The analysis of the line revealed problems in line structure, which led one say, a little abusively, that there was no relation between the price and the energy efficiency of the products.

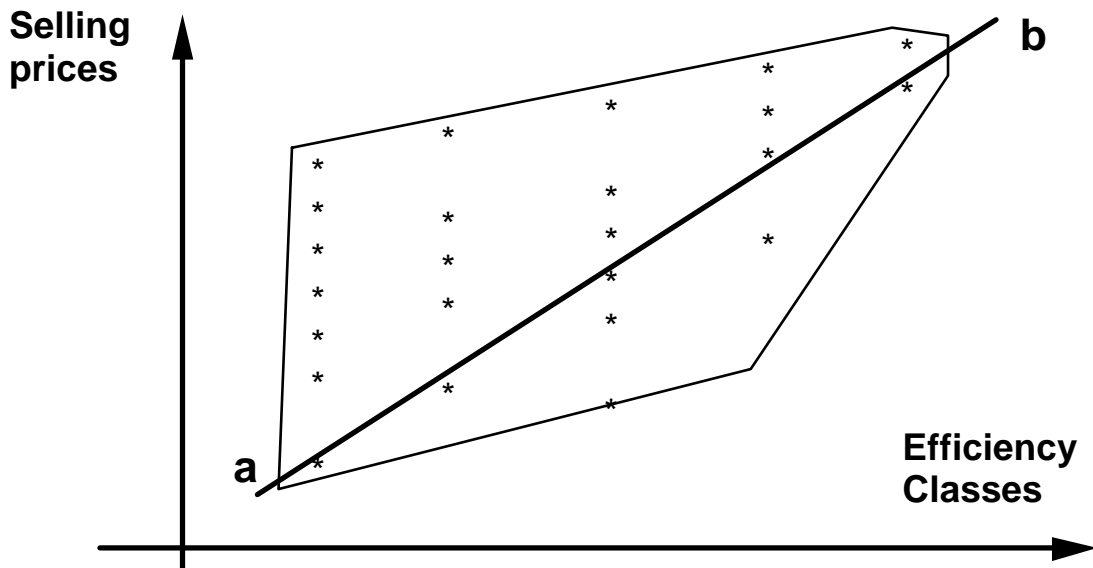
From an industrial point of view, it is clear that the energy efficiency has a cost : reinforced insulation, high performance compressors, over dimensioning of the

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<sup>18</sup> This may also explain the failure of the action undertaken with the retailer Auchan, which presents a very different context : if Auchan has succeeded to build a strong image, this one concerns its "generalist" job, and offers less opportunities for a strategy which is targeted on the household sector.

commuters, etc., increase the construction costs. If this logical hierarchy was not observed in the shops, until now, it is because, since the market did not eliminate very inefficient products, there was a place in the shops for relatively expensive products with low energy efficiency. The market did not eliminate very inefficient products. In fact, the representation of the products on a price/efficiency graph does not indicate a linear relation, but it neither shows a random organisation : if, for comparable appliances, the price of a product of the F or G class is very variable, there is no loss-leader price in the A or B classes.

**Fig. 1 : Relation between prices and efficiency for cold appliances**



The retailer was thus obliged either to complement its supply in C, B and A classes, and to eliminate the G, F, E and D products, which were “above” the right line (ab), i. e. whose price position seemed contradictory with the energy performance (for a lower or same price, more efficient products were available).

In fact, this line modification has encountered several constraints. The retailer had to buy A, B or C products in satisfactory conditions, and to sell them at prices compatible with those of the competitors. To propose new and more efficient products, he had to remove others, because the shop shelves are not extensible. The retailer hoped to compensate for the lack of turnover of a suppressed product by a shift in the sales on new products.

It may seem easy to remove products which are both expensive and inefficient, but one has to bear in mind criteria other than energy efficiency. For example, it was unimaginable for an important French retail store to remove Brandt products from its offer, even if it was theoretically possible to substitute them by products of a comparable quality and a better energy efficiency for the same price : a consumer faced with an "exotic" shelf in terms of brand names would be confused and could leave the shop, even before speaking with the salesman...

Finally, if a line modification was possible, it also represented a risk for the retailer, because it took place in a context of severe competition between the different actors of the retail sector.

### 3.3.2. Adapting Selling Proposition

The retailer's concern was of course that the sales follow the line modification. He thus had to try to adopt a sales strategy which highlighted energy efficiency, without risking to destabilise the consumer by putting too much emphasis on a factor which is only secondary in his mind. The risk would be twofold : to destabilize the consumer by adopting arguments that are not compatible with his wishes, and to give him the impression that he is led to high-scale products against his agreement.

The first remark, confirmed by the salesmen themselves, is that the kWh does not say anything to the customer : what he seeks is a global quality appreciation, or simple economic information. For reasons of tariff and currency disparities, the European label indicates the electricity consumption in kWh and not in francs, but it gives an appreciation of the appliance quality based on the "energy" criterium, where the consumer does not have to compare and calculate the relative consumption values, volumes, etc.

On this basis, three selling proposition levels were developed with the salesmen, in order to complete the labelling message :

- “For the same price, we propose a better product” : first proposition, aimed at convincing the consumer reluctant to buy a more efficient product. This customer favours the price, and does not wish to pay a higher price in order to buy a famous brand. The salesman will then try to show that, for a comparable price, his product is different from the competitor's, because of the efforts made in line modification : for the same price, he proposes a better classed appliance and thus one that is less expensive to run.
- "The price difference is quickly payed off" : second proposition, aimed at the customer who is interested in appliances of a famous brand name, and is ready to accept extra expenditure on his initial budget. Among other criteria, the salesman can use the label, showing that an overcost of 100 to 300 francs between the appliances which the consumer has selected, could be payed off in one, two or three years if one takes account of the running costs.
- "Don't hesitate to buy a beautiful appliance, in the long run, it will not cost you more" : third proposition for a customer who is interested in high quality appliances. This customer, whose budget constraint is low, hesitates to make a step and to choose an expensive appliance. If the latter is classified in A or B categories, the salesman will have the possibility to talk about global costs (purchase + running) in order to make the sale.

Of course, these arguments can only be developed if the proposed product line allows it. That is why modifying the line is important. One must however bear in mind the compromises that have to be made to reorganise the product line, and which sometimes oblige the salesmen to adopt a withdrawal strategy.

The environmental or citizen argument, much appreciated by the Danish salesmen (and consumers), does not appear relevant in the French context : a lower concern for the issue, the feeling that nuclear energy does not pollute... the reasons that could explain these differences are numerous. At best, this argument can be used by the salesman during the dialogue, to reinforce a choice.

### 3.3.3. The Role of the Salesmen

Salesmen adopt a sales argument when they are themselves totally convinced of its relevance. This was not the case in the beginning for cold appliances<sup>19</sup>. In order to interest the salesmen in the approach, it was necessary to inform them of the average annual running cost and the differences between the models. This information showed the large differences of energy use between the products. This led the salesmen to reconsider the established hierarchies between "good and bad" appliances. Without this previous information, the appearance of the label on the shelves would not have mobilised the salesmen, essentially because of a lack of clear information.

The motivation of the salesmen to use this information was developed through a training programme:

- The salesmen should know and understand the new label and discover in which degree the products has changed
- Salesmen who were not convinced by the arguments, would have been reluctant to use them ; as a consequence, this training in energy efficiency should be considered as a new element of company strategy .

One should also mention the fear that salesmen may feel when they see their role reduced by information on the label. We observed a certain reluctance from the salesmen who had not received any specific training courses, who did not really understand the information and perceived the label as putting their own opinion in question. Whenever the label was introduced unaccompanied, it was under-exploited by the selling forces. The training programme contributed to eliminate this fear : the label, considered as an information support, reinforces the value of the salesman's proposition.

In this case, the issue of the remuneration of the salesmen, often put forward as a key problem, was no longer a constraint. The salesmen are often payed on the basis of fixed wages plus an incentive system based on the sales ; the salesman may then have a strong motivation to sell certain appliances, for which he will earn a higher premium, rather than another, more efficient one.

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<sup>19</sup> The energy consumption of the cold appliances are not well known by the salesmen : asking them the question, what kind of household appliances are the most "energy consuming", less than 5% of the participating salesmen have cited the refrigerators and/or freezers. For them, a refrigerator "consumes 200 W", which is limited compared to the laundry appliances which "consume 2500 W". In the same manner, the sales persons were surprised by the importance of the consumption gap between appliances which are nevertheless comparable in terms of supplied services to the consumer.

It should also be understood that these profit-sharing modes, when they vary according to the products, allow the firm to send an incentive signal. In the event that the firm was truly engaged in a global approach (progressive line restructuring), it seemed clear that the incentive system should be simultaneously adapted. Some incoherence may have persisted (some rather expensive appliances with low efficiency, were maintained, because the firm made profits with these models and refused to substitute them) but probably only during a transitory period. As a consequence, the payment system is not perverse in itself, when the approach is well integrated by the firm.

#### **4. Conclusion**

The principal purpose of this text was not to analyse the impact of the pilot operation in Nord-Pas-de-Calais Region on the cold appliances market, but rather to present its philosophy and the contents of the approach. However, it is interesting to rapidly present several of the observed results of this action<sup>20</sup>.

We observe that, over a relatively short period, a strongly motivated retailer (Boulangier) succeeded in introducing a significant evolution in its products line: in the refrigerators/freezers category for example, the 1994-line, which was centered on the D and E classes, has been replaced by a 1995-line in which the C class is dominant, whereas the A and B classes, nearly absent before, are a larger proportion. This evolution took place in spite of a very strong context of competition between the different retail chains, which circumscribed the possibility of a radical range transformation due to the risk of confusing the customers.

Thanks to the training programme carried out for the salesmen, and more generally to the commercial strategy followed by the retailer, actual purchases have followed the shift in the line; the proportion of sales in B and C categories has clearly grown, whereas the sales of E and F products have virtually collapsed. For the retailer, the strategy incorporating energy labelling and a products line should be coherent and is: the consumers accepted the label information and the propositions of the salesmen, and they have purchased more efficient products.

These first results have to be confirmed at medium term. Notably, we need to verify if the retailer's strategy is reflected at the commercial level by an increased turn over, a better index of consumers satisfaction, or by a stronger differentiation and, accordingly, lower competitive pressure.

Lastly, this experience allows us to draw some lessons for the implementation of public policies aimed at stimulating the dissemination of efficient technologies. It appears that a labelling scheme should not be seen as an instrument which targets consumers alone, whose increased interest in the energy efficiency criteria would automatically lead to an evolution in the supply of the manufacturers. Other economic actors are concerned and may, according to their own strategies, choose to appropriate the instrument for themselves or, on the contrary, to minimise its significance. The distribution sector is an example of an actor which may usefully relay and amplify the

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<sup>20</sup> For details, see Colombier M., and Menanteau P., to be published in European Council for an Energy Efficient Economy Summer Study. Czech Republic, 1997.

signal given by the label between consumer and manufacturers, if this signal fits in with the actor's business strategy. The experience in Nord-Pas-de-Calais shows that certain desires of the retailers may complement the collective interest in the labelling issue and contribute to make it a market transformation instrument which is really efficient.

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## **Voluntary agreements in Italy: a new approach in environmental policy**

**by Edoardo Croci & Giulia Pesaro\***

### **1. Introduction**

Voluntary agreements are playing an increasingly important role within Italian national environmental policies since the beginning of the 90s.

The USA, by means of the EPA, are promoting the use of “voluntary programs”, where participation does not require any form of negotiation with the EPA but obliges single companies to comply with a series of requirements set up by the programs, according to a certain schedule. The participation within a program generally allows the use of an environmental logo which identifies the program itself. The US programs include information and training support by the EPA and usually carry economic advantages in terms of reduction of management costs for the participating companies.

Some European countries have also promoted similar “voluntary agreements” but usually without environmental logos. De facto, these agreements occur because they are preferable to alternative of regulation. Participation generally involves costs for the companies, and therefore intra-sector negotiations to share such charges. Recent evaluations have concluded that there are around 400 voluntary agreements in community countries with the Netherlands and Germany ranking first and second.

The majority of American and European environmental agreements concern energy problems (not necessarily the energy sector) with the two main areas being the reduction of emissions (CO<sub>2</sub>, SO<sub>2</sub>, Nox) from large combustion plants and energy efficiency (in both the industrial and the domestic sector).<sup>1</sup> Energy problems are also particularly relevant in the transportation sector.<sup>2</sup>

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\* We would like to thank Prof. Giorgio Giorgetti for his contribution to our work.

<sup>1</sup> Sections 1 to 5 and 7 to 8 were written by Edoardo Croci and paragraph 6 was written by Giulia Pesaro. Among the most known american voluntary programs are: Green Lights (for a better energy efficiency in industrial lighting), Energy Star (for a better energy efficiency of PCs and printers), Natural Gas Star

On 27th November 1996 the European Commission, following the strategies envisioned in the Fifth Program and its future revision, submitted a Communication on this subject to the Council and the Parliament defining a scheme for the implementation of voluntary agreements<sup>3</sup> at the European level<sup>4</sup>; the way of embodying European directives at the national level through voluntary agreements; and a scheme to strike environmental agreements at the national level (as a Recommendation to Member States). The Commission is now able to submit a Proposal of Decision to the Council and the Parliament. The document considers certain areas as more favourable for the application of voluntary agreements: the reduction of CO<sub>2</sub> car emissions, the reduction of SO<sub>2</sub> and Nox emissions from large combustion plants and energy saving in the use of electric appliances. Furthermore, the document considers non binding voluntary agreements as a form to be used only temporary, waiting to pass to a tighter system of binding agreements.

In this paper Italian voluntary agreements are examined, following an industrial economics approach<sup>5</sup>.

## 2. Definition problems

There is a lack of a shared definition of the term 'voluntary agreements' or a clear subdivision into categories of the different typologies of agreements on the basis of specific features. There is also a controversy on the possibility of using the term voluntary agreements (an oxymoron) in order to describe:

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(for the reduction of leaks from methane pipes), SERP - Super Efficient Refrigerator Program (for the production of a more energy efficient refrigerator). The main target of Dutch long term environmental policy, through "covenants", is CO<sub>2</sub> stabilization.

<sup>2</sup> This is the case of Italy, as we will see, with FIAT, Agip Petroli and Unione Petrolifera.

<sup>4</sup> The European Union has not yet subscribed voluntary and negotiated agreements at a community level, but it recently launched two voluntary regulations on "ecomangement and environmental auditing" and on "ecolabelling". Even though their configuration is very similar to the US voluntary programs, they were preceded by intense discussions with the industrial associations and were introduced as regulations (and therefore are characterized by a few legal restrictions). In all these cases the competitive aspect of the companies' participation is important in terms of acquisition of possible advantages and market positioning. In certain cases advantages are a direct result of management (qualitative) improvements implied by the participation to the agreements, in other cases they are "artificially" created, by advertising the companies or the participating products, thanks to a "reputation" mechanism.

<sup>5</sup> Very different approaches have been used to examine environmental agreements, also because the range of aspects related to them goes from public policy to private negotiation.

- co-operation between public administration (PA) and industry,
- voluntary commitment to reduce pollution by industries.<sup>6</sup>

The European Commission sequentially used these three terms: “voluntary agreement”, “negotiated agreement” and “environmental agreement”, showing a shift of emphasis on the various aspects of these agreements. In the following text the term voluntary agreements will be used, since it is quite recurrent in the still limited economic literature on the subject.

Voluntary agreements represent a more general co-operation trend between PA and companies in order to face environmental problems. Such a trend is developing at different levels in industrialised countries and is generally related to

- 1) the sensitivity of public opinion to environmental problems;
- 2) to the confidence between PA and companies;
- 3) to PA’s technical expertise in the environmental sector;
- 4) to the awareness of the competitive importance of the environmental variables by companies.

Voluntary agreements allow a companies’ management processes to review the whole production process but downstream and upstream .

The first step aimed at analysing advantages and disadvantages of voluntary agreements is represented by the definition of what belongs to this category. To this aim it is possible to locate a continuum which, from negotiated regulation to voluntary company programs, covers the forms described below. The various forms are differentiated by the decreasing importance of the public subject in:

- determining the contents of the agreement and the fulfilment modalities concerning the private party,
- monitoring the compliance to the agreement,
- sanctioning the defaulting behaviours.

The different forms are:

#### **a. Negotiated regulation.**

It consists of a new way of imposing regulations and standards by the PA which provides for the creation of committees where members are both PA and corporate representatives with the ability to reach regulation. Examples are:

the “Acid Rain Committee” (EPA and industry), aimed at defining the new criteria to fight acid rain, provided for by the last amendments to the US Clean Air Act;

the Auto-Oil project (EU Commission, automotive industry, fuel industry), aimed at defining new standards on cars and gasolines in order to reduce atmospheric pollution all over Europe.

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<sup>6</sup> More generally we accept the term voluntary approaches, also meaning two different things:

- 1) environmental policy instruments, to be used at different levels of the P.A.,
- 2) environmental improvement processes managed by companies.

While the first case was successful, the second was not.

These processes may delay regulation but on the other hand they are useful for subsequent easier implementation of the regulation whenever an agreement is reached. In any case they are useful because they encourage companies to “disclose information” during the process, resulting in the possibility to get a “better” regulation.

The PA uses both the carrot and the stick, because if it does not reach a shared regulation, it still can proceed by itself. However there is the risk of “regulator capture”. This risk is highest when the competence of the PA on the subject is low when the number of representatives of industrial sectors; companies benefiting by the regulation (e.g. the environmental sector) and citizens is high.

**b. Public voluntary schemes.**

They consist of standard programs introduced by the PA to a whole universe of companies (belonging to a certain sector, to a certain geographic area, using a certain production process, using a certain substance), without the intermediate participation of industrial associations. These programs define the modalities of individual participation, the provisions to be complied with by the participants, the timetable, the monitoring criteria and the evaluation of results. Economic benefits (tax advantages, subsidies) or information benefits (technical assistance, training) can be provided for. Generally the participating companies are able to use an environmental logo (on products or stationery) identifying the program, aimed at obtaining:

- 1) public recognition and image benefits;
- 2) competitive advantages in the market.

No penalties are foreseen, with the exception of moral penalties, for the non-compliance with the program or the commitments.

Information transparency is necessary for the success of these programs. The public must be able to access information on the participants and on individual results and an independent controller is necessary (the PA itself or a subject recognised by the PA).

A high technical competence by the PA is required in order to set up appealing programs for the companies. The first evidence of success is represented by the number of participants, since participation is on an individual basis. In configuring a program the PA can consult different subjects (company, industrial associations, scientific bodies, environmental associations).

The public voluntary schemes are divided into two main categories:

- 1) US voluntary programs<sup>7</sup> promoted by EPA in the 90s, among which are 33/50, Green Lights, Energy Star, Gas Star;
- 2) communitary schemes on ecomanagement and audits and ecolabels.

Since communitary schemes are introduced by regulation, they are subject to stricter provisions. For example EMAS foresees a series of formal obligations, such as an external verification of the environmental management system by a verifier recognised by the PA.

### **c. Negotiated agreements.**

They consist of an agreement between the PA and an industrial association, a company or a consortium of companies, following negotiation between the parties. Other parties which may or may not subscribe to the agreement (e.g. environmental associations) may also participate to the negotiations.

If the agreement is signed by an industrial association there is the problem of its representativeness and of the legal value of the commitment. There will also be a second negotiation phase among the participants of the association, in order to share the charges stated by the agreement.

The agreement can call for the commitment of companies in order to: 1) obtain certain results, 2) carry out certain actions. Also actions to be carried out by the PA can be called for, either in positive terms (economic or information benefits, implementation of public awareness campaigns, etc.) or in negative terms (revision of regulations, commitment not to regulate the matter, etc.). A typical voluntary agreement can be made up of some or all of the the following elements:

- definition of key terms
- parties
- possibility of future participation of other subjects
- goal
- liabilities (nature, timetable, legal value, possibility for third parties to go to Court)
- validity period
- possibility of future discussions between the parties (possible committees) for possible reviews
- monitoring and evaluation criteria (people in charge, parameters)
- possible conditions that can modify the agreements
- conflict-resolution criteria (e.g. resort to arbitrators, committees)
- penalties in case of non-fulfilment
- access to information
- relationship with the regulation (and the authorisation system).

The main examples of voluntary agreements are Dutch covenants, which fall within the framework of a long-lasting overall plan of environmental policy. Also Denmark and Germany have a number of voluntary agreements. In Italy several voluntary agreements have been signed at the national and regional level and discussed below.

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<sup>7</sup> Therefore the US voluntary programs do not belong to the category described at point 4 (voluntary programs), because they are configured as schemes.

This paper argues that agreements that have been signed by companies from the one side and by environmental associations on the other side cannot, in our opinion, belong to this category<sup>8</sup>. In fact, even though these associations are independent from companies, they do not belong to the Public Administration, which represents an indispensable counterpart for the implementation of a voluntary agreement.

**d. Unilateral voluntary programs recognised by the P.A**

These are represented by the forms described in Section e, when formally recognised by the PA (at a European, national or local level). In Italy this is the case of the Fare and Fenice programs by FIAT. The recognition must include adequate forms of access by the public and monitoring by the PA.

**e. Unilateral voluntary programs**

These consist of environmental improvement programs set up by the companies which have public commitment. They are a form of self-regulation which are not legally subject to penalties in case of non-fulfilment. The definition of the goals, as well as the monitoring criteria, fall within the competence of the committed subjects who, among other things, can delegate the verification functions to another independent subject in order to strengthen the credibility of the commitment. The following elements belong to this category:

- behaviour codes and voluntary programs at a level of industrial associations. They can exclusively entail the commitment by industrial associations or the adhesion by single companies, therefore they are bound to behave in a certain way and/or to obtain certain results. “Responsible Care”, promoted in Italy by Federchimica, is among them.
- voluntary programs promoted by one or more companies, complying with the following requirements:
  - a) they must be formalised, according to goals and times,
  - b) they must be identifiable with a precise denomination,
  - c) they must be advertised at the moment they are launched and regarding the results<sup>9</sup>.

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<sup>8</sup> When showing the proper characteristics, they may belong to the category described at point 5.

<sup>9</sup> When these requirements are lacking we are facing a case of a contract between companies, or a generic corporate policy.

3P by 3M and WRAP by Dow are among them. Also agreements between companies and environmental associations concerning programs showing the above-mentioned elements belong to this typology.

Even though these categories have been identified, it is worth repeating that they follow a continuum therefore intermediate hybrid forms are possible. As already mentioned, the fundamental element to evaluate their position along the continuum is represented by the importance given by the public party to the determination of the configuration of the different voluntary forms. To this end other two important factors must also be considered: the nature of the controller (public, independent, self-monitored), and the penalty for the non-fulfilment of the commitments (criminal, civil, moral).

According to the following analysis, it seems that forms b, c and d can be described as voluntary agreements, while forms a and e cannot. Forms b, c and d are characterised by truly voluntary actions (this is true also for form e, but not for form a, which nevertheless ends up in a regulation, which companies can only affect), and also by the guarantee in favour of citizens that a public counterpart will be present to evaluate and recognise the companies' commitment (this aspect is not covered by form e).

### **3. Distinctive features of voluntary agreements**

Voluntary agreements in the environmental field are basically contracts, even though within a whole variety of possible legal situations (typology of penalties in case of non-compliance, possibility to go to court in case of non-compliance, possibility for third parties to go to Court, etc.). But voluntary agreements, compared to private-law contracts, show the following specific features:

- they have been implemented in the public's interest, that is to say that the main beneficiaries of the agreements are the citizens;
- there must be at least two subjects participating in the agreement: one public and one private subject (therefore the agreements between public administrations are not voluntary agreements);
- the agreements represent an environmental policy instrument for the public subject.

If just one of these elements is lacking, it is a case of ordinary contracts.

Moreover voluntary agreements must not be the natural expression of the institutional activity of a body that, according to the law, has been created with the aim of carrying out agreements. In this case we would lack the true voluntary aspect characterising the agreements (that is to say, nobody should be able to dispute the actions of such a body only because it does not carry out voluntary agreements).

Nevertheless it is not so simple, even by using these criteria, to distinguish between a voluntary agreement and an ordinary contract. The problem is particularly important for mandatory consortia created by law 475/88 they must stipulate contracts with the municipalities (directly or with municipalized companies in charge of waste collecting) in order to recycle materials collected by the municipalities themselves. Within this framework therefore consortia carry out a precise legal function, which is the reason for their creation. Such contracts undoubtedly do not belong to the voluntary agreements described above.

But the consortia themselves enter into framework agreements with institutions at different levels (generally Regions and Provinces, and sometimes large Municipalities, or agencies where the majority is owned by the local bodies in charge). These framework agreements can specify important aspects, which will then be part of the subsequent contracts, such as the means for distributing the materials gathered and the purchase prices. They would not specify the denominations of the specific corporate subjects which will be in charge of the recovery of materials in the single areas (this aspect is dealt within the contracts with the municipalities or, more often, with their municipalized companies).

Certain consortia use a different terminology in order to distinguish between framework agreements and operating contracts; for example, Comieco calls the former “intense” and the latter “conventional”. The “political” aspect is prevailing in the former, while the “technical-managerial” aspect is prevailing in the latter.

It can nevertheless happen that the operating contracts contain elements going beyond the simple compliance by the consortium of its own mission, as defined by the law. For example there can be incentives, communication campaigns addressed to the public, or even direct waste collecting activities, which have an absolutely voluntary character. In this case these contracts would fall within the voluntary agreements. This is the case of Replastic: the consortium, which institutionally is only responsible for recycling plastic bottles collected by other bodies (mainly Municipalities), has instead also assumed the task of developing a collection network (which is the biggest problem), so subscribing voluntary agreements in this field.

#### **4. Advantages of voluntary agreements**

Voluntary agreements lead to specific advantages, both for the companies and the PA. These aspects can or cannot occur, according to the typology of the agreement, and can be present in different degrees.

The advantages for the companies are:

- avoiding or delaying a coercive regulation,
- affecting the development of the regulation,
- flexibility in reaching environmental goals (to lower costs and shorten times set by the regulation to reach the same goals),
- improving the image,
- improving the competitive position,
- finding out innovative technological solutions,
- motivating the personnel,
- improved relations in the territory hosting production units.

The companies must also take the costs of non-participation into account: they can be particularly high, especially in terms of competitive perspectives.

The advantages for the PA are:

- “information disclosure” by companies, in cases of information asymmetry,

- a better allocative efficiency compared to the regulation (on certain conditions the marginal costs of the environmental improvements, as well as of the economic instruments, should be made equal<sup>10</sup>),
- higher effectiveness of the environmental policy (cutting down times and collective costs),
- higher consent,
- incentives leading to innovation and technological transfer.

There are also a few hindrances to the spreading of voluntary agreements:

- uncertainty in the forecast of the results,
- lack of confidence between companies and the PA (fear that the former do not commit enough and that the latter impose regulations),
- negative perception by the public (certain environmental associations are strongly adverse),
- distortion of competition,
- relative disadvantage for small and medium-sized companies (which may not be able to afford the necessary investments).

