Case study

A comparison between France and The Netherlands of the voluntary agreements policy

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This case study aims to show how the MURE model could be used to analyse the pertinence of measure such as a voluntary agreement. The tool provides a full description of measures and data that permits to computerise the effect of a given measure.

This text case study contain two parts :

- A qualitative analysis of the voluntary agreements in two countries of the European Union, France and Netherlands. These countries have been chosen for two main reasons. First, information was available. Second, their environmental policy differs widely. Most of the information analysed here come from the MURE database and are completed by some bibliographical research.

- A quantitative analysis, which assess the consequences, in terms of energy efficiency of the voluntary agreements. In this step, the MURE model is used to perform some simulation providing figures on energy consumption and pollutant emissions. Simulations had been made in two sectors : industry (glass industry in France, glass industry, brick industry, ceramics industry and meat industry in Netherlands) and private transport in France and Italy.

The presentation made here shows how MURE could be useful in the choice of actions to implement to reach the objectives and goals of a given policy. MURE can then provide a great help to decision-makers on the field of energy and environmental management.

Contents of the study

I

QUALITATIVE ANALYSIS

This part presents a comparison between France and The Netherlands about voluntary agreements in energy policy. Voluntary agreements is a policy instrument which involve government and industrials in a negotiation process. The underlying principle is that a voluntary approach is better than a regulatory policy in a world where technologies and production process are always more complex, and the number of actors is limited.

However, this point of view is differently implemented according to the countries and it is why two very different countries have been chosen : France and The Netherlands.

I.1 Voluntary agreements in France

In 1997, 7 voluntary agreements have been counted by the French ministry of Environment. These agreements stems from negotiation between government and individual firms or between government and professional trade-union. These voluntary agreements concern the largest energy consuming sectors, such as the chemical sector:

1. PECHINEY, a main producer of aluminium, committed to reduce, in the year 2000 with comparison to 1990, the per ton emission of CO_2 by 19 %, and by 63 % for the CF_4 (tetra carbon fluoride), another greenhouse gas.

2. FEDERATION FRANÇAISE DE L'ACIER (French Steel Federation), a professional grouping of steel and iron industry, committed on December, 1996, to reduce by 10 % its total emissions of CO_2 with comparison to 1990.

3. The CHAMBRE SYNDICALE NATIONALE DES FABRICANTS DE CHAUX GRASSES ET MAGNESIENNES (French Industry Syndicate), committed on July 2nd, 1996, to reduce its per ton CO2 emissions by 5%.

4. The SYNDICAT FRANÇAIS DE L'INDUSTRIE CIMENTIERE (French cement industry) in its October, 1996 commitment, took the objective of 25% of its total CO_2 emissions from energy consumption, or a decrease in about 10% per ton produced, from 1990 to 2000.

5. The CHAMBRE SYNDICALE DE VERRERIES MECANIQUES DE FRANCE (French Federation of Glass Industry) signed in February, 1997, a commitment to reduce by 10% its CO_2 emissions between 1990 and 2005 its packaging glass. This objective will be obtained by recycling more glass, by improvements in the performance of glass ovens, and the use of gas and electricity as primary sources. This commitment includes also a reduction by 49% of nitrous oxides (NO_X) by 2005 compared to 1990.

6. The firm TROIS SUISSES France, a major mail-order retailer, in its October, 1996 commitment, takes the objective of a general reduction of 25% of its CO_2 emissions. This will be obtained through measures concerning energy consumption on the production sites and on the transport conditions for sold goods. The latter will include notably an increase in the filling ratios of lorries, and a choice of alternate means of transport such as trains, and vehicles using compressed gas, liquid petroleum gas and electricity. This commitment has been audited and evaluated by

ADEME.

7. The transport groups RENAULT and PSA PEUGEOT CITROEN have declared on September 4, 1996, that they would reduce the mean level of emissions of their vehicles to 150 grams of CO_2 per km. This means an average consumption of 5,8 to 6 litres per 100 km. They also commit to propose in 2005 at the latest, at least one vehicle using a thermal combustion engine emitting less than 120 grams of CO_2 per Kilometre.

The first evaluation of these voluntary agreements shows the weakness of the industrials' obligations. Most of the objectives would be reachable very easily. In one case, the objective was already reached at the signature of the voluntary agreement between government and industry! Then, the interest of this environmental policy instrument seems to be very weak, and they are more a marketing operation than a real action of improvement of the energy efficiency.

