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**The Window of Opportunity:
How the Obstacles to the Introduction
of the Swiss Heavy Goods Vehicle Fee have been Overcome**

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**THE WINDOW OF OPPORTUNITY: HOW THE OBSTACLES TO THE INTRODUCTION OF THE
SWISS HEAVY GOODS VEHICLE FEE HAVE BEEN OVERCOME**

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FOREWORD

This report has been prepared as part of the work programme of the Joint Meetings of Tax and Environment Experts under OECD's Fiscal Affairs Committee and Environment Policy Committee. It was written by Ueli Balmer, Federal Office for Spatial Development, Switzerland. Similar case studies on how the political obstacles to the introduction of economic instruments for environmental policy with potentially negative impacts on sectoral competitiveness have been overcome have been prepared concerning the Climate Change Levy in United Kingdom and the 'minerals accounting system' MINAS, that address nitrogen and phosphorous run-off from agriculture in the Netherlands. A similar study on the taxation of fuels used in domestic commercial aviation in Norway will be prepared in 2005.

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THE WINDOW OF OPPORTUNITY: HOW THE OBSTACLES TO THE INTRODUCTION OF THE SWISS HEAVY GOODS VEHICLE FEE HAVE BEEN OVERCOME

EXECUTIVE SUMMARY

Origins of the fee.

The history of the distance-related fee for heavy goods vehicles started in the 1970s. More than 20 years later, the fee was successfully implemented. In-between lies an eventful history with many steps forward and back.

A first step was made in 1985 with the introduction of a flat fee for heavy goods vehicles. The main characteristics of this fee were very similar to the Eurovignette, introduced in several member countries of the EU later on. From the outset, the flat fee was to be an intermediary solution, to be replaced by a distance-related fee in the years to come. An important step in this direction was made in 1994, when a large majority of the Swiss people accepted the constitutional bases for a distance-related fee in a referendum. Two years later however, the realisation of the project seemed beyond hope: the outcome of the consultation about the proposal for a law that was necessary to implement a distance-related fee was negative and tactical manoeuvres against the envisaged change had stopped the technical work essential for a successful implementation. A change in the political environment, utilised successfully by the promoters of the fee, brought a change in trend: on the 27th September 1998 the proposal for the law, redrafted according to the critique in the consultation, was accepted by 57% of the Swiss people. Due to strenuous efforts by the Swiss Customs Authority, the authority in charge of the technical implementation, the fee could be introduced as planned on 1 January 2001.

Reasons for acceptance of the fee.

Probably the most important step which was made towards gaining acceptance for the new fee was the use of the special political situation in the mid-1990s: In order to make up for the disadvantages that resulted from being neither a member of the European Union nor of the European Economic Area, Switzerland wanted to conclude bilateral treaties with the EU. One of the conditions of the EU for concluding such treaties was the raising of the Swiss weight limit for heavy goods vehicles from 28 to 40 tonnes. Due to the fear that Switzerland might be invaded by an avalanche of 40-tonne trucks when raising the weight limit, Switzerland had so far explicitly refused to make such a change. The change from a flat fee with a low rate to a distance-related fee with a much higher rate showed a way out of this impasse: the introduction of such a fee was considered a suitable means to make up for the raising of the weight limit and therefore met the needs of Switzerland as well as those of the EU.

To seize the favourable political situation - **the window of opportunity** - was not the only decisive step on the way to gaining acceptance for the new fee. The following factors proved to be essential as well:

- **Part of a policy:** the fee was (and still is) an essential part of a policy, aiming at transferring goods from road to rail. This policy has been accepted by Swiss people in several referenda;
- **Use of revenue:** the revenue is reinvested in the transport sector, mainly for projects in public transport, thus supporting the policy of transferring goods from road to rail;
- **Practical technical solution:** The technical solution is simple, reliable and suited to solving the problems resulting from the political guidelines;

- **Polluter-pays principle:** The calculation of the fee takes the external costs of heavy goods road transport into account. According to opinion polls, this was well accepted by the Swiss population.

Design of the fee.

The fee depends on three factors:

- the distance driven on the Swiss road network (all roads)
- the maximum permitted laden weight of vehicle and trailer
- the emissions of the vehicle (there are three emission classes)

The fee was introduced on 1 January 2001 at a rate of 1.0 Ct/tkm (medium environmental class). In parallel, the weight limit was raised from 28 to 34 tonnes.

On 1 January 2005 the rate will be increased to 1.6 ct/tkm and the weight limit to 40 tonnes.

Impacts of the fee.

As the fee was not introduced as an isolated measure, but simultaneously with a change of the weight limit, the results observed since its introduction have to be seen as a result of the interaction between these two factors. The main effect of the new regime with the new fee on the one hand and a higher weight limit on the other was that heavy goods transport on the road has become much more efficient. This increase of efficiency was mainly due to the following developments

- **Strong renovation of the truck fleet** In order to save fees, the hauler business bought cleaner vehicles belonging to the cheapest emission category and adjusted the size of their vehicles to the actual needs of the market. Previously, oversized vehicles were very common in the business.
- **Concentration in the hauler industry** Due to better capacities, bigger companies are able to operate their lorries in a more efficient way. This allows especially to avoid empty trips.
- **Less heavy goods vehicles on the road:** With the introduction of the new regime, the prior annual increases in vkm of about 7% were replaced by declines of about 4% in 2001 and 3% in 2002. In 2003, the traffic volume of lorries remained stable. Although it has to be admitted that the slow-down of economy has contributed to this change in trend, the new regime has obviously left its traces.

As to the envisaged shift of goods transport from road to rail, no remarkable shift could be noticed so far. Considering the fact that the competitive advantage gained by rail due to the introduction of the fee was more or less balanced out by the productivity gain of the road sector as result of the higher weight limit, this is not astonishing. A transfer of freight from road to rail will not be possible without strong additional efforts in the rail sector.

Conclusions.

Though the development of the Swiss heavy goods vehicle fee was also influenced by some peculiarities of the political system of Switzerland, the conclusions drawn out of this case for a successful implementation of road tolling projects can be considered as being of general value. They can be summarised as follows:

1. The traffic (or transport) problem which is to be solved with the help of a road tolling project has to be acknowledged as such in public.
2. The authority in charge has to offer a solution that is understood as suitable to solve the recognised problem. Normally, the road tolling project is one part of a package of measures foreseen to solve the problem.

3. The acceptance of a road-pricing project can be increased decisively if the revenue is earmarked for transport matters. The use should, of course, also be in line with the policy developed.
4. It is decisive to start with the technical solution in time and it is an advantage to begin with a simple design and to shift to more sophisticated solutions later on.
5. The best project will fail, if it is launched in an unsuitable political environment. So seize the window of opportunity and good luck.

For more information about **THE WINDOW OF OPPORTUNITY: HOW THE OBSTACLES TO THE INTRODUCTION OF THE SWISS HEAVY GOODS VEHICLE FEE HAVE BEEN OVERCOME**, contact: Nils Axel Braathen, National Policies Division, Environment Directorate, OECD.

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THE WINDOW OF OPPORTUNITY: HOW THE OBSTACLES TO THE INTRODUCTION OF THE SWISS HEAVY GOODS VEHICLE FEE HAVE BEEN OVERCOME

1. Introduction

1. The national referendum on the introduction of a distance-related fee for heavy goods vehicles (HVF) was one of the most controversial referenda Switzerland has ever seen. This is not surprising inasmuch as the HVF was considered as a new tax affecting – at least indirectly – almost all citizens. What is astonishing, at least at first sight, is the fact that a clear majority of 57% voted in favour of the new fee. The question is why a population which is neither fond of new taxes nor known for being particularly progressive accepted a new fee.

2. The present study tries to highlight the reasons for the outcome of the vote. The study is part of an OECD-wide project on how obstacles to the introduction of economic instruments that could promote sustainable development have been overcome. It is a project undertaken under the auspices of the OECD's "Joint Meetings of Tax and Environment Experts" which mainly comprise delegates from the Ministries of Finance and the Environment in member countries. The project aims to obtain a clearer picture of both the drivers that helped to facilitate the introduction of the fee and those that could have prevented it. In addition, the case study is to evaluate the economic efficiency and the environmental effectiveness of the fee.

2. Starting point

3. In January 1972, the Swiss government decided to set up a commission which was to elaborate an integral transport concept for Switzerland. The reason for the setting up of this commission was the insight *"that the state's existing legal, financial and organizational means could no longer cope with the strongly growing transport needs and the new major projects for rail, road, shipping and air transport. The state's available resources were also incapable of dealing with the massive expenditure, demands on regional planning and environment protection and the social consequence of transport arising from these projects under discussion. Possibilities for state intervention in the individual transport system, which have been elaborated in varying ways during the last 130 years according to prevailing circumstances, are not sufficient. The conflicts in objectives which arose made it imperative to work out a global method of overcoming the problem"*.¹

4. Five years later, the commission presented its recommendations. One of them was that "heavy road transport, which does not cover the infrastructure costs it causes, will receive a new special tax linked to work performance."² The argument in favour of the suggested fee was that freight transport did not cover the costs of its use of infrastructure. As the possibility for the introduction of road user charges was

¹ SICT p. 5.