Transparency of informations for the public is particularly important to the success of voluntary agreements coupled with the strength of the PA's body signing the agreement. These two elements in fact represent a guarantee for the public opinion and mean that the parties are seriously committing themselves.

## **5. A categorisation proposal**

Among the main evaluation criteria of voluntary agreements there is a certain consensus on the following elements:

- efficiency
- effectiveness
- transparency
- social acceptability

Also certain pre-conditions are necessary in order to actually implement the voluntary agreements:

- the definition of clear and reachable goals
- the recognition of the existence of mutual advantages for the parties
- the existence of a threat of retaliation by the public party in case of non-fulfilment
- confidence between the parties.

We believe we should start to propose a first taxonomy of voluntary agreements on the basis of their purpose with reference to the environmental regulation.

Voluntary agreements can be subdivided into four categories, according to their purpose:

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<sup>10</sup> E.g. perfect information by companies on technologies and costs of other companies.

- 1) **substitutive** as regards a regulation, because they are able to reach the same goals with a lower collective cost and/or a better allocation of costs,
- 2) **integrative** as regards a regulation, because they are able to boost better environmental results with a group of pioneering companies, thanks to lower marginal costs of the improvements or to higher competitive advantages,
- 3) **anticipatory** as regards a future regulation under study, in order to inform the PA about the costs of the regulation and to gradually prepare the industrial system to stricter limits,
- 4) **implementative** as the means for implementing an existing regulation at a communitary, national or local level.

Public voluntary schemes and unilateral voluntary programs recognised by the PA express their maximum potential when they belong to the integrative category (and the same happens both for the US programs and for ecoaudit and ecolabel).

Negotiated agreements can, according to the different cases, play all 4 roles.

Independently of the goal of the agreement, the process leading to a voluntary agreement can originate both from the PA and from the other companies. Companies must not always be considered as a group having homogeneous or coinciding interests. Sometimes there are even companies which are interested in supporting not only voluntary agreements<sup>11</sup>, but even stricter environmental rules, in order to get the leading edge over a less dynamic competition (this can be true also for sectors or countries)<sup>12</sup>.

We must finally observe that only voluntary agreements belonging to the substitutive category can be analysed using the theoretical instruments of regulation theory in order to compare them with an alternative regulation. In the other cases the different aim of the agreements makes such a comparison useless.

## **6. The use of negotiated agreements: a first appraisal of the Italian situation**

Italy is still at a starting stage in the use of negotiated agreements for environmental purposes, both for the number of signed agreements and for their structure.

Agreements are increasingly important in Italy. This paper aims to evaluate its level of diffusion and the characteristics of use. It sets out the negotiated agreements signed in Italy till now. The objective is to identify the principal trends in the use of negotiated agreements in the environmental field and to point out their role in our institutional and economical reality. As a result of our definition of negotiated agreement, we considered only the agreements signed between at least an economic and an institutional actor.

### **6.1 The survey**

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<sup>11</sup> Certain voluntary consortia, gathering the biggest subjects of a sector, promote voluntary agreements also in order to “skim” the market from subjects operating according to lower qualitative standards.

<sup>12</sup> Among companies the case of the US oil company ARCO can be mentioned: it promoted stricter standards on gasolines in California, already having at its disposal “cleaner” gasolines; among sectors it must be considered that the chemical industry of certain countries was favourable to a faster banish of CPC, since it already had substitution products; among the countries the Netherlands follows this policy, subsequently asking for stricter standards at a communitary level.

Our sample is composed of 26 agreements, 14 of which are at a national level and 12 at a regional or local level<sup>13</sup>. Furthermore, the Fiat case, signed in 1993, due to its complexity, has been considered as a set of agreements under a single title. Therefore we divided it into 7 agreements<sup>14</sup>, on the base of the contents of each document article.

A) *National level agreements*

**1. Fuel Agreement**

Agip Petroli and Unione Petrolifera with the Ministry of Industry, the Ministry of Trade, and the Ministry of the Environment - July 12th 1989

Object: control of aromatic hydrocarbons levels in unleaded fuels in the national market

**2. Implementation protocol for the Ministry of the Environment and the Ministry of Urban Areas ordinances regarding urgent actions on oil products quality**

Agip Petroli and Unione Petrolifera with the Ministry of Industry, the Ministry of Trade, and the Ministry of the Environment - December 11th 1991

Object: implementation of public provisions regarding the improvement of oil products quality in identified metropolitan areas

**3. Agreement on the quality of fuels**

Agip Petroli and Unione Petrolifera with the Ministry of Industry, the Ministry of Health, and the Ministry of the Environment - October 29th 1992

Object: improvement of the quality in oil products in the different Italian Regions

**4. Development and Environment - Fiat agreement part 1  
End-of-life vehicles recycling activity (F.A.RE program)**

Fiat with the Ministry of the Environment and Urban Areas - June 23rd 1993

Object: revisal of collection and demolition processes for end-of-life vehicles

**5. Development and Environment - Fiat agreement part 2  
Fiat's environmental management program**

Fiat with Ministry of the Environment and Urban Areas - June 23rd 1993

Object: to make an environmental management system in every plant available

**6. Development and Environment - Fiat agreement part 3  
Emission reduction - part 1. Vehicles and fuels evolution**

Fiat with the Ministry of the Environment and Urban Areas - June 23rd 1993

Object: vehicle emissions reduction plans and development of new optimised engines for lower emissions and improvement in fuels

**7. Development and Environment - Fiat agreement part 3  
Emission reduction - part 2. Public transport**

Fiat with the Ministry of the Environment and Urban Areas - June 23rd 1993

Object: improvement of diffusion of public transportation means with controlled polluting impact

**8. Development and Environment - Fiat agreement part 3**

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<sup>13</sup> To provide a better understanding of the results in this first phase of the analysis, we decided to take account only of those documents for which the complete text was available to us.

<sup>14</sup> The 1993 FIAT agreement is the evolution of a 1990 one. There is another very recent agreement signed by Fiat on July, 31st 1996, but this text is not yet available as it hasn't been ratified by CIPE.

**Emission reduction - part 3. Actions to improve lower emission vehicles diffusion in large metropolitan areas**

Fiat with the Ministry of the Environment and Urban Areas - June 23rd 1993

Object: improvement of the evolution process towards the increase of environmentally sound catalysed vehicle parks in urban areas

**9. Development and Environment - Fiat agreement part 4**

**Pilot project for an integrated mobility system at the metropolitan level, to optimise the environment-traffic relationship**

Fiat with the Ministry of the Environment and Urban Areas - June 23rd 1993

Object: reduction of environmental impact of traffic and improvement of vehicle-town relationship

**10. Development and Environment - Fiat agreement part 5**

**Treatment of production residuals (FENICE program)**

Fiat with the Ministry of the Environment and Urban Areas - June 23rd 1993

Object: to provide for direct internal waste management with maximum possible recycling rate

**11. Letter of intents for the implementation of an agreed program for the protection and promotion of environmental quality**

Fiat with the Ministry of the Environment - July 12th 1989

Object: reduction of air and noise pollution in large metropolitan areas and development of a monitoring and analysis system for pollution sources

**12. Asbestos protocol**

Fiat with the Ministry of the Environment - June 1990

Object: total asbestos removal from friction and breaks gaskets

**13. Framework agreement on the collection and recycling of plastic bottles for liquids**

Replastic, Assoambiente, Federambiente with ANCI - January 1993

Object: to organise the collection of plastic bottles for liquids at the national level

**14. Framework agreement on the collection and recycling of plastic bottles for liquids**

Replastic, Assoambiente, Federambiente with ANCI - July 1995

Object: to foster and spread separated collection and recycling of plastic bottles for liquids

*B) Regional and local level agreements*

**1. Understanding for the quality protection in all production steps, use, regeneration and waste management of consumable materials and auxiliary products for computers and office equipment**

Consorzio Ecoqual-It with Regione Lombardia - May 25th 1994

Object: quality promotion and incentives for consumable materials and auxiliary products for computers and office equipment; planning activity for collection of such exhausted materials, minimisation of the amount of waste to be sent to disposal; maximisation of the recovery of separately collected elements

**2. Understanding on actions for collection and recycling of paper and cardboard**

Assocarta with Regione Veneto - July 13th 1993

Object: implementation and development of selected collection and recycling circuits for paper, to minimise the quantity to be sent to disposal and to maximise the recovery of separately collected fractions

**3. Understanding on actions for collection and recycling of paper and cardboard**

Assocarta with Regione Lombardia - July 15th 1993

Object: implementation and development of selected collection and recycling circuits for paper, to minimise the quantity to be sent to disposal and to maximise the recovery of separately collected fractions

**4. Understanding on actions for collection and recycling of paper and cardboard**

Assoambiente-Ausitra, Assocarta, Assorecuperi Gruppo Carta da Macero, Comieco, Federambiente-Cispel Lombardia with Provincia di Milano - May 25th 1994

Object: implementation and development of selected collection and recycling circuits for paper, to minimise the quantity to be sent to disposal and to maximise the recovery of separately collected fractions

**5. Understanding on the development of selected collection and recycling circuits for paper**

Assocarta with Regione Toscana - September 12th 1994

Object: to provide a real implementation for national and regional provisions for the promotion of waste reduction and the improvement of local public administration institutions actions towards selected waste collection

**6. Understanding on the recovery and recycling of paper and cardboard and promotion of selected collection of paper**

Comieco with Regione Lombardia - January 25th 1996

Object: implementation and development of selected collection and recycling circuits for paper and cardboard, to minimise the quantity to be sent to disposal and to maximise the recovery of separately collected fractions

**7. Understanding on the recovery and recycling of paper and cardboard and promotion of selected collection of paper**

Comieco with Provincia di Torino - July 3rd 1996

Object: implementation and development of selected collection and recycling circuits for paper and cardboard, to minimise the quantity to be sent to disposal and to maximise the recovery of separately collected fractions

**8. Understanding on the recovery and recycling of paper and cardboard and promotion of selected collection of paper**

Comieco with Regione Lazio - 1996

Object: implementation and development of selected collection and recycling circuits for paper and cardboard, to minimise the quantity to be sent to disposal and to maximise the recovery of separately collected fractions

**9. Framework agreement for the collection and recycling of compostable residuals**

Consorzio Nazionale Compostatori Italiani with Federambiente e ANCI (National Association of Italian Municipalities) - March 29th 1995

Object: implementation of law directives for the promotion of activities oriented to compostable residuals selection, collection and re-use

**10. Understanding protocol for the promotion of activities oriented to selected collection and recycling of compostable organic components of urban solid waste**

Consorzio Nazionale Compostatori Italiani with Agenzia Regione Recupero Risorse (Regione Toscana) - April 14th 1995

Object: implementation of national and regional regulations to promote waste reduction and to stimulate the adoption and testing of selected collection systems for organic components in urban solid waste

**11. Understanding protocol for the promotion of activities oriented to selected collection and recycling of compostable organic components of urban solid waste**

Consorzio Nazionale dei Compostatori italiani with Regione Lazio - July 28th 1995

Object: implementation of national and regional regulations to promote waste reduction and to stimulate the adoption and testing of selected collection systems for organic components in urban solid waste

**12. Understanding protocol for the program oriented to the reduction of water consumption and of polluting effects of dyeing industry**

Associazione Industriali Provincia di Modena, Associazione Piccole Imprese Modena, Organizzazioni Sindacali with Regione Emilia Romagna, Provincia di Modena, Comune di Carpi - July 1st 1994

Object: optimisation of water resources management and of consumption control activities on the use of water, chemicals and energy

From this first phase of analysis of the collected documentation, we have identified a number of characterising elements of the present level of knowledge and use of negotiated agreements in Italy. We summarise our findings in the following table.

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**Table 1. Summary of the first outcomes of IEEE'S research on negotiated agreements in Italy**

Sample: 26 agreements

N.B. In points 6 and 7 multiple answers were admitted

- 1) Economic actors (many agreements see the participation of more than two actors)
  - a) Single enterprises - 2 (Agip Petroli, Fiat), in 12 agreements
  - b) Consortium of enterprises - 3 (Comieco, Ecoqual-it, Consorzio Italiano Compostatori, Replastic), in 9 agreements
  - c) Industrial associations - 4 (Unione Petrolifera, Assocarta, Federambiente, Associazioni Industriali di Modena), in 16 agreements
  
- 2) Years
  - a) 1989 - 2
  - b) 1990 - 1
  - c) 1991 - 1
  - d) 1992 - 1
  - e) 1993 - 10 (7 in the Fiat's protocol)
  - f) 1994 - 4
  - g) 1995 - 3
  - h) 1996 - 3
  
- 3) Production sectors
  - a) Oil - 3 (Agip)
  - b) Cars - 9 (Fiat)
  - c) Computers and office equipment - 1 (Ecoqual-it)
  - d) Paper - 7 (Comieco 3, Assocarta 4)
  - e) Agriculture - 3 (Consorzio Italiano Compostatori)
  - f) Dyeing - 1 (Associazioni Industriali della Provincia di Modena)
  - g) Waste recycling - 2 (Replastic)
  
- 4) Object of the agreement
  - a) Process - 5
  - b) Product - 21
  
- 5) Geographical area
  - a) National - 14
  - b) Regional/Local - 12
  
- 6) Environmental sectors
  - a) Air - 8
  - b) Water - 1
  - c) Soil - 5
  - d) Energy - 2
  - e) Raw materials - 3
  - f) Waste management/Selected waste collection - 15
  - g) General environmental impact - 1
  
- 7) Nature of goals
  - a) Quantified - 16
  - b) Qualitative - 10
  
- 8) Value
  - a) Binding - 0
  - b) Non binding - 26
  
- 9) Period of validity
  - a) From a defined date - 4
  - b) Less than 1 year - 1
  - c) 2 years - 6
  - d) 3 years - 4
  - e) Defined as medium/long term - 2
  - f) Different expiration terms for different articles (2 to 5 years) - 1
  - g) Undefined - 8

- 10) Benefits requested by the enterprises to the undersigning public bodies
    - a) R & D activities promotion - 4
    - b) Amendments and integrations to planning activities and administrative procedures - 12
    - c) Amendments to authorising process - 2
    - d) Amendments to regulation - 5
    - e) Economic incentives - 11
    - f) Information dissemination and promotion of public awareness activities - 8
    - g) Promotion of public demand for products object of the agreements - 8
  
  - 11) Presence of joint committees with monitoring and evaluation role on the agreement implementation
    - a) Ad hoc joint committees - 6
    - b) Direct evaluation activity by undersigning actors - 10
    - c) No committees expressly stated - 10
  
  - 12) Typology classification
    - a) Substitutive negotiated agreements -1
    - b) Implementative negotiated agreements - 14
    - c) Integrative negotiated agreements - 6
    - d) Anticipative negotiated agreements - 3
    - e) Unilateral voluntary programs recognised by the P.A., with integrative value - 2.
-

## 6.2 *The analysis*

On the 26 considered documents, 24 can be surely identified, under our definition, in the category of negotiated agreements (cf. par. 2). We instead consider unilateral voluntary programs recognised by the P.A. the two Fiat's agreements on F.A.RE and FENICE programs (A4 and A10).

One of the first elements that emerges from the analysis is the low number of economic actors (see the priority role of Fiat with 9 agreements) and, as a consequence, industrial sectors interested by negotiated agreements. On the other hand, it is our belief that this is a very dynamic context. The interest we registered during the collection of the documents (probably also linked to the information diffusion activity supported by the EU), bring us to the conclusion that there will be a progressive (even if slow) increase in the number of industries and economic activities involved.

This initial phase of use of voluntary instruments is also characterised by another quality. Contrary to other European experiences, which show a large majority of agreements promoted by industrial associations, in Italy the three main categories of economic actors (single enterprises, consortiums of enterprises and industrial associations) are equally represented. Therefore, the negotiating activity is understood not only as a public interaction process addressed by whole sectors, but also as an individual choice for individual economic actors.

Moreover, larger enterprises have been in an advantageous position not only because of their financial capability and R&D strength, but also because they are often already present at the negotiation tables at national and international level (Fiat again is a clear example).

Italy frequently uses voluntary consortiums as a form of co-operation among individual enterprises, even of large dimensions. A good example could be Ecoqual-It, a consortium established in May 1994 by the main companies in the sector of computers and office equipment (B1)<sup>15</sup>.

The use of negotiated agreements for single enterprises or consortiums of enterprises also represents a clear market strategy. The different economic actors are able to prove to the public actor their availability and capability providing better environmental performances in terms of both processes and products. They reach, therefore, a better competitive position compared to the other actors not involved in the negotiation. This is even more true when the agreement relates to the evolution of public demand models.

Among the analysed agreements, for instance, we find in eight cases on improvement in environmental quality by changing the purchasing behaviour of the PA itself (in particular the increase in use of recycled and environmentally sound products, like recycled paper, controlled environmental impact office equipment, low pollution emissions vehicles for public transportation).

The characteristics and the goals of negotiated agreements reflect the trends of environmental regulation. Our results confirm this consideration. Eight cases, for instance, refer to the reduction of polluting air emissions and 15 are related to waste management oriented towards recycling. These two items are the most important environmental problems on the national public agenda.

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<sup>15</sup> The consortium members are: Canon, Epson, Facit, Fujitsu, Genicom, Lexmark/IBM, Manesmann Tally, NRG, Oki, Rank Xerox, Ricoh, Apple, Hewlett Packard.

There is also a strong correlation between these aspects and those related to: geographical value, period of validity, goals, quantification, typology of the agreement.

All the agreements related to the management of selected collection and recycling of paper and organic waste, for instance, are of an implementative nature, in relation to the recent and abundant public regulation activity. Their territorial value, connected to actions already undertaken at an operational level, is normally identified at regional and local levels, with quantified objects and defined time validity.

The only implementative agreements with quantified goals and national level effects are the Agip case signed in 1991 (A2) and the two Replastic's cases (A13 and A14). But in all these cases, in spite of the national level of validity, the areas involved are precisely defined. The Agip case involves the most important 7 metropolitan areas in Italy. The Replastic cases, as framework agreements, are to be implemented through specific agreements with Municipalities.

Regarding the goals of the economic actors in the use of negotiated agreements, and in line with our hypothesis on the need of large and appropriate resource availability, we can observe that, at least until now, only larger companies have been committed to agreements over and above implementative ones.

The typology of most of Fiat and the Ecoqual-It's agreements are integrative; one of Agip (A3) and two of Fiat (A6 and A8) are anticipative. Only one agreement has been detected as certainly substitutive: Agip's A1. In the text of the document, in fact, there is a clear reference to the fact that the commitment to reduce the benzene contents in unleaded fuels is accepted «... in order to avoid that adoption of average national limits of polluting contents in unleaded fuels may lead to their adoption at regional or local level, as a limit valid for each refinery<sup>16</sup>» (cf. the text of the agreement, forward, 5th comma).

Finally, we propose a first classification of the benefits requested by the enterprises to the undersigning public bodies. Negotiated agreements are, in fact, characterised by a co-operation process, which, by its own nature, implies a barter. The results of the research demonstrate that financial and economic factors continue to play a central role (11 cases), as one could expect. It clearly emerges that the commitment to change by the PA is important when assessing the extent to which the goals of the agreements are achieved.

In 12 cases, for instance, the public bodies are requested to facilitate the administrative activity connected with the agreement contents (mainly about production process modifications and plant relocalization actions, in order to reduce the environmental impact): integration and change to public provisions, land planning and similar interventions to effectively implement the agreement<sup>17</sup>.

The role of the promotion of public demand and the diffusion of information towards the changing of behaviour of "citizens-users" (eight cases) is also very important. In this last case, the population behaviour represents a crucial factor in its success: it is the "first ring of the chain" of the selected waste collection and the basic element for the successful implementation of projects connected with changes in consumer attitudes (i.e. unleaded fuels) and with the reduction of air pollution from private use of vehicles and heating equipment.

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<sup>16</sup> Translation by the authors

<sup>17</sup> For instance the Regional Waste Plan Layout for selected waste collection and recycling activities

In Italy, one of the main problems for an effective use of negotiated agreements as an instrument of environmental policy remains the lack of good monitoring mechanisms on the attainment of expected goals. None of the analysed documents foresee penalty clauses in case of default; in only 4 cases a supervising evaluation committee is explicitly mentioned; in 10 cases the control activity is directly performed by the partners. Finally, no mention exists in the remaining 10 cases. Moreover, a reference to legal bounds never appears: the expected results evaluation, when foreseen, is often expressed as minimum quantity limits (i.e. for waste paper collection), beyond which the goal is considered generally attained. So voluntary instruments don't reach a sufficient level of institutional identification and, most of all, they remain open to legitimization and social acceptability criticism.

The lack of a direct control system and of judgement criteria on the real attainment of the goals of the agreements, together with the requests of benefits from the enterprises to the public administration may represent a source of disagreement with the public opinion. In many cases, as in other European countries, environmental and consumeristic associations make opposition to the use of negotiated agreements, suspecting the possibility of regulator's capture or opportunistic behaviours. This mainly in consideration of the limited technological and scientific knowledge available to the public administration sector, and of the strength and dimension of the economic actors involved.

## **7. Problems and proposals for a system of voluntary agreements in Italy and in Europe**

The main hindrances to a serious encouragement to use voluntary agreements in Italy are:

- the spreading of unclear rules, making the reference context uncertain and reducing incentives to companies which operate inside a "minefield".
- the lack of technical and scientific expertise of the PA, the logical bureaucracy of the PA; the inability to compare itself to companies in a constructive way; and because of a poor degree of autonomy, discretion and responsibility of public officials.

- the high degree of dispersion characterising many industrial sectors, with the resulting difficulty for industrial associations to undertake valid commitments for all their associates, thus gathering their global consent, because of the fragmentation of interests<sup>17</sup>.
- the poor confidence between PA and companies.
- a certain immaturity of the public opinion which is easily effected by emotional factors and lacking an adequate environmental culture.

The Italian framework shows some structural peculiarities which condition negatively the relationship between the PA and firms. In particular, the following aspects characterise the firms side:

- the fear that :
  - a) the possible success of a voluntary agreements could be the premise for its transformation into a rule or a regulation;
  - b) the PA doesn't provide an information support (about rules, technologies, etc.);
  - c) that any request by firms to competent bodies may involve the risk of the activation of inspections and controls.
- public officers cannot assume any responsibility in the interpretation of rules and regulations, because they don't have any discretion.
- a firm requesting information risks self accusation, particularly important when considering that often little violations have criminal relevance.

Within this framework the following actions are desirable in order to obtain a positive development of voluntary agreements in Italy:

- to deregulate the environmental field and to rationalise and systematise laws (single texts).
- to start a system of national and regional Agencies for the environment, which would have operating authority and be in charge of the setting up and verifying of the implementation of the goals of voluntary agreements.
- to create a constructive discussion between PA and industrial association, rewarding; associate companies participating to voluntary agreements; allowing a "preferential lane" for authorisations and controls.
- to initiate serious environmental education programs for citizens, starting from compulsory school.
- to activate (with SINA, the national environmental information system) a certain and transparent environmental information system.
- as a consequence of the subscription of a voluntary agreement in a certain field, the PA may make the commitment not to regulate the matter (for a certain time, also in consideration of the reaching of the goals forecast in the agreement).

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<sup>17</sup> Within this framework it is interesting to notice the possibility of stipulating voluntary agreements at a level of industrial district, due to the homogeneity of the problems characterizing the companies in the territory and the relatively good confidence existing with the local P.A.

The role of promoting agreements played by the European Commission must be considered as positive<sup>18</sup> for Italy, as it can give stimulation to the Italian PA in a framework of integration and competition.

## 8. Conclusions

Voluntary agreements have recently been examined by scholars of different disciplines (in particular economists and jurists), with a certain delay in their application by actors in the real world (who, since the 90's make increasing use of them).

Different approaches are utilised to analyse voluntary agreements. Their nature is a matter of discussion. They are alternatively considered:

- contracts between public and private actors.
- interaction and negotiation processes between P.A. and firms and among firms.
- policy instruments.

Every perspective looks promising, but it's the third we consider here. Better still, we consider voluntary agreements not only as environmental policy instruments, but more in general as industrial policy instruments.

Voluntary agreements are interesting with respect to regulation and terms of efficacy, amount and allocation of costs and time to reach specific goals. Many aspects have still to be investigated to better evaluate which issues are likely to be successful through voluntary agreements and, above all, which conditions have to be respected in order to use them effectively.

Respecting market competition and avoiding opportunistic behaviour and free riding are among the more relevant problems which can distort the market in favour of countries, industrial sectors or firms. In this perspective, the EEC Treaty and the GATT agreements managed by the WTO represent important frameworks.

Other aspects of great importance concern the transparency, representation of citizens and the protection of consumer interests (in Italy consumer associations are still young and lack powerful representation).

The European Commission already encourages consultations with local institutions, industrial associations, environmental associations, etc. before striking a voluntary agreement, in order to consider their comments and has proposed the institution of a Public Register of voluntary agreements, freely accessible by citizens. On both the PA and firms side, voluntary agreements must be considered as part of a vision of medium-long term industrial development.

In Italy a wider adoption of voluntary agreements, with the background of a reference framework at the European level, can represent an opportunity to revise extensively the relationship between P.A. and firms and to spread an industrial culture centred on responsibility even to small and medium size firms.

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<sup>18</sup> Among other things the revision of provision 83/189 on the notification of the national legislation to the Community, in force since July 1994, states that also voluntary agreements must be notified.

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# **CEEETA**

## **Contractual Regimes in the Energy Sector The Portuguese Case by Alvaro Martins and Valdemar Rodrigues**

### **1. Introduction**

Are there innovations in energy policy in the Portuguese environment of liberalization? To answer this question let's make a review of the main guidelines for energy policy adopted by the socialist government:

- a. The success of natural gas in Portugal is the main concern of the authorities, taking into account the huge investments involved. To accommodate the delay in construction of the first natural gas combined cycle power plant, the government has approved the conversion of two groups of the old fueloil power plant of Carregado into natural gas, because of the negotiated clauses "take or pay" in the long term contract with Argelia.
- b. The EC Directive 88/609/CEE - great installations of combustion was transposed to national legislation and there is some concern with the practical way to oblige the firms concerned to act according to this legislation. A protocol signed recently between the government and the owner of the big combustion installations was the first step to put this subject on the negotiations table. Because of the globally defined targets, there are some scope for negotiations within the firms involved. It must be stressed that the environment authorities have been the leaders of the negotiations.
- c. The huge Energy Program negotiated with the European Union for the period 1994-1999, supports mainly natural gas and decentralized electricity production (wind farms and small hydro power plants are explicitly mentioned).

- d. There is some political concern with the management of energy in the municipalities. A training program aiming to prepare experts in energy management attached to the municipalities is being defined and some support to local investment in the area is expected.
- e. The feasibility study for a biomass power plant using forest residues will be conducted, under the government initiative. It is considered as a multipurpose project: electricity production, job creation in depressed areas and an innovative policy against fires which every year destroy large areas of forests.

Almost all of the instruments and policies mentioned have considerable positive impacts on the environment. Investment in renewables is also supposed to be reinforced, which will counterbalance the loss of market of biomass owing to the penetration of natural gas in traditional biomass consumers.