This problem of *adverse selection* shows the importance for the government or the public agencies to have a good and entire information on the energy consumption and the technical improvement before to negotiate with industry. Furthermore, these examples of voluntary agreement show the difficulty for the government, in France, to negotiate a strong agreement without regulatory policy. Indeed, no one of the voluntary agreement contains penalty for industrial in case of non-respect of the commitment.

The table below indicates the main characteristics of the French voluntary agreements. Number seven (carmakers) is not considered a voluntary agreement per se but only a public statement.

Main characteristics of French voluntary agreements

Characteristic of the agreement	**Voluntary agreement**					
	1	**2**	**3**	**4**	**5**	**6**
Process						
Obligation	-	-	-	-	-	-
Penalties	-	-	-	-	-	-
Type of agreement	Supple	Supple	Supple	Supple	Supple	Supple
Individual/Collective agreement	Individual	Collective	Collective	Collective	Collective	Individual
Duration of the agreement	x	x	x	x	x	x
Level of commitment						
Accounting an ex-ante inventory	x	x	x		x	x
Action Plan	x			x	x	x
Commitments	x	x	x	x	x	x
Main choice	Best available technologies	Best available technologies	Best available technologies	Best available technologies	Best available technologies	Best available technologies

Cont'd

Characteristic of the agreement	**Voluntary agreement**					
Evaluation and control reports						
Follow-up of the agreement	Individual	Collective	Collective	Collective	Collective	Individual
Content of the follow-up	x	x	x	x	x	x
Frequency of the follow-up	x	x	x	x	x	x
Publicly available						
Follow-up standards		x	x	x	x	
Self-Evaluation by the participants.	x	x	x	x	x	x
Outside verification process.					x	
Regulation instruments						
Types of instruments	Information	Information	Information	Information	Information	Information
Participation and decision-making						
Types of participants	Manufacturer, Regulator	Association, Regulator	Association, Regulator	Association, Regulator	Association, Regulator	Firm, Regulator

Five remarks have to be made :

1. Objectives of voluntary agreements are too weak: we can assume that with the incremental technical progress, objectives would be reached without these agreements. Furthermore, objectives concern a branch or a firm and not a specific process. Thus, the control of this kind of agreement is more difficult.

2. Government cannot control the real efficiency of the actions of the industrialists : it do not have the information on the best available technologies for each process and the real equipment of the industrials.

3. The agreements are static, e.g. when the deadline is reached, no improvement is asked to the industrials. The risk is to see some firms improve their energy efficiency just before this deadline (with end-of-pipe, no process specific measures) and after, to stop any improvement! One of the most important thing to guarantee the effectiveness of voluntary agreements is to integrate a dynamic component. In order to allow this objective, government has to implement a follow of the technological progress in each industrial branch. The American experience of energy efficiency improvement of electrical appliances would be a good example.

4. Due to the fact that voluntary agreements are not regulatory mechanisms, government can not control the effectiveness the measures of each firm. Then, the level of liability and credibility of the results given by industrials are low.

5. No regulatory policy complete voluntary agreements.

These remarks show the weakness of the French government in the negotiation of the voluntary agreements. This weakness stems from the fact that France is traditionally a country where government and firms (or government and trade-union) are opposite : government uses regulatory policy and industrials try to avoid it. Thus, the voluntary agreements are totally different of the French practice.

However, a law, *La loi sur l'air et l'utilisation rationnelle de l'énergie,(act on air quality and the efficient use of energy)* voted in 1996 supplies a new scheme to implement voluntary agreement.

The analysis of the French voluntary agreements shows that they have to be improved in two way :

1. the negotiation process have to be improved to allow a good definition of the objectives : they have to be strong but realistic and it is only with a real and long negotiation process that they will be defined.

2. in order to incentive industrial to respect the voluntary agreement, penalties and outside control processes have to be defined in the same time that the negotiation process.

I.2 Voluntary agreements in Netherlands

The process resulting in long term energy efficiency agreements (LTA's) in The Netherlands started in 1990. In that year the ministry of Economic Affairs formulated a new way of dealing with energy saving. Reason for this new policy was the increased attention for CO_2 emission reduction in the Dutch Environmental Policy Plan Plus (NMP+), due to the growing concern about climate change. CO_2 emissions should be stabilised in the year 1995 and reduced by 3% in the year 2000, compared to the 1989 level. With the choice of voluntary agreements instead of regulation it was expected to get more support of industry.