² SICT p. 65.

- as a principle - excluded by the constitution³ a specific amendment was planned to create the legal basis for the authority to “levy earmarked taxes for both public and private transport.”⁴

5. In the consultation that followed the publication of these recommendations the principle of fair competition, which included the introduction of a distance-related fee for heavy goods vehicle (HVF), was well accepted⁵. Some people asked for external costs to be considered for the calculation of the fee, others asked for the extension of distance-related charging to passenger transport. The report seems to indicate that enshrining the legal bases for road user charges was not controversial. The only exception to this outcome were road traffic organizations, who refused a general charging competence “*if the pending new check of the road budget shows, that the lack of costs coverage could be eliminated*”.⁶

6. For a correct assessment of the results of the consultation it ought to be considered that the heavy goods vehicle fee was just one element among many others, embedded in a global concept. Its comparatively good acceptance should therefore not be overestimated. It will be shown below that the battle begins when the principle is to be implemented in practice.

3. Too ambitious a goal

7. In the political process which followed the elaboration of the integral transport concept in the eighties several of the principles that had been stipulated by the committee – and that had been welcomed in the consultation – were not maintained. The first steps in this direction were taken by parliament in the early eighties.

3.1 Introduction of a flat fee

8. In 1983, the Swiss Parliament decided not to wait until the whole project was implemented before it introduced the distance-related heavy goods vehicle fee (HVF), but to introduce it separately in advance. And as it assumed that the technological prerequisites for a distance-related fee were not yet fulfilled, it decided to introduce a flat fee instead. It was similar to the Eurovignette, introduced in several EU member countries later on. In addition to the introduction of a flat fee for heavy goods vehicles, the Swiss Parliament decided to implement a motorway user permit. The motorway user permit is a flat fee for private cars which has to be paid for the use of the motorway network. As passenger cars did cover their costs for the use of the roads (see box), the decision in favour of such a fee was even less in line with the integral transport concept than the one for the HVF. The reasoning behind these acts of parliament was clearly political in nature: both projects were considered to be promising. Both fees were designed as interim solutions that were to be replaced by definitive solutions later on in the framework of the integral transport concept.⁷

³ According to the Swiss Constitution, the use of the road network is free of charge. Exceptions of this principle are possible if the Swiss Parliament approves them. Up to today, the Swiss Parliament made use of this competence only once (for the use of a road tunnel connecting Switzerland and Italy). The principle of the free use of roads was weakened in 1984 (see next chapter) and in 1994 by creating the basis for the introduction of a HVF. It still is, however, a strongly defended principle explicitly mentioned in the Swiss constitution.

⁴ SICT, p. 69.

⁵ ICT, report on the consultation, p. 68-69.

⁶ ICT, report on the consultation, p. 76.

⁷ Federal council, explanations concerning the vote on 26 February 1984, p. 3.

Cost coverage in Swiss Road Transport

Whether a vehicle category – and road transport altogether – is covering its costs or not can be learned from the Swiss Highway Report, which is published annually. In this report, income from road users and expenditure for construction and maintenance of the road network are summarised. As road pricing is, in general, not allowed in Switzerland (see footnote 3), the main components of the income were (and still are) fuel excise duties and vehicle licenses. According to this report, passenger transport covered the costs it caused during the period covered by this study whereas heavy goods transport did not. It should be noticed that the highway report refers only to road costs, external costs are not considered.

9. Even though it was not in line with the integral concept of transport, the approach of the Parliament proved to be successful. In the following referendum, which was compulsory for both projects (see box “Initiative and referendum”), both bills were accepted (57% in favour of the flat fee for heavy goods vehicles, 53% in favour of the motorway user permit).

10. The fees, which weakened the principle of a charge-free use of the road network, were accepted for different reasons:⁸

- The flat fee for heavy goods vehicles was considered to be justified because freight traffic did not cover its costs for the use of infrastructure. Furthermore, the fee was considered to be a catalyst for the transfer of freight traffic from road to rail, a goal that has a long tradition in Switzerland. Last but not least, trucks are often experienced as a nuisance by the other road users, who represent the majority of the voters.
- Whereas the acceptance of the fee for heavy goods vehicles comes as no surprise, the approval to the motorway user permit, which has to be paid by a large majority of the road users, seems to be more astonishing. It has to be considered, however, that this user permit is a practical means of getting a contribution from foreigners for their use of the Swiss road network.

Initiative and referendum

The political system of Switzerland gives its citizens specific rights which are often used in context with transport matters and are therefore of importance in the context of this study.

People's initiative: 100,000 citizens can demand a change in the constitution by signing a corresponding text. Once the authority in charge has examined the initiative and declared it valid, the government writes a message to parliament and suggests to either accept or reject the initiative. The government can also submit an alternative to the solution proposed in the initiative. The Parliament is free to accept the suggestions of the government or to take its own decisions. It can, in particular, make its own, alternative proposal. It does not matter whether it is different from the one of the government or whether the government has made one at all. Once Parliament has decided, there is a federal referendum, either on the initiative, or on the counter-proposal (if the original initiative has been withdrawn by the committee in charge of the initiative), or on both. In the last case, the citizens have to declare, whether they prefer the initiative or the counter-proposal in case both should find a majority. To be accepted, an initiative needs to be accepted by both a majority of the individual votes and a majority of the cantons.

Referendum: There are two kinds of referenda: compulsory referenda and optional referenda. A compulsory referendum takes place when parliament wants to change the constitution. The introduction of the flat fee for heavy goods vehicles and the motorway user permit fell into this compulsory regime and so did the creation of a constitutional basis for a distance-related heavy goods vehicle fee (HVF) in 1994 (see chapter 4.3). If Parliament decides matters on the level of laws (be it changes to existing laws or the introduction or abolition of entire laws), an optional referendum may take place if 50,000 citizens sign such a demand. If they do so, the parliamentary decision has to be submitted to a national vote whose result is binding. This happened in the case of the law about the distance-related heavy goods vehicle fee (HVF) in 1998 (see chapter 6.3).

⁸ GfS, Analysis of the vote on 26 February 1984.

3.2 *People's initiative rejected*

11. In 1982 the Swiss Association for Transport & Environment (ATE), a conservation group specialized in transport matters, submitted a people's initiative (see box) requesting the introduction of a distance-related fee for heavy goods vehicles. For the environmentalists, such a fee - which was to compensate not only the direct costs of road use, but also the external costs of air-pollution, etc. - was to play a key role on the way towards a more environmentally-friendly system of freight transport. With their initiative, they tried to support the corresponding idea in the integral transport concept and to influence the discussions and decisions in parliament that did not develop in the direction they wished.

12. Though the Federal Government and Parliament basically agreed with the motives of the initiative, they finally rejected it. According to the statements of the government before the vote in 1986,⁹ the initiative came at the wrong time (the flat fee having been accepted only two years before), it focused one-sidedly on freight transport, and the government needed more time to establish a suitable fee system. The population followed its government and rejected the initiative with a majority of two to one. An important reason for the clear failure of the initiative may have been that the flat fee was to be tripled between 1988 and the time of the introduction of the new fee. It is remarkable that only 35% of the population took part in the vote. The question whether the system of charging freight transport should be altered apparently was not considered as a fundamental issue at the time.

3.3 *Coordinated transport policy refused*

13. Two years after the refusal of the initiative, a vote was held on the bill for a "coordinated transport policy". The bill, which had been accepted by a large majority in Parliament, consisted of an integral package of articles which, (if they had been accepted), would have provided the constitutional basis for the implementation of the integral transport concept. The paragraph which was to allow the introduction of a distance-related fee was not limited to heavy goods vehicles but implied a general competence to raise road user taxes. This general competence, though it was limited inasmuch as user charges were limited to a level necessary to cover uncovered costs, was one of the decisive points for the unsuccessful outcome of the vote. 64% of the opponents of the bill, which was refused by a majority of 54% of the voters, considered the coordinated transport policy as a tool to raise new taxes.¹⁰ Since the refusal of the coordinated transport policy in 1988 several proposals of the integral transport concept have been introduced by separate steps (among others the distance-related HVF). The outcome of the process for an integral concept of transport is another proof of how difficult it is to find a majority for a global concept. Although the principle might be accepted as correct by a majority, it is finally refused due to the accumulated opposition of interest groups, who dislike specific – and different - aspects of the suggested bill.

4. Step by step

4.1 *A clear hint*

14. The refusal of the bill for a coordinated transport policy did not solve the transport problems Switzerland was confronted with. One development in particular kept transport issues on the top of the political agenda: the increase of heavy goods vehicles transiting through the Alps. Up to 1980, the year of the opening of the St. Gotthard road tunnel, only a few hundred vehicles crossed the Swiss Alps every day. After the inauguration of the tunnel, the situation changed rapidly. In spite of the clear statement of the

⁹ Federal council, explanations concerning the vote on 7 December 1986.