Portugal has other innovative social instruments with an emphasis on negotiated (voluntary) agreements.

*An agreement between government and industry to facilitate action with a desirable social outcome, which is encouraged by the government, to be undertaken by the participant based on the participants self interest*

In Portugal the energy sector has been traditionally driven by the state, through the state-owned national utilities EDP (Electricidade de Portugal) and GDP (Gás de Portugal) and the recently privatized PETROGAL (refining and distribution of oil products). Perhaps due to this contingency, and possibly aided by the semantics of the term industry, the energy sector has also been recurrently separately apart from other industry sectors. This is particularly visible when looking at the contractual regimes established for the environment between companies and the government. A global agreement on environment and sustainable development which provided the framework for voluntary agreements (VAs) involving specific industry sectors was signed in 1994, but none of the institutions involved was representative of the energy sector.

Very recently, in January 1997, a protocol was signed between the Ministry of the Environment and those industry sectors under the scope of the EC Directive 88/609/CEE - great installations of combustion. Such directive was transposed to the Portuguese legislation by the Decree-Law 352/90 of November 9<sup>th</sup> (further regulated

by the Regulation 286/93 of March 12<sup>th</sup>), but its targets regarding the emission of atmospheric pollutants were defined globally, without mentioning sectoral emission abatement targets. The absence of such sectoral guidelines was thus in the origin of the protocol, which aimed at defining the pollution abatement quotas for each sector. In this case the electricity production sector was one of the contracting parts, together with other partners such as petrochemical and ironworks companies.

## 2. Voluntary Agreements

In a recent inventory of VAs conducted by DGIII (see table I) and published in CEC (1996), 10 VAs have been signalled for Portugal, to be compared with 107 for Netherlands, 80 for Germany or 1 for Ireland. However, none of these agreements concerned the energy sector. The main sectors having signed the mentioned VAs are the following: food products, beverages and tobacco, basic metals and fabricated metal products. The main themes, again according to the DGIII inventory come as follows: emissions reduction, global framework, product improvement. The main signatories have been large firms and the Ministry of Environment and Natural Resources.

In November 1994, a *global agreement on environment and sustainable development* (AGMADS, 1994) was signed between the government, CIP - the confederation of Portuguese industry, and CAP - the confederation of Portuguese land farmers. The agreement involved three ministries (Environment, Industry and Energy, and the Ministry of Agriculture) and established the major guidelines for an institutional co-operation towards the adjustment of the various industrial sectors to the environmental legislation in force. The *leitmotiv* of the agreement was basically the recognition that environmental legislation was being transposed to the national context at a rate clearly not balanced by the capacity of Portuguese industry to accommodate their requirements. In other words, companies in general felt that they were becoming increasingly illegal, and something should be done to permit a more progressive adjustment, to delay the legal enforcement, and thus to avoid the possible consequences in the meanwhile (Rodrigues & Ribeiro, 1995). This global agreement should be the basis for the formulation of more specific agreements, involving particular sectors of industry in Portugal.

The first sectoral voluntary agreement was signed in February 1995, between the responsible government departments and the national federation of pig-breeders associations (FPAS). The results of this agreement are very poor based on an analysis of actions undertaken by the sector to control emissions of pollutants.

The success of legislation, which seems to be the *engine* of these voluntary agreements, is part of a wider process that is now being learned for the first time by many of the managers of the firms concerned.

**Table I - Classification of VAs by Member States and by 5EAP Sector**

Member State	5EAP Sector					Total	
	Agriculture	Energy	Industry	Transport (1)	Tourism	DGIII Survey <sup>1</sup>	EC Com <sup>2</sup>
Austria			✓			20	25
Belgium		✓	✓			6	14
Denmark	✓	✓	✓			16	16
Finland			✓			2	n/a
France		✓	✓			8	n/a
Germany		✓	✓			93	80
Greece						0	0
Ireland			✓			1	1
Italy			✓			11	11
Luxembourg		✓	✓			5	5
Netherlands	✓	✓	✓			107	107
Portugal	✓		✓			10	10
Spain			✓			6	6
Sweden	✓	✓	✓			11	13
UK			✓			9	8
<b>EU Total</b>	<b>4</b>	<b>7</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>305</b>	<b>296</b>

Sources ;<sup>1</sup> DGIII : Inventory of Voluntary Agreements, CEC, 1996 (Draft Final). <sup>2</sup> Communication from the Commission to the Council and the European Parliament on Environmental Agreements, 15 November 1996. NB.

For the purpose of this Table the term sector used in the definition of VAs (Section 1.3) has been taken to mean variously agricultural, energy, industry, transport, tourism etc..

Notes : Transport Sector refers to the transportation of freight and people. Changes that affect the transport industry (i.e. vehicle manufacture, recycling, petrochemical production) are reflected under Industry Sector.

: Energy refers to activities by any firm that derives its main revenues from the supply, distribution or sale of energy.

: Agriculture is defined as activities at the farm level. Thus, the agro-chemicals, farm packaging and forest products sectors are not included.

### 3. Other protocols

The combustion installations having a thermal power greater than 50 MWth, and whose permit was given before the 1st July 1987 include:

- six thermal power stations
- five paper pulp plants
- one petrochemical unity
- an integrated steel works
- two oil refineries

In table II thermal capacities and the type of fuel being used are listed.

**Table II - Existing combustion installations having a capacity greater than 300 MWth**

<b>Big combustion units</b>	<b>Thermal Power</b>	<b>Type of Fuel</b>
I	862	Residual fuel
ii	728	Residual fuel and LPG
iii	3080	Imported coal
iv	2993	Imported coal
v	2501	Residual fuel
vi	1910	Residual fuel
vii	487	Domestic coal and residual fuel
viii	343	Residual fuel, wood residues and black liquor
ix	438	Residual fuel, wood residues and black liquor
x	320	Residual fuel, wood residues and black liquor
xi	314	Residual fuel, wood residues and black liquor
xii	432	Residual fuel, fuel from pyrolysis

Source: Grupo de Trabalho das GICS (1996)

According to article 3 of the Directive above mentioned, each Member State must define a national program with the objective of a progressive reduction of total annual emissions. The upper limits for SO<sub>2</sub> and NO<sub>x</sub> emissions come as in table III.

**Table III - Upper limits for SO<sub>2</sub> and NO<sub>x</sub> emissions**  
(according to Directive 88/609/CEE and annex VI of Regulation n<sup>o</sup> 286/93)

	<b>1st phase 1993</b>	<b>2nd phase 1998</b>	<b>3rd phase 2003</b>
SO <sub>2</sub> (kt)	232	270	206
NO <sub>x</sub> (kt)	59	64	-

Source: Grupo de Trabalho das GICS (1996)

To accommodate the specificities of the Portuguese economy an increase in emissions was allowed until 1998. And because the Directive and the national legislation only define global emissions for the existing combustion facilities, the breakdown by sector of tables IV and V is now being discussed.

**Table IV - SO<sub>2</sub> emissions per sector**

<b>Sectors</b>	<b>1996 kt</b>	<b>1998 kt</b>	<b>2000 kt</b>	<b>2003 kt</b>
Electricity	218.0	219.0	190.0	165.0
Paper Pulp	10.0	10.0	9.5	9.0
Petrochemical	7.2	7.2	6.2	6.2
Iron and steel	2.3	2.3	2.3	1.8
Refining	30.5	30.5	26.0	22.0

Source: Grupo de Trabalho das GICS (1996)

**Table V - NO<sub>2</sub> emissions per sector**

<b>Sectors</b>	<b>1996 kt</b>
Electricity	54.5
Paper Pulp	3.6
Petrochemical	0.9
Iron and steel	0.4
Refining	4.3

Source: Grupo de Trabalho das GICS (1996)

The following measures are envisaged to reduce SO<sub>2</sub>, by at least 24% in the period 1998-2003, and NO<sub>x</sub> emissions:

**Table VI - Some measures envisaged to reduce emissions**

<b>Sector</b>	<b>SO<sub>2</sub></b>	<b>NO<sub>x</sub></b>
Electricity	- fueloil with a less sulfur content	- new burners in the three biggest power plants
Paper pulp	- rational use of energy - natural gas consumption	- rational use of energy - new technologies (OFA and LNOG)
Petrochemical	- low sulfur content for fuel oil - increase the burning of pirolisis fueloil	- new burners
Iron and steel	- rational use of energy	- Control of combustion - new burners - rational use of energy
Refining	- Oil with low sulfur content	- new burners

The protocol signed recently can not be considered as a voluntary agreement as defined above. In order to force the main polluters to take into account the legislation, the public sector has encouraged the signing of the protocol. Unfortunately the firms involved have not been able to negotiate pollutant permits among themselves, which could have in the future a positive effect in terms of efficient use of investment resources. In fact there is a lack at national level of a regulatory framework to enable a global system of tradeable emissions, following the main ideas expressed in *Stewart & al.* (1966).

#### 4. Conclusions

New instruments and policies are being used in the energy sector with positive impacts in the environment. However, the introduction of natural gas in the Portuguese economy will be the most relevant in terms of impact both in the energy and environment sectors.

Specific VAs for the energy sector have not been signed till the moment but it is expected that in a near future VAs will be signed by government and big firms which have combustion installations with a thermal power greater than 50 MWth.

The experience in VAs existing in Portugal covers several industrial sectors with the agreements concerned with emissions reductions and recycling. However, the experience obtained with these agreements is encouraging for further negotiations and a limited amount of financial support is to be provided by government.

## ***Acknowledgements***

*The authors are deeply acknowledged to Mrs. Teresa Ribeiro from the European Environmental Agency (EEA) who kindly provided very useful data on voluntary agreements in the EU.*

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# *RISØ National Laboratory*

## **Voluntary agreements in the Danish power sector** by senior scientist, economist P.E.Morthorst

### **1. Background**

During the past 20 years the Danish authorities have to an increasing extent engaged in energy and environmental policies. In the 70s and 80s a number of initiatives were taken concerning the future energy system, including the development of a natural gas system and a comprehensive heating plan. Following the energy plan, Energy2000, the Danish Parliament committed itself to a 20% reduction in the emissions of carbon dioxide (CO<sub>2</sub>) by the year 2005 relative to 1988. This reduction target was recently reconfirmed by the Parliament following the discussions of the new energy plan, Energy21.

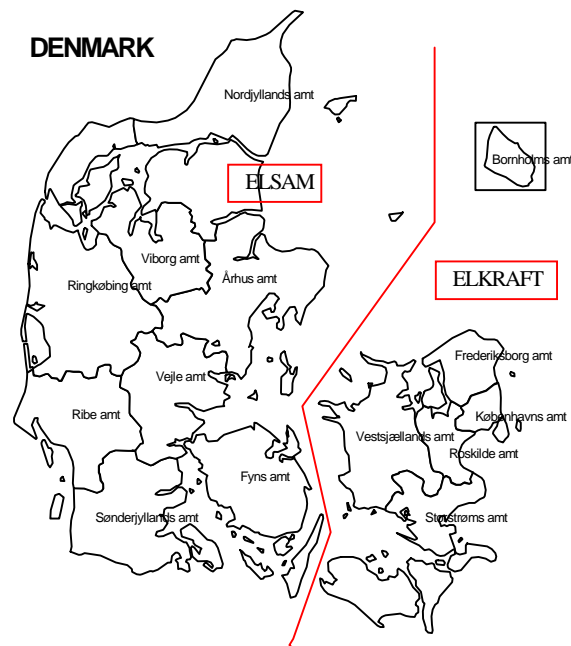
The electric power industry constitutes a considerable part of the Danish energy system, and therefore plays a crucial role in governmental energy and environmental policies.

### **2. The structure of the Danish power sector**

Historically, the Danish power sector has developed locally. In the towns, electricity supply was established and owned by the municipalities, while in the countryside it was established as an initiative of local people and organised in consumer co-operatives. Over time fusion and merges have reduced the number of individual companies significantly. Power generation is now mostly centralised, but more than 100 distribution companies still exist. Ownership in the utility sector is characterised by this historical development. Most companies are co-operatives, owned by the consumers, or joint-stock companies mainly owned by the municipalities.

The Danish power industry is divided into two independent areas: the Jutland and Funen area and Zealand, including its nearby islands, organised in to the associations ELSAM and ELKRAFT. Between the two areas no electric connection exists - a cable across the Great Belt has been discussed for a number of years, but until now no final conclusion has been reached. In addition to power lines to Germany, the ELSAM area has cable connections across the sea to Norway and Sweden, while the ELKRAFT area has similar connections to Sweden and Germany. The subdivision into the two areas is shown in

Figure 1 below.



**Figure 1: The subdivision of Denmark into the two electric associations ELSAM and ELKRAFT.**

In total the Danish power industry has an installed capacity of approx. 8500 MW. Of this ELSAM's share is approximately 60%. Most of the power generating capacity consists of large coal-fired centralised combined heat and power (CHP) plants, but during the last few years a rapid development has taken place in the establishment of small scale decentralized CHP plants, which have attained a share of approximately 20%. At the end of 1996 approximately 700 MW of wind turbine capacity exists in the Danish energy system, covering approximately 5% of total electricity consumption.

The electricity market in Northern Europe is in a transition phase. Norway and Sweden together have established an Electricity Exchange market (Nord Pool), and on a small scale the Danish utility companies have engaged in pool trading. Recently, the Danish law on electricity supply has been changed to allow for trade in electricity across the borders for consumers with a yearly electricity consumption above 100 GWh. The recently approved EU-directive on common rules for the internal market in electricity states the rights for access to the electricity and distribution grids, thus allowing free electricity trade in Europe.

Therefore, Danish utilities have started to adapt the organisational structure to a more liberated market for electricity. Recently, the ELSAM association has been split into three parts: ELSAM power generation, ELSAM systems operator and the ELFOR distribution association. The latter was founded by distribution companies that were formerly members of ELSAM.

### **3. Interactions between electric utilities and the Government**

In Denmark there is a long tradition of energy planning. In the '90s two energy plans were put forward by the Government, both with a focus on reducing the emissions of greenhouse gases. Following these energy plans the Danish Parliament has committed itself to a reduction in CO<sub>2</sub>-emissions of 20% by the year 2005 relative to 1988. The Danish CHP industry consumes approximately 50% of total gross energy consumption in Denmark, and accounts for approximately 55% of the total emission of CO<sub>2</sub>. Thus, the power industry has a decisive role to play in the energy plans concerning the reduction of energy use and subsequent CO<sub>2</sub> emissions.

The Government sets the rules of the interplay between the electric utilities and the public. The most important rules are shortly summarised in the following:

- The electric utilities have to be organised as non-profit companies. A surplus in one year has to be eliminated by a reduction in the electricity price the next, and conversely for a deficit.
- In regard to large generators including CHP plants, the sales prices of electricity have to be approved by the Electricity Price Commission each year. Only costs related to the production of electricity and heat can be covered.
- The prices of heat have to be approved by the Heat Price Commission. This applies to small scale CHP generation, district heating and natural gas.
- New electric capacity has to be approved by local and state authorities (for plant sizes above 25 MW).

Thus, the Danish power industry is strongly regulated by the Government. It has been especially difficult for the electric utilities to gain approval for new coal-fired plants. These new coal-fired plants will contribute to the reduction of greenhouse gas emissions as they replace existing low-efficiency coal-fired power plants, but only to a limited degree.

### **4. Voluntary agreements in the Danish power sector**

Given that the Danish power industry is as strongly regulated as it is, is it at all meaningful to speak about voluntary agreements? The answer might be: To a certain extent, but it requires a specific definition of what is understood by voluntary agreements. The following definition will subsequently be used in this paper:

*Voluntary agreements in the power sector exist where:*

- *The electric utilities have negotiated with the authorities and have had a significant influence on the results.*

Using this definition it is possible to identify the following four areas, where voluntary agreements have been undertaken in the Danish power system:

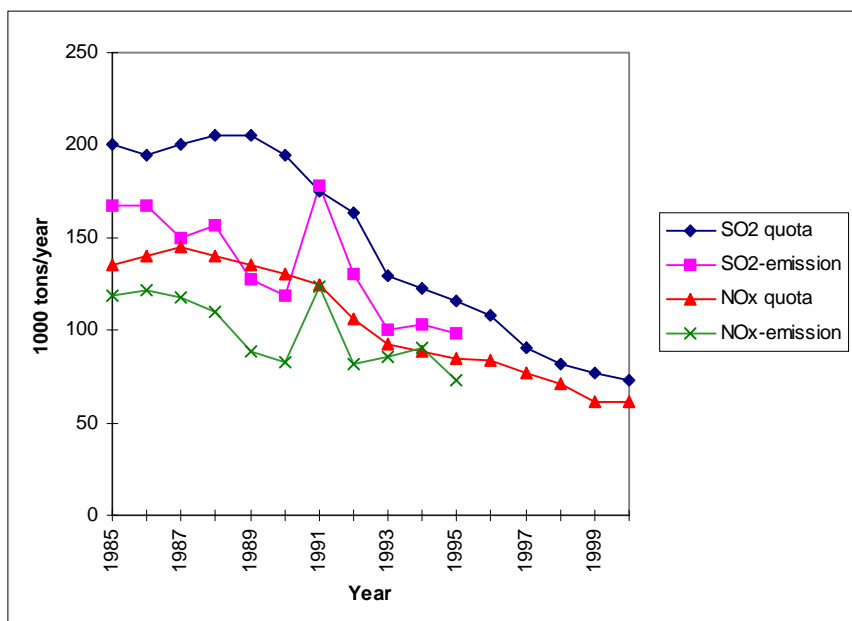
- Emissions control
- The utilisation of renewable energy resources
- Restrictions in the use of fossil fuels in power plants
- Integrated resource planning

In the following sections these four areas will be discussed separately.

## 5. Emissions control

Within the electric power sector emissions control is mainly undertaken for SO<sub>2</sub> and NO<sub>x</sub>. In the late '70s the Danish Government and utility companies initiated discussions on the possibilities for reducing the emissions of these two pollutants. The main reasoning behind this was not the damage to the Danish environment, but rather the acidification of Swedish lakes and rivers. Following these discussions a voluntary agreement was established for quotas for emissions of SO<sub>2</sub> and NO<sub>x</sub> from the beginning of the '80s. In 1985 Denmark signed the ECE-protocol on acidification, stating that emissions of SO<sub>2</sub> should be reduced by 30% by 1993 relative to 1980. Correspondingly, Denmark signed a protocol in 1988, stating that NO<sub>x</sub>-emissions should be reduced by 30% by 1998 relative to either 1986 or 1980. From the time of signing these protocols the voluntary agreements were changed to obligatory ones for the utilities, following the Danish Government's international commitments. At present Denmark is committed by both the EU directive on large combustion plants and by the extension of the ECE-protocol. The development in emissions of SO<sub>2</sub> and NO<sub>x</sub> and the corresponding quotas are shown in

Figure 2. Moreover, the future quotas are shown until the year 2000.



**Figure 2 : Development in emissions and quotas for SO<sub>2</sub> and NO<sub>x</sub>.**

As seen from

Figure 2 there is a substantial decrease in emissions. If the future quotas are respected, the emission of SO<sub>2</sub> will be decreased by almost 60% by the year 2000 relative to 1985. Correspondingly, the emission of NO<sub>x</sub> will be decreased by almost 50% by the year 2000 relative to 1985.

As mentioned above the Danish Parliament in 1991 committed itself to a 20% reduction of CO<sub>2</sub> emissions by 2005 relative to 1988. Following this, the electric utilities proposed to the Government that this national target was carried on to the individual sectors of society, implying that the electric power industry should commit itself to a 20% reduction in its CO<sub>2</sub> emissions. This offer was refused by the Government. However, there is currently no agreement on how this target is to be achieved by the individual sectors, although the general expectation is that the electric power industry will reduce their emissions by more than 20%.

## **6. Agreements on the use of renewable energy resources**

Concerning the utilisation of renewable energy resources the electric power industry has been engaged in the development of wind energy and combustion of biomass.

For *wind energy* agreements are made within three areas:

- The development of wind turbine capacity
- Buy-back rates for wind-generated electricity
- Payment of connecting the wind turbines to the national grid

In the mid '80s, parallel with the private development of wind turbines, the Danish Government made an agreement with the electric utilities to establish 200 MW wind power. The agreement had two main objectives: 1) to increase the capacity development of turbines and 2) to strengthen the development towards more powerful turbines. The latter was achieved by the utilities ordering prototypes of new, larger turbines.

Later this agreement for 200 MW of wind power was followed by another two both of the same capacity size with the last one starting in 1996. Finally, it has recently been agreed that if the Governmental target of 1500 MW of wind turbine capacity in year 2005 is not achieved by the private and planned utility capacity development, then the utilities have to build the missing capacity themselves.

In Denmark the buy-back rates for wind-generated electricity were negotiated between the electric utilities and the Wind Turbine Owners Association, encouraged by the Government. The result of the negotiations was a long-term agreement that relates the buy-back rate to the electricity price in the individual distribution areas.

A few years ago, there was a very fervent discussion in Denmark concerning who was to pay for the connection of the wind turbines to the electric grid, and eventually for

reinforcing the existing distribution grid. The Government finally imposed the requirement that on the utilities and the wind turbine owners the latter had to pay for the connection from the turbine to the existing grid but that the electric power industry was responsible for the overall grid, and, if necessary, to undertake and pay for grid expansion, no matter what the reason was for this expansion.

The use of *biomass* in the electric power industry is not promoted by voluntary agreements as is the case for wind turbines. The Government has imposed the following requirement on the utilities:

- The electric power industry has to use 1.2 million tons of straw and 0.2 million tons of woodchips by the year 2000.

The intention here is to use biomass for combustion in the large centralised CHP-plants. The phasing in of biomass has begun in the electric industry but has not been an easy task. The combustion of straw has a number of problems including the corrosion of boilers, low efficiency of plants and high costs of investments and fuels. The Danish Parliament is now revising the plans for biomass use. The most likely outcome seems to be a continuation of the present policy but with more emphasis on the use of woodchips.

## **7. Agreements/obligations on the use of fossil fuels and Integrated Resource Planning**

Concerning the *use of fossil fuels* the Danish Government has imposed a number of obligations on the electric utilities. Among others :

- From the mid 80s the electric power industry was restrained from buying coal from South Africa. This restraint was removed in the mid-90s.
- From the beginning of the 90s the utilities were obliged to buy a certain volume of natural gas from the Danish fields.

*Integrated Resource Planning (IRP)* was introduced by the authorities by a new electricity act in 1994. The intention by the Government to introduce IRP was to achieve a balance between investments in electricity conservation and the development of the electricity supply sector. The overall concept of IRP was imposed by the Government to the utilities, but the general assumptions were agreed upon in negotiations between the electric industry and the authorities. According to IRP the two associations, ELSAM and ELKRAFT, are obliged to present 15-year plans that specify how they will achieve their commitments in the environmental policy. The plans must integrate the development of electric supply capacity and the use of conservation measures.

## **8. Conclusion**

During the last 20 years the Danish Parliament has engaged to an increasing extent in energy and environmental regulating policies. The Parliament has committed itself to a number of environmental targets, including the reduction of airborne pollutants.

Due to its size, organisation and importance the electric power industry plays an essential role in Danish energy and environmental policy, and for these reasons the sector is strongly regulated by the authorities. The energy and environmental targets for the electricity sector are reached by the Government either by

- Imposing a law or, typically, by
- Imposing a framework on the industry and then negotiating the actual content.

The expected liberalisation of the energy markets might change the Governmental regulation of the electric power industry radically in the future.

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**Market-oriented Measures of the Swiss Energy Policy on the Supply and Demand Side: Consumption Target Values and Labels for Electrical Appliances**

by Dipl. soc. Edelgard Gruber

The Swiss energy conservation programme Energy 2000 includes a policy mix of voluntary and regulatory measures. The policy aims at the reduction of energy consumption and of CO<sub>2</sub> emissions. It is based on consensual solutions with a partnership between public institutions, the private economy, non-governmental institutions and the population. Energy 2000 consists of the following elements, among others: information, and consultation, education and training, promotion programmes and working groups for the exchange of experiences.

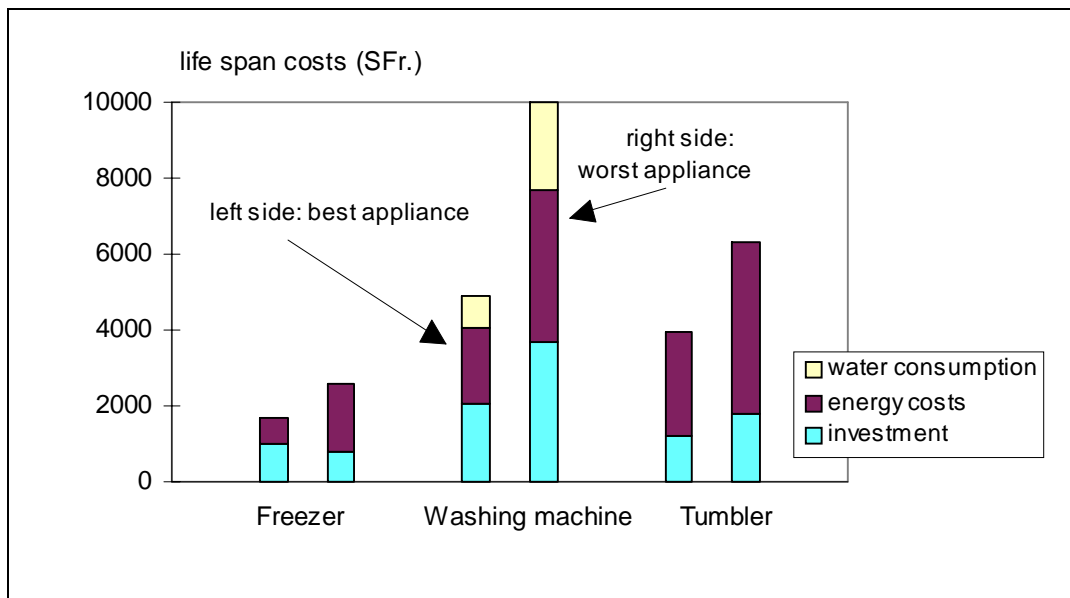
As in most other countries the consumption of electricity is growing in Switzerland and is becoming a major factor in the overall energy consumption. In addition, some years ago the Swiss population decided to hold a moratorium in the future development of nuclear power. As the possibilities for extending the use of hydro power are also limited for environmental reasons, efforts to promote the efficient use of electricity became necessary.

There is one very interesting innovative measure in Switzerland which has been evaluated recently in detail by the ISI. It is a combination of target-setting in co-operation with industry, the possibility of introducing trade restrictions if the targets are not fulfilled, and the labelling of energy-efficient equipment. The target-setting includes

- the large electricity-consuming appliances in private households: refrigerators, freezers, washing machines, tumblers, dishwashers and ovens
- electronic entertainment advices: television sets and video recorders
- office equipment: telefaxes, photocopiers, printers, personal computers, and monitors.