By taking this initiative, the ministry of Economic Affairs prevented a policy such as promoted by the ministry of Environment, directed at absolute reduction goals of energy use, detailed regulation and energy taxes. The ministry of Economic Affairs translated the national goals regarding CO_2-reduction and energy saving in terms of energy-efficiency, expecting that an improvement of industrial energy-efficiency of 20% would be feasible and necessary as part of a strategy to reach the long term CO_2-reduction goal.

In 1990 government started to negotiate with industry, first with the largest energy consuming sectors, such as the chemical sector and sectors with branch organisations that were already active in the field of energy saving.

In the negotiations per branch the following parties participated: the government, represented by the Ministry of Economic Affairs, the provinces (Inter Provincial Board: IPO) and one or more branch organisations. Besides, NOVEM (Dutch organisation for Energy and Environment), as a government agency, supports the process, assists the sectors and controls the monitoring.

I.2.1 Process

The negotiation process includes the following steps:

1. First, sectors are selected by the government and *preliminary consultations* started, dealing with the reliability of the energy-efficiency potential and the possible participation of sufficient enterprises within the sector (covering 80% of the sectoral energy use).

2. The next step is to sign a *Letter of Intent* by the government and the branch organisations involved. This Letter of Intent is a confirmation of commitment and the starting point for further research on the sectoral energy use and saving options at some (or all) of the participating enterprises.

3. The results of this *inventory* form the input for the reduction goals to be specified in the sectoral LTA. Most LTA's include an increase in energy efficiency of 20% in the period 1989-2000.

4. Subsequently, *LTA's* are signed by all representing parties involved in the negotiations. Individual enterprises are asked to sign the agreement afterwards and to commit themselves to the appointments in the MJA's.

5. *Execution* of the LTA's by the individual firms is reinforced by advice of NOVEM and subsidy and stimulating programs by the government and regional energy companies.

The whole process, from negotiations to signature of a LTA, on the average takes 1-2 years. In some cases it took longer, for example in the chemical industry. Individual enterprises may join sectoral LTA's every moment after the LTA agreement. Consequence of late signature is that the sector or enterprise concerned has to reach the year 2000 energy-efficiency goals in a shorter time period. However, often companies had already started with carrying out energy saving plans before negotiations were finalised.

Another possibility for individual enterprises is to join the LTA for "Other industry". So far, 18 firms have taken that opportunity.

The first LTA has been established in January 1992 (iron and steel industry). At this moment, more than 30 industrial LTA's have been signed. About 1000 industrial companies participate within LTA's, covering over 90% of the industrial primary energy consumption.

Most industry agreements end in the year 2000. Both government and industries are already working at the next generation of MJA's. The following elements have been suggested in the White Paper on Energy Saving to be included in the next generation LTA's after 2000:

- LTA's at the individual firm level, in case of larger firms (so far, one company signed an individual LTA)

- Integral chain management, especially regarding the role of transport within the product chain

In the preparations for the new generation LTA's that already started in some sectors (e.g. the mushroom cultivation), supplementary targets for renewable energy are already included. Also targets for non-CO_2 greenhouse gases are suggested to include in the next generation LTA's.

I.2.2 Suggestions based on Dutch experiences

Basically, the Dutch approach proved to be successful. However, improvements can be made on the following points:

- more ambitious targets
- uniform monitoring and reporting guidelines
- more attention for light industry
- public information
- be more economical with giving subsidies

I.2.3 Subsidiarity

Industries are involved in the LTA process on the level of branch organisations. So far, for one individual company (Philips) a separate LTA has been established. Varying by sector, one or more branch organisations are involved. For example, the chemical sector is represented by the Netherlands Chemical Industry Association, whereas in the LTA for the Margarine, fats and oils industry five branch organisations are involved (Margarine, Fats and Oils Commodity Board, Association of Netherlands Manufacturers of Edible Oils and Fats, Association of Animal Fat Processors, Salad Dressings, Spicy and Related Sauces and the Association of Netherlands Margarine Manufacturers).

Though it might be recommendable to establish LTA's on a European level, the organisation will probably be too complicated in terms of time and money. Therefore, as a second best option, one might stimulate co-ordination between member states regarding monitoring, reporting, control and target setting, taking into account differences in energy-intensity and level of energy saving already reached in industry.

To our knowledge, there has been no quantitative comparison of energy saving potentials in Europe between a top-down and a bottom up approach.

However, for The Netherlands, intermediate results of current LTA have been evaluated by different (both top-down and a bottom up) methods, in order to estimate the contribution of the policy instrument LTA to energy saving in the period 1989-1995 (see Rietbergen et al, 1998).