¹⁰ GfS, analysis of the vote on 7 December 1986.

responsible minister that “*this is not a tunnel for heavy goods traffic*”¹¹ the number of heavy goods vehicles transiting the Swiss Alps increased rapidly in the following years. The fact that an ever-increasing number of heavy goods vehicles came from abroad made the subject politically delicate and strengthened the need to find a solution that met both the Swiss need for a better protection of the population along the transit routes and the demand of the EU of sufficient transport capacity for transalpine traffic.

15. The suggested solution was to transfer freight traffic from road to rail. In order to achieve this ambitious goal – it has to be considered that at the time of this decision about 80% of freight traffic across the Alps was already done by rail – the Swiss Parliament decided to build two new rail links through the Alps. The heart of the project were two new tunnels with a length of 57km (St. Gotthard) and 34km (Lötschberg), respectively. The decision of Parliament in favour of two new rail links was all the more significant in the context of exhaustive research work carried out in the early eighties that had led to the conclusion that additional rail capacity across the Swiss Alps would not be necessary in the decades to come. The project, which was considered to be profitable in the long term, was to be financed mainly by loans. One quarter, however, was to come from vehicle excise duties. The argument in favour of this contribution from road users was the fact, that it also was in the interest of car users to relieve the transit routes from heavy goods vehicles.

16. On 27 September 1992, the Swiss people had to decide whether it approved the project or not. In the period preceding the vote, the decision of Parliament had been criticized in particular by environmentalists. They argued that:¹²

- transit capacity on the rail was not exhausted yet and two new rail links would therefore lead to tremendous overcapacity
- the extremely expensive project would end in a financial disaster
- new rail capacity would only make sense if the use of rail would be mandatory for transit traffic

17. Another group of opponents, defending the interests of car users, was afraid that Parliament might subsequently raise the share deriving from fuel excise duties.

18. In the final vote, a clear majority of 64% of the voters approved to the decision of Parliament. According to the opinion poll carried out after the vote, the following motives were decisive for the majority of voters approving the bill:¹³

- motives in favour of public transport (namely the transfer argument)
- ecological reasons
- project is in the interest of road users (namely less traffic on the road)
- project favours international integration

¹¹ Statement of Federal Councillor Hürlimann at the inauguration of the tunnel on 5 September 1980.

¹² Federal Council, explanations concerning the referendum of 27 September 1992, p. 5.

¹³ GfS, analysis of the vote on 27 September 1992.

19. Overall, the result can be interpreted as a clear hint in favour of the policy aiming at the transfer of freight traffic from road to rail. The introduction of a performance related fee is perfectly in line with such a policy.

4.2 *A hidden step*

20. Ten weeks after the acceptance of the new rail links across the Alps, the Swiss refused to join the European Economic Area (EEA, see box) in another referendum (with a very slim majority of 50.3%). At first sight, this verdict does not seem to have anything to do with the distance-related heavy goods vehicle fee introduced eight years later. Though it is true that the refusal of the EEA bill was indeed no decision in favour of such a fee, it is also true that the negative outcome of this vote was a necessary prerequisite for the introduction of such a fee later on. There are two points which support this argument:

1. If Switzerland had joined the EEA, EU regulations in transport (and many other) matters would have become part of the Swiss legislation. This means, that a distance-related fee as designed in Switzerland would not have been possible, because it would not have been in line with EU directive 1999/62 on the charging of heavy goods vehicles for the use of certain infrastructures. The problem can be illustrated with the example of Liechtenstein, which is a member of the EEA. When Liechtenstein wanted to introduce the Swiss heavy goods vehicle fee on its territory¹⁴, a sophisticated solution had to be found to avoid interference with this directive (see box). Such a solution would by no means have been possible for Switzerland.
2. If the EEA bill had been accepted, “economiesuisse”¹⁵ would most certainly have refused the HVF bill in 1998 (because, in this case, the federation would not have been interested in concluding bilateral treaties). The same might be true for political parties allied with the industry. The support of industry (or at least of prominent parts of it) and of these political parties, however, was crucial for the acceptance of the HVF bill, as will be shown below.

The European Economic Area (EEA)

The agreement creating the European Economic Area was negotiated between the European Community and the seven member countries of the EFTA (European Free Trade Association) and signed in May 1992. Switzerland subsequently decided not to participate (see main text) and three other EFTA members joined the European Union. The EEA Agreement entered into force on 1 January 1994 and was maintained because of the wish of the three remaining EFTA countries – Norway, Iceland and Liechtenstein – to participate in the Single Market while not assuming the full responsibilities of membership of the EU. The Agreement is concerned principally with four liberties – free movements of goods, persons, services and capital.

¹⁴ In a referendum, Liechtenstein had decided with a large majority to join the Swiss solution.

¹⁵ “economiesuisse” is the largest umbrella organization covering the Swiss economy. It is the product of the merger between the Swiss Federation of Commerce and Industry and the Society for the Promotion of the Swiss economy which supported together the HVF in 1998.

The Liechtenstein case

As an EEA member, Liechtenstein is bound to apply EU regulations in transport matters such as directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. This directive forbids user charges on the entire network. But that was exactly what Liechtenstein intended to do. The way out of the problem consisted in introducing the Swiss system on the Liechtenstein territory by granting in parallel a flat reduction for the estimated use of the roads presumably not due to charging. In practice, the solution works as follows: The fee is due for the use of the entire road network of Liechtenstein. When leaving or entering Liechtenstein by Schaanwald, the only border crossing from Liechtenstein to Austria with a relevant volume of heavy goods vehicles, the hauler has a right to a flat reduction equivalent to a ride of 3 kilometres. It is self-evident that such a solution was possible only for a small region like Liechtenstein.

4.3 Two decisive steps

21. The acceptance of the project for two new rail links across the Alps (see 4.1) was not only a clear hint in favour of the transfer of goods from road to rail, but also a catalyst in favour of a distance-related fee as a suitable means to push the policy forward. Because the bill for a coordinated transport policy, which would have comprised the constitutional bases for a performance related HVF, had been refused in 1988 (see chapter 3.3), it was necessary to draft a separate bill to create the constitutional bases for a HVF. In parallel to this bill, a popular initiative, the “Initiative for the protection of the Alpine region against transit traffic”, was put to the vote in a referendum. The core of this initiative was the compulsory transfer of all freight transiting through the Swiss Alps from road to rail. Although the Swiss government clearly acknowledged its support for a policy aiming to transfer goods from road to rail, it rejected the initiative. It argued that the initiative was discriminatory, and therefore not in line with the principles of international law and that its policy, which included a distance-related fee, would be sufficient to reach its goals.

22. The vote, which took place on 20 February 1994, ended with a surprise: the Swiss people not only accepted the constitutional bases for a distance-related fee (with a large majority), but also the popular initiative for the protection of the Alps.¹⁶ The strongest arguments in favour of the initiative were the protection of the environment in general and the will to express solidarity with the troubled population living along the transit routes.¹⁷

¹⁶ The acceptance of a people’s initiative is rather rare.

¹⁷ GfS, analysis of the vote on 20 February 1994.

The implementation of the Alpine Initiative

The initiative's categorical demand that transit traffic (i.e. traffic which has neither its origin nor its destination on Swiss territory) crossing the Swiss Alps had to happen exclusively on the rail was considered to be discriminatory such as formulated in the text. It was therefore necessary to interpret the text of the initiative in a way that was both not discriminatory and respected the will of the majority of voters. The way out of the situation, to which all sides involved finally agreed, was to interpret the initiative as follows:

In 1994, the year when the Alpine Initiative was accepted, about 1.3 million heavy goods vehicles crossed the Swiss Alps. About 50% of these vehicles, i.e. 650'000, were vehicles in transit and therefore, according to the text of the initiative, ought to be transferred to the rail. Thus the number of vehicles crossing the Alps that people were willing to accept was 650,000. In order to achieve this figure in a non-discriminatory way, a policy was developed which considered traffic as a whole, regardless of its origin and its destination. The pillars of this policy are the distance-related HVF, the construction of two new rail links across the Alps (Gotthard and Lötschberg) and the rail reform which aims at making rail more competitive.

5. Last Setbacks

23. After the clear mandate of the vote of February 1994, the administration started the work for the implementation of a distance-related fee. The work to be done was split between the Swiss Customs Authority (SCA), incorporated in the Swiss Ministry of Finance, and the General Secretariat of the Ministry of Transport.¹⁸ The SCA, experienced in matters of raising taxes, was mandated to prepare the implementation on the technical level whereas the Ministry of Transport was to be responsible for the political part, in particular the elaboration of the future fee and the scientific work on which it was based. Opposition in both fields led to delays, proving that the implementation of the fee might become difficult.