The potential of these products for saving energy through efficient technology has been proven in several studies (Brunner et al., 1986; RAVEL 1993; BEW 1993; Bachmann et al., 1993). Whereas the large household appliances have long been regarded as important for the improvement of energy efficiency (Figure 1), it has only recently been recognized that the "stand-by" losses of office and consumer electronics equipment are constituting an increasingly significant share of electricity consumption. The ETH Zurich projected the annual stand-by losses of this equipment as amounting to 900 million kWh, which is about 2 % of the total electricity consumption in Switzerland (Prechtel, 1993). The saving potential was assessed at between 30 and 80 %.

**Figure 1: Examples of energy-efficient and energy-wasting appliances**



By detailed measurements in Switzerland in 1991 and 1992 it has been proven that stand-by losses in office and consumer electronic equipment could be reduced to a few percent of their levels during this period without impairing their operational readiness. Neither manufacturers, distributors, nor purchasers were conscious of the need to pay attention to electricity consumption. Based on these studies on the potentials and the availability of technologies to improve the energy efficiency of household, office and entertainment equipment, the initiative for the target values and other measures concerning electric and electronic appliances were started. Based on legislation which had been confirmed by the population in a referendum, the Swiss Federal Government determined targets and procedures for the suppliers to reduce the electricity consumption of their products.

## **Target value negotiations with the industry**

The Swiss Federal Office of Energy invited leading manufacturers and importers, together with experts, to participate in working groups for the different equipment categories, such as household appliances, TV/video, telefax, etc. The subjects of the negotiations were the target values themselves, their scope of application, the deadlines by which they were required to be reached, the testing methods and annual reporting on type and number of models sold. The working groups were moderated by independent engineering offices, and held meetings on a number of occasions. Decisions were taken on a consensus basis.

Two different methods were used to determine the target values. In the case of the household appliances the values were based on an orientation towards the market; according to this criteria around 40 % of the available models already met the target values. For the electronic equipment the values were oriented towards the technological possibilities. The measurement of electricity consumption was based on self-declaration on the part of the manufacturer. The testing methods were decided in the working groups, where the manufacturers could exercise a great deal of influence concerning the specification of testing procedures.

Most of the participants were highly motivated to be involved in the definition of target values, deadlines and testing procedures, to contribute their own know-how and to arrive at realisable results. After a certain amount of scepticism in the initial stages, all participants agreed that the atmosphere in the work groups could be described as very co-operative, which is primarily attributable to the open and competent way in which the Federal Office of Energy and the group leaders handled the negotiations, and to the interest displayed by the representatives of the sectors concerned. There was also a marked spirit of partnership among the various competitors involved, and this even resulted in co-operations which extended well beyond the actual negotiations. However trade in general, as well as companies that were not involved in the negotiations, received relatively little information on the various activities.

Most of the participants were satisfied with the outcome of the negotiations. The manufacturers assessed the agreed target values and deadlines as strict but attainable. The results of the negotiations are shown in Table 1. The only serious point with which industry was not in agreement was that it would have preferred a more marked differentiation of the target values according to equipment categories.

## **The impact of the target values**

All in all, the target value setting in Switzerland is regarded as a successful energy policy measure. Not only was industry involved in the responsibility for energy efficiency, but also considerable improvements of at least some of the appliances have been achieved. With regard to television sets and video recorders, electricity consumption had not previously been a subject of discussion – either for manufacturers, dealers or consumers. The energy technology improvements are attributable to the target values to a very great extent.

**Table 1: Target values and deadlines for the individual equipment categories**

Category	Appliances	Target values	Deadline
<b>Household appliances</b>	washing machines	0.23 kWh/kg load	1997
	tumblers	0.6–0.7 kWh/kg load	1997
	dishwashers (different sizes)	0.12–0.13 kWh	1997
	ovens (different technologies)	0.8–0.9 kWh	1997
	freezers and refrigerators: different categories (upright freezers, chest freezers and freezer/refrigerator combinations)		1995
<b>Entertainment equipment</b>	television sets	5 W (Stand-by)	1995
		3 W (Stand-by)	1997
	video recorders	6 W (Stand-by)	1996
		3 W (Stand-by)	1998
<b>Office equipment</b>	telefax	2 W (Stand-by)	1997
	photocopiers (c = copies/min)	1 W ("Off" state)	1996
		27 + 3.23*c W (Stand-by)	1996
	printers	1 W ("Off" state)	1996
		2 W (Stand-by)	1996
	PCs	5 W ("Off" state)	1997
	"	3 W ("Off" state)	1999
	PCs with monitor	15 W (Stand-by)	1997
	"	13 W (Stand-by)	1999
	PCs without monitor	10 W (Stand-by)	1997
monitors	5 W (Stand-by)	1997	
"	3 W (Stand-by)	1999	

In the field of household appliances, the target values supported a trend that has been observable in Switzerland and elsewhere for some time now. When buying appliances, consumers are attaching ever greater importance to low electricity consumption, though the price/performance ratio is still the most important criterion. In the office equipment sector, the influence of target values was supported by two other measures in this sector which will be discussed below.

In the meantime, manufacturers have adapted their development guidelines, importers have approached their suppliers, and some models have even been specially adapted for sale in Switzerland. In the field of electronic equipment, for instance, the development of an intelligent energy management system has been accelerated. It proved possible to overcome practically all the technical problems involved in attaining the target values. Additional costs can only be attributed to energy technology improvements to a certain extent, since as a general rule design and performance features have also been improved.

Figure 2 shows the results achieved by the end of 1995. The fulfillment of the target values is measured by the market share of units sold: 95 % of the equipment sold by the deadline for the various categories (see Table 1) had to meet the standards. The evaluation is based on a report on units sold by all manufacturers, importers or dealers.

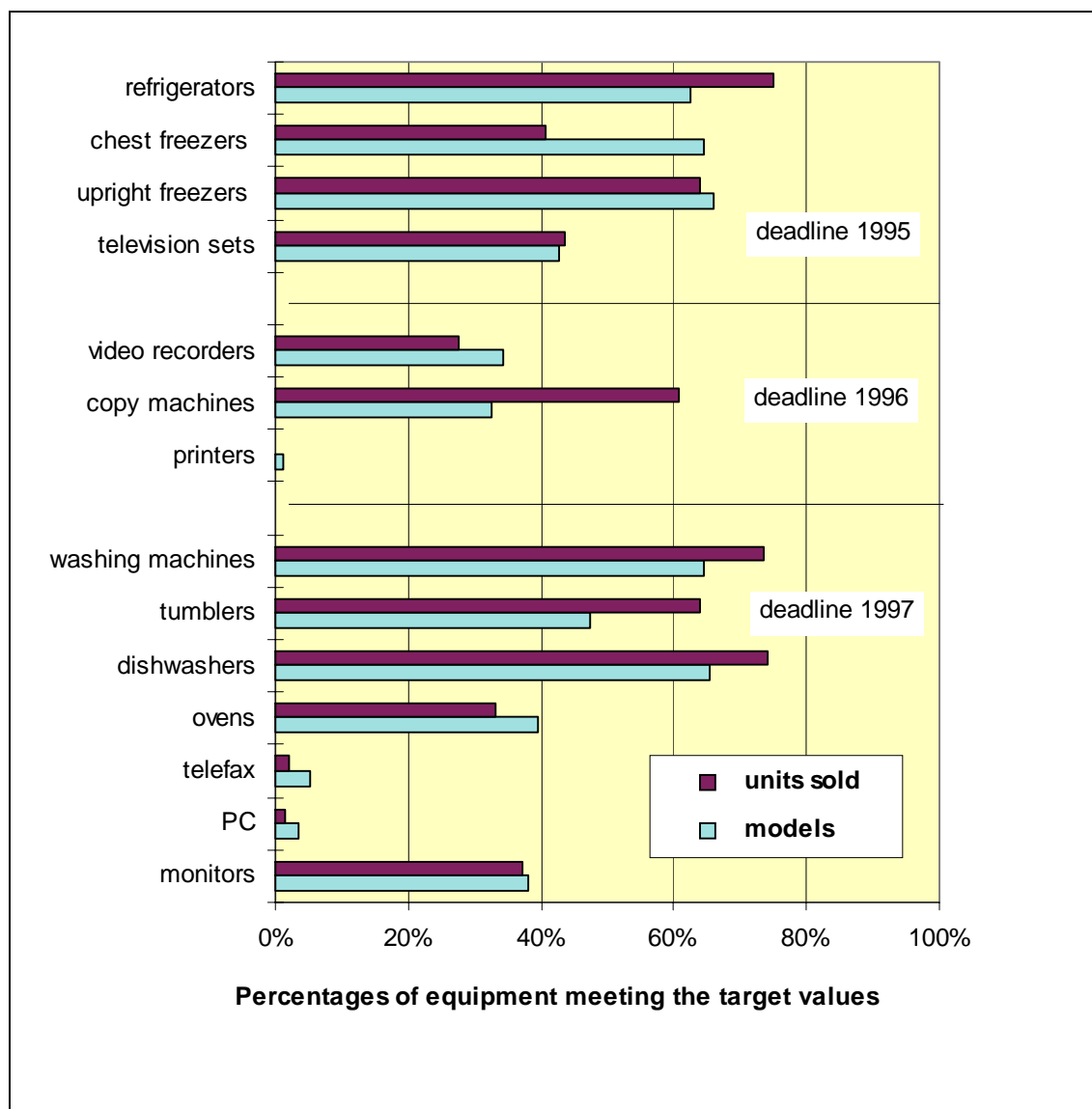
For four equipment categories (refrigerators, upright freezers, chest freezers and television sets) the deadline for meeting the target values expired at the end of 1995. According to the sales statistics, none of these groups have succeeded in meeting the target values to date (see Figure 2), but with a market share of around 75 % refrigerators are very close to the mark. Chest freezers and television sets are still a long way from the target, however. Washing machines and dishwashers, for which the deadline is due to expire at the end of 1997, have already shown extremely pleasing results with a market share of around 75 %.

Most office equipment is still a long way from meeting the target values, but great improvements were made between 1994 and 1995. Some electronic devices already show electricity consumption levels in 1995 that correspond to more stringent target values which are only required to be met by the end of 1998 or 1999. This points clearly to the fact that the target values are indeed attainable. The very stringent target values for printers (especially laser models) are proving difficult to meet.

The percentages of available models in the various equipment categories meeting the consumption target values rose in 1994 – with the exception of ovens – and this can be interpreted as an indication of technological progress. A comparison of the product ranges and market shares shows that the market penetration of energy-efficient equipment is still unable to keep up with technological progress in roughly half the equipment categories. On the other hand, pressure from demand is the most marked in the field of copiers.

The average efficiency increase due to achieving the target values differs greatly between the household appliances and the electronic equipment. Compared to consumption in 1994, chest freezers, for example, will save 23 %, tumblers only 9 %. Printers have the highest potential with 88 %. Television sets and video recorders will save about 70 %. The sum of these increases in efficiency would result in total electricity savings in Switzerland of 182 million kWh during the lifespan in the case of the large household appliances, compared to 230 and 179 million kWh respectively in the case of entertainment and office electronics. This considerable saving potential of electronic equipment despite the low consumption of only a few Watts is equally a result of the high share of stand-by use and the stringent standards of the target values.

**Figure 2: Percentages of equipment on the market meeting the target values and percentages of units sold (1995)**



Within one year – from 1994 to 1995 – around one quarter of the available energy-saving potential has been realized through the implementation of target values.

### **A policy mix and its influence on the energy efficiency of equipment**

Other policy measures are directed to the demand side of the equipment market:

- The "Energy 2000 Label" was introduced at the beginning of 1994, initially for office equipment, and subsequently for television sets and video recorders. The label is awarded to the top 20–30 % of devices (in terms of energy efficiency) available on the market.

- A household appliances database has been compiled in collaboration with the corresponding industrial and consumer organisations. It contains product information and includes details concerning advisory services, retail outlets, etc.
- The goods declaration takes the form of a standard sheet for each appliance, containing certain product information including electricity consumption. It has already been widely adopted in the field of household appliances and will be introduced in the office equipment sector shortly. The goods declaration is also a result of negotiations between industrial and consumer organisations.
- Within the Swiss "Impulse Programme" RAVEL experts have elaborated short training seminars in different fields of electricity use for professionals such as engineers, installers, company managers and technical personnel. This programme has contributed to enhancing the general awareness of electricity consumption.

Improvements in energy consumption levels, therefore, cannot be attributed solely to target values. Especially the E2000 Label has resulted in concrete action on the demand side in the form of individual initiatives in the private and public sector through the policy of large-scale buyers, for instance bank companies and large public administrations, to purchase equipment that has been awarded the E-2000 Label. These actions have put pressure on manufacturers and importers from the demand side.

### **Application of target values in other countries**

It is remarkable that most of the manufacturers who operate on a world-wide scale are prepared to comply with the target values, even though Switzerland only represents a marginal market share for them. In the fields of electronic office and entertainment equipment, the impacts abroad were much higher than expected. Target values and labelling requirements have been adopted by leading manufacturers and incorporated into their general development guidelines. In this way, Switzerland's policy has had a global impact.

The specification of target values, particularly in combination with the E2000 Label, has generated interest in other European countries. For example, Denmark, the Netherlands, Sweden and Austria have signed a "Memorandum of Understanding" with Switzerland in 1996 which concerns voluntary informative activities regarding home electronics and office equipment. The aim of this Memorandum is the harmonisation of testing procedures and award criteria. The criteria laid down for the E2000 Label for 1996 serve as the basis here and are to be regarded as minimum targets. Other countries have already expressed their interest in the Memorandum of Understanding, including Spain, Germany, Italy and France. In the Netherlands, preparations are currently being made to introduce a label for television sets and video recorders in 1997 already, which will be closely in harmony with the criteria of the E2000 Label.

The countries involved in the Memorandum of Understanding are interested in establishing a scheme of labelling electronic devices throughout Europe as a medium-term goal. The

larger the market, the greater will be the impact of the informative measures on the development of energy-efficient appliances. Common definitions of labels and measuring methods make it more convenient and less expensive for the manufacturers to offer efficient devices. They are therefore certainly interested in harmonisation in Europe.

In Switzerland, a label for large household appliances does not exist. It has therefore been recommended to develop an E2000 Label for these appliances, or to adopt the EU Label. It would also make sense to introduce target values in the other European countries and to aim for harmonisation of the efficiency requirements. Switzerland, however, will only be able to adopt the specifications laid down for Europe as a whole if these do not mean a step backwards and do not halt the continued progress of its target values.

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# *STEM*

## **Negotiated Agreements in the Belgian Electricity Sector**

by Aviel Verbruggen and Laurens De Jonghe

Our paper is composed of two parts. Part A deals with the appraisal of a formal agreement signed in 1991 about the reduction of SO<sub>2</sub> and NO<sub>x</sub> emissions from the central power sector plants. Part B provides an introduction into the overall regulatory climate in the Belgian electricity sector, and it concentrates on the memory of understanding signed in 1996 between the Flemish regional Minister for Energy and the electricity distribution federations.

In the typology of Croci and Pesaro<sup>1</sup> the former agreement is to be classified as a truly negotiated agreement substitutive to (eventually forthcoming) regulation. The latter agreements cannot be classified in Croci's and Pesaro's typology because they are limited to notes of understanding, perhaps being a first step towards real agreements.

### **Section A: Agreement on the Reduction of SO<sub>2</sub> and NO<sub>x</sub> Emissions**

#### **1. Introduction**

On the 18<sup>th</sup> of October 1991, the Belgian federal and regional governments and the Belgian electricity producers formally signed an agreement on the reduction of SO<sub>2</sub> and NO<sub>x</sub> emissions by the Belgian electricity sector<sup>2</sup>. The agreement was signed by Ministers of the federal state and of the 3 regions (Flanders, Brussels, Wallonia) on the one hand and by the power companies Electrabel and SPE on the other hand. The following 2 paragraphs of this text give an overview of the obligations of the electricity sector and the governments (both federal and regional) contained in the agreement. In the last paragraph, we discuss the results obtained so far and present 3 scenarios of the emissions in the period 1995-2005 based on the latest electricity generation equipment plan.

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<sup>1</sup> Croci E., Pesaro G., "Voluntary agreements in Italy: a new approach in environmental policy", ENER-seminar, Antwerp, Jan. 30-31, 1997 (this issue).

<sup>2</sup> 'Overeenkomst betreffende emissiereducties van SO<sub>2</sub> en NO<sub>x</sub> afkomstig van elektriciteitsproductie-installaties', October 1991.

## 2. Obligations of the electricity sector

The agreement mentions 5 general obligations:

- a. The electricity producers have to use fuels with a low sulphur content (max 1 %) in production plants without desulphurisation equipment.
- b. The electricity producers have to implement NO<sub>x</sub> reducing measures in their existing plants. These measures were studied in the 'NO<sub>x</sub> control program' of the electricity sector.
- c. The electricity producers have to install measuring equipment on all production units with a thermal capacity of at least 300 MW. This equipment will measure emissions of SO<sub>2</sub> and NO<sub>x</sub> on a continuous basis. An exception is made for measuring SO<sub>2</sub> emissions in production plants that are mainly fired by natural gas or other fuels with a very low sulphur content (e.g. gasoil).
- d. The electricity producers have to continue their research on desulphurisation.
- e. The electricity producers must cooperate in government programmes on the dissemination of environmental technology.

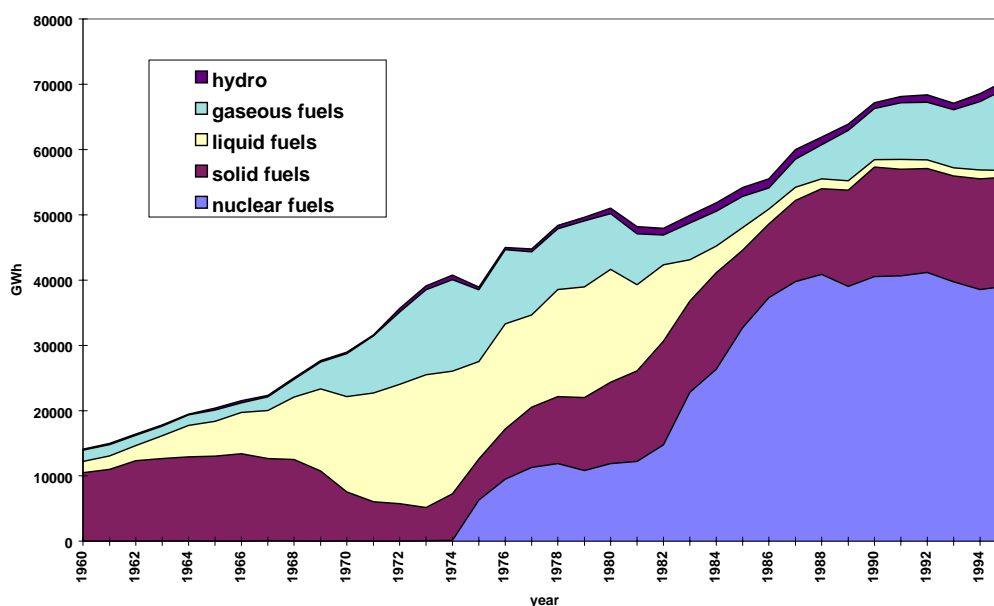
In addition, the agreement states the emission reductions that have to be realised by the power sector. These reductions are expressed as a percentage of the 1980 emissions which amounted to 351.643 tons of SO<sub>2</sub> and 87.010 tons of NO<sub>x</sub>. Table 1 gives an overview of the agreed reductions.

**Table 1: Agreed reductions of SO<sub>2</sub> and NO<sub>x</sub> emissions as a percentage of the 1980 emissions**

	agreed reduction	target value
SO <sub>2</sub>		
1993	- 70 %	
1998	- 75 %	- 77,5 %
2003	- 80 %	- 85 %
	agreed reduction	target value
NO <sub>x</sub>		
1993	- 30 %	
1998	- 40 %	
2003	- 40 %	- 45 %

By 2003, the SO<sub>2</sub> and NO<sub>x</sub> emissions from the electricity sector have to be respectively 80 % and 40 % lower than in 1980. These figures seem quite spectacular. However, we must keep in mind the evolution of the fuel mix used to generate electricity between 1980 (point of reference) and 1990 (most recent emissions figures known at the moment of signing the agreement). Figure 1 shows the evolution of the fuel mix for the years 1960-1995.

**Figure 1: Electricity generation and fuel mix (1960-1995)**



In 1980, total electricity generation in Belgium amounted to 51015,4 GWh. The largest part of the production (33,9 %) was based on liquid fuels (oil). 24,4 % was based on solid fuels (coal); 23,3 % was based on nuclear fuels and 16,7 % was based on gaseous fuels. The remaining 1,6 % came from hydro power.

Between 1980 and 1990, the fuel mix changed substantially. New nuclear power plants were commissioned and oil fired plants were converted to coal fired plants. In addition, only fuels with a low sulphur content (max 1 %) were used from 1989 onwards.

As a result, 60,4 % of total electricity generation in 1990 - which amounted then to 67161,5 GWh - was based on nuclear fuels. 25 % was based on solid fuels (coal) and 11,6 % was based on gaseous fuels. Liquid fuels (oil) only accounted for 1,7 % of production. The remaining 1,8 % came from hydro power.

Not surprisingly, the SO<sub>2</sub> and NO<sub>x</sub> emissions had diminished substantially due to this evolution. The 1990 emissions amounted to 94.381 tons of SO<sub>2</sub> and 59.183 tons of NO<sub>x</sub>. This comes down to reductions of about 73 % and 32 % respectively compared to the 1980 levels.

Table 2 gives an overview of the agreed reductions compared to the 1990 emissions.

<b>Table 2: Agreed reductions of SO<sub>2</sub> and NO<sub>x</sub> emissions as a percentage of the 1990 emissions</b>	
agreed reduction	target value

SO <sub>2</sub>		
1993	+ 11,8 %	
1998	- 6,9 %	- 16,2 %
2003	- 25,5 %	- 44,1 %
NO <sub>x</sub>		
1993	+ 2,9 %	
1998	- 11,8 %	
2003	- 11,8 %	- 19,1 %

By 2003, the SO<sub>2</sub> and NO<sub>x</sub> emissions from the electricity sector have to be respectively 25,5 % and 11,8 % lower than in 1990.

### 3. Obligations of the government

The government agreed not to impose stronger emission limits on the electricity sector during the lifespan of the agreement than those mentioned in Tables 3 and 4. The emission limits in table 3 are for existing power plants (by the end of 1991). Those in table 4 are for new power plants. The limits in tables 3 and 4 are not applicable to gas turbines and units with internal combustion.

**Table 3: Emission limits for existing power plants**

	emission limit in mg/Nm <sup>3</sup>
SO <sub>2</sub>	
power plants burning recuperation fuels	2000
other power plants	1700
NO <sub>x</sub>	
oil power plants converted to coal power plants after 1980	1100
other power plants on solid fuels	950
power plants on liquid fuels	575
power plants on gaseous fuels	425

**Table 4: Emission limits for new power plants**

	emission limit in mg/Nm <sup>3</sup>
SO <sub>2</sub>	
power plants on solid fuels	250
power plants on liquid fuels	250
power plants on gaseous fuels	35
NO <sub>x</sub>	
power plants on solid fuels	200
power plants on liquid fuels	150
power plants on gaseous fuels	100

In practice, the use of fuels with a low sulphur content and fine tuning of the burners should suffice to meet the emission targets for existing power plants. For new power plants, the limits are so strict that flue gas desulphurisation technologies and secondary denitrification technologies have to be applied.

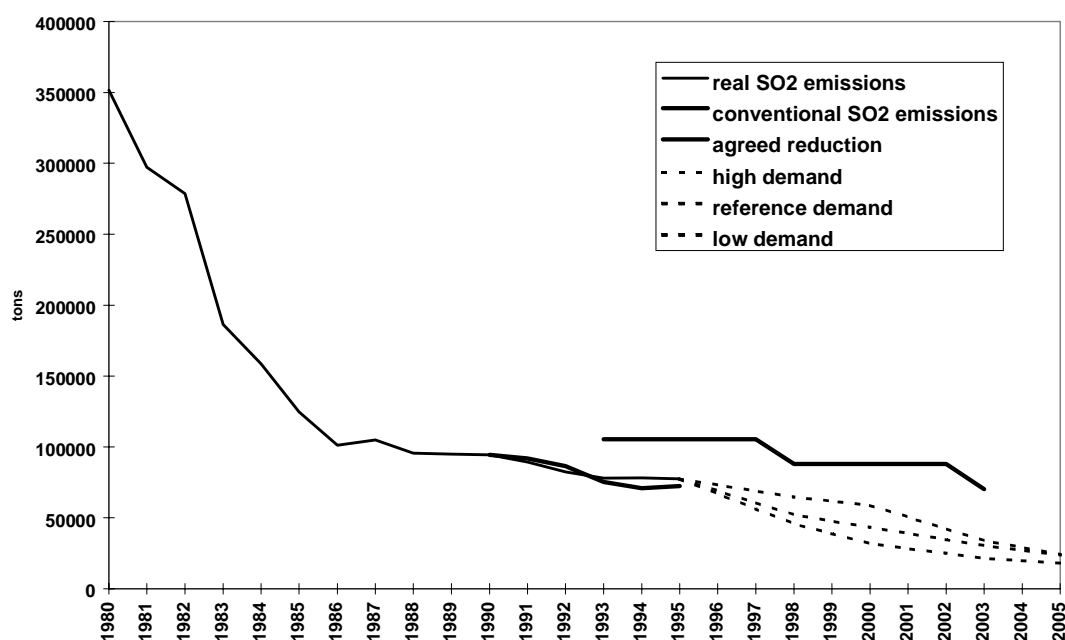
For gas turbines, the agreement only mentions that the most environment friendly technologies should be used.

#### 4. Results and future outlook

In this last paragraph, we look at the results obtained so far and present 3 scenarios of the future emissions, based on 3 evolutions of electricity demand<sup>3</sup>.

An important development since 1990 was the extension of the Belgian electricity generating system with 2 natural gas fired 460 MW CCGT power plants. As a result, the share of the gaseous fuels in the fuel mix rose from 11,6 % in 1990 to 17,8 % in 1995 (see also figure 1).

Figure 2: SO<sub>2</sub> emissions: evolution, agreed reductions and scenarios



Between 1990 and 1995, the average sulphur content of coal and oil used in the power plants decreased from 0,75 % to 0,64 % and from 1,15 % to 0,94 % respectively. These developments led to a further reduction of the emissions<sup>4</sup>.

The evolution of the real SO<sub>2</sub> emissions from the electricity sector is shown in figure 2 (normal line). The evolution is shown for the period 1980-1995. In 1995, the real SO<sub>2</sub> emissions amounted to 77.447 tons. Actually, the conventional (bold line) instead of the real emissions should be compared with the agreed reductions. The conventional emissions take into account the increasing or decreasing use of cogeneration units and nuclear power<sup>5</sup>. In 1995, the conventional SO<sub>2</sub> emissions

<sup>3</sup> BCEO-CGEE, 'Nationaal uitrustingsprogramma inzake de middelen voor productie en transport van elektrische energie 1995-2005', October, 1995.