I.2.4 Reference case

- *Reference and elements of the agreements*

After signing the Letter of Intent, NOVEM makes an inventory of energy consumption in the base year 1989 and of economically viable measures that can be taken in major companies within the industry organisation. This provides the basis (reference) for the target for energy-efficiency improvement.

The measures to achieve the objectives of an LTA are set out in the Long term plan for improvement of energy efficiency. It includes:

- an assessment of energy consumption in 1989 as reference year
- opportunities for energy efficiency improvement
- drafting of company energy plans
- monitoring and energy management in each company
- R&D on new energy efficient technologies
- demonstration projects for energy saving measures
- market introduction of new energy efficient technologies
- assistance to individual companies
- transfer of know-how and information

- *Calculation of targets*

Targets are formulated in terms of energy efficiency improvements and indicated with the "energy efficiency index" (EEI). In the LTA's several methods are used to calculate the EEI's. Main methods are based on:

i) the energy use per unit of physical production/raw material product

ii) monitoring of energy saving per energy saving project

The first method is used most often.

The EEI in year j is calculated as the quotient of the actual energy use (per product) and the reference energy use (per product) in the base year, as follows:

$$EEI\ j = 100 \times \frac{\textit{Actual energy consumption}}{\textit{Reference energy consumption}}$$

In this formula, the reference energy consumption is calculated as the product of the specific energy consumption of product i in the reference year 1989 (SECi) and an index-linked production of product I (Pi). In this way, structural effects on firm or sectoral level are accounted for.

Each year, enterprises have to report on the EEI, amounts of energy purchased and net primary energy used. Corrections of these data are allowed for energy use needed to meet more stringent environment, health or safety requirements, changed product specifications and changes in manufactured or purchased intermediary materials.

The way the reference energy use is calculated is not known, even not to the agency in charge. This is a great drawback of the system.

- *Level of ambition*

Current targets are expressed in terms of energy efficiency improvements, for most sectors 20%.

For next generation LTA's, there are three main other possibilities to define the level of ambition (Ecofys 1998):

(i) use pay back periods (PBP) of energy saving measures, stating that all measures with PBP's less than e.g. 3-5 years should be taken.

(ii) use an internal rate of return (IRR) of for example 15%

(iii) relate investments and expenses for energy saving measures to total production value or value added.

The advantage of linking investment costs to total production value or value added is that it can result in a distribution among the enterprises which is more equal than with the other systems.

- *Results*

In terms of energy efficiency improvements, the current achievements are still in line with the LTA targets for 2000. However, CO_2-reduction goals will not be met, as CO_2 emissions actually are increasing instead of declining, due to a higher economic growth than projected.

I.2.5 Branches

- *Co-operation of branches*

In general, heavy industry appeared to be more co-operative. However, the chemical industry had problems with the monitoring system (there was an unexplained discrepancy with the energy consumption statistics of the National Statistical Bureau), and the iron and steel industry kept part of its energy use from the LTA, regarding it as feedstock energy use.

Enterprises in a branch are represented by either one or more branch organisations, as indicated above (see: 2. Timetable). Not all branch organisations in a branch wanted to co-operate in the LTA process.

- *Robustness of agreements*

In The Netherlands, no situations are known in which LTA's resulted in a decline of energy efficiency.

Agreements can be considered as weak, as they do not include any sanctions. Besides, individual enterprises might try to avoid taking energy saving measures themselves.

Evaluation of the intermediate results of current LTA's show that the LTA instrument contributes for about 25-45% to energy efficiency improvements in the period 1989-1995 [Rietbergen et al, 1998].

- *Non-CO_2 greenhouse gases*

The first generation of LTA's primarily focus on energy efficiency improvement. Targets are not formulated in terms of CO2 reduction.

For the non-CO_2 greenhouse gases that have been included in the Kyoto protocol (N_2O, CH_4, HFC's, PFC's and SF6), so far no agreements (nor regulation for ..) have been exists in The Netherlands. However, targets on these gases might become part of next generation LTA's.

I.2.6 Verification of agreements

- *Monitoring and control*

Monitoring of LTA's and the controlling of the energy plans of invidual firms is carried out by Novem. There appear to be a number of problems and disadvantages connected to the current way of monitoring:

- differences between sectors in the monitoring method: way of monitoring, definitions of energy carriers, inclusion of feedstock. This may result in real energy efficiency improvements lower than suggested by the energy efficiency index;

- within one sector (or even one enterprise), the energy efficiency index is aggregated over different products. However, the way in which this takes place is often not transparant.