5.1 Negative feedback

24. Immediately after the vote of 20 February 1994, the Ministry of Transport started to draft the law that was necessary for the implementation of the fee. The draft, which was presented to the organizations having an interest in the subject in summer 1995, corresponded to a large extent to the law which entered into force on 1 January 2001:

- The fee was to depend on the distance driven and on the maximum permitted laden weight
- It was to be levied for the use of all roads on the Swiss territory
- The government was to be authorized to make exceptions
- The level of the fee was to be limited according to the total amount of costs caused by heavy goods vehicles (including external costs)
- The cantons were to receive parts of the net income of the fee

25. There were, however, also differences (see chapter 7):

- The maximum level of the fee was set at 2 Swiss cents (about 1.3 cents) per tonne and kilometre (tkm)

¹⁸ The full name of the ministry is "Federal Department of Environment, Transport, Energy and Communications". For practical reasons, it will be named Ministry of Transport in this study.

- The fee was not differentiated according to vehicle emissions
- The share of the Federation in the income was supposed to be used mainly for road purposes
- The share of the cantons was not fixed
- The cantons were to be in charge of levying the fee for domestic vehicles

26. The feedback to the proposal described above was mainly negative¹⁹. A majority of the organizations consulted either refused it overall or considered that time as not ripe for the change envisaged. Of special importance was the refusal of five of the seven political parties involved, among them three of the four parties represented in government and disposing of a strong majority in Parliament (the only big party supporting the proposal was the Social Democratic Party).

27. The reasons for the refusal of the proposal were complex. They were, first of all, not due to the change from a flat-rate to a distance-related fee. The arguments forwarded against the fee were the following

- A strong minority suggested that the fee should not be based on distance, as proposed, but on the consumption of diesel
- The fee should, additionally, depend on vehicle emissions
- The fact that the fee would only apply to vehicles with a laden weight of more than 3.5 tons would lead to a shift to lighter vehicles.
- The scientific basis for the calculation of the external costs was not solid enough
- The rate of 2 (Swiss) cents per tonne-km was too high
- A reliable On Board Unit meeting the specific requirements inherent to a kilometre based fee was not available on the market
- The fee should not be introduced prior to a solution on EU level (or should at least be compatible with a solution on a European level).

28. A new idea, which had not been part of the proposal but was brought into the debate by a working group for the financing of the new rail links across the Alps (see 4.1), was clearly rejected in the consultation. A strong majority was against the idea of the group to use part of the revenue of the new fee to finance the new rail links.

29. It finally comes as no surprise that the cantons demanded a bigger share of the income of the fee.

5.2 *Scapegoat on board unit*

30. A specific On Board Unit (OBU), capable of registering the distance covered, was an obvious prerequisite for the implementation of the fee in the way it was designed (see 5.1). As such an OBU was not available on the market yet, the ministry in charge started a call for tender for the development of such

¹⁹ Department of the Environment, Transport, Energy and Communications, "Federal law on the Swiss heavy goods vehicle fee, report on the consultation".

a unit. A sum of 7.9 million Swiss Franks (about 5 million euro) was designated in the budget for 1996 to procure the necessary finances for the development of the unit. In the first chamber of parliament which debated the proposal, the Council of States²⁰, it passed without difficulty. The second chamber, however, the National Council, decided not to follow the Council of States and the government, that had drafted the proposal. It refused to grant 4 million Swiss Franks, the sum designed for the development of the On Board Unit in the years to come (a part of the money had already been spent). The arguments raised against the full amount – Switzerland should wait until Europe had decided how it wanted to proceed, or the consideration of alternatives to a distance-related fee such as an increase of excise duties on diesel – raised the suspicion, that the real aim of the opponents was not the proposal but the fee itself: *“I get the impression, that you beat the bag and mean the donkey. The very subject is the fee and not really the On Board Unit.”*²¹

31. After the proposal was refused by the National Council it went back to the Council of States that decided to stick to the full sum –with a slim majority of only 16:14 – and sent the bill back to the National Council. When the National Council rejected the proposal once again, the Council of States finally decided to give in, thus following the arguments of the speaker of the commission responsible for the proposal. He argued that considering that the session would end the following day it would be time to put an end to the debate, mainly for reasons of opportunity. The fervent debate on a comparatively small sum was another clear hint that it would not be easy to introduce the fee.

5.3 *Beyond hope?*

32. The negative outcome of the consultation on the proposed law and the rejection of the credit to develop an OBU seemed to make the project of a distance-related fee rather hopeless. This at least was the comment of the former secretary general of the transport ministry, when he handed over the dossier to his successor in winter 95/96.²²

6. **The window of opportunity**

6.1 *Different interests*

33. During the controversy about the EEA Bill in 1992, the opponents to the bill, or at least a majority of them, had not denied that it was necessary to improve the framework conditions for the Swiss industry such as it had been envisaged by the EEA. They had argued, however, that this could be done in a better way if Switzerland remained independent and thus had the possibility to formulate its economic policy on its own. Such a policy includes the possibility to conclude bilateral treaties, in particular with the European Union, Switzerland’s most important partner in international trade. Although the economic disaster that had been forecast by some of the promoters of the EEA bill did not take place when the latter was rejected, the claim for an improvement of the economic framework conditions, especially regarding trade with the European Union, was growing. The option chosen was to achieve the goals of the industry by negotiating bilateral treaties with the European Union. Even though the problems the EU wanted to solve in its relations with Switzerland were not as urgent as the ones forwarded by the Swiss, the EU also had an interest in negotiating bilateral treaties with Switzerland. In the context of this study the issue of

²⁰ The set-up of the Swiss parliament is similar to the one in the US: it consists of two chambers, the National Council (similar to the House of Representatives) and the Council of States (similar to the Senate).

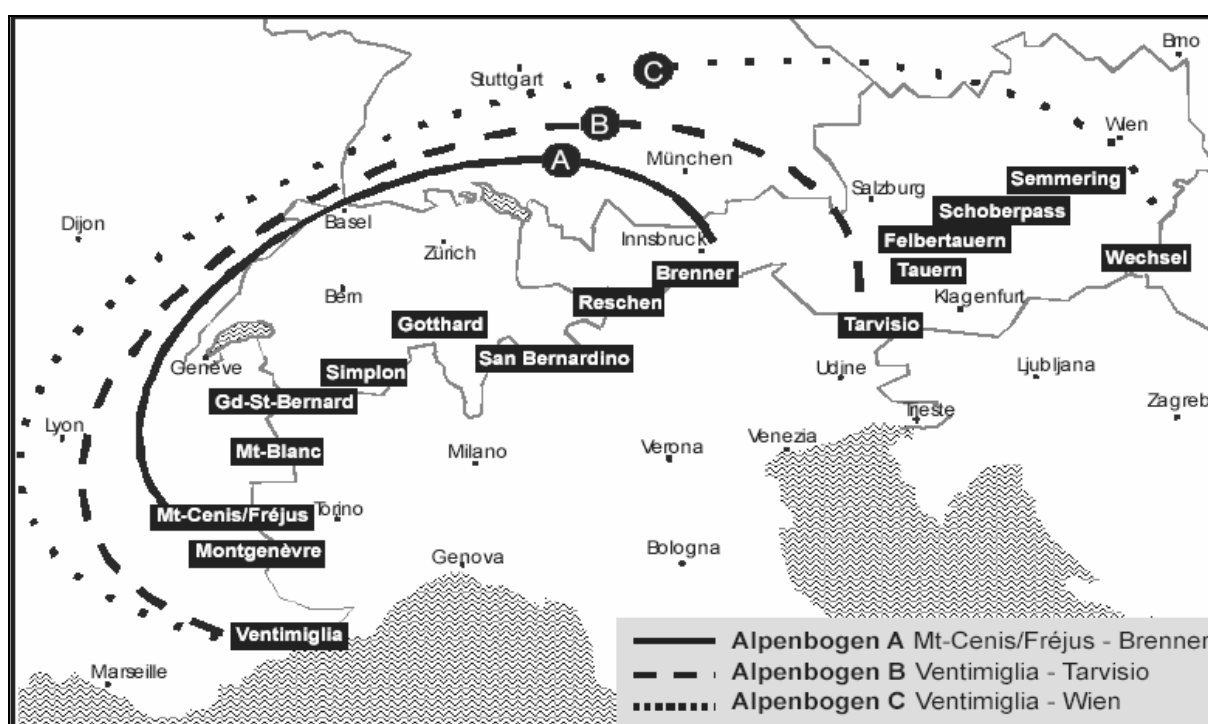
²¹ Statement of the responsible minister Kaspar Villiger during the debate, Amtliches Bulletin der Bundesversammlung 1995, National Council p 2509. To beat the bag and mean the donkey is a famous German proverb meaning that you seem to attack one thing but in reality want to attack something else.

²² Werder Hans, p. 6.

transalpine traffic was of special importance. The reasons for the interest of the EU in this subject were due to the geographical location of Switzerland on the one hand and to specific transport regulations in Switzerland on the other hand.

34. **Geographical location:** as the map illustrates, Switzerland not only lies in the heart of Europe, but also between three of the major members of the European Union, France, Italy and Germany. Of special importance is the heart of the heart: the St. Gotthard pass, the shortest route between the north and the south of Europe. Italy, in particular, was afraid to be cut off from the other members of the EU and interested in unhindered transport across the St. Gotthard and the other passes across the Swiss Alps.