Lissens G; 'Evaluation of the covenant between the government and the electricity producers to reduce acid emissions in Belgium', in Power-Gen Europe '93, Conference Papers, Volume 4, p. 349-365.

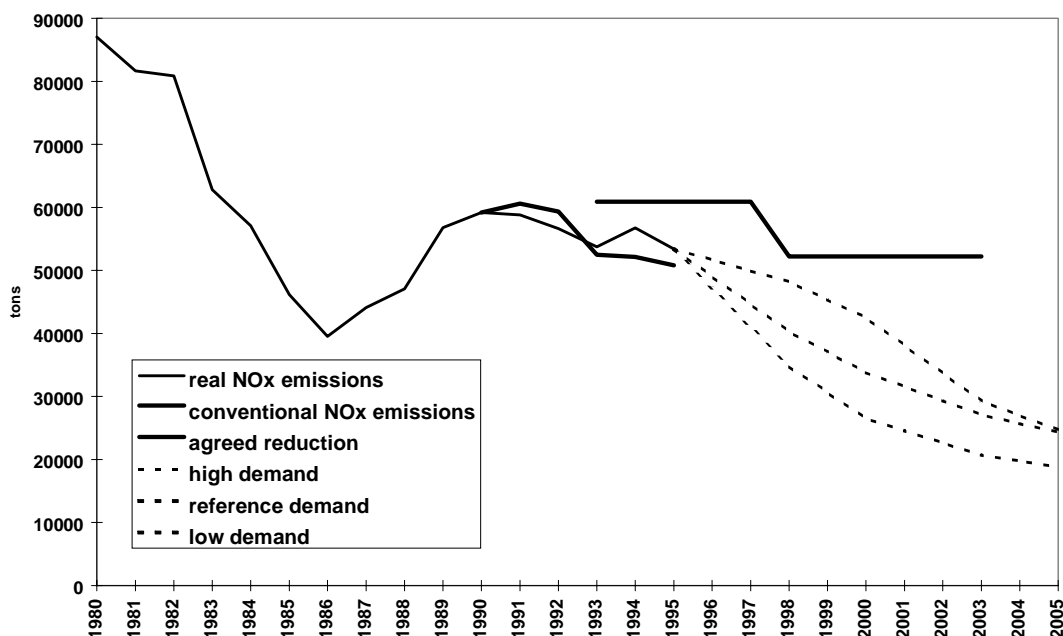
<sup>4</sup> Electrabel and SPE, 'Terugblik op morgen', environmental report, 1996.

<sup>1</sup>) To take into account the increasing use of cogeneration units, the real emissions are reduced by the emissions that would result from producing the same amount of heat in separate boilers instead of in the new cogeneration units.

amounted to 72.581 tons. This means that the agreed reduction (bold also) by 1998 was already achieved in 1995.

Figure 3 shows the evolution of the NO<sub>x</sub> emissions from the electricity sector. In 1995, the real NO<sub>x</sub> emissions amounted to 53.412 tons, whereas the conventional emissions amounted to 50.805 tons. This means that the agreed reduction by 2003 was already achieved in 1995.

**Figure 3: NO<sub>x</sub> emissions: evolution, agreed reductions and scenarios**



The dotted lines in figures 2 and 3 represent 3 scenarios of the future emissions from the electricity sector. These scenarios are derived from 3 scenarios of the future electricity demand. They were presented in the 1995 electricity generation equipment plan of the Belgian electricity sector (see reference 2).

We briefly summarise the most important assumptions of these scenarios:

- In the low demand scenario, the annual growth of electricity demand is 1 % a year in the period 1995-2000 and 0,5 % a year in the period 2000-2005.
- In the reference demand scenario, the annual growth of electricity demand is 2,1 % a year in the period 1995-2000 and 1,5 % a year in the period 2000-2005 (Note that the real growth was 2,2 % in 1996).
- In the high demand scenario, the annual growth of electricity demand is 3,2 % a year in the period 1995-2000 and 2,3 % a year in the period 2000-2005.
- In the period 1995-2005, a number of 125-MW units with a total capacity of 3070 MW will be shut down. Most of these units (2500 MW) are coal fired.
- 3 existing coal fired units will be equipped with desulphurisation and denitrification technologies.

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2) If the real nuclear production is lower than the reference nuclear production (based on a capacity factor of 83,1 %) in some year, then the real emissions are reduced by this difference in production (in absolute value) times the average emission factors of fossil fuel generation in the same year (and vice versa).

- Decentral production capacity will rise by about 1000 MW.
- Central production capacity will rise with the share in the new nuclear power plants Chooz B1 and B2 (about 725 MW) and with 3 new natural gas fired CCGT units (460 MW + 350 MW + 350 MW).
- Depending on the evolution of the electricity demand, further extensions of the electricity generating system will be necessary from 2000 onwards. The following extensions were proposed by the electricity sector:
  - low demand: 2 CCGT units (of 350 MW each) + 1 coal fired unit (400 MW)
  - reference demand: 3 CCGT units + 3 coal fired units
  - high demand: 7 CCGT units + 4 coal fired units

The emissions that would result from these scenarios are shown in figures 2 and 3 and summarised in table 5.

**Table 5: SO<sub>2</sub> and NO<sub>x</sub> emissions in 3 scenarios**

	agreed reductions	low demand	reference demand	high demand
SO <sub>2</sub>				
1998	- 75 %	- 87 %	- 85 %	- 82 %
2000		- 91 %	- 88 %	- 83 %
2003	- 80 %	- 94 %	- 91 %	- 90 %
2005		- 95 %	- 93 %	- 93 %
NO <sub>x</sub>				
1998	- 40 %	- 60 %	- 54 %	- 45 %
2000		- 70 %	- 61 %	- 51 %
2003	- 45 %	- 76 %	- 69 %	- 66 %
2005		- 78 %	- 72 %	- 72 %

As can be seen from table 5, the agreed reductions can easily be realised, even in the high demand scenario.

The underlying causes are:

- a shift to nuclear energy
- use of fuels with low sulphur content
- a shift to natural gas
- installation of desulphurisation and denitrification equipment on existing and new coal fired power plants.

## 5. Conclusions

The agreement on SO<sub>2</sub> and NO<sub>x</sub> reductions was a beneficial commercial impetus for the power sector. The targets implied were part of the forecasted sectoral development and are realised without any special effort of energy conservation or renewable energy development. In the medium term, while the nuclear generation share remains significant, the emissions will continue to decrease because obsolete coal fired 125 MW-units built in the 50s and 60s are replaced by high-efficient CCGT natural gas fired units.

But this continuous decline in emissions is not sufficient to meet targets that safeguard natural ecosystems in our region. In Flanders it is shown that deposition of acids has to decrease by 50 % in 2002 and by 70 % in 2010 compared to 1990 (see Verbruggen A. (red.) p. 432)<sup>6</sup>. Because power generation accounts for 22 % of total emissions a more stringent reduction plan is necessary. Maybe the time has come to renegotiate the emission reduction agreement, and to set stricter objectives.

The new agreement should than also comply with the list of conditions proposed by the European Commission<sup>7</sup>, in particular regarding public information, transparency and independent verification of results. In addition to the purpose of verification, more independent expertise should be harnessed to stipulate the right objectives that should be included in the agreement. In the present agreement, there was no contribution by independent experts, although they were available and willing to evaluate the reduction programme. This strengthens the opinion that the agreement was mainly set up for public relations purposes by the four Ministers as well as by the electricity sector itself.

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<sup>6</sup> Verbruggen A. (red.), 'Milieu- en natuurrapport Vlaanderen. Leren om te Keren', Vlaamse Milieu Maatschappij, Garant Leuven - Apeldoorn, 1996, 585 p.

<sup>7</sup> CEC (Commission of the European Communities) 'Communication from the Commission to the Council and the European Parliament on Environmental Agreements', COM(96) 561 final, Brussels, 27.11.1996.

## **Section B: Agreements on Electricity Conservation Policy**

### **1. Compromising is a Belgian Tradition**

For understanding the present developments in the negotiations and agreements about electricity conservation in Belgium, one has to be somewhat familiar with the overall regulatory and policy context in Belgium and in the various regions.<sup>8</sup> Since World War II, electricity policy in Belgium has been based on negotiations, agreements, compromising and contracting between the main players in the field, i.e. the power companies, the public authorities, the employers' federations and the trade unions. Furthermore, agreements were also influenced by occurrences and developments outside the electricity sector.

The immediate post-war period of conflict between leftist trade unions and capitalist interests in the power sector, ended with a 1955 peace treaty, also founding the so-called 'Control Committee on Electricity' that surveyed and developed the clauses of the treaty. The treaty itself as well as the Control Committee, result from a private negotiation process that was started and completed by the employers' and employees' federations. The political authorities supported the negotiation process fully and were willing to give up the sovereignty of governing the power sector by regulation or by nationalising the entirety or central parts of the electricity supply sector. Since that period, the federal government in Belgium was very cautious about interventions in the power sector. In practice, most interventions were negotiated in advance with the members of the Control Committee.

The history of the Control Committee is instructive about the advantages and disadvantages of negotiated agreements. We summarise some of the lessons in five focal points:

1. The flexibility and speed in realising objectives agreed upon by the contracting parties is remarkable.

In 1955 the main objectives were the enlargement and the negotiated distribution of the economic rents of electricity supply by rationalising the electricity supply sector and by guaranteeing its income flow through a standardised tariff system. At that time the sector consisted of tens of generating companies and even more distribution utilities. The former ones were mostly investor-owned. The latter ones were either public or concessionary private companies distributing electricity for local communities. Within a period of ten years after the signing of the agreement the generation sector was largely restructured, installing a common central management and control system for all private producers (e.g. central load dispatching, fuel procurement, research, etc.). The economies of scope and of scale coming from this restructuring were very significant and permitted the sector to grow in a profitable way. It also laid the foundations for a successful nuclear power construction program.

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<sup>8</sup> Verbruggen A., De Jonghe L., Borghys A., 'The Belgian Electricity Sector', November 1996.

Moreover, the tariff system was reformed and by 1975 a uniform system was imposed on all distributors of electricity in Belgium. Competition in prices among distributors was forbidden, and the gross margin was kept high enough to generate significant rents that were distributed among the partners. This brings us to our second point:

2. The objectives pursued by a negotiated agreement are those of the contracting parties.

The contracting parties aim to improve their own position in the contract. It is also obvious in Belgium that the three main players in the negotiation process got most out of the contract and of the rents generated in the power sector, i.e.:

- \* the employers' federations realise lower electricity prices for the industry, because of productivity gains in supplying electricity on the one hand and low tariffs for base-load power consumption<sup>9</sup> on the other hand;

- \* the trade unions have mixed feelings about the low prices for base-load power. On the one hand they are in favour of it because they follow the argument that low electricity prices enhance the competitiveness of the Belgian industry, safeguarding industrial employment. On the other hand they also represent the domestic customers because union membership includes membership of the union consumer organisation. In this way, the trade unions are the consumer organisations with the most members in Belgium, and they, therefore, claim the official representation of the domestic consumers. In our assessment the industrial employment argument was and mostly is predominant over the interests of the domestic customers when tariff restructurations are coined. This eventually may be rather the ex-post outcome of the process than the ex-ante position taken by the trade unions. In addition, corporatism in the electricity sector is rather strong, and the trade unions' representatives in the Control Committee are monitored quite narrowly by the union leaders of the electricity sector federation that want to safeguard the privileges of the own sector members.

- \* the private investor interests are those of any other investor, i.e. a growing business with a good return, where the height of the profits can be traded against their security. It is fair to say that productivity in the sector has been increasing rapidly since 1955. A firm control on costs has been established, and while wages and fringe benefits are excellent there has been no reports about excessive payments of top management. The sector profits have been noticeably high (10 to 15 % return on capital), given the quasi guaranteed character of this return.

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<sup>9</sup> although cross-subsidising of the large customers is difficult to prove, most empirical evidence points towards this occurrence; see De Braekeleer F, 'Ramseynorm en Regulering van Electriciteitstarieven in Nederland en België', doctoral dissertation, University of Amsterdam, 1990.

3. The interests of groups that are not among the negotiating parties may be hurt by the outcomes of the agreement.

If the government is not one of the contracting parties, it is very unlikely that general welfare will be high on the priority list of actions forthcoming from the negotiation process. Accepting the point of view that electricity supply to some extent should be directed by public interests, public policy has to be imposed on private parties in one way or another. Therefore, the government should not step aside in the negotiation process, but should take up a leading role. Since it has never taken up this role, it can do little more than provide suggestions to the members of the Control Committee. Eventually it can threaten the Committee with overruling legislation, but this is very unlikely to occur given the societal influence of the Committee's members.

After the government itself, other societal groups are manifestly absent at the Control Committee's trade-off sessions, e.g. the consumer interest organisations that defend the domestic customers and the environmental organisations.

Because of the overall absence of the public authority and of the 'general' interest groups, a significant part of the electric power success story is paid for by the citizens under the high tariff system, generating rents that are distributed among the contracting parties.

The Belgian experience illuminates the central question of whether an abdication of regulatory power by the public authority is acceptable. Even with the advantage that such an abdication involves someone else may have to pay for the lubrication of the process.

4. Democratic control of the negotiation process is non-existent.

Because there is no formal obligation to open the private negotiations to public parties in particular or third parties in general, all important agreements are forged secretly among the partners. Only the outcomes of the processes are posted to the outside world, which has to pay for the outcome.

The secrecy of the Committee is tight, and still is when it comes to crucial matters. In this case the final compromise is arbitrated by the top executives of the member organisations in the Control Committee, i.e. the power sector, the employers' federations and the trade unions. Sometimes, this arbitrage crosses the border of the electricity business itself.

5. The technical, organisational and financial power of the members is decisive in their impact on the compromises settled ('When parties negotiate, the strongest mostly wins').

This evident rule of negotiation processes has also proven to be true in the Belgian electricity sector. The private power companies, belonging moreover to the - for a long time - strongest financial-industrial group of Belgium, have organised the electricity sector along their insights and their interests. For some projects and during some periods this has been beneficial for the sector and for the country (e.g. when central dispatch was installed). On other occasions however, it has delayed new developments and has made the customers pay the bill (e.g. the opposition against decentralised generation and cogeneration).

The public sector has not invested in independent regulatory know-how of the electricity sector. This may have saved some few staff resources, but the balance of this abdication is in our assessment extremely negative.

## **2. Discovering energy conservation demand policy**

As in most regions of the world, energy policy in Belgium has for a long time focussed on energy supply. Interest in demand came mainly from a marketing point of view, i.e. the distribution sector was expected to sell as much energy as the customers could afford. The consecutive institutional reforms of the Belgian State have driven the public powers in the energy sector apart. While the authority over supply and transmission remains with the federal government, the one over distribution and end-use belongs to the regional governments (Flanders, Wallonia, Brussels) since 1988. Although price is still the single most important determinant of demand, the authority over pricing continues with the Control Committee and the federal government.

The newly gained powers by the regions in 1988 were executed quite differently in the three regions. Here we only consider the evolution in Flanders because this region has shown an explicit will for using negotiated agreements as a policy instrument.

In Flanders over the period 1988-1991 an extensive energy demand policy plan was developed by the minister<sup>10</sup> for energy, but the plan was never discussed in parliament and disappeared. This was mainly due to the lack of negotiation and consensus building during the development of the plan. In addition, the main ideas of the plan were delivered by academics, and therefore too advanced compared to the reality of the region. Moreover, the players in power in the energy sector did not like the ideas nor the authors of the plan.

In the period 1992-1995, energy was added to the long list of responsibilities of the regional prime minister, and he devoted little resources to the energy issue. A high-level assistant of the prime minister stated to me in private that the low level of interest for energy from the political side was simply “because in our country no politician can gain any votes by working on this issue, while he has to confront the most powerful private interest groups in Belgium that may cost the politician some other

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<sup>10</sup> De Batselier N., ‘Naar een duurzaam energiebeleid in Vlaanderen’, April 1991.

support”. Instead of making plans, the administration tried to engage a dialogue with the energy sector aiming for an official negotiated agreement on energy conservation. Quite a few negotiations were set up but the efforts foundered. We had to wait for the new legislature before the initiative was taken seriously.

### **3. Electricity Conservation by Agreement**

With a delay of a few years the ideas of Integrated Resources Planning and Demand Side Management penetrated slowly, since they were first put on the agenda in Belgium in the late eighties during the hearings about the power expansion plans. The setting now is changing definitively. In the new setting a Memory of Understanding (MoU) between the Flemish regional government and the power sector is negotiated and signed. After a description of the new elements, we will briefly evaluate the experiment.

#### **3.1 The new setting**

Since the end of the eighties climate change has gained policy attention world-wide, also in Belgium. On the wave of the UNCED Rio Summit in June 1992, the Belgian government declared it would reduce CO<sub>2</sub> emissions by 5 % by the year 2000, compared to the level of 1990. Such a declaration was based on little analysis because there was no knowledge nor understanding of the feasibility and costs of realising such a goal by the Belgian economy. However, given that the declaration was expressed officially in the governmental cabinet<sup>11</sup> and repeated for the world in Rio afterwards, the target was there and something had to happen. The energy sector was expected to take up the challenge and reduce the emissions.

By the end of 1995, a new legislature started and in Flanders the authority on energy was assigned to the Minister for Economic Affairs, who expressed his will to execute fully the powers that were attributed to the regions since 1988. In autumn 1996 the minister published an Energy Policy Letter<sup>12</sup>, indicating his intentions in the energy field. One of the central issues of this Policy Letter is the creation of a new platform, called VIREG (the Flemish Institute for the Rational Use of Energy), being essentially a platform for discussion and negotiation among a number of selected partners about measures and actions to promote energy conservation.

From November 1995 to January 1996, the electricity sector submitted its new power generation expansion plan<sup>13</sup>, the first one since 1988, and now devoting much more words to new ideas such as Integrated Resources Planning, Demand Side Management, etc. In the demand forecasts it was argued that a conservation effort of 8 TWh was to be realised by the year 2005, compared to the autonomous demand

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<sup>11</sup> Federal governmental cabinet, session of June 6, 1991.

<sup>12</sup> Van Rompuy E., ‘Verkenningnota voor het energiedebat in het Vlaams parlement’, 1996.

<sup>13</sup> BCEO-CGEE, see reference 2.

growth. Although this number looks rather arbitrary it imposes on the electricity sector the obligation to limit demand expansion when it would exceed 1,8 % per year and then to care about electricity conservation. Therefore, it was decided by the Control Committee to withhold part of the rents gained by the sector and spend it on energy conservation and demand side management measures. For the distribution utilities a yearly amount of 415 million BEF (about 13,5 million US \$) for the years 1996-1998 is set aside. For the production sector the amounts are million BEF 200 in 1996, 250 in 1997, 300 in 1998 up to 450 in 2005.

In addition, some parts of the electricity sector become more convinced of their broader societal role. In particular, the public distribution utilities are playing a maverick role, eased by the fact that all the rents they gain are automatically transmitted to the public sector and so they do not have to transfer profits to private shareholders.

### 3.2 The Memory of Understanding (July 3, 1996)

With the new setting described above it is quite evident that the regional governments and the electricity sector meet. The former want to execute the powers they were assigned by the state reform but they command very few human and financial resources to implement those powers. The latter own resources and are obliged to allocate part to their rents in the sector to energy conservation, but they lack the experience in the field. They also fear therefore performing badly and coming under pressure from societal groups, a course of affairs that could reduce their full control over the sector.

The partners signing the Memory of Understanding (MoU) are the Flemish Minister for Energy representing the Flemish government and Inter-Regies and Intermixt which act for the community because they are the official electricity distribution organisations. However, there is no signature by Electrabel-SPE which is the most important player in the sector. It must also have annoyed the latter because at this moment a similar memory of understanding is being discussed among the Flemish Minister and Electrabel-SPE. Secondly, and more importantly, the MoU is signed among contracting parties that in the end belong to the same governmental structure, i.e. regional and communal public authorities. The opportunity of applying the instrument 'Negotiated Agreement' for regulating the relationships among the various parts of a public authority is being discussed.<sup>14</sup>

The central part of the MoU deals with the foundation and development of a new Negotiated Agreement, called VIREG that the Minister announced in his Energy Policy Letter. VIREG (notwithstanding its name itself) 'does not want to be an institute but rather an organisation' for co-ordinating all the efforts in the field of energy conservation undertaken in the region. VIREG would get a small staff of 4

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<sup>14</sup> Mina-raad, 'Advies van 1 oktober 1992 betreffende het gemeentelijke milieuconvenant', Jaarverslag 1992, tweede deel, volume I, p.51-59.

people on a yearly budget of 20 million BEF (about 650.000 US \$). VIREG will start to develop a conservation policy plan, and then undertake initiatives for the plan to be realised by third parties. In this way VIREG can provide information, co-ordinate activities, monitor programmes, redistribute the resources set aside for conservation actions in the distribution sector by the Control Committee. In addition, VIREG will investigate and develop new mechanisms of rent generation and distribution in the electricity sector for rewarding energy conservation efforts and successes. This point is stated a few times in the Minister's Policy Letter because being an economist he believes in the performance and necessity of market forces to realise sustainable conservation programmes.

The platform of VIREG will enlarge the 'old boys club' of the sector because it is stated that it will be composed of government representatives, of consumers and of energy production, transport and distribution companies.

Moreover, and quite importantly, the MoU states explicitly that the Flemish government withholds its rights and powers to raise additional funds by energy taxes or by any other instrument when the resources set aside by decision of the Control Committee would fall short of the needs required for the Flemish energy conservation programme.

### 3.3 Evaluation

It is not easy to evaluate the new-born experiment, because little has happened so far in the field. Therefore, the following points are based on reading the intentions and on expectations.

1. The objectives of the MoU and of VIREG are not clearly stated. The negotiation processes and the MoU are not emanating from clearly defined goals that the partners want to realise, but from their consciousness they have to do something about energy conservation. The process is triggered by the new setting as described above: the target of CO<sub>2</sub>-emission reduction, the limits on expanding electric power use and the availability of funds. When there are no clearly stated objectives, there are also no provisions for control of meeting the objectives and for enforcement. The distribution companies have engaged in an obligation of delivering some efforts but not in one of reaching particular goals.
2. The list of possible actions is very specific, and a subsidy per action is posted. Contrary to the vagueness in objectives the MoU lists a number of specific measures that can be undertaken in the industrial, commercial, domestic and public sector for reducing electricity consumption. This is a positive element, because the list is not to be considered as exhaustive.

3. The parties involved in the MoU remain limited. Next to the inner circle of the electricity sector that gathers at the federal level in the Control Committee, one new party is recognised, i.e. the regional ministry for energy. This small widening of the 'old boys club' was necessary because the regions have the power to stop the construction of high-voltage lines and also are involved with the licensing of construction of power plants.

We consider the extension of the discussion platform as far too limited, and think it necessary to involve on an active basis the consumer organisations, the environmental NGO's, scientists and so on to prepare the road to a real open and democratic policy debate. Energy conservation can only be realised by the final energy consumers and therefore it is vital that they are involved in the process.

4. The regional minister has not given up his discretionary power to take measures when the energy conservation results are falling short of what he considers as necessary.

This is somewhat unexpected because this generally is the aim from the other negotiating party in a negotiated agreement.

5. The basis of the conservation projects is the financial envelope set aside from the rents of electricity supply. The money for supporting energy conservation is allocated among the distribution companies in proportion to their gross margin (= sales - purchase of power at the producers). The higher the sales are, the higher the budget for conservation is. This rule has a positive feedback because it may be true that a company with high sales, must deliver more effort to conserve energy. The negative feedback, however is that a company where a lot of energy is already conserved, faces more expensive measures for improving conservation further, but this company would receive less financial resources.

Financing conservation on the basis of rents collected by higher sales, contains some perverse mechanism. It is opposed to market oriented solutions where profits of the distribution companies depend on their success in limiting energy demand growth. The deployment of these solutions is feasible without spectacular revolutions in the electricity distribution sector<sup>15</sup>, and is the only approach that will limit energy use significantly and permanently. The introduction of mechanisms that make the profits of electricity distribution proportional to the success in energy conservation is also necessary because the amount of profits (rents) that a distribution company can contribute to the communal treasury is an important determinant for its survival.

In conclusion, we think that the impact of negotiated agreements is very limited. It has contributed to a better understanding of the parties involved, but we argue that the circle of parties must be widened. We consider it more important to develop an

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<sup>15</sup> Moskowitz D., Austin T., Harrington C., Weinberg C., 'Future Utility and Regulatory Structures', The Regulatory Assistance Project, December 1993.

independent regulatory authority that can support the Minister in policy making. This authority will have to propose the mechanisms for coupling profits in electricity distribution to the performance in electricity conservation.

*ECN*

**Government-industry agreements on greenhouse gas reductions**

**Guidelines for developing covenant policies**

Contributing paper prepared for the project on "Policies and measures for Common Action", UN FCCC Annex I Expert Group.

Ton van Dril

**1. Approach and overview**

In this report an evaluation is made of policies for common action. The subject here is "Voluntary Agreements with Industry", although the degree of voluntariness is subject to evaluation. The approach chosen is to analyse what possible forms agreements can take and what may determine their success or failure. The Netherlands experience with Long Term Agreements on Energy Efficiency with Industry is used as a reference. First, the general context and history of greenhouse gas policies is presented. Then, this is specified in the case of the iron and steel industry, the aluminium industry and the industrial emissions of sulphuric acid. In the third chapter, the analysis of the "Agreement instrument" is made. A comparison is made with alternative policies and many issues are dealt with concerning how an agreement should be formulated. Also in the third chapter, the case of the Netherlands iron and steel industry and non-ferrous metals industry agreements is illustrated. In the fourth chapter, an attempt is made to quantify the potential to reduce greenhouse gas emissions and costs of the Agreement instrument. Finally, a general evaluation is made on how the agreement instrument can be used in the international context of common action.

## 2. Context

### 2.1 International agreements on greenhouse gas reduction

According to the Framework Convention on Climate Change, OECD countries have reported on their net anthropogenic emissions of greenhouse gases. Also, they have reported on reduction policies. The first goal of the treaty is to stabilize greenhouse gas emissions in 2000 on the 1990 level. No goals are formulated for separate gases like methane, nitrous oxide (adepic acid), HFC's, HCFC's and CFC's.

As for CFC's and HCFC's, these are covered by the Montreal protocol. Replacement of these by HFC's may still contribute to global warming. Replacement of some CFC's by CF's is also considered possible, though this will increase global warming substantially.

### 2.2 National policies

In the Netherlands, the policy on greenhouse gas reduction was formulated in the First and Second National Environmental Policy Plan and the related White papers on Energy Saving and Climate Change [1,2,3]. The National goal was a reduction of CO<sub>2</sub> emissions in 2000 of 3 to 5 % compared to the 1989 level. Industrial fuel based CO<sub>2</sub> emissions were 84 mton, including electricity production for industrial purposes, refineries, oil and gas production and coke production. The goal to establish for national industries was an efficiency improvement of 20% in 2000 compared to 1989 on energy excluding feedstocks. For this reduction goal, the Long Term Agreements on Energy Efficiency were encountered. As by far the largest part of the Netherlands energy supply is based on fossil fuels, reducing energy consumption is largely congruent with reducing CO<sub>2</sub> emissions.