- too much use of correction factors in such a way as to increase the energy efficiency index;

- the monitoring reports delivered to Novem are too condensed and not sufficient for control.

- the controlling agency, Novem, combines both control tasks and other tasks (for example the inventory of economic viable options). In this way, different objections might be mixed up.

- *Suggestions for improving the current monitoring*

These disadvantages of the current system could be overcome by introducing uniform monitoring guidelines, expanded reporting, independent control of energy data of individual enterprises and independent control of sectoral results

I.2.7 Trade-off

In general, both government and the industry is quite satisfied with the process and results of MJA's in The Netherlands until now. The advantage for the industry is that energy use is not restricted in absolute terms. In other words, expansion of production and entry of new enterprises is allowed for. Secondly, the LTA processes have resulted in decline in energy costs for a number of enterprises.

The government is proud to have this “dialogue” with industry. Also, in the international context, the Dutch approach receives much positive reactions.

However, NGO’s are less content with the process, especially with the fact that only in the largest industrial sectors sufficient energy saving has taken place. Another problem is the confidentiality of data and monitoring methods. As indicated above, the results are only controlled by Novem.

- *Sanctions*

Last year, it has been considered to exclude some companies from their LTA’s. Although this would not have direct consequences for these firms, they would have been earmarked which could be a disadvantage when applying for certain subsidies etc. Besides, participation in LTA’s in some ways facilitates procedures for obtaining certain environmental permissions within the framework of the Law on Environmental protection.

II QUANTITATIVE ANALYSIS

Some simulation had been made in industry and transport sectors with the MURE model. Hereafter the principal characteristics of the exercise are described and the results given below.

Description of the voluntary agreement in the industry sector and its simulation by the MURE model

Country	Sub-sector	Aim of the VA	Action carry out by MURE	End use groups	End uses or technologies
France	Glass industry	Reduce by 10% CO_2 emissions between 1990 and 2005 ; by recycling more glass and use gas and electricity as primary sources	Simulation of RUE actions on end use group and end uses of the sub-sector Energy switch : the part of oil as primary source is split between gas and electricity (50% each)	Glass technologies	Glass annealing, glass tanks
Netherlands	Glass industry	Reduce by 20% in 1999, compare to 1989, the primary energy consumption used for melting and moulding processes	Simulation of RUE actions on end use group and end uses of the sub-sector	Glass technologies	Glass annealing, glass tanks
Netherlands	Brick industry	Reduce by 20% in 1999, compare to 1989, the primary energy consumption used for drying and baking	Simulation of RUE actions on end use group and end uses of the sub-sector	Dryers and evaporators, kilns and furnaces	Humidity control, improved drying process, insulation, recirculation, scheduling
Netherlands	Ceramics industry	Reduce by 20% in 1999, compare to 1989, the primary energy consumption used for spray-drying and baking processes	Simulation of RUE actions on end use group and end uses of the sub-sector	Dryers and evaporators, kilns and furnaces	drying, kilns, intermittent kilns, tunnel kilns
Netherlands	Meat processing industry	Reduce by 20% in 1999, compare to 1989, the primary energy consumption used for cleaning, chilling and preservation processes	Simulation of RUE actions on end use group and end uses of the sub-sector		

Results of the simulation of the voluntary agreement with the MURE model

FRANCE : Glass industry without energy switch							
Energy consumption				Related CO_2 emissions			
START	Total	Electric	Thermal		Total	Electric	Thermal
ktoe	1.594	579	1.015	tCO_2	6.967,60	4.110,90	2.856,70
%	100%	36%	64%	%	100%	59%	41%
END							
ktoe	1.272,2	527,1	745,1	tCO_2	5.839,20	3.742,10	2.097,10
%	100%	41%	59%	%	100%	64%	36%
REDUCTION							
ktoe	321,8	51,9	269,9	tCO_2	1.128,40	368,8	759,6
%	20%	9%	27%	%	16%	9%	27%

The glass melting process used by the manufacturers accounts for about two thirds of primary energy consumption. Electricity consumption is significant in the moulding and post-processing of products.

The results of the simulation of actions described in the previous table show that, by carrying those actions, the energy saved is about 321,8 ktoe (a reduction of 20% compared to the consumption of the sub-sector. The reduction of the related CO_2 emission is 1.128,4 tons ; that means 16%.