Figure 1. The location of Switzerland as a barrier to transport between Italy, France and Germany.



This map illustrates the geographical location of Switzerland as a potential barrier to road transport between Italy and the two big EU member states France and Germany.

35. **Transport regulations:** Switzerland had (and partly still has) specific traffic regulations that are unfavourable to transport by heavy goods vehicles. The regulations have different goals such as promoting freight transport by rail or reducing noise pollution along the road: The permitted weight of heavy goods vehicles was limited to 28 tonnes and trucks with a laden weight of more than 3.5 tonnes are banned from the roads between 10 PM and 5 AM, (night ban). Both regulations were (and the night ban still is) highly popular in Switzerland. The fact that they had been integrated in the transit agreement of 1992, a treaty Switzerland and the EU had put in force in 1992 to regulate transit traffic through Switzerland – was considered a success in Switzerland. Together with the good performance of the Swiss railways these two measures have certainly been decisive for the comparatively high share of the rail in freight transport in Switzerland (about two third of transit traffic, about one third of the total of freight transport²³). The

²³

The figures refer to the share in tonne-km.

importance of these two regulations had even increased since the opening of the St. Gotthard road tunnel in 1980 that led to a steady increase of lorries crossing the Swiss Alps²⁴.

6.2 *The key role of the fee*

36. The different interests described above led to a political deadlock. The EU was not willing to conclude bilateral treaties in matters that the Swiss industry, in particular, was asking for as long as Switzerland remained unwilling to make concessions to facilitate road transport, especially road transport across the Swiss Alps. The HVF provided a way out of the impasse. If it was high enough (see box), the fee was considered to be a valuable instrument to make up for the consequences of an increased weight limit. The 28-tonne-limit had forced the trucks with a higher weight to make a detour around Switzerland up to then. By introducing the HVF as a means to protect the Swiss Alps from an avalanche of trucks the policy aiming at transferring freight traffic from road to rail could be maintained and simultaneously one important precondition of the EU for accepting the package of treaties as a whole could be met.

The setting of the charge level

The setting of the charge level was very delicate for the following reasons:

- to make up for the consequences of an increased weight limit it had to be high enough;
- to be accepted in a referendum, the charge was not to exceed a certain (i.e. politically acceptable) limit;
- the level had to meet both the requirements of EU legislation and of Swiss legislation, according to which "the revenue must not exceed uncovered infrastructure costs and the costs for society".

After a long and very controversial process, which is described in detail in annex 1, it was decided that the maximum fee was to be limited to an amount equal to 1.8 cents²⁵ and that the fee was to be introduced gradually and in coordination with the increase of the weight limit. These are the key dates:

- 01.01.01 Introduction of the HVF at a rate of 1.0 ct/tkm. Simultaneous increase of the weight limit from 28 to 34 tonnes.
- 01.01.05 Increase of the rate from 1.0 to 1.6 ct/tkm and of the weight limit from 34 to 40 tonnes.
- Ca 2007 Increase of the rate to 1.8 ct/tkm

37. Politicians in favour of the new fee seized the opportunity to put this item on the political agenda again, using it as a bargaining power for the negotiations with the EU. The lobbying proved to be successful. The door to a change of the regime in freight transport was flung open within only one year. A significant proof for this change in trend was the fact, that the credit for the development of an OBU passed both houses without problems at the end of 1996.

38. To make the best use of the change in trend, the new head of the transport ministry, Moritz Leuenberger, and his secretary general, Hans Werder, organized the steps necessary to improve the acceptance of the suggested fee:

²⁴ This number has increased from a few hundred lorries a day before the opening of the tunnel to about 4,500 in 2000, more than eighty percent of them passing through the St. Gotthard.

²⁵ Unless specified otherwise the numbers in this study are from now on given in euro only.

- In a meeting with the representatives of the cantons it was agreed that one third of the net revenue of the fee should be allocated to their treasuries. This step of course helped to get their support for the fee.
- The remaining two thirds of the net revenue, allocated to the Federal state, were to be earmarked for the financing of the new rail links across the Alps. This step was decisive because it had become clear in the meantime that these rail links would not be profitable and could therefore not be financed on the basis of credits, as planned originally. This change of the use of the fee fitted perfectly into the developed policy that aimed at transferring goods from road to rail.
- By engaging one of the best Swiss pundits in the domain of external costs, professor René Frey from the University of Basle, the commission of Parliament in charge of the HVF-item could be convinced that the scientific basis for the calculation of external costs was solid enough.
- It was decided, that the fee should also depend on the emissions. In doing so, government not only took into account the corresponding demand expressed in the consultation, but could also balance the criticism of those who had favoured a fee on the consumption of diesel. Last but not least, taking into account the emissions had also been a demand of the EU when negotiating the treaty on land transport (see Box).

39. Thus the opportunity of the opened window on the political level was seized and the administration took the steps that were necessary to improve the acceptance of the HVF bill. This way, the field was prepared for a successful campaign in favour of the HVF in the final referendum.

The bilateral treaties

After the Swiss people had refused to join the European Economic Area (see 4.2), the Federal Council (Swiss cabinet) took the initiative and started bilateral negotiations with the European Union. Their aim was to avoid that the negative outcome of the vote led to substantial economic disadvantages, which the Swiss export industry, in particular, was afraid of. As a first step, certain economic areas such as air transport were to be liberalized and a full participation of Switzerland in the EU research program was to be realized. The EU was ready to negotiate, but made two conditions from the very beginning:

1. Liberalization was not to be limited to the areas favoured by Switzerland, but be extended to other areas such as free movement of persons and to land transport (including a raise of the weight limit).
2. The different treaties (seven in total) had to be part of a single package, which would have to be accepted or refused in its totality.

To get the advantages it was aiming for, Switzerland therefore had to deal with the disadvantages it had hoped to avoid, such as the liberalization of land transport. The negotiations concerning land transport were therefore especially controversial and more than once threatened by a dead end. The compromise finally found consisted in balancing the negative effects of the increased weight limit by implementing a substantial user charge for heavy goods vehicles. With this deal one of the main obstacles on the way to a successful conclusion on the bilateral treaties had been overcome. In the vote of 21 May 2000, the treaties were accepted by a large majority of 67% of the voters.

6.3 The final vote

40. The government submitted the bill for a distance-related heavy goods vehicle fee to Parliament in 1997. It was amended in the way described above and despite the opposition on the right wing of the political spectrum the bill passed both councils with clear majorities (120:46 in the National Council,

22:14 in the Council of States). The fundamental driver for the clear acceptance of the bill was undoubtedly the context of the bilateral treaties, which induced two big parties²⁶ that had refused the draft in the consultation to the bill.

41. Immediately after the approval of Parliament, the opponents of the bill launched a referendum against it. Their main argument was that the new fee would lead to additional costs of 300€ per household and year. Further arguments were that the fee would neither lead to a transfer from road to rail nor would it work as a catalyst for the European integration of Switzerland. And finally, they criticized that the use of the revenue was not to be allocated strictly to road purposes, as had been stipulated in the vote of 1994. Apart from the lobbies of the road transport sector, the referendum against the HVF was supported by politicians unfavourable to a better political integration of Switzerland into the EU.

42. The referendum was successful inasmuch as it was signed within a short delay by about four times more signatures than necessary (50,000). In the campaign which preceded the final vote about the law on 27 September 1998, the main arguments were those put on the political agenda by the opponents:

- The costs the new fee might cause;
- The role of the fee as a driver to manage transport demand and;
- The integration of Switzerland within Europe.

43. Concerning the argument of costs, the different points of view of the opponents on the one hand and of the promoters on the other are of special interest. The figure of €300 per household claimed by the opponents was the result of a simple division of the total income of about 1.2 billion € (per year from 2005 onwards) by the number of about 4 million Swiss households.

44. The authorities criticized this calculation for three reasons:

1. It did not take into account the abolition of the flat fee;
2. One third of the revenue would be paid by foreign haulers;
3. The progressive increase of the weight limit to 40 tonnes would lead to gains in productivity that would more or less make up for the additional cost caused by the HVF.

45. Based on these arguments, their conclusion was, that the additional costs would constitute €7 per household at the most. It is interesting that this second way of calculating the fee was also supported by “economiesuisse”. The background for doing so was a calm analysis of the political situation. It clearly showed that the Swiss people would not accept the bilateral treaties (including the raise of the weight limit to 40 tonnes ultimately demanded by the EU) without having the HVF installed as a means of protection against the avalanche of heavy lorries they were afraid of. The high priority for the bilateral treaties even induced “economiesuisse” invest considerable amounts of money into the campaign in favour of the HVF. Together with the support of the moderate right-wing parties FDP and CVP (the left was in favour of the fee anyway), the alliance in favour of the new fee had grown strong enough to win the vote with a comparatively clear majority of more than 57% the voters. The opportunity had been seized.