For methane, a 10% reduction goal for 2000 compared to 1990 (970 kton) was stated [3]. Agricultural emissions, emissions of landfills and gas production and distribution are the main sources of methane in the atmosphere. Reduction will be achieved by current reductions of agricultural manure production and recovery of landfill waste gas. For nitrous oxide, stabilization in 2000 is planned, compared to the 1990 level (63 kton). Agricultural emissions are most important, but industry emits one third, mainly because of nitric acid production for fertilizers. A plan to reduce emissions is made, but is not operational. For CFC's a 100% reduction is planned in 1996. CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub> are not included in this category, and no reduction targets are specified. In 1992 an agreement on environmental improvements is made between the government and the basic metals industry [4]. The relevant agreements on energy efficiency are part of this framework agreement. Emission targets of CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub> are not included in this plan. As for greenhouse gases like methane, adepic acid, CFC's, other policy instruments are used to achieve reductions. The main instrument is the Environment Law, setting the framework for permits on all industrial operations. Related regulations include all kinds of standards for permit conditions.

## 2.3 Cases

The Netherlands iron and steel industry includes one primary plant with a production of approximately 5500 kt steel/yr and one secondary plant producing about 250 kt. The primary production requires coke as input for blast furnaces, secondary production uses mainly electricity in electric arc furnaces. Both plants also use natural gas for additional processes. The primary plant delivers coke oven gas and blast furnace gas to an adjacent power plant. Based on net consumption of fuels, direct CO<sub>2</sub> emissions amount 7 mton annually. Another 0.7 mton CO<sub>2</sub> is emitted due to lime addition in blast furnaces. Indirectly, electricity consumption causes another 1.8 mton CO<sub>2</sub> emission from power plants.

The Netherlands primary aluminium industry includes two plants. Primary production amounts 270 kt. Secondary production based on scrap amounts to 150 kt. In addition, there are 7 industries processing primary and secondary aluminium in extruders or rolling mills. Fuel is used for ovens causing a CO<sub>2</sub> emission of 0.3 mton. The main energy consumption concerns electricity used to operate Hall-Heroult cells for primary production. The largest aluminium producer is powered by an adjacent nuclear plant. However, based on average CO<sub>2</sub> emissions from the Netherlands electricity system, indirect emissions of primary aluminium production are calculated at 2.4 mton CO<sub>2</sub>. In addition, 0.4 mton CO<sub>2</sub> is emitted due to the consumption of carbon anodes during the process. CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub> emissions of both primary plants are roughly estimated at an equivalent of 2.5 mton CO<sub>2</sub>. No emission standards for CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub> have been set in covenants or in current permits. International aluminium industry is working on improved technology.

Adepic acid is not as such produced in the Netherlands. Main emissions of N<sub>2</sub>O are caused by HNO<sub>3</sub> production. No emission standards on adepic acid have been set in current permits.

## 3. Descriptions of the measures

Agreement instruments are not very common in environmental policy. Most of the environmental policies are laid down in laws and regulations defining physical standards for all kinds of human activity. Historically, it was necessary for governments to take up responsibility for the environment, do research and prescribe extensively what has to be done. There is common notion now that detailed and pervasive regulation does not match with individuals and companies feeling responsible for the environment. Moreover, detailed local standards are not always necessary when global problems are to be dealt with. Setting specific goals to be reached by individual parties can be sufficient when these parties are capable of meeting them. When individual sense of responsibility grows and know-how is available it can be more efficient to define broad goals. This leaves individual parties with more flexibility to reach optimal solutions. It is this insight that inspired environmental policy based on government-industry agreements.

In this chapter, an analysis is made on how agreements on greenhouse gas reductions can or should be organized. First, an overview of topics is presented, to be dealt with in the following sections.

comparison of policies: (voluntary) agreements / legislation / economic incentives  
agreements: parties, extent of commitment, sanctions, avoiding free riders  
industry party: local plant / national section / transnational companies / industry branch organisations (national / international)  
government party: local / national / international / intermediary agency  
suitable time frames  
scope of the agreement: which emissions / energy consumption / gross energy requirement  
entity to be agreed on: absolute level of emissions / emissions per unit of physical output / emissions per unit of economic output (value of shipments)  
level to reach / autonomous / policy induced  
government support: funding research and development / relax legislation / avoid taxation  
monitoring system: funding / confidentiality / public verification  
monitoring details: valuation of electricity production by industry / corrections on climate / correction for varying prices (economic denominator) / corrections for varying feedstock / product properties (physical denominator) / corrections for emissions or energy consumption induced by policy (environmental or safety regulations)  
economic effects: costs or benefits for the industry / competitiveness / macro-economic effects

The Netherlands approach of agreements on energy efficiency is illustrated throughout the following sections, some results are presented for the cases of the iron and steel industry and the aluminium industry.

### 3.1 Comparison of policies

Agreements with industries are favoured because industries are regarded as parties and not as subjects. There should be mutual commitment, governments have to make concessions, like funding or relax legislation. No rigid uniformity is necessary, as legislation would require. There is relative freedom to achieve optimal results.

Motivation to comply with the terms of the agreement will be better, depending on how the involvement of an industry was in reaching the agreement. Bigger industries that are individually audited previous to the agreement (to establish the potential) tend to be more committed. Small industries that are committed as a group will experience no big difference between "agreement" and "regulation".

In the Dutch case, agreements are made with relatively small groups of big users (iron and steel: 2 companies, non-ferrous metals 17 companies) but also big groups of small users (greenhouse horticulture 10000; bakeries 3200; printing 3600). Results so far concern mostly big users that have been separately audited before reaching an agreement.

An obvious advantage to comply in the case of greenhouse gas emissions is the potential for cutting energy costs. This leaves the question of how effective an agreement is compared with autonomous development (see 3.8 and 3.12). Goals for energy efficiency and CO<sub>2</sub> reduction are still moderate and require often zero or negative costs. This advantage does not apply for other greenhouse gases like PFC's and N<sub>2</sub>O. Another advantage is the green image a company can demonstrate in encountering an agreement.

There is no easy assessment to make on how much work is involved with reaching a set of agreements versus reaching effective legislation and uphold it. Optimal may be tailor made agreements with selected big industries and standard rules for the big groups of small industries. Compared to agreements or regulation, taxation on emissions or energy is much easier to implement. It also leaves subjects free to find their own optimal solutions. However, pure taxation has the disadvantage that no party is responsible for reaching environmental goals. Moreover, when the desired reaction on taxes is low, revenues will be high and the environmental tax tends to become an income tax. Taxes will be more widely accepted when the revenues are used to prevent pollution according to agreed upon standards. In that case, they are experienced as true costs and not so much as taxation. However, especially in the case of CO<sub>2</sub>, a system for funding prevention, removal or storage is still far away.

### 3.2 Agreements

Agreements are meant to commit private persons or companies to meet public goals. Therefore, parties are private companies or institutions and a public government body. However, the agreement is no private deal, like a contractor building a waste incinerator and government paying for it. Government does not pay for emission reduction equipment. Government pays by refraining from undesirable legislation. Sanctions therefore are explicitly or implicitly part of the deal. This means that governments should develop effective "backstop" legislation as well as an agreement policy. In this sense, a voluntary agreement is a contradiction. When industries voluntarily initiate or engage in environmental programs, in general their market situation only would allow for limited efforts. Greenhouse gas policy has no substantial effect when industries publicly commit themselves to environmental goals, but bad publicity would be the only sanction if they do not succeed.

In the Netherlands, a large part of industrial energy users engaged in the agreements, although no real pressure was imposed by planning undesired legislation. Companies experience advantages in free initial audits, and government subsidies on exemplary energy projects. The environment law is used as "backstop" legislation for companies that fail the agreement or do not partake. This law can impose the use of state-of-the-art energy technology and other measures. Participating industry is in favour of sanctions for non-participants.

### 3.3 Industry parties

Industry parties must preferably be the units that have decision competence on environmental issues. In many cases this is the plant management, but when major investments are concerned, company management will decide. When making commitments, company management has to implement goals for separate plants. Furthermore, they have to assess that these goals can be achieved by local management. Multi plant companies can create economies of scale in choosing which investments to make to reach company goals. In fact, companies should ideally be able to choose the scale on which they operate concerning agreements. The government party in the agreement will have to be meet this scale. For transnational companies the government party would therefore be an international body. In that case, it will be practical to let national establishments make agreements with national governments within an international framework agreement.

Industry branch organizations in general have no competence to take or enforce environmental measures. Companies have to sign the agreement to make it work. However, branche organizations can be a valuable intermediary for communicating agreement policy, and also in the process of monitoring.

In Dutch policy, industrial branch organizations sign the agreement from the part of the industry. However, the agreements are effective when individual companies enter this agreement. It is not uncommon that companies follow the general line of the agreement for their sector, but do not sign a letter of entry. Multi-plant companies have engaged in the agreements and have set their own goals for individual sites. Because monitoring reports are on an aggregated level, goals of individual companies or plants are not public information.

### 3.4 Government parties

Preferably, government parties are able to make agreements on the scale that industries want to operate. The government party has to be able to implement sanctions effectively in case industries do not comply or refuse to make agreements. At present, international government bodies are not likely to do this effectively. This leaves national governments to be the most likely party. As for the industry party, governments also have to delegate commitments to local authorities in case funding research, monitoring results and implementing sanctions takes place at a lower level.

An intermediary government agency can be useful to efficiently negotiate agreements. Democratic control on these negotiations to preserve some level of equity is needed to validate the agreement process. Here, a trade-off has to be made between equity and effectiveness.

Equity in the Dutch voluntary agreements is apparent, because nearly all agreements imply an energy efficiency reduction of 20% within the same time frame. This allows for companies with different levels of technology to make comparable efforts. However, large quantities of fuel or electricity used as raw material or for specific chemical reactions, are exempted. Producers of

basic chemicals and basic metals consider a large part of their consumption practically fixed to their physical output. The exclusion of "non-energetic" consumption allows these industries to meet the efficiency target. The role of Novem, the intermediary agency in the Netherlands, is broadly appreciated by industry. Novem initiates energy audits and research projects, and executes most of the monitoring and reporting.

### 3.5 Time frames

Each measure to consider in reducing greenhouse gas emissions has its own time frame. Behavioural measures like switching off idle equipment can often be implemented instantly while switching to alternative processes may take several decades. Replacement of capital goods can take place at intervals of twenty years or more. Here also the industry's point of view should be honoured. Industries hate volatile policies and want to have maximal freedom of planning. Major investment decisions in industry are often made within a ten year time horizon. Planning ahead in industry is largely limited to this, so agreements on structural measures should match the industries time horizon.

### 3.6 Scope of the agreement

To reduce greenhouse effects, including all greenhouse gas emissions in policies is necessary. This does not mean that all emissions should be included in an agreement. When emissions are avoidable and standards are obvious and easy to maintain, there is no reason to negotiate them. Like in legislation, complicating matters should be avoided in agreements if possible. As for CF<sub>4</sub>, N<sub>2</sub>O, C<sub>2</sub>F<sub>6</sub> and CH<sub>4</sub>, there are few measures possible to reduce emissions, compared to CO<sub>2</sub>. Also, the specific categories of emission sources (landfills, cattle, primary aluminium) require specific treatment. For these measures, other instruments may be more appropriate than generally formulated agreements on CO<sub>2</sub>.

Because of the general approach of the agreements in the Netherlands engaging complete sectors like chemicals or non-ferrous metals, only energy related CO<sub>2</sub> is included.

Parties in an agreement should only commit themselves to issues they can control. For industries, this comes down to the choice of their equipment and buildings, the behaviour of their staff and the services they hire. As for raw materials and fuel, what the market offers can already affect emission results (e.g. when metal ore is less rich, this may affect energy input). Also, the market determines the array of products and their specifications. The industry is only one of the market parties, so it wants to be able to follow market developments. Industries in general do not take responsibilities for the emissions of their raw material and energy suppliers. Neither do they feel responsible for what costumers do with their products, how they use them and dispose of them.

For these reasons, a range of "external" effects could be exempted from agreement targets, e.g.

- production volume growth
- economic recession
- capacity utilisation
- energy effects of other legislation, e.g. product standards, safety rules
- variations in climate
- composition of raw materials
- product market requirements
- efficiency and emissions of the power supply
- incineration or recycling of used products

What to correct in these cases should be subject to further negotiation and additional agreements\*. To the extent that the industry party does not assume responsibility for these effects, additional policies should be implemented.

\*agreements on efficient appliances; on recycling products; on demand side management; on sustainable sources; etc.

### 3.7 Entity to be agreed upon

With regards to the effects stated in the former section, the agreement should include as much as is deemed reasonable by the industry. As for the greenhouse gases, at least CO<sub>2</sub> from fossil origin should be included, therefore all fossil fuel combustion and other major chemical processes. Because fuel is often interchangeable with electricity, developments in electricity consumption and CO<sub>2</sub> emissions from power generation should be included.

As for the Netherlands example, only CO<sub>2</sub> is looked at. Moreover, production volume growth is excluded because the entity is energy consumption divided by physical production. Also, corrections are possible for most of the other effects, but these have to be proven reasonable by industry. The emissions from electric power suppliers is accounted for in the Dutch agreements with industry. This is because of the large dependence on fossil fuels in Dutch power generation, and the important role of combined heat and power generation projects.

What should be corrected for differs for each country and each industry sector. For effects that the industry can influence, like market developments, an incentive to use this influence should remain. This could imply that corrections should not be made for the full effect, but only part of it.

Some examples:

- A fast growth of product demand triggers more investments, therefore relatively more efficiency can be required. A declining business on the other hand would be able to postpone investments.
- An industry could be rewarded for optimizing raw materials specifications (e.g. humidity, purity) with its suppliers so the total process route requires less emissions.
- An industry could be rewarded for using electricity from sustainable sources.

For operational reasons, simplifications are allowed to make negotiating the agreement and subsequent monitoring more efficient. When using energy instead of CO<sub>2</sub> emissions as the entity, this stresses the positive aspect of cost cutting.

### 3.8 Level to reach

With respect to the nature of the greenhouse gas problem, the required reductions would be substantial. Therefore, the negotiated levels will not be based on what is environmentally required, but what is feasible within the time frame. When the time frame expires, new goals have to be set. As the extent of the greenhouse gas problem is still uncertain, intertemporal optimizing of reduction measures is practically impossible.

Trading of emissions reduction efforts therefore seems unwise, for several reasons:

- What is feasible is meant to refer to what companies could improve with regards to their own emissions. Allowing trade would reduce the agreement to establishing what a company can pay, regardless of the emissions it causes.
- No static (once and for all) reduction level is set, and this would be required to achieve optimality by trading. Moreover, technological dynamics would flaw in the long run as trading would distract attention of companies from improving their own activities. There would remain no technological vanguard to lead the way in meeting new goals.
- Since not all agreements can start simultaneously, parties that are involved early tend to buy low cost measures. This would affect negotiations in other agreements.

Basically, the emission reduction that is feasible exceeds the reduction that would take place in the absence of an agreement. In absence of an agreement, reduction would be partly autonomous and partly induced by present regulations. To set the framework for the agreement policy, insight is required on how these baseline trends are expected to develop in the future.

In the Dutch case, both government and industry estimate that almost half of the 20% efficiency improvement will not be reached in absence of agreements. For the basic metal industry, past trends show low annual efficiency improvements, less than 0.5% yearly. However, this reflects the specific fixed ratio of energy and physical output mentioned above. The energy consumption covered by the Dutch agreement would show an efficiency increase of more than 1% yearly. Historic analysis of the Dutch brick- and rooftile industry also shows 1% annual efficiency improvements over more than 25 years. Recent results from the agreement with the Dutch chemical industry, covering 287 PJ, show that two thirds of the efficiency gain comes from general proces improvements. Of these improvements, a substantial part is not likely to be induced by the agreement. In section 3.12 some results of model calculations are presented on the possible effects of agreement policy.

The negotiated level should be based on energy audits, preferably in each company involved, and the associated measures should be accepted as being financially and technically possible. In the agreement, intermediate reduction levels should be planned according to a suitable time frame. Differences should be possible between countries, between industry sectors and even between companies. A rigid universal technological standard should not be required, to allow gradual development. Agreeing on a certain pace of improvement, for instance an equal percentage reduction over a decade seems attractive to retain some equity.

### 3.9 Government support

Possible contributions of governments to the agreement are:

- facilitate agreements policy with legislation,
- refrain from undesirable legislation as far as agreed upon,
- monitor improvements and report them
- funding of preliminary audits, funding of relevant other research, funding of monitoring and reports
- funding part of the actual measures

The Dutch government supports the agreements by funding inventory energy audits and part of the monitoring and reports. Also, industrial projects for research, development and demonstration of energy technology is subsidized. Not all recent government policy is deemed desirable by industry. Combined heat and power has been very successful in recent years and subsidies on these projects are now cancelled. Also, a revenue-neutral environmental energy tax for small users is implemented in 1996, of which most of the agreement companies are exempted.

### 3.10 Monitoring system

Monitoring is used to verify that parties fulfil the agreement. When using a long time frame, intermediate verifications should take place. This helps the company to communicate its efforts to the public. It is also necessary to implement adequate additional policies or sanctions when required.

Because of the nature of the agreement policy, both parties should contribute to monitoring. When the entity agreed upon is expressed in absolute levels and few corrections are necessary, then monitoring is simple. But when corrections are made, more information has to be processed and confidentiality may become an issue. A significant contribution then is required from the companies to fill in the details.

To meet their part of the agreement, industries already have to make an inventory and analyse their processes, especially when CO<sub>2</sub> emission is concerned. They have to consider improvements and estimate costs and benefits. When effects occur like the ones mentioned in 3.6, they are inclined to make corrections.

The amount of detail involved in monitoring may be a signal on how seriously an agreement is taken, and how much efforts are made to reduce emissions. So monitoring itself can become a substantial effort. Because the agreement basically is made to serve a public goal, public verification is in the interest of both parties. For part of the companies, there is a trade-off between public verification and confidentiality of industrial data. This issue should be attended to in agreement negotiations. Details of the monitoring *system* should be public information, because responsibilities for effects that are not assumed by companies should be assumed by government.

In the Netherlands case, the monitoring system is often complicated. In steel industry, 20 separate product flows with associated energy consumption are monitored. Monitoring data are processed every year. Because of confidentiality, only primary energy consumption and efficiency improvement is stated on a sectoral level. Applied corrections are specified in terms of primary energy consumption. In general, no details on the monitoring system are available to the public. However, the iron and steel industry and other individual companies are open on this subject.

The importance of how a monitoring system works, is illustrated by the following examples from Dutch basic metals industry. In producing oxygen steel, a certain amount of scrap is added to the pig iron. As pig iron production requires more energy than heating scrap, increasing the scrap content of oxygen steel shows as efficiency improvement. In the Dutch monitoring system for the iron and steel industry, the blast furnace stage is exempted as this is considered to be chemical reduction. As this is an imported source of CO<sub>2</sub>, the real positive emission effects of adding scrap are substantially higher. For aluminium production, recycling scrap is considered a separate production flow. Therefore, using a higher ratio of recycled metal does not show in energy efficiency results. Moreover, because electricity for primary aluminium electrolysis is exempted from monitoring, increased recycling would even show as an adverse structural effect.

### 3.11 Monitoring details

As for the effects mentioned in 3.6, the monitoring system should offer adequate solutions with minimum complexity. Not all effects that occur during the term of the agreement can be foreseen in the negotiation stage. General agreement has to exist on how to deal with eventualities. What has to be dealt with from the start is how to account for production growth, electricity and heat consumption from the grid and deliveries to the grid. Other exceptions are mainly specific to certain industries.

In the Netherlands monitoring practice, most corrections have been made for energy consumption due to environmental regulations. Also, effects due to raw materials composition (e.g. humidity) and product diversification have occurred. Corrections are reported for adverse effects on energy consumption, so actual energy consumption is higher. The reported corrections so far amount 5 to 10% of the energy efficiency improvements.

### 3.12 Economic effects

In general, measures taken to protect the environment according to accepted standards incur costs for the industries. In the long term, these costs are internalized and become part of the general categories like capital and labour costs. Therefore economic effects of agreement policy cannot be accumulated on the long term. They have to be stated as an increase on normal or baseline costs for a certain period.

As for CO<sub>2</sub> emissions due to energy consumption, also benefits exist because of savings. When rigidly applying economic theory, it could be argued that companies always balance costs and benefits. This would imply that they have taken all profitable energy saving measures. Measures that are enforced by policy should therefore always be suboptimal and incur costs. However, engineering studies often state vast potentials of profitable energy saving measures. Why these options are not applied has been the subject of many studies. Increasing total factor productivity is of prime interest to companies, not energy saving or any other environmental goal. Most research and development, information gathering and managing effort is aimed at increasing total productivity. Many profitable energy saving projects are simply not part of the set of options a company looks at. Costs involved with selecting and verifying information, avoiding risks and motivating decision makers can be considerable. In this area policy can help to bridge information gaps and develop attractive programs. This could be viewed upon as subsidizing environmental measures.

Agreements in the Netherlands are operated in this grey area, where energy saving measures are profitable as such, but total overhead costs of both government and industry can be considerable. The total annual budget of the Dutch government for the agreement program amounts 33 mln ecu. The overhead costs of industry are estimated to be of the same order of magnitude. Total investments related in some way with the agreement program amount 250-500 mln ecu annually. The actual investments are hard to separate in an autonomous part and a policy induced part. Moreover, an investment like the replacement of machinery serves more objectives than energy saving. Based on annual savings of energy costs and an average lifetime of ten years, the whole program would save about 500 mln ecu annually in 2000.

To establish the effects of agreement policy, some exercises have been made with the ECN-SAVE-model. This model incorporates specific technologies and it separates 3 components of investment decision making. The first component is a profitability evaluation. The second component is a vintage registration. The third component is the gradual S-shaped development and implementation path of specific technologies. The agreement policy is assumed not to affect profitability

and does not increase the rate of depreciation. It can be effective in the third category, speeding up implementation and diffusion of new technology. Calculations show that a substantial effort in disseminating technology may increase efficiency rates. For these calculations, the implementation period is assumed to be reduced by one third. For the basic metals sector, this additional effect amounts to 0.25%-0.7% annually for fuel and 0.03%-0.1% for electricity. In the model, all energy inputs are included. In the food industries, additional efficiency improvement rates of 0.3% average were found on primary energy. Because of speeding up dissemination of technology, additional effects may occur in profitability. New technology will be relatively familiar, and therefore perceived risk may be lower.

It can be concluded that a margin exists were additional policy efforts can result in profitable energy efficiency improvements, and therefore reduction of greenhouse gas emissions. This means that no adverse macroeconomic effects occur when modest agreement policy is implemented. On the contrary, total productivity may increase and technological development is stimulated. When further reaching agreements are implemented under pressure of legislative sanctions, profitability may be impaired. In that case, negative effects can prevail.

#### **4. Results in the case of the Netherlands**

Policy on greenhouse gas emissions from industry in the Netherlands is largely covered by long term agreements on energy efficiency. At the end of 1995, 28 agreements with industry sectors were signed and 4 more were planned. The primary energy consumption covered by agreements with Dutch industry amounts 708 PJ in the base year 1989. This was 55% of the industrial primary energy consumption registered by the national energy statistics. Of the rest, an important part represents consumption for feedstock purposes and for specific chemical reactions. The total CO<sub>2</sub> emission covered by the agreements is estimated at 45 mton CO<sub>2</sub> (50-55% of total industrial energy related CO<sub>2</sub> emissions). The available results cover 15 sectors and 459 PJ primary. Compared to the base year 1989, in 1993 a 6% efficiency improvement was made, which is slightly behind schedule. For 1994, good results in the chemical industry are published. The ministry of Economic Affairs expects a 9% improvement for 1994 compared to 1989. This is based on available figures concerning 70% of the companies involved in agreements. Actual primary energy consumption in 1993 for the reported sectors amounts 464 PJ, so volume and structural effects caused a 7% increase.

Iron and steel industry did relatively well with an efficiency improvement of 11% in 1994 compared to 1989. Agreements included 1 primary and 1 secondary plant covering 61 PJ primary energy and about 4.1 to 4.5 mton CO<sub>2</sub>. Several corrections were made for product specifications, environmental measures and capacity utilization leading to a 1% increase of energy consumption. Weighted production volume increased by 7.8%. Categories of improvement projects were: good housekeeping (28%); energy systems (37%) and strategic general improvements (35%). Improvements in the good housekeeping category were considerably higher than expected in 1989.

The agreement with the non-ferrous industries included 19 companies most of which processed aluminium. It covered 8.4 PJ primary energy consumption in 1989 and about 0.5 mton CO<sub>2</sub>. This excludes 46 PJ primary energy consumption, mainly electricity for electrolysis processes. Reported efficiency improvements were 5% in 1993 compared to 1989. Several corrections were made, mostly for environmental measures, leading to a 5% increase of energy consumption. Weighted production volume decreased 1.2%. The largest energy savings were reported on the non-energetic use, about 1% of the 46 PJ primary consumption. Categories of improvement projects included good housekeeping/energy management 55%; energy systems 20%; general replacements/enlargements 25%. Despite its high share, good housekeeping results were behind schedule.

## 5. Conclusions

Agreements with industry on environmental issues can be a valuable contribution to the reduction of greenhouse gas emissions. Agreements are favoured by industry parties because they can participate in setting realistic targets, and retain flexibility in the process of meeting them. To make policy effective for meeting national or international targets, the voluntariness of the agreements must be limited. Therefore, attention has to be paid to the issue that industries must stay competitive and that non-participants are sanctioned. To assure real attention and commitment to the subject, energy audits and realistic reduction plans have to be made before an agreement is signed. Agreements should specify physical targets, time frames, monitoring methods, and conditions on when and how to make corrections for eventualities. It should be clear what sanctions are taken when companies do not meet targets or do not participate. Because agreements serve public goals, their contents and their results should be public information.

An agreement policy will have a limited scope for obvious reasons. Industry parties cannot commit themselves to substantial absolute emission reductions under all circumstances. Governments have to be aware of volume increases and all kinds of structural effects that become apparent in accurate monitoring. Additional policy on these issues may be necessary.

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# *ECN*

## **Long term agreements on energy efficiency: Fehler! Textmarke nicht definiert. the Dutch experience Ton van Dril**

The first part of this paper deals with the general features of Dutch voluntary agreement policy and its results. In the second part, some of its weaknesses are analyzed and suggestions are made for future improvement. Also, options for this type of policy for Europe are dealt with.

Concern for the environment is the main motive for the adoption of Dutch energy policy nowadays. The Long Term Agreements (LTA) policy was based on the first and second Memorandum on Energy conservation of 1989 [1]. In order to accomplish a national reduction in CO<sub>2</sub> of 3 to 5% in the year 2000, Dutch industry had to improve its energy efficiency by 20%, compared to 1989. Since by far the largest part of the Netherlands energy supply is based on fossil fuels, reducing energy consumption is largely congruent with reducing CO<sub>2</sub> emissions. The instrument of covenants with industry was chosen to create maximum support from industry and give them freedom of movement. In this way they could find their own solutions and take up responsibility in saving energy. The first LTA was signed in 1992 by the iron and steel industry.