Results of the simulation of the voluntary agreement with the MURE model

FRANCE : Glass industry with energy switch							
Energy consumption				Related CO_2 emissions			
START	Total	Electric	Thermal		Total	Electric	Thermal
ktoe	1.594,00	807	787	tCO_2	7.697,20	5.729,70	1.967,50
%	100%	51%	49%	%	100%	74%	26%
END							
ktoe	1.272,20	755,1	517,1	tCO_2	6.653,70	5.360,90	1.292,70
%	100%	59%	41%	%	100%	81%	19%
REDUCTION							
ktoe	321,8	51,9	269,9	tCO_2	1.043,50	368,8	674,8
%	20%	6%	34%	%	14%	6%	34%

The glass melting process used by the manufacturers accounts for about two thirds of primary energy consumption. Electricity consumption is significant in the moulding and post-processing of products.

The results of the simulation of actions described in the previous table show that, by carrying those actions, the energy saved is about 321,8 ktoe (a reduction of 20% compared to the consumption of the sub-sector. The reduction of the related CO_2 emission is 1.043.5 tons ; that means 14%.

Results of the simulation of the voluntary agreement with the MURE model

NETHERLAND : Glass industry							
Energy consumption				Related CO_2 emissions			
START	Total	Electric	Thermal		Total	Electric	Thermal
ktoe	252,7	39,9	212,8	tCO_2	855,4	283,3	572,1
%	100%	16%	84%	%	100%	33%	67%
END							
ktoe	193,2	36,8	156,4	tCO_2	681,7	261,2	420,5
%	100%	19%	81%	%	100%	38%	62%
REDUCTION							
ktoe	59,5	3,1	56,4	tCO_2	173,7	22,1	151,6
%	24%	8%	27%	%	20%	8%	26%

The glass melting process used by the manufacturers accounts for about two thirds of primary energy consumption. Electricity consumption is significant in the moulding and post-processing of products.

The target of improvement in energy efficiency assigned to the brick industry for 2000 was 20 %. The results of the simulation of actions described in the previous table show that, by carrying those actions, the energy saved is about 59,5 ktoe (a reduction of 24% compared to the consumption of the sub-sector. The reduction of the related CO_2 emission is 173,7 tons ; that means 20%.

Results of the simulation of the voluntary agreement with the MURE model

NETHERLAND : Brick industry							
Energy consumption				Related CO_2 emissions			
START	Total	Electric	Thermal		Total	Electric	Thermal
ktoe	202,9	12,7	190,2	tCO_2	566,4	90,2	476,2
%	100%	6%	94%	%	100%	16%	84%
END							
ktoe	155,4	12,7	142,7	tCO_2	447,3	90,2	357,2
%	100%	8%	91%	%	100%	20%	80%
REDUCTION							
ktoe	47,5	0	47,5	tCO_2	119	0	119
%	23%	0%	25%	%	21%	0%	25%

Some 95% of energy consumption is attributable to the drying (45%) and baking processes (50%). Pre-processing accounts for 5% of energy consumption.

The target of improvement in energy efficiency assigned to the brick industry for 2000 was 20 %. The results of the simulation of actions described in the previous table show that, by carrying those actions, the energy saved is about 47,5 ktoe (a reduction of 23% compared to the consumption of the sub-sector. The reduction of the related CO_2 emission is 119 tons ; that means 21%.

Results of the simulation of the voluntary agreement with the MURE model

NETHERLAND : Ceramics industry							
Energy consumption				Related CO_2 emissions			
START	Total	Electric	Thermal		Total	Electric	Thermal
ktoe	102,2	7,6	94,6	tCO_2	294,5	54	240,5
%	100%	7%	93%	%	100%	18%	82%
END							
ktoe	77,7	7,5	70,3	tCO_2	231,5	52,9	178,6
%	100%	10%	90%	%	100%	23%	77%
REDUCTION							
ktoe	24,5	0,1	24,3	tCO_2	62,9	1	61,9
%	24%	1%	26%	%	21%	2%	26%

The spray-drying and baking processes consume the most energy. In the pottery industry, the baking process is the highest energy consumer.

The target of improvement in energy efficiency assigned to the ceramics industry for 1999 was 19 %. The results of the simulation of actions described in the previous table show that, by carrying those actions, the energy saved is about 24,5 ktoe (a reduction of 24% compared to the consumption of the sub-sector. The reduction of the related CO_2 emission is 62,9 tons ; that means 21%.