²⁶ Both parties, the FDP (Radical Free Democratic Party) and the CVP (Christian Democratic People's Party) are situated right of the centre of the political spectrum

46. Although the specific context of the bilateral treaties was central for finding a majority other reasons were decisive for the acceptance of the fee as well:

- **Part of a policy:** the fee was (and still is) an essential part of a policy, aiming at shifting goods from road to rail. This policy has been accepted by Swiss people in several votes.
- **Use of revenue:** the revenue is reinvested in the transport sector, mainly for projects in public transport, thus supporting the policy of transferring goods from road to rail.
- **Practical technical solution:** The technical solution is simple, reliable and suited to solve the problems resulting from the political guidelines (see chapter 7).
- **Polluter pays principle:** The calculation of the fee takes in account the external costs of heavy goods road transport. According to opinion polls this was well accepted by the people.

7. Successful implementation

7.1 Technical hurdles

47. Successful implementation not only implies to provide political acceptance, but a reliable technical solution for the levying of the fee as well. The example of the German lorry toll (LKW Maut) shows that this aspect should not be neglected.²⁷

48. In the case of the Swiss HVF, the Federal Council (Swiss cabinet) decided that the levying of the fee should not be privatised and delegated this task to the Federal Customs Authority (FCA). In this way, the large competence of this authority in taxation matters could be utilized directly. The knowledge of external experts was captured by integrating the consultants on all levels in the project organization established in January 1997 (immediately after the proposal for the development of the On Board Unit had been accepted in Parliament) with the clear objective to introduce the fee on 1 January 2001. The solution to be developed had to meet the following legal requirements²⁸:

- The fee has to be paid by vehicles with a maximum permitted laden weight of more than 3.5 tonnes;
- In contrast to the existing toll systems in the neighbouring countries, the fee was to be levied on all roads;
- The fee was to be levied according to the maximum permitted laden weight of vehicle and trailer. It was therefore necessary to develop a mechanism registering the coupling or uncoupling of a trailer;
- The fee was to be differentiated according to the emissions of the vehicle.

7.2 The Swiss solution

49. One of the first problems to be met was the fact, that – due to legal reasons – Switzerland could not declare the installation of an on board unit mandatory for foreign vehicles. The installation of such a unit not only facilitates collecting the necessary data, but also is a helpful tool to avoid fraud, a crucial issue for the success of any fee.

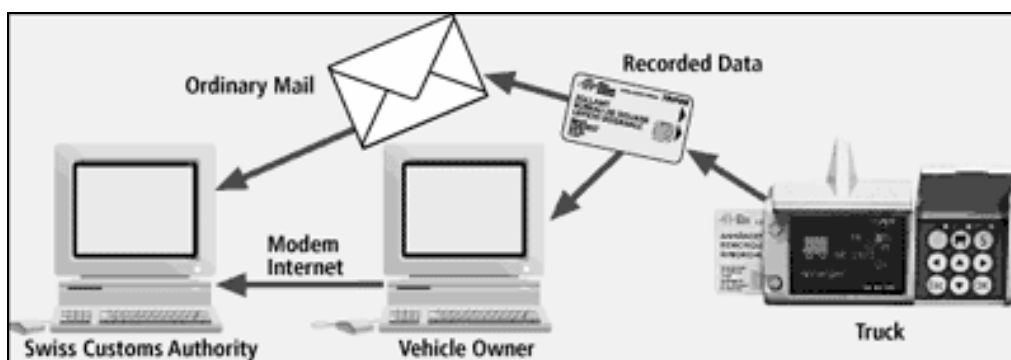
²⁷ Due to technical difficulties, the introduction of the lorry toll (Lkw-Maut) has been postponed first from August to November 2003, and then to an unspecified date

²⁸ Both the legal requirements of the Swiss legislation (constitution, law and ordinance) and those of the Land Transport Agreement Switzerland-EU have to be respected.

50. Switzerland therefore developed two systems, one for users equipped with an On Board Unit and one for users without an OBU.

51. System for vehicles equipped with an OBU: This system applies mainly to domestic vehicles, for which the installation of an OBU is mandatory. The maximum permitted laden weight of the vehicle and the emission class are stored in the OBU. In order to record the driven kilometres, the OBU is coupled to the tachograph. If the vehicle crosses the border, a device fitted above the street (microwave radio connection) deactivates the registration. When the vehicle returns to Swiss territory, the same device reactivates the recording. The recording of the data cannot be manipulated by the drivers. The only information they are entitled and able to enter themselves is the coupling or uncoupling of a trailer.²⁹ Every month the data stored in the OBU is registered by the introduction of a chip card into the OBU. This data is then forwarded to the federal authorities who use it to calculate the fee and write the appropriate monthly invoices.

Figure 2. From data to billing



Every month the data stored in the OBU is registered by the introduction of a chip card into the OBU. This data is then forwarded to the Swiss Customs Authority who uses it to calculate the fee and write the appropriate monthly invoices. The data can be forwarded either by sending the Chip Card by mail or by sending the data directly via Internet.

52. System for users without OBU: as mentioned above, the installation of an OBU is not mandatory for foreign vehicles, although their owners can acquire them for free (like the domestic users) if they wish to do so. If the vehicle has no OBU, the fee is registered by using an identification card at the special terminals for HVF clearance. This identification card is provided when a lorry enters Switzerland for the first time and contains the relevant data, in particular the maximum permitted laden weight and the emission class. To get the distance relevant for calculating the fee, the driver has to insert the actual mileage of the tachograph on a form when entering and when leaving the country. To avoid fraud, the distance driven is checked occasionally by comparing the mileage declared on the form with the tachograph and by means of papers in possession of the driver concerning the destination of his goods. The fee has to be paid when leaving the country, either in cash or, preferably, by fuel credit cards or through an account with the Customs Authority.

²⁹

Whether the coupling of a trailer has been registered correctly by the driver can be seen from the outside of the vehicle due to a specific configuration of lamps burning at the back of the OBU.

Figure 3. Clearance terminal for users without OBU



7.3 First of January 2001

53. Although a team of about seventy experts had been working hard for a successful introduction during four years, it was not without anxiety that the manager of the project, Hugo Geiger, Vice-Director of the Swiss Customs Authority, watched the day of introduction coming closer. What made things particularly difficult was the fact that many lorry owners installed the OBU at the very last moment, because they had hoped that the introduction of the fee might be postponed. But finally, all went well. The following facts helped a successful implementation:

- Both systems, the one for vehicles equipped with an OBU and the one for users without an OBU, are simple. The key element for measuring the distance in domestic and foreign vehicles alike is the tachograph which is a legally recognized instrument and which is compulsory in all commercial vehicles throughout Europe. The system for users equipped with an OBU relies on a technology that has been proven to be useful for electronic fee collection for a long time.³⁰ With the link to the tachograph the specific requirement of registering the distance driven could be met without having to implement additional delicate technologies for this matter. The procedures for vehicles without OBU is very practical. It does not require more time than has been necessary before for the payment of the flat fee. It is mainly for this reason that only few foreign lorries have been equipped with an OBU.³¹

³⁰ The so-called DSRC (dedicated short range communication) technology the Swiss OBU relies on has been (and still is) the most applied system for electronic fee collection, such as for tolls on the motorways in Italy, France, Spain and Portugal as well as for the heavy goods vehicle fee successfully introduced on 1 January 2004 in Austria.

³¹ Up to now, only about 2,000 OBUs have been installed in foreign vehicles.

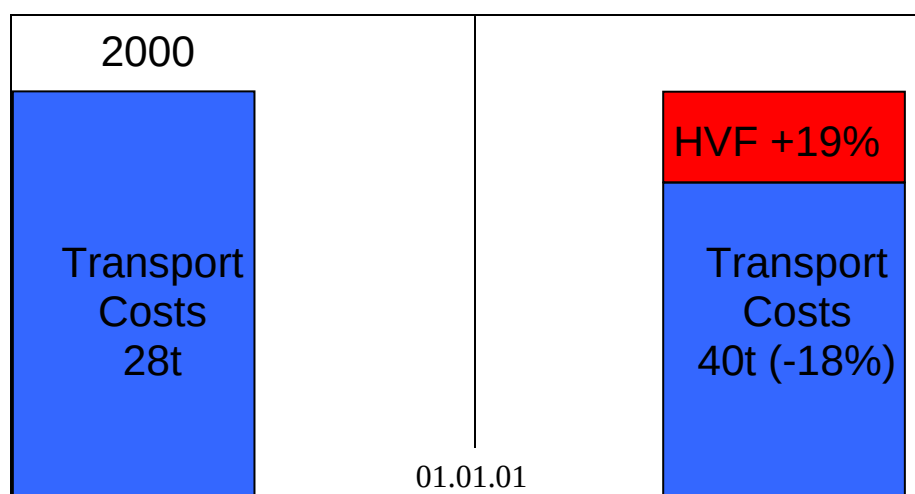
- Throughout the project, a practical solution was given priority. The approach was never technology-driven.
- The Swiss Customs Authority had a long-standing experience in implementing IT and automation projects. Throughout the project there was a good working relationship between the Swiss Customs Authority, the consultants and the industrial suppliers based on clear specifications, fairness and trust.
- The fact, that the fee had been accepted in a popular vote increased its acceptance within the road transport industry. Without the generally good cooperation with this industry a successful introduction of the fee would hardly have been possible.
- It proved to be wise to start the system at the beginning of January: The level of heavy goods transport is very low at this time of the year (especially on 1 January).