Long term agreements are contracts between the Ministry of Economic Affairs and industry. In this contract, the industry party is committed to improve energy efficiency by (in general) 20% over the period of 1989 to 2000. The government part of the deal seems less profound: research programmes are funded and monitored. Furthermore, government is committed to reduce or avoid taxes and direct regulation on energy consumption. Of course this is the chance industry was willing to take, being aware that some kind of policy was unavoidable.

In an international perspective, Dutch LTA's are regarded as relatively strict and well specified. Combined with a high degree of participation and regulatory sanctions for non-participants, "voluntary" may not be the right qualification. In most cases, industry organizations adopt the role of negotiator, but individual companies have to sign for their participation. The government agency Novem plays an important role in this process and also in the subsequent monitoring of the LTA. Depending on their situation, industry branches and separate companies participate in LTA's. In the process of reaching the agreement, government funded energy audits are made in separate companies, to assure feasibility. By doing audits, practical possibilities and cost-effectiveness of saving options are checked before signing an agreement. In this way, a company is committed to its own energy saving plan, which can be implemented in its investment schedule. The time frame of 1989 to 2000 is regarded sufficiently long for making the adjustments.

A total of 32 industrial LTA's are made or presently under negotiation, and another 10 can be listed in agricultural and service sectors. Reports are available from 17 sectors, of which results are listed in table 1 [2]. The overall efficiency improvement appears to be on schedule, although large variations between sectors exist. Apart from the sectors listed in table 1, four other major sectors (PJ) can be mentioned: refineries (154); oil and gas production (39); greenhouse horticulture (157) and health care buildings (27).

**Table 1. Reported intermediary results of LTA's**

Sector	Consumption PJ primair in 1989	Improvements % ref. 1989		Corrections % ref. 1989 1993/1994
		in 1993	in 1994	
Chemicals	310	5	8	0
Iron and steel	61,2	10	10	-1
Paper	30,2	5	8	-2
Dairy	17,3	4	5	?
Philips	10,8	20	23	?
Glass	11	5	10	0
Sugar	7,5	8	9	-1
Non-ferrous metals	8,4	4	7	-5
Margarine, oils, fats	7,5	4	5	0
Cement	7,1	7	14	0
Meat processing	6	3	9	-3
Breweries	4	12	15	0
Textile	3,9	4	9	-7
Rubber	1,9	2	6	-2
Sand-lime bricks	1,2	3	8	0
Vegetable and fruit processing	1,6		6	?
Coffee roasting	1		6	?
<b>Total</b>	<b>490,6</b>	<b>6</b>	<b>8,6</b>	<b>-0,4</b>

Total coverage of the LTA's for industry amounts to 708 PJ (1989 levels) which is 84% of the consumption for energy purposes, and 55% of total industrial energy consumption (including use as raw material or for specific chemical reactions). In calculating the results in table 1, corrections were made, mentioned in the last column. These corrections refer to energy consumption increases due to developments not controllable for individual companies. These include measures for environmental protection and altered product- and raw material specifications or composition. A negative correction means that actual consumption was higher. The reported corrections amount to 5-10% of total savings.

Both the coverage and the results are reasons to evaluate this LTA-policy as being successful. Although both government and industry estimate that about half of the improvements would have taken place in absence of LTA's, the policy contribution is considered to be significant. However, in the remaining section, some criticisms and weaknesses will be dealt with.

The first and foremost weakness is that *efficiency* is the subject, stated as energy per unit of output, instead of absolute levels of energy consumption. Although this is reasonable from the industry's point of view, it leaves national CO<sub>2</sub> policies in the dark. In the period of 1989 to 1994, industry volume growth was a moderate 0.9% annually, which was below macroeconomic scenarios. However, total industrial energy consumption still rose with 1.0% annually. If the reported efficiency improvement would refer to this total consumption, this leaves us with adverse structural effects amounting to 1.8% annually. Looking at recent figures for 1995, value added growth of 3% is outrun by an energy consumption increase of 5.6%. Energy intensive industries like chemicals and basic metals showed volume growth figures of 4-5% in 1995. Looking at LTA results for energy intensive industries like chemicals and iron and steel, table 2 shows significant structural effects for chemicals.

**Table 2. Analysis of the chemical and iron and steel sectors**

<b>annual growth %, 1989/1994</b>	<b>chemicals</b>	<b>iron and steel</b>
value added volume (est.)	0,9	1,4
physical output (energy weighted)	2,1	1,5
primary energy consumption	1,6	-0,6
reported specific energy consumption	-1,6	-2,0
>>adverse structural effects	2,3	0

In chemicals, the relevant physical parameters used in LTA's [3] rose considerably more than value added, implying a movement towards energy intensive bulk production. The rest of the structural gap has to be explained by the LTA coverage of total consumption as reported in National Statistics [4]. Apart from a small fraction of non-participants and corrections, the exclusion of large amounts of fuel for non-energy use here is the main cause<sup>1</sup>.

Successful economic growth and structural effects seem to cast a large shadows on the energy efficiency improvements. The Ministry of Economic Affairs claims successes, both in energy and economic policies, saying that economic growth and protection of the environment can go hand in hand. To fill the gap between planned CO<sub>2</sub> reduction and the expected rise in 2000, an additional effort is made to stimulate technology. This effort is focused on both development of new technology and a structural strengthening of the economy. Therefore, it is not expected that CO<sub>2</sub> emissions will be reduced in the short term. That technological progress and favorable structural change will outrun economic growth on the long run is still very much hoped for, but today largely out of reach. So, although a successful environmental policy is carried out with an almost nationwide participation, it is still far from solving global climate problems.

Using a ratio of energy and output has other disadvantages, apart from the absence of a boundary on CO<sub>2</sub> emission levels. The choice for a certain output parameter bears some kind of value judgement or scope, both on macro and micro levels. On macro level, when comparing countries, we know that evaluating energy consumption per capita shows results that differ considerably from energy over GDP. On a micro level, in the LTA's, output is generally specified in mass units for separate processes. This will focus efficiency improvements solely on the technology of these processes. For example:

- in the aluminium industry, this means that primary production and secondary production are separately monitored, even if it takes place in the same plant. If the energy consuming primary production decreases in favor of scrap remelting, this would not show in the efficiency results;
- in the paper industry, producing thinner sheets for a specific purpose would require less paper stock processing and therefore less energy. Using square meters as an output parameter would show different results from using tonnes.

Normally, an industry would determine its own parameters when encountering an LTA, and this is very understandable. This choice will correspond with the possibilities an industry perceives in determining its output specifications. In the paper example, if the market specifies grades of paper in grammes per square meter, the industry is not interested in reducing this weight. In the glass industry however, a company controls both the energy consuming melting process and the production of bottles. The market does not specify tons of bottles but the number of bottles and their capacity. In the LTA for the glass industry, it was possible to use the total liquid containing capacity as unit of output. This would allow the producers to improve their energy efficiency by making bottles with thinner glass. Customers will have additional transport advantages, provided of course, that strength requirements can be maintained.

The second weakness in the Netherlands policy on long term agreements is the exclusion of non-energetic energy consumption. Substantial parts of this category are contributing to CO<sub>2</sub> emissions in the same way the energetic consumption does. Natural gas for ammonia production; coke for iron ore reduction; electricity for electrolysis are examples of this exclusion. Using oil products for plastics production does not cause instantaneous CO<sub>2</sub> emissions, but waste incineration does in a later phase. These exclusions are to some extent

reasonable, when bearing in mind that a 20% efficiency improvement has to be reached within the present process technology setting. Such a target would be practically infeasible when all fuel inputs are included. The problem is, however, that no incentive comes from this exclusion to implement other routes, like recycling metals or plastics. On the contrary, preparing and remelting scrap would count as energy consumption, whereas energy for primary production is largely excluded. The present largely extractive production system is protected, while the closing of production cycles is not stimulated with this policy.

A third critical point to be made with regard to Dutch LTA's is the evaluation of on-site electricity production. Several industries consider combined heat and power production as a cornerstone of their energy efficiency program. Modern combined cycle installations are built to supply the required process heat, and electricity is delivered back into the grid. This electricity is valued in the LTA monitoring system as primary energy by multiplication with a conversion factor of 2.5. In this way the reference efficiency for electricity generation is set at 40%. This is below the average for the existing public electricity supply operating at about 43%. With a large state-of-the-art CHP unit, this way of accounting can result in low or even negative consumption levels for separate plants. The present system stimulates CHP to an extent that can frustrate further reductions of final energy demand in the future. Today, the Dutch electricity generation system is largely overcapacitated.

In conclusion, although the judgement on Dutch LTA's can be positive, it seems appropriate to make some suggestions for improvements. First, physical volume growth deserves attention from policy makers, considering that it can largely outrun efficiency improvements. One suggestion would be to make the required improvement target dependent on output growth. High output growth could speed up investments and allow for extra efficiency improvements. On the other hand, stagnating growth would be a reason to postpone investments and set lower efficiency targets. This way of target setting may in fact reduce uncertainty for both industries and government. A second suggestion would be to include energy consumption as raw material or for specific chemical reactions. This seems reasonable as far as direct or indirect CO<sub>2</sub> emissions are concerned. For the relevant industries, this would imply differential target setting instead of the industry-wide 20% goal. Differential target setting is also advocated by the environment movement [5] to make a better use of the available potentials. In a future round of LTA's past 2000, a differential approach may be required anyhow, when the final scores in 2000 will be evaluated. A third improvement on the present system of monitoring would be to use a conversion factor for electricity back to the grid that represents a state-of the art reference technology.

Looking closer at the present system for monitoring energy efficiency, it becomes clear that optimizing the efficiency of a process does not lead to optimal solutions from a National or Global point of view. Not only fuel consumption causes CO<sub>2</sub> emissions, and indirectly the consumption of electricity, but also the consumption of e.g. oxygen, fertilizer, zinc or milk powder causes considerable CO<sub>2</sub> emissions. Accounting for specific energy intensive inputs would be a logical step towards a more integrated approach. For example, some of the monitoring systems applied today in Dutch industries already allow for accounting of oxygen. Monitoring and setting targets for other energy intensive inputs could be applied as an incentive to optimize material use. An important precondition for such an integrated approach would be that information on the CO<sub>2</sub> content of a product is passed correctly. This integrated approach would automatically mitigate undesired structural and volume effects, without explicitly restricting growth of energy intensive sectors.

In 1997, two initiatives will be taken to further implementation of this type of policy on an international scale. First, a feasibility study is made by the Annex I expert group on the UN Framework Convention on Climate Change, contributing to the project on Policies and Measures for Common Action [6,7]. Second, an initiative is taken during the Dutch chairmanship of the EU, to put this type of policy on the European agenda. As most energy intensive sectors are organized on a European scale, their organizations would be the obvious negotiating parties. Research and development for energy saving applications in specific sectors could benefit from economies of scale. One of the major advantages of Agreement policy on an International scale, would be to avoid the risk of unfair competition on international markets. Apart from that, the Dutch experience shows that saving energy can be cost-effective and provide industry with a competitive edge.

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<sup>1</sup>. Although fuels used as raw materials for plastics etc. will not cause immediate CO<sub>2</sub> emissions, many other "feedstock" applications do (e.g. for ammonia production and electrolysis applications).

***GIEE***

## **Environmental Voluntary Measures Adopted in Spain in The Field of Thermal Electricity Generation**

by Vicente Plaza Balaguer

Before the recent adoption and publication by the European Commission of a Communication on environmental agreements (EC, 1996a) and recommendation on this issue (CE, 1996) some European electric companies have applied this instrument for the purpose of achieving environmental objectives (UNIPEDA, 1996).

Environmental voluntary measures adopted in the field of conventional electricity generation by the Spanish electric company ENDESA are presented in detail in this paper. The first section places the environment in context and describes a number of different pressures which will influence future environmental performance of the European electricity generation installations. In fact, the effectiveness of the different policy instruments will vary in function of the type of scenarios which appear in the future.

### **1. Pressures on the environmental performance of the electricity generation installations**

The European Electricity Supply Industry faces a number of different pressures (Barrett, G., 1995). Among these pressures, the following ones should be considered:

- Rapidly changing environmental legislation at different levels (local/regional, National, European and International - UNECE) with increased requirements, restrictions and liabilities on electric utilities.

The emergence of new environmental issues such as critical loads and the “new” ambient air pollutants, including PM10, certain heavy metals (Cd, As, Ni), PAH for which new European specific Directives are expected in the short term (EC, 1996c). At the same time, the application of the IPPC Directive (EC, 1996b) and the on-going revision of Directive 88/609/EEC will very probably imply new more stringent requirements on both new and existing large combustion plants (LCP).

- The rapid technological development of new power production technologies such as those based on renewable energies, clean coal technologies and combined cycle gas-fired plants. The availability of natural gas and different advantages associated with latter systems (higher efficiencies, lower investment costs, etc) is pressing for their current increasing incorporation in the mix of generation of several electric utilities in many European countries. This is leading to a significant improvement of the environmental performance of these companies, as measured in function of their atmospheric emissions (SO<sub>2</sub>, CO<sub>2</sub>, dust) and residue production (e.g. in tons of ashes, FGD-gypsum).
- The growing environmental complexity stemming from the need of an integrated approach which includes an increasing number of issues which present environmental policies which the companies have to cover. In this sense, the environmental statement which has to be formulated for information for the public, as a part of a standardized environmental management system (EMS) certified under EMAS has to comprise many different elements such as data related to the environmental performance of the installation, the environmental policy, programme and EMS applied by the company in the corresponding specific site of the installation, (involving training, informing and organization issues), an assessment of all the significant environmental issues of relevance to the activities concerned (e.g. those concerning the property to be protected, including ecosystems, cultural heritage, etc).
- The introduction of more competition in electricity generation in the framework of a clear trend towards liberalization and deregulation of the electricity market. In this context, electricity companies have to face and respond to commercial drivers. On one hand, it will allow and encourage the free access of electricity producers to energy sources and fuels, coinciding with the disappearance of central electricity planning, with probable positive consequences for environmental performance in certain countries.

On the other hand, a bigger use of the old existing LCP, which will avoid the construction of new LCP and the abandonment of the development and demonstration of clean coal technologies (of more expensive investment and exploitation costs) may negatively influence the environmental performances. In addition to these considerations, the harmonization of environmental conditions is considered by some authors a prerequisite to achieve a fair competition (Bulteel, P., 1996). Moreover, in the most existing deregulated markets, it's unlikely that premia for clean electricity or pass-through of environmental costs will be available.

- An increasing public expectation on environmental performance of the LCP which are power plants, among others industrial installations, which is being reinforced by Directive 90/313/EEC on the freedom of access to information on the environment.

It seems quite clear that these pressures will increase as the trend toward market liberalization accelerates and commercial realities intervene (Barrett, G., 1995).

Environmental agreements and self commitments can provide the opportunity to the European Electricity Supply Industry to comply with and realize environmental objectives more effectively than if imposed by law.

## **2. Spanish legal/official references on the application of voluntary measures**

At the level of Spanish State Central Administration, the two main legal/official references on the use of environmental agreements are as follows:

- Direct reference in a regulatory text has been made in the Royal Decree 484/1995 on waste water regulation and control. Recognizing the deficit in industrial waste water treatment and control, this new regulation empowers watershed authorities to negotiate and conclude with industrial associations sectoral plans for waste water control. These sectoral regularization plans are considered equivalent to the regularization procedures, as established in article 5 of the mentioned Royal Decree. In other words, in the case of a river basin, where sectoral regularization plans be set out, they would apply to waste water discharges of industrial plants belonging to a given sector, provided that the recipient (inland water-river, lake or dam) be the same (a common water body). The Decree also includes a provision of financial aid to industries to facilitate reaching these goals.
- In the Environmental and Energy Strategies (ESEMA) issued in 1995 by the Industry and Energy Ministry (MINER)(1), it's foreseen, among other goals for electricity generation from fossil fuel-fired power plants, to set out, together with the main electric undertakings, voluntary agreements which promote the environmental adaptation of this sector, looking for the appropriate mechanisms for encouraging environmental investments aimed at environmental performance levels beyond the ones required by the existing regulations.

Finally, several financing programmes for industry environmental retrofitting (PITMA, P.AA.EE.), recognize agreements between Industry and Public Authorities as the preferred way to obtain financial contributions or aids.

## **3. Voluntary measures adopted in the Spanish electricity industry**

Voluntary approaches should be distinguished between negotiated environmental agreements, on one side, and environmental self-commitments, on the other side. Both of them are new policy instruments which are applied by those companies whose policies are based on a proactive attitude, a rational approach and the integration of environmental matters and concerns into the business. In the case of environmental agreements, the subject of the agreement and the associated efforts and action plans described in the agreement, will be determined in a very precise and specific way, describing for a particular environmental issue a particular set of efforts or goals to be implemented (UNIPEDE, 1996).

In addition to that, the agreement has to specify clearly how its commitments are to be measured, monitored and checked. The agreement is not a set of internal rules, but a contract-like externally binding document, where both the company or group of companies and government commit themselves to a number of obligations or binding counter-commitments.

In the case of environmental self commitments, government does not commit itself as a second party as in the case of environmental negotiated agreements. An environmental commitment is then a one-side (unilateral) declaration, addressed only to the public or to various authorities without including and expecting a binding counter-commitment from the government. The contents of commitments in this second voluntary policy instrument can be similar to the one of a negotiated environmental agreement and should be very specific and precise, given that it will be considered externally binding by the company or group or companies concerned. It seems to be quite logical that a company which is going to undertake some action under the unilateral declaration corresponding to a self environmental commitment, expects some kind of acknowledgement or recognition of it in terms of a tangible response from Parliament or government. But it is difficult for this to be under the current legislative framework become recognised, unless the government accepts the self commitment in a specific, binding response.

#### **4. ENDESA voluntary measures in the field of electricity generation**

In this paper, voluntary environmental measures adopted by ENDESA in the field of electricity generation are described. They are included in a chapter of strategic actions of the ENDESA Environment Plan, which was issued and presented in December 1993 (ENDESA, 1993).

These measures are the most significant and relevant from the point of view of the importance of investments and committed actions which are presently being undertaken in the Spanish Electricity Supply Industry in the category of voluntary approaches. Two key features must be pointed out :

- Their investment costs have the character of recognized costs under the Stable and Legal Framework for tariffication and remuneration of Spanish electric utilities. In the future regime, stemming from the recent Electric Protocol of December 1996, they will enter in the “regulatory commitments”, for being adequately remunerated.
- After the presentation and public dissemination of the ENDESA Environmental Plan, an ecotax at a Regional level on SO<sub>2</sub> and NO<sub>x</sub> emissions from stationary sources has been imposed, affecting some ENDESA coal-fired power plants which are committed to significant SO<sub>2</sub> emission reductions. It could be interpreted as a fiscal punishment to the great efforts made to improve the environmental performance of those electricity generation installations.

Before describing in more detail the ENDESA voluntary measures in electricity generation, they are listed as follows:

- Transformation of As Pontes power plant, in order to achieve a 40% SO<sub>2</sub> emission reduction with respect to the permitted levels.
- Retrofitting of Teruel power plant, consisting of 90% SO<sub>2</sub> emission reduction compared with permitted levels. The SO<sub>2</sub> emission levels to be reached in the plant, once this measure is implemented, will be significantly lower than those currently required by Spanish regulations on SO<sub>2</sub> emissions from the LCP.
- SO<sub>2</sub> emission reduction in a thermal unit of Compostilla II power Plant, which will lead to a 25% SO<sub>2</sub> emission decrease of the whole power plant with respect to permitted levels and an increase of local indigenous coal with a higher sulphur content.
- Construction and putting into operation of the Puertollano Integrated Gasification Combined Cycle (IGCC) power plant, in order to demonstrate that this technology is a modern alternative for coal-based electricity generation, in an environmentally friendly sound manner and providing increased energy efficiency.
- To promote and reinforce the use and development of renewable and energy saving by focusing in particular on the wind energy and the analysis study and applications of other renewable energies (solar, biomass).

## **6. Transformation of As Pontes Power Plant**

This measure has been focused on as one of the actions for complying with the National SO<sub>2</sub> ceiling and reduction targets for SO<sub>2</sub> emissions from existing LCP. In fact, the National Programme on SO<sub>2</sub> and NO<sub>x</sub> emission reduction from existing LCP includes for the period 1994-98, among other actions, the consumption of a 50% mixture of local brown coal and imported sub-bituminous coal in this power plant.

The transformation of current facilities, enabling the use of the mentioned mixture of coals, will allow to extend the life of the mine/thermal power plant complex up to the year 2010 (Martínez Crespo, P. and Abadía J., 1996).

The following actions which have taken place are:

- Construction of the infrastructure associated to the unloadings of ships, coal transportation and storage.
- Certain modifications to the boilers for the four groups of 350 MWe each, in order to burn the new fuel mixture and achieve a higher energetic efficiency.

In spite of the fact that the major objective envisaged through the transformation of As Pontes power plant is to reduce the SO<sub>2</sub> emissions, the modifications which have been carried out on the boilers have significantly increased the thermal-electric conversion efficiency by 8.3% (on HHV basis) and have lead to a similar reduction of 8.3% in the CO<sub>2</sub> specific emissions. The

efficiency improvement has been obtained to a large extent as a result of the fact that ash and moisture contents in the new coal mixture is much lower than in the original brown coal. The CO<sub>2</sub> emission rate of the new coal mixture is 0.38 g CO<sub>2</sub>/Kcal, which is similar to the brown coal one. Therefore, the decrease in specific CO<sub>2</sub> emissions, from 1,164 g CO<sub>2</sub>/kWh net to 1,068 g/kWh net is associated with the efficiency improvement.

The modifications which have been performed on the boilers are listed as follows:

- Replacement of the economizer.
- Modification of the coal mills in order to adapt them to the new fuels.
- Replacement of the coal burners and redistribution of flue air ducts.
- Geometrical modification of the pressure parts.
- Change of the gas intake for the drying of coal.
- Installation of a system for using natural gas, considering the viability of said type of fuel in the near future.

## **7. FGD Plant at the Teruel power station**

This power plant consists of three identical units, with a nominal output of 350 MWe each, which were commissioned in 1979 and 1980, to produce electricity from local coal combustion. This indigenous local is a sub-bituminous lignite, with a high sulphur content, with values of 5-6% on average.

Before the approval of the construction of this FGD plant for treating 100% of flue gases produced, some other different measures were adopted in the past few years such as the operation of a coal washing plant for treating more than 1.5 Mt/year and the mixture installation of local coal with a certain proportion of low sulphur imported coal, for a fuel mix consumption of some 4 Mt/year.

This FGD is foreseen to be put into operation in July 98. The selection of the FGD technology was based on the following criteria (Lacarta, M., 1996):

- The need for adapting and fitting the FGD plants with the physical (location, surface area, access) and working characteristics (operation, maintenance) of the thermal plant of which it will form part. This integration has to be solved in the same way as corresponding to the boiler or the turbine; in this sense, it can not be considered as an annex to the installation.

In addition, a large flow rate of flue gases needs to be treated (1.6 Nm<sup>3</sup>/h from each of the three units)

- Minimum impact on the availability of the power plant.
- Potential impact of each of the different technologies on the Teruel power plant specific limitations and characteristics which include:
  - \* Produced by-product volume (handling and stockpiling needs).
  - \* Water consumption (whose availability is limited, due to other uses of raw water in an area of low rainfall).
  - \* Energy consumption. In this case, and for this specific site, the associated electricity production costs are increased sharply compared with the case of a more “conventional” desulphurisation, due to the volume and characteristics of the flue gas treated.
  - \* The needs for maintenance, reliability, surface area requirements, operation and control complexity, availability of the reagents (due again to the volume and composition of the flue gases to be treated).

On the basis of the criteria previously listed, the selected process was that called LSFO (wet desulphurisation with in situ forced oxidation, using limestone as reagent). In this process, flue gases from the boiler comes into intimate contact with a spray of finely-ground limestone rock slurry. The sulphur dioxide in the flue gases is removed by reaction with the limestone (calcium carbonate) to produce calcium sulphite; after undergoing a forced oxidation with air, it becomes partially- hydrated calcium sulphate (gypsum).

The figures of the FGD plant operation parameters, are presented in table 1. They refer to a FGD design coal mix, whose characteristics are given in a footnote of that table.

**Table 1. Operation parameters (1) (2) of the FGD plant to be installed at the Teruel power plant**

SO <sub>2</sub> retention : .....	95%
Availability: .....	> 95%
Interval between maintenance shutdowns: .....	3 years
Limestone consumption: .....	102 t/h
Water consumption: .....	500 m <sup>3</sup> /h
Electricity consumption: .....	22 MW
Gypsum production: .....	180 t/h

(1) Figures related to the treatment of flue gases from the three units.

(2) Corresponding to a FGD design mix coal with the following characteristics:

H.H.V (kcal/kg): .....	3900
Moisture (%): .....	21.91
Ash (%): .....	22.85
Volatile matter (%): .....	26.12
Sulphur (%): .....	4.50

## **8. SO<sub>2</sub> emission reduction in Compostilla II power plant**

This action will be undertaken by means of the installation and operation of a FGD plant in one of the thermal units of this power plant (the one of a installed capacity of 330 MWe) as well as the selection of local coals for a better control of SO<sub>2</sub> emissions. It's foreseen that this FGD plant will be put into operation by the end of 1997.

## **9. Puertollano Integrated Gasificacion in Combined Cycle (IGCC) power plant**

In 1989, the Puertollano Project started within the Thermie Program. ELCOGAS, a Spanish Joint Stock Company, was created in 1992 to carry out the construction, management and operation of the industrial process development in a 335 MWe IGCC demonstration plant to be installed in Puertollano, Spain. The shareholders of ELCOGAS are: ENDESA (30.52%), EDF (23.19%), IBERDROLA (11.10%), SEVILLANA DE ELECTRICIDAD (7.40%), HIDROCANTABRICO (4.00%), EDP (4.00%) ENEL (4.00%), NATIONAL POWER (4.00%), BABCOCK WILCOX ESPAÑOLA (2.50%), SIEMENS (2.34%), KRUPP KOPPERS (1.00%). All of the partners of ELCOGAS are from countries belonging to the European Union.

The process consists of the combustion of clean gas coming from the coal gasification, in a combined cycle formed by a 195 MWe gas turbine of advanced design, a heat recovery boiler with three pressure levels and a 140 MWe steam turbine. The gross electric power generated by the plant is expected to be 335 MWe, by burning a fuel mixture of local coals and petroleum coke, reaching a thermal-electric conversion efficiency of 41% (over HHV), which is equivalent to a net heat rate of 2100 kcal/kWh.