Results of the simulation of the voluntary agreement with the MURE model

NETHERLAND : Meat industry							
Energy consumption				Related CO_2 emissions			
START	Total	Electric	Thermal		Total	Electric	Thermal
ktoe	112,8	43,2	69,6	tCO_2	482,7	306,7	175,9
%	100%	38%	62%	%	100%	64%	36%
END							
ktoe	106,8	43,2	63,6	tCO_2	467,7	306,7	161
%	100%	40%	60%	%	100%	66%	34%
REDUCTION							
ktoe	5,9	0	5,9	tCO_2	15	0	15
%	5%	0%	8%	%	3%	0%	9%

Energy is used for cleaning purposes (hot water, mainly gas) and for chilling (mainly electricity. In the meat processing sector, the highest amounts of energy are used for product preservation (heat treatments, deep freezing).

The target of improvement in energy efficiency assigned to the meat processing industry for 1999 was 19 %. The results of the simulation of actions described in the previous table show that, by carrying those actions, the energy saved is about 5,9 ktoe (a reduction of 5% compared to the consumption of the sub-sector). The reduction of the related CO_2 emission is 15 tons ; that means 3%.

Description of the voluntary agreement in the transport sector and its simulation by the MURE model

Country	Aim of the VA	Action carry out by MURE
France Scenario A	Reduction of the mean level of emissions of RENAULT and PEUGEOT vehicles to 150 grams of CO_2 per km.	Simulation of RUE actions are with the following assumptions : • improvement of 18% of the petrol and diesel cars specific consumption at 2005, • slight decrease of new cars specific consumption (10% in 25 years) • the market fuel split (petrol and diesel) is kept constant • the car stock growth rate tends to 0% by 2030 • the average travelled distance is kept constant during the period of simulation • the penetration rate are as follow : 10% at 2005, 30% at 2015 and 50% at 2025.
Scenario B	This means an average consumption of 5,8 to 6 litres per 100 km. Both manufacturers also commit to propose in 2005 at the latest, at least one vehicle using a thermal combustion engine emitting less than 120 grams of CO_2 per kilometre.	
Italy	Reduction of CO_2 emission by the adoption of : • short and medium programmes aimed to reduce the vehicles unitary consumption • vehicles emissions reduction initiatives • minimum environmental impact vehicles	Simulation of RUE actions are with the following assumptions : • improvement of 18% of the petrol and diesel cars specific consumption at 2005, • slight decrease of new cars specific consumption (10% in 25 years) • the market fuel split (petrol and diesel) changes : the petrol and diesel decrease (-17% at 2025) and are replaced by CNG cars (assumed as generic clean source) • the car stock growth rate tends to 0% by 2030 • the average travelled distance is kept constant during the period of simulation • the penetration rate are as follow : 10% at 2005, 30% at 2015 and 50% at 2025

The results of simulation are given in the tables hereunder.

ITALY - Results of the simulation of the voluntary agreement with the MURE model

Energy consumption - ktoe

Energy consumption - ktoe	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Urban	9 471	10 380	10 224	8 895	10 274	9 881	8 288
Non Urban	12 560	12 716	12 523	10 892	12 588	12 108	10 158
Highway *	0	0	0	0	0	0	0
Total	22 030	23 096	22 746	19 786	22 862	21 989	18 446

Total pollutant emissions - tons

Pollution emissions	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Total CO_2	138 465,21	152 998,34	161 971,35	160 640,58	152 313,00	159 744,68	156 699,67
Total NOx	1 768,60	1 881,18	1 966,57	2 040,02	1 877,85	1 958,76	2 027,49
Total SOx	155,74	159,09	144,70	145,54	158,88	144,12	144,54
Total CO	7 135,48	5 498,37	3 929,81	3 165,74	5 441,73	3 801,75	2 963,50
Total VOC	1 142,35	868,70	639,72	572,81	861,12	623,75	546,23
Total PM	233,36	243,30	254,76	263,58	242,92	253,81	261,98

Avoided pollution in percentage

Avoided Pollution in %	2000/1995	2015/2005	2025/2015
Total CO2	0,45	1,37	2,45
Total NOx	0,18	0,4	0,61
Total SOx	0,13	0,4	0,69
Total CO	1,03	3,26	6,39
Total VOC	0,87	2,5	4,64
Total PM	0,16	0,37	0,61

Millions passenger.km/year	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Urban	158 752	172 138	185 073	198 245	172 138	185 073	198 245
Non Urban	323 401	337 494	362 854	388 679	337 494	362 854	388 679
Highway *	46 895	42 293	45 471	48 708	42 293	45 471	48 708
Total	482 153	509 633	547 927	586 924	509 633	547 927	586 924

The calculation made, in accordance with the assumptions assumed show that by 2025 the energy consumption due to private transport will be reduced about 7% when comparing the reference scenario (business as usual) and the target scenario ; this implies a reduction of CO_2 emissions of less than 2,5% between the scenarios.