8. Economically efficient and environmentally effective

8.1 Preliminary considerations

54. Part of the mandate of this study was to evaluate the economic efficiency and the environmental effectiveness of the fee. Before going into the details of a corresponding analysis, the following facts ought to be considered:

1. Although the HVF was introduced in the context of the situation in transit traffic, it is applied on the whole road network and therefore has an effect on the whole territory of Switzerland.
2. The introduction of the HVF did not only lead to a change of the structure of the fee system, but also of the (average) amount of the fee. On the average, the fee rate per truck is now five times higher than it used to be until 1999 (from 2005, it will be about 8 times higher).
3. Economic efficiency and environmental effectiveness can not be clearly separated. The corresponding effects are therefore presented together (chapter 9.2).
4. The fee was not introduced as an isolated measure, but simultaneously with a change of the weight limit: The consequences of raising the weight limit are ambiguous. On the one hand, it raises the productivity of road transport, which in short term leads to less lorry traffic on the roads. On the other hand, it more or less makes up for the price increase caused by the HVF (see figure below). This is why the costs of road transport remained practically stable overall. This is of importance when analysing the effects of the fee, especially for the road – rail ratio. For this reason, and because the transfer of freight traffic from road to rail has been declared a main objective of the fee, the rail-road ratio will be analysed separately (chapter 9.3). As all effects have to be seen as a result of the interaction between the HVF and the higher weight limit, it is more precise to speak of effects of the new regime instead of effects of the fee alone.

Figure 4. Consequences of lifting the weight limit from 28 to 40 tonnes

The figure shows that the overall gain in productivity of 18% in road transport due to the higher weight limit more or less makes up for the effect of the HVF, which increased the total costs in heavy goods transport by 19%.

8.2 The chain of effects

55. The new regime with a HVF and a higher weight limit led, first of all, to serious changes in the fleet composition and the structure of the road transport sector:

- In the year prior to the introduction of the HVF, sales of heavy goods vehicles increased by 45%. By renovating their fleets, truck owners saved money in two ways: new vehicles belong to the lowest and therefore cheapest emission class and the size (or laden weight) of the trucks in the fleet could be matched better to the actual needs of the market. As regards the second point, two trends have to be distinguished: On the one hand, there was a trend to buy vehicles with a lower maximum permitted laden weight by those haulers who formerly mostly used over-sized vehicles for their average loads (to do so mattered much less under the old regime with the flat fee). On the other hand, those haulers who could make use of the higher weight limit tended to buy heavier vehicles.
- The new system led to a concentration in the hauler industry, either through mergers or through the closure of smaller companies. Larger companies necessarily dispose of highly developed logistic systems. This enables them not only to utilize the best suited (i.e. especially not oversized) vehicle, but also to combine different transport-trips. Thus, empty runs can be avoided, or at least be reduced in distance.

56. The changes in fleet composition and the structure of the road transport industry led to a change of trend in the mileage³² of heavy goods vehicles. Two levels have to be considered separately:

- On the national level, the new traffic regime led to a significant break of the former growth trend: annual increases in mileage of about 7% in the years before the introduction of the fee were replaced by a drop of around 4% in 2001 and of 3% in 2002. In 2003, the number of vehicle-km of heavy goods vehicles remained more or less stable. The decrease observed cannot, or at least

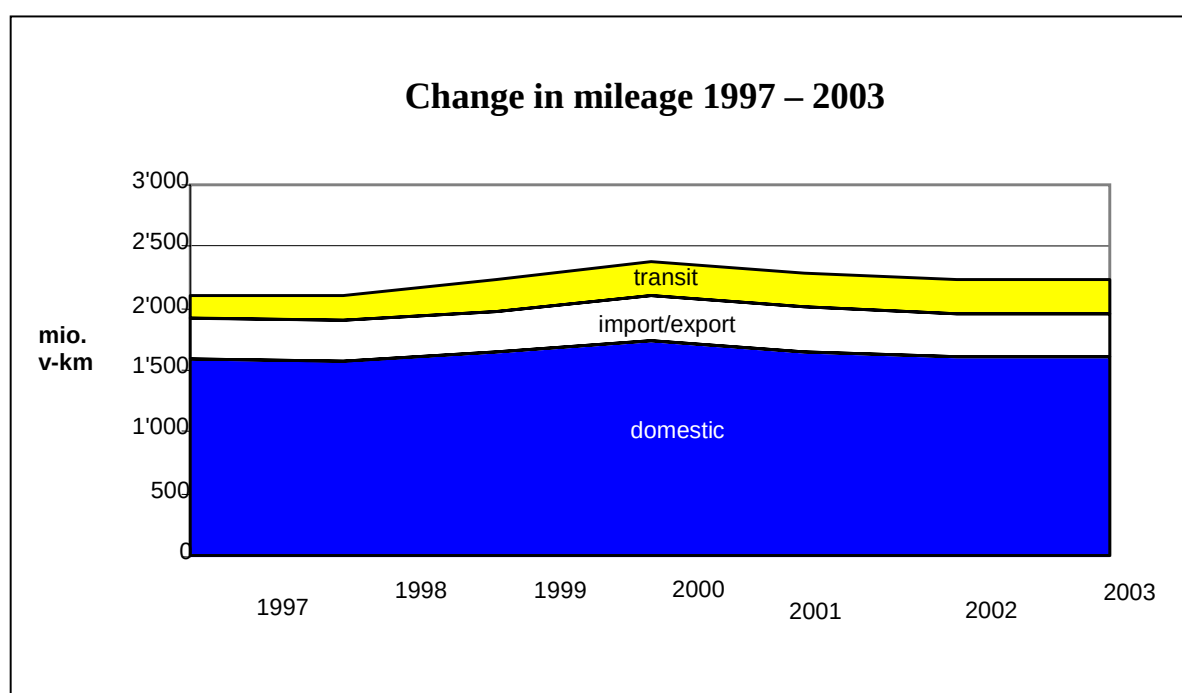
³²

Number of vehicle-km.

not entirely, be attributed to the slowdown of the economy, because it was also recorded in the first half of 2001, when economic growth was still about the same as in previous years.³³

- In transit traffic across the Alps the higher weight limit led to a significant increase of articulated lorries. As this increase was almost outbalanced by a significant decrease in the ratio of lighter lorries, the total number of lorries crossing the Swiss Alps in 2001 was practically stable. After the steady annual increase of about 7% before 2001, this meant a break in trend. In 2002, the number of lorries across the Swiss Alps was even reduced by 9%. As this reduction might mainly be due to the restrictive traffic regulation system introduced after the tragic accident in the St. Gotthard road tunnel on 24 October 2001, this decrease cannot be considered as representative. At present, the number of lorries crossing the Swiss Alps is about 8% lower than in the corresponding periods in 2000, the last year under the old regime.

Figure 5. Mileage in freight transport



After a strong increase between 1997 and 2000, mileage in freight transport (measured in vehicle-km) was reduced remarkably in the years after the introduction of the fee.

57. The development described above proved to be positive for both the economy and the environment:

- The introduction of the polluter-pays principle, inherent to the HVF, relieves the public hand by lowering external costs (e.g. damages caused by air pollution).
- In parallel, due to the reduction of the number of vehicle-km and the renovation of the fleet, external costs themselves were lowered as well. This effect can be illustrated with the help of the example of NO₂, CO₂ and PM 10 emissions (see figure 6). Due to the new regime the emissions

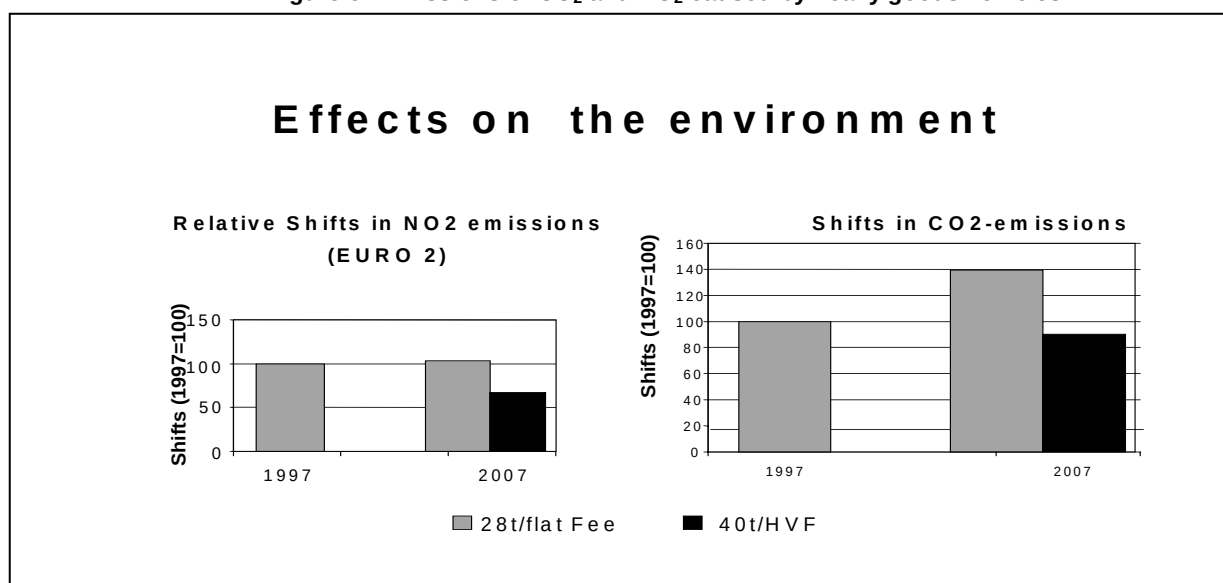
³³

A study on the question which factors influenced the decrease of vehicle-km to what extent is to be carried out in 2004.