Technical data of this plant are showed in table 2. According with these figures related to environmental performance parameters, the IGCC technology offers the following substantial advantages over conventional coal-fired power plants:

- Improved efficiency with figures 5-6% over those of conventional coal-fired plants.
- Minimum gaseous emissions (CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>), to the atmosphere, in particular, with regard to CO<sub>2</sub> and SO<sub>2</sub>. In the case of SO<sub>2</sub>, the expected emission values are lower than 25 mg/Nm<sup>3</sup>, which are significantly below the emission limit value of 400 mg/Nm<sup>3</sup> currently required in the EU for those new coal LCP.
- As to the CO<sub>2</sub>, the specific emission should be in the range of 794 g CO<sub>2</sub>/kWh, around 20% less than that achieved by a conventional electricity generation system using the same low quality coals. The annual associated CO<sub>2</sub> saving effect will be about 570,000 tons.
- Extremely low solid particle emissions to the atmosphere. Particle emission concentrations of approximately 7.5 mg/Nm<sup>3</sup> are expected, which are much lower than the emission limit value of 50 mg/Nm<sup>3</sup>, as presently required for dust emissions coming from coal LCP.

- Lower raw feed water consumption than that one required by conventional plants. In fact, this water saving is around 50% of the water consumption in a conventional coal-fired power plant.
- Solid residues are presented in a vitrified and granulated slag, avoiding in this way, fugitive emissions of dust and eventual leaching of some of their compounds.

**Table 2. Technical data of Puertollano IGCC project**

Gas turbine : .....	198.15 MWe
Steam turbine: .....	136.85 MWe
Gross electrical power: .....	335 MWe
Internal consumption: .....	38 MWe
Net electrical power: .....	297 MWe
Efficiency: .....	45% (ISO conditions)
Fuel: .....	50% coal from the area and 50% coke from Repsol Puertollano refinery.
	Fuel design features are:
	Moisture ..... 9%
	Ash ..... 24%
	Volatiles..... 16%
	Carbon ..... 54%
	Sulphur ..... 3.21%
	Heat Value ..... 5520 kcal/kg
Water demand : .....	90 m <sup>3</sup> /h
Emissions: .....	SO <sub>2</sub> ..... < 25 mg/Nm <sup>3</sup>
	NOx ..... < 150 mg/Nm <sup>3</sup>
	Dust ..... < 7.5 mg/Nm <sup>3</sup>
	CO <sub>2</sub> ..... 80% of the corresponding rate of a conventional coal-fired power plant
Solid Residues: .....	Vitrified clinker and elemental sulphur

## 10. Concluding remarks

Two main remarks should be noted:

- It must be pointed out that the application of fiscal instruments (taxes, levies, etc) on atmospheric emissions, residues, or electrical energy coming from electricity generation installations (such as LCP), after the unilateral adoption of voluntary environmental measures, could discourage either their implementation or the future approval of new voluntary actions.
- The lack of legal status under present law for environmental agreements and self-commitments in many European countries has to be solved so that this can be used as a legitimate means for the implementation of environmental objectives laid down in Community law.

In this sense, it will be necessary to lay down a set of minimum legal and administrative framework conditions for the development and implementation of these voluntary measures, by recognizing their valuable role in environmental policy making. One possible solution would consist of the clear definition and inclusion of these framework-conditions in each individual Directive.

Finally, in a more deregulated, high volume, low margin undifferentiated commodity market in the future, where competition between individual companies is increasing, we have to take into consideration that these companies seek stability in regulation, regulatory planning time scales that match the long planning cycles of the industry required to remunerate investments and an integrated approach that allows plant and environmental flexibility (Adrain, S., 1996).

Concerning the latter issue, the consequent greater interferences in the business process (e.g. conventional electricity generation) stemming from an increasing command and control approach should lead to the study and formulation of alternate options which recognize that industry is better placed to find the most cost effective solutions. These alternative options include voluntary measures and the use of economic instruments such as permit trading.

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**Voluntary Agreements in Danish Energy Extensive Industries**  
**Peter Helby**

**1. Introduction**

At a recent informal meeting with energy policy researchers, a senior Danish government official expressed his frustration: "How do I explain to my foreign colleagues, that we are serious about our ambitious goals? They look at our goals and say: Very nice. Then they look at our policy instruments and shake their heads in disbelief. What we regard as effective and proven instruments, they regard as hot air." Energy policies reflect national priorities and traditions, not only in the definition of goals but also in the methods and style of implementation. A strong government hand is not part of Danish tradition. The state is understood as the servant, not the master, of civil society. As long as the state powers accept this role, they are regarded rather favourably by the Danes, who are willing to pay some of the highest taxes in the world. When state powers have shown even slight tendencies to transfer this role, the popular reaction has often been swift and strong. This was last seen in the negative Danish reaction to the Maastricht treaty. The reaction was much more due to a concern for the sovereignty of civil society, than to a preoccupation with national sovereignty. The Danes simply suspect, that Brussels is dominated by a rather authoritarian conception of the relation between state and civil society, and there are very circumspect about granting any state authority to Brussels.

**2. The national regulatory tradition**

Danish society shows a strong preference for self-regulation. In the field of industrial relations, for instance, the Danish state have never fixed working hours or minimum wages, but has left such matters to voluntary agreements between labour unions and employers organisations. In negotiating the Maastricht agreement, Denmark thus had great difficulties with the social charter, because this charter gives authority to Brussels in an area, which in Denmark is regarded as the prerogative of civil society. Unlike the UK, Denmark strongly sympathised with the aims of the social charter. A solution was found, where EU-directives in this area (i.e. the exercise of state power on a European level) can be nationally implemented through voluntary agreements between labour unions and employers organisation, i.e. without involving Danish state powers.

When such self-regulation is not likely to protect the public good, a somewhat stronger state role is often implemented. Mostly, however, Danish politicians are careful not to make this role more powerful than absolutely necessary. A common solution is some form of negotiated regulation based on cooperation or balance of power between civil society organisations and state officials. An example of this is environmental protection. Here state and local authorities have been granted wide powers to decide what individual enterprises may or may not do. However, their decisions can be appealed to a review board, where a majority of the members represent business organisations. Obviously, this creates strong incentives for state and local officials to negotiate solutions which are broadly acceptable to the business community, and to use their discretionary powers with considerable restraint.

In most policy fields this cooperative approach to regulation has been quite successful. In international comparison, for instance, Denmark has achieved high standards in industrial relations and environmental protection. In certain fields however, the approach has not been successful. The relationship between house lords and tenants for example is regulated according to adversarial principles. Attempts have been made to reform this and install a regulation based more on cooperation, but without much success. It is difficult to define in any general way, what leads to success or failure. It seems likely however, that some important preconditions for success are these: there must be a high degree of shared values among the parties involved; maintaining good reputation, social respectability and positive relations must be important for the parties; behaving badly must somehow carry significant costs, even without formal sanctions.

Working in this tradition, officials emphasise some styles and methods of implementation, and are reluctant to use others. Danish officials are very reluctant to impose fines on business, even when they have the powers to do so. Having to use such powers is often regarded as a sign of incompetence or failure, because it demonstrates that the officials involved have not been able to find a cooperative way of dealing with the issues. On the other hand, officials are often fond of methods that can change values, such as information, education, public debate, moral awards for good behaviour, etc. Officials often emphasise that the seeds of cooperation must be carefully sown and nourished, and work creatively to do this.

### **3. Sowing the seeds of cooperation**

The careful preparation of preconditions for cooperation can be illustrated by some of the methods that have been used for state intervention in industrial energy use in Denmark:

- Great publicity has been given to the climate problem. The risks have been emphasised, rather than the scientific uncertainties. The moral issues have been stressed, rather than the economic issues. Actually, this has mainly been a spontaneous process in civil society (in the media, in the schools etc), rather than something initiated by government. When government officials have intervened, however, they have been supportive of this publicity process, instead of trying to counteract it, as happens in some countries. This process plays an important foundation for cooperative regulation, because such information and value change quickly infiltrate most business leaders, but through employees, customers, and through the whole social and family network of those involved.

- Similarly, ever since the 1973 oil crisis, publicity has been given to the economic risk involved in energy consumption, i.e. the prospects for sudden price changes and supply interruptions. Official publications have generally painted a rather bleak picture of future supplies and prices.
- The growth of consulting competence has been nurtured, through economic subsidies to the users of consultants, and through formal demands for their use in specific circumstances. The effect is not only, that such competence is available when asked for, but also that it increasingly becomes part of the "package" provided by those who advise businesses, i.e. engineering firms, architects, lately even accounts (who are now developing environmental accountancy as a new branch of their activity).
- Trade associations have been given incentives to develop their competence and activity in the energy field. For instance a long series of industry specific energy reports have been prepared. This work has been paid by the state, but has often involved the staff of trade associations, and has meant a transfer of state funds to these associations. To the extent that such organisations have wanted to engage in energy consulting activities for their members, the state has also provided for part of the costs of such activity. Engaging cooperatively in energy policy, has thus become a method for such associations to increase their staff resources and provide additional services for their members. This has strategic value, because these associations have a key role in the establishment of values and priorities in the business community, and also in the representation of the business community vis-à-vis media, political parties, and in negotiations with government officials.
- Reduced energy taxes have been an option available for energy intensive industries, provided they perform certain activities. Prominent among these activities have been the internal accumulation of information and development of staff competence. Typical demands have been: Making a general review of energy consumption, installing equipment and procedures for measurement, analysis and reporting of energy consumption, educating staff in energy efficiency, developing procedures for and including energy efficiency information in all procurement and investment decisions, establishing lines of responsibility and information which keep business leaders aware of savings potentials. The knowledge and competence thus developed is expected to increase the motivation and capability of the individual enterprise to engage cooperatively in the implementation of energy policies.
- The employment by firms of staff dedicated to energy savings is subsidised rather generously by the state. Such staff are expected to contribute to the motivation and capability mentioned above.

This kind of seeding helps to create a situation, where the business community is willing and able to engage cooperatively in energy policy. It provides some sense of shared purpose and shared understanding of problems and prospects. It also promotes a certain material alignments of interests, by creating a situation where "cooperation" is not a case of one party trying to push another party to engage in some activity which is foreign to him, but is something happening between two parties, which are both actively and voluntarily engaged in energy savings.

#### **4. No-regrets: A contingent concept**

The activities mentioned above do not change the fact that government officials work in pursuit of policy goals, whereas their private partners work in pursuit of profit. It does however, open the private parties eyes to the idea, that there is more than one way to pursue profits, that the contradictions between government policy and business goals may not be insurmountable, and that a cooperative approach may actually benefit business.

Basically, the logic of this cooperative scenario limits its use to no-regrets options. This however, is a huge field. Firstly, these options are seldom known until a substantial analytical work has been performed. Secondly, they often receive a low priority internally in the business enterprise. Thirdly, the borderline between no-regrets options and options carrying a cost is quite blurred, and many savings potentials are located within the grey zone, where decisions depend more on attitudes than on economic calculation. Fourthly, the borderline can be shifted a great deal depending on the economic importance accorded to such moral factors as company image, employee relations, customer relations, etc. Fifthly, a change in company strategy can greatly influence the definition of no-regrets options.

Furthermore, the size of the field of no-regrets options depends heavily on energy prices, present as well as future. This parameter can be changed by government policy, through energy taxes. However, government is not really at liberty to impose taxes. There is a domestic barrier: A certain degree of consent is necessary from those being taxed. And there is a foreign barrier: Taxes may work to replace domestic products with imported products, resulting in no (or even negative) effects on the global climate situation.

The first barrier is often underestimated by those who approach energy policy from a technocratic view point. In politics, as the game is played in real life, it is difficult for government to impose taxes against a determined opposition from those being taxed. Some partial consent is often essential. This is particularly the case for taxes targeted at vocal and powerful interests, such as industry. Energy taxes do not have to be loved by industry, but they must make some sense to the business community. Otherwise they are a difficult political proposition. Thus, an energy policy based on taxation requires some of the same preconditions, as an energy policy based on voluntary agreements.

The second barrier poses a real complication for national energy policy. In energy intensive industries exposed to international competition, government cannot raise energy prices without the risk of severe negative effects, not only on national production and employment, but also in many cases on global energy efficiency itself. Thus - as long as coordinated international policies are not realistic - this is an area with particular need for effective identification and implementation of no-regrets solutions. This area will be the focus of the remaining part of this article.

## **5. Token agreements : 1993-1995 experience**

The idea of voluntary agreements was always reserved exclusively for energy intensive industries. It was first implemented in 1993(?). In this first implementation of the idea, a voluntary agreement really meant nothing more than an energy audit and a vague promise to act on this audit.

It is difficult to regard the 1993 agreements as a serious effort to engage energy intensive industries in a savings effort. The agreements are better understood in terms of political expediency: A parliamentary majority wished to impose energy taxes on industry, but did not want to tackle the problems of the energy intensive industries. An explicit exemption for this part of industry was regarded as bad policy. A formal exemption would send the wrong signals to the enterprises, and would also be awkward in relation to EU competition law.

In lieu of an explicit exemption, a vague concept of voluntary agreements was implemented. At worst, it may be interpreted simply as a fig leaf. At best, it may be interpreted as a communicative device: Government sends the signal, that the energy consumption of individual enterprises is indeed within its purview, even if it is not acting at the moment. The associations representing industry, by agreeing to this solution, sends a signal of good will to the government and a warning to their own members, that laissez-faire will not be a politically sustainable position. The individual enterprises, by committing themselves voluntarily even to a vague form of agreement, signal their understanding in principle, that they ought to do something. This communicative process may to some extent have paved the way for the more comprehensive system of taxation and agreements implemented in 1996.

As far as actual energy savings are concerned, for the great majority of enterprises involved, there is nothing to indicate any results of the 1993 agreements. In fact, there are several indications that the guidelines of the agreements have been grossly ignored. On the side of the authorities, there has been no efforts to implement any controls or sanctions. This also indicates the token nature of the agreements.

There are however a few outstanding exceptions to this picture, particularly in knowledge based industries (for instance pharmaceutical and biotech industries, which can have quite energy intensive processes). A few enterprises have quite diligently pursued the guidelines of the agreements. This may reflect some general progressive trends in these enterprises, in management as well as technology. As far as management is concerned, some companies have clearly made a strategic choice in favour of a green corporate identity, and have launched quite impressive efforts to change their culture in this direction. For such companies, the guidelines contained in voluntary agreements can serve as a tool, which adds direction and motivation to staff efforts. As far as technology is concerned, some knowledge based industries have a strong tradition for high quality design and supervision of their production processes, and therefore rather easily accommodate the ideas of energy management.

## **6. The 1996 regulatory regime**

The 1996 implementation of voluntary agreements is more comprehensive than the 1993 implementation. It reflects a change of government, a growing political determination to include energy intensive industries in energy savings policies, and also a gradual acceptance in the business community of some need for action in relation to energy intensive industries.

Policies towards the energy intensive sector are still very moderate. But it would no longer be fair to say, that this moderation reflects a desire to do nothing. It rather reflects the contradiction between a reasonably strong desire to do something, and the difficulties of getting anything done in a small open economy.

In 1996, CO<sub>2</sub> taxes were implemented for all energy use. The tax is applied at a high rate (81 ECU/ton CO<sub>2</sub>) to all non-industrial users. For industrial users the rate is differentiated according to the purpose for which energy is used. It is high for room heating, moderate for general process energy, and low for energy employed in specific processes with high energy intensity.

**Table 1 : Danish CO<sub>2</sub> taxes**

ECU/ton CO <sub>2</sub>	1 ECU = 7,40 DKK	1996	1997	1998	1999	2000
<u>Transportation (all sectors)</u>		... special tax system, not covered here ...				
<u>Sectors with standard rate</u>						
<i>includes:</i>						
Households						
Central and local government						
Some non-profit activities						
Financial and housing services						
		81	81	81	81	81
<u>Sectors with differentiated rates</u>						
<i>includes:</i>						
Other service industries						
Manufacturing industries						
Agriculture						
Other primary industries						
<i>Rates differentiated according to purpose:</i>						
Room heating						
		27	54	81	81	81
Energy light processes						
- without agreement						
		6.75	8.10	9.45	10.80	12.15
- with agreement						
		6.75	6.75	6.75	7.83	9.18
Energy intensive processes						
- without agreement						
		0.68	1.35	2.03	2.70	3.38
- with agreement						
		0.41	0.41	0.41	0.41	0.41

The law recognises 32 specific processes as energy intensive. They cover roughly 1/3 of industrial energy use. All energy use, which is neither an energy intensive process, nor room heating, is defined as an energy light process. Thus, as residual category, this includes fixing lighting, office machines, refrigeration and air conditioning.

Enterprises with heavy processes, or with energy costs exceeding 3% of sales, can reduce their tax rate through a voluntary energy savings agreement. To get an agreement, the enterprise must present an energy audit performed by an independent certified consultant. Based on this audit, the enterprise must suggest an action plan. The action plan must demonstrate how the enterprise will implement a system of energy management, will apply procurement policies favouring energy efficiency, and will give its staff education in energy efficiency. Most important, the enterprise must commit itself to implement all energy efficiency investments, which were recommended in the energy audit, and have a simple payback time of less than 4 years (in some cases 6 years).

If the enterprise disagrees with the energy audit, or have other reasons to reject investment proposals, it can suggest alternative investments which will provide equivalent CO<sub>2</sub> results. In case of disagreement, the enterprise can also suggest that some areas of energy use be referred to an evaluation by special experts. This can also be suggested by the energy consultant herself, or by government officials. In this case, the action plan must commit the enterprise to implement all investments recommended in such a special expert review, if they have a simple payback time as mentioned above.

On the basis of this action plan, the enterprise signs a 3 year agreement with the government. This agreement provides for reduced energy tax rates, conditional on the fulfilment of the obligations in the action plan.

## **7. Comprehensive agreements : 1996 experience**

The energy tax rebate which can be achieved through a comprehensive voluntary agreement gradually increases, as seen in *table 1*. Agreements thus gradually become more attractive. For the majority of qualifying enterprises, the rebate in 1996 has been too small to justify the expenses of an agreement. As the rebate becomes more substantial in the following years, a larger number of enterprises are expected to apply for an agreement.

In 1996 a total of 48 enterprises applied for individual agreements. However, when the costs of an agreement became clear to them, 28 of these enterprises withdrew their application.

20 enterprises did sign an individual agreement. These are enterprises with a very large energy consumption in energy intensive processes, such as cement, steel, petrochemicals, other bulk chemicals, building materials, paper, and food processing. Their total energy consumption were 9,6 TWh/year, corresponding to 13% of industrial energy use and 6% of national energy use.

The energy use covered by these agreements can be divided into energy use, which could be evaluated by a standard certified energy consultant (71%) and energy use which was reserved for evaluation by special experts (29%). The agreements specify 58 evaluations to be carried out by special experts.

For energy use evaluated by standard certified energy consultants, the agreements specify 103 investment commitments, expected to yield savings in this sphere of 2,9%, equivalent to a reduction of energy costs by 7.4 MECU per year. Total investment costs are projected to be 16 MECU. The average pay-back time is thus quite low, about 2 years.

Aggregated over the 3 years of the agreements, these 20 enterprises are expected to use some 1,000 MECU to fuel their energy intensive processes. Without agreements, they would pay 10 MECU as CO<sub>2</sub> tax on this energy during the same 3 years. By entering into an agreement, they are saving 7.0 MECU on their tax bill.

Besides individual agreements, the law allows for collective agreements with groups of similar enterprises. Such agreements are typically negotiated with the industrial association to which these enterprises belong. In a few years, when the tax rate has increased, and more enterprises want agreements, this collective option is expected to cover a large number of small and medium sized enterprises with energy intensive processes. For such enterprises the procedure associated with individual agreements may be too costly. Requirements in collective agreements can be based on average or typical values, rather than individual calculations. For instance, all electric motors may be required to conform to some specific standard, if this refurbishment on the average is judged to have a pay-back time of less than 4 years. By entering into the collective agreement, an enterprise will accept this standard, regardless of the actual pay-back time in the individual enterprise. If this "package deal" is not acceptable, an individual enterprise can always opt for an individual agreement, but will then also have to pay for a full individual energy audit, and must use time and other resources for individual negotiations with the authorities.

## **8. Unequal information**

In the negotiation between enterprise and authorities, information is an essential resource. The two parties are not equal in this respect. The authorities have only a superficial knowledge concerning the efficiency of energy use in the individual enterprise and the opportunities for improvements. The enterprise (particularly large, specialised enterprises) may have much deeper and more sophisticated knowledge.

The authorities can use different strategies to limit the importance of this inequality of information.

The optimal strategy would probably be a system of bench-marking based on comparison between similar enterprises. However, the art and science of such comparisons have not progressed to such a state, where they can really be used for such practical purposes. For this, Danish authorities are quite dependent on international developments. Danish industry only contains one steel work, one cement factor, etc. Thus, Danish authorities do not have any direct access to much comparative information. Often the enterprises have much better comparative information, particularly if they are part of multinational enterprises. The present Danish legislation is not based on a principle of bench-marking. The fact that an

enterprise performs badly in comparison with others, provides no legal basis for extra demands or denial of agreement. But of course, such information may guide the attention of the authorities, and may also have some intimidatory effect on negotiations.

The principle strategy chosen by Danish authorities is the use of independent, certified consultants for the energy audit. This audit provides the basic information, on which the authorities can base their negotiation position. An essential question is thus: Are these audits reliable? The consultant is chosen and paid by the enterprise. On the other hand, she is certified by the energy authorities, and presumably want to maintain that certification. Thus, she somehow must sail between Scylla and Charybdis, guided by her professional ethics, or by her sense of what is good for her own business.

More important than this ethical or business dilemma, is probably the fact, that just as the authorities are dependent on the consultant for information, she herself is dependent on the enterprise. As far as information is concerned, she is in a much better position than the authorities, because she spends much more time on the case, makes a physical examination of the enterprise, and can compare with other enterprises at a detailed level (rather than the aggregate level discussed above). On the other hand, she has to depend a great deal on, what she is told by enterprise staff. She is particularly in a weak position when dealing with technologies that are not generic, but specific to the trade, or even to the enterprise. How can she evaluate the options for improvement of some exotic electro-chemical process, except by asking the company's own experts? One solution is to call on international experts, but this may require the consultant to admit her own shortcomings, and may in some cases be legitimately opposed by the enterprise, on basis of cost or secrecy. Evidently, from an information standpoint, the Danish approach to voluntary agreements is quite vulnerable. An enterprise which works determinedly to frustrate the information needs of the authorities can probably achieve a significant reduction in the investment commitments required by a voluntary agreement. However, such an effort to conceal information is not itself free of costs. To be efficient, such a strategy requires the enterprise to establish internally a culture of "not knowing" or even deceit. Either, the enterprise must make sure that its staff does not know of savings potentials, or staff must be instructed to withhold such information, even though the enterprise is officially cooperating with the authorities. "Not knowing" is likely to be costly, because it will reduce the enterprises own ability to control its energy costs. Deceit may also be costly, because it must involve several staff members, at different levels and functions. In simplistic terms, honest staff will resent the deceit which will thus have a cost in staff loyalty and commitment, while dishonest staff may accept the deceit, but is also likely to carry the same norms into other activities, where they are harmful to the enterprise. Thus, it may not be a rational strategy to make any determined effort to conceal information. After all, it is basically no-regrets investments that will be required by an agreement. Just forgetting about such options and concentrating on core business may be a rational business strategy. Using a lot of effort to conceal such options on the other hand, does not seem very rational. This may be a basic advantage of the authorities: that it is easier for the enterprise to go along in a cooperative way than to put up a fight. Or, if the enterprise really does not want government interference, it may be less costly to simply pay the full energy tax, rather than developing intricate strategies to exploit the advantages of unequal information. The basic information problem may thus not be the surplus of information available to some enterprises, but rather the lack of energy information which is characteristic of many enterprises. The regulatory regime is well focused on mitigation of this lack of information in enterprises, which choose to cooperate.

## **9. Review by the EU commission**

Selective tax reductions can obviously be used as a form of national subsidy to particular industries and enterprises. Therefore, the EU commission is keeping a rather jealous eye on such initiatives. After a careful review, and with many reservations, the commission accepted the Danish combination of tax reductions and voluntary agreements. The principal reasons for this acceptance seems to be twofold. One is the purpose of the arrangement, which is in line with EU environmental policy. The other is the fact, that even though some elements of the arrangement can be considered as subsidy, this is not the case for the arrangement as a whole. Seen as a whole, the arrangement will add burdens on Danish enterprises, compared to European competitors.

The most interesting reservations made by the Commission were these:

- The comprehensive voluntary agreements must in fact commit the enterprises to significant investment in energy efficiency.
- The Danish authorities must implement a control system, that tightly supervises the actual implementation of the commitments agreed with the enterprises.
- The list of energy intensive processes eligible for energy tax reduction must be revised every year.
- Enterprises receiving an energy tax reduction must not have a net economic advantage from the arrangement.
- That the energy tax reduction must not place Danish enterprises in a more favourable position than competing enterprises in other EU countries, which decide to implement CO<sub>2</sub> taxes.

The last reservation has a significant dynamic potential. It means, that if other countries decide to implement a tougher regime for their energy intensive industry, Denmark must either follow suit, or abandon its own CO<sub>2</sub> taxes. The effect, if this reservation is really implemented, could be the development of a two-tier system in the EU. On one hand there would be countries which have no CO<sub>2</sub> taxes, or such low CO<sub>2</sub> taxes that special rules for energy intensive business is not necessary. On the other hand there would be countries with such a high level of CO<sub>2</sub> taxes, that they feel forced to give some privilege to their energy intensive industry. These countries would have to keep in step, and the toughest country would lead the way. This might ensure a fairly level playing field among countries with strong environmentalist profile, such as Holland, Germany, Austria and the Scandinavian countries. This is a significant advantage for enterprises in these countries, which have a large trade among each other in manufactured products, and whose enterprises thus are often in close competition with each other. On the other hand, it would give a favourable position to enterprises in other countries, which have chosen to do little about CO<sub>2</sub> reduction. On a European scale, this may move production from less polluting enterprises to more polluting enterprises.

## **10. Conclusions**

Energy intensive industries represent a major problem for a small, open economy, embarking on an energy savings policy. Denmark has reacted to this problem by implementing a differentiated tax system, which is combined with a system of voluntary agreements. These

agreements must be seen in the context of national regulatory tradition. Danish authorities usually work hard to achieve consensus with those whose activity they regulate. The preferred means of regulation are those that are based on consensus, and are likely to reinforce consensus. Voluntary agreements fit nicely with these regulatory preferences, and have thus been chosen as major means of policy towards energy intensive industries. Results have not materialised immediately. The first implementation of the concept 1993-95 was very timid, and no significant effects are evident. A new framework was implemented in 1996, with more exact demands on enterprises and more control on performance. This has resulted in a large number of quite specific commitments, which are expected to actually produce savings. In the fields covered by agreements, the commitments are expected to produce savings of approximately 1 per cent per year over a three year period. For investments, the average pay back time is approximately 2 years. To what extent these savings will be additional savings, over and above the normal efforts of the same enterprises is an open question. The European Commission has been concerned with the energy tax rebates, which are associated with voluntary agreements. After close scrutiny, and with several reservations, these rebates have been accepted.

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