FRANCE - Scenario A - Results of the simulation of the voluntary agreement with the MURE model

Energy consumption - ktoe

Energy consumption - ktoe	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Urban	9 377	9 859	10 278	9 559	9 758	9 917	8 871
Non Urban	13 270	13 423	13 993	13 015	13 286	13 502	12 079
Highway *	1 925	1 682	1 754	1 631	1 665	1 692	1 514
Total	22 647	23 282	24 271	22 575	23 044	23 419	20 950

Total pollutant emissions - tons

Pollution emissions	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Total CO_2	99 279,60	103 598,50	108 253,81	105 952,87	102 939,86	105 898,46	101 458,47
Total NOx	852,94	769,77	712,45	687,18	766,60	703,86	672,17
Total SOx	99,03	92,91	78,82	75,01	92,49	77,58	72,69
Total CO	5 230,93	3 856,46	2 822,82	2 360,29	3 817,61	2 726,51	2 197,51
Total VOC	813,94	575,36	412,63	369,02	570,06	400,30	347,15
Total PM	169,60	144,60	127,18	120,18	143,83	125,17	116,62

Avoided Pollution in %	2000/1995	2015/2005	2025/2015
Total CO2	0,64	2,18	4,24
Total NOx	0,41	1,21	2,18
Total SOx	0,45	1,58	3,09
Total CO	1,01	3,41	6,9
Total VOC	0,92	2,99	5,92
Total PM	0,53	1,58	2,96

Millions passenger.km/year	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Urban	158 752	172 138	185 073	198 245	172 138	185 073	198 245
Non Urban	323 401	337 494	362 854	388 679	337 494	362 854	388 679
Highway *	46 895	42 293	45 471	48 708	42 293	45 471	48 708
Total	482 153	509 633	547 927	586 924	509 633	547 927	586 924

The calculation made, in accordance with the assumptions assumed show that by 2025 the energy consumption due to private transport will be reduced about 7,2% when comparing the reference scenario (business as usual) and the target scenario ; this implies a reduction of CO_2 emissions of less than 4,3% between the scenarios.

FRANCE - Scenario B - Results of the simulation of the voluntary agreement with the MURE model

Energy consumption - ktoe

Energy consumption - ktoe	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Urban	9 377	9 848	10 248	9 505	9 748	9 888	8 821
Non Urban	13 270	13 409	13 952	12 941	13 272	13 463	12 011
Highway *	1 925	1 680	1 748	1 622	1 663	1 687	1 505
Total	22 647	23 257	24 200	22 446	23 019	23 352	20 832

Total pollutant emissions - tons

Pollutant emissions	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Total CO_2	99 279,60	103 530,53	108 057,04	105 595,57	102 873,14	105 711,68	101 131,05
Total NOx	852,94	769,42	711,73	685,99	766,26	703,18	671,08
Total SOx	99,03	92,89	78,72	74,82	92,47	77,48	72,52
Total CO	5 230,93	3 851,16	2 814,64	2 347,77	3 812,41	2 718,72	2 186,02
Total VOC	813,94	574,65	411,59	367,33	569,37	399,31	345,61
Total PM	169,60	144,56	127,02	119,89	143,79	125,02	116,35

Avoided Pollution in %	2000/1995	2015/2005	2025/2015
Total CO2	0,63	2,17	4,23
Total NOx	0,41	1,2	2,17
Total SOx	0,45	1,58	3,07
Total CO	1,01	3,41	6,89
Total VOC	0,92	2,98	5,91
Total PM	0,53	1,57	2,95

Millions passenger.km/year	Reference scenario				Target scenario		
Private cars	1995	2005	2015	2025	2005	2015	2025
Urban	158 752	172 138	185 073	198 245	172 138	185 073	198 245
Non Urban	323 401	337 494	362 854	388 679	337 494	362 854	388 679
Highway *	46 895	42 293	45 471	48 708	42 293	45 471	48 708
Total	482 153	509 633	547 927	586 924	509 633	547 927	586 924

The calculation made, in accordance with the assumptions assumed show that by 2025 the energy consumption due to private transport will be reduced about 7,2% when comparing the reference scenario (business as usual) and the target scenario ; this implies a reduction of CO_2 emissions of less than 4,2% between the scenarios.