of these pollutants (caused by heavy goods vehicles) will be about 6 - 8% lower than they would have been if the old regime had been maintained.³⁴

- For a country like Switzerland with a dense transport infrastructure it is economically interesting to put a break on traffic growth. In this way, expenses for the extension of the road infrastructure can be saved and used for other, more productive investment or for tax breaks.
- The new regime had practically no consequence on the cost of living. According to the federal office for statistics, the gross increase due to the new regime was 0.1% at the most.

Figure 6. Emissions of CO₂ and NO₂ caused by heavy goods vehicles



The graph, calculated by the Swiss Agency for Environment before the introduction of the fee, indicates, that in 2007, the emissions of CO₂, NO₂ and PM₁₀ caused by heavy goods vehicles could be about 6-8% lower with the new regime than they might have been if the old regime (flat fee, no higher weight limit) had been maintained.

58. The economic efficiency of the new regime was improved by the fact that the implementation costs are rather small in relation to the revenue. Implementation and operation of the HVF costs about 40 Million euros a year. This amount includes the costs for research, investment, construction, replacement, operation and staff. In the short term, these 40 million euros correspond to about 8% of the gross revenue of about 500 million euros per year. In the long term, this percentage will even decrease: While the costs remain stable, the revenues will rise considerably due to the increase of the rate. The implementation costs therefore are likely to correspond to 5-6% of the revenue. In most other systems the corresponding ratio varies between 10 and 20% (In Austria, it is estimated to be about 13, in Germany to

³⁴

As the new regime described concerns only a comparatively small part of the vehicle fleet on Swiss roads, its environmental benefit can only be figured out with the help of a model. It was provided by the Swiss Agency for the Environment, Forests and Landscape. Originally, an even stronger reduction had been forecasted. But the following factors limited the positive effects of the new scheme:

- On road, Euro 2 Vehicles emit much more NO_x than in test cycles.
- The shift to heavier vehicles was stronger than expected. It clearly proved that the new regime would lead to remarkable emission reductions, especially in comparison to a status quo scenario with no HVF and a weight limit of 28 tonnes. As the corresponding data is currently being updated it is not yet possible to say to what extent the prognosis shown in figure 6 can be confirmed.

be about 19%). When comparing the very low operation costs of the Swiss system with those of other systems it should be considered that the rate of the fee is rather high.

59. On the whole, the new regime introduced on 1 January 2001 is a good example of how market-based instruments and environmental effectiveness can go hand in hand.

8.3 The road-rail ratio

60. One of the main objectives of the new fee was to encourage haulers to transfer freight transport from road to rail. So far, no general trend in this direction could be recognized. Given what was said above, this is not astonishing: The better competitiveness of rail due to the HVF was outbalanced by increased productivity in road transport caused by the higher weight limit. If railways are to reach a higher market share, they have to improve their productivity as well. With the ongoing construction of new railway infrastructure and the railway reform program (see chapter 2), the necessary framework has been established.

61. There remains the interesting question of what might have happened in the rail sector if the effects of the HVF had not been made up by the effects of the higher weight limit. In this context it is most interesting to know that rail now has a much bigger share in the transport of mineral oil from some Rhine ports to the oil storage sites in central Switzerland than it had before the introduction of the HVF. Though mineral oil is a heavy good it is, at least in the short term, not possible to profit from the higher weight limit in this transport sector for various reasons (e.g. safety regulations and the capacity of road tankers). This example clearly shows the importance of pricing where there is real competition between different modes of transport.

62. The importance of pricing is not the only lesson that can be learnt from the mineral oil example in the road-rail context. Another interesting fact is that this example took place in the short-haul sector where rail is said not to be competitive with the road. Other factors than distance seem to be more decisive for the choice of mode. This seems to be especially true for the factor of reliability, as the following example shows: A retail firm, which originally transported all their goods on the road, has now transferred their shipments to the Ticino (distance of about 200km) to the rail. One of the major arguments for doing so was the better reliability of the rail, due to the difficult situation along the Gotthard road connection. The HVF was important inasmuch as it compensated the gain in productivity of the road due to the higher weight limit. In conclusion, pricing measures can only develop their effects if other conditions for the transfer, like reliability and simple procedures (which is often not the case in international rail transport), are fulfilled.

*... "A transfer of freight from road to rail is therefore not possible without strong additional efforts in the rail sector. Two factors are crucial: The railway sector must realise substantial **gains in productivity** and has to improve its **reliability**. A specific problem to solve are the delays in transnational transports."*³⁵

9. Conclusions

63. Having examined the long journey from the first ideas of realizing a distance-related fee for heavy goods vehicles to the final implementation, one might think that the successful outcome was mainly due to the particular characteristics of the Swiss political system. It is undoubtedly true that the specific features of the Swiss system played an important role:

- without the right to launch a referendum against the EEA bill, Switzerland would have become a member of this area. As a consequence, “economiesuisse” and two major political parties would probably not have supported the campaign in favour of the HVF.
- The same is most probably true for the bargaining power in the negotiations with the EU, the weight limit. This limit – rather questionable from an ecological point of view - would certainly have been given up long ago, if government and parliament had not been conscious of the fact that such a change would have no chance in a referendum.

64. But the influence of the Swiss political system should not be overestimated. Often enough, people's rights have not encouraged progressive ideas, but rather hindered them. Otherwise, the right of women to vote would not have been delayed until the early seventies of the last century! If one looks closer, one will soon realize that the real reasons for the acceptance of the fee are valid in general. In the context of the HVF, these reasons can be summarized and put in order as follows:

First stage: Recognize the problem

65. In the Swiss case, the decisive factor for finding a solution was the situation regarding transit traffic, where the opening of the St. Gotthard road tunnel had triggered an enormous growth in transit traffic, leading to strong reactions on the political level. In the London case (as well as in many others), the decisive factor favouring the charge was the huge volume of traffic in the city centre. In other cases, it was the need for financial resources for the building of transport infrastructure. In all cases, there is a traffic problem that needs to be solved.

Second stage: Find a plausible solution

66. The authority in charge has to offer a solution that is understood as suitable for solving the problem. In Switzerland it was the package of measures considered by the majority as suitable for achieving the goals the country was aiming for and in which the Fee played a central role.

Third stage: Make correct use of the revenue

67. The proposed method of using the revenue is part of the solution and therefore crucial for the success of the whole project. The safest way to scupper a road pricing project is to design the revenue for the treasuries of the state. The acceptance of the fee can be increased decisively if the revenue is used for transport matters. It is interesting that there seems to be no problem if the revenue of one transport mode is used to improve another. This finding complies with the experience of the London Charge³⁶ as well as the findings of the PRIMA³⁷ project.

Fourth stage: Keep it simple

68. For a successful implementation it is essential to stick to a simple solution and to select an experienced and committed operator:

³⁶ The revenue derived from the London charge is used mainly to improve public transport.

³⁷ PRIMA was a research project of the European Union on PRicing Measures Acceptance (therefore the name), see bibliography.

- *Simple solution:* As can be learned from the Singapore case³⁸, it is always possible to shift to more sophisticated solutions later on (for instance different tariffs according to the time of the day) once the system has been implemented successfully. Just make sure at the beginning that you do not set up a system which cannot be developed in a direction in which you might later like to move.
- *Experienced and committed operator:* In Switzerland, the strong commitment of the Customs Authority has led to highly usable processes and a practical technological implementation. The tight time schedule could only be met by limiting the system to the needs of this one operator, i.e. to fee collection, and not to include value added services.

Fifth stage: Seize the opportunity

69. Nothing can be learned better from the Swiss case than the importance of seizing the right moment for pushing through a delicate project on the political agenda, i.e. when the circumstances are favourable. But it is essential to have done the necessary basic work when the window of opportunity is open. Considering that on the one hand the number of vehicle kilometres is (in total, i.e. including passenger cars) still increasing steadily and that on the other hand the necessary resources for building a new infrastructure are getting more and more scarce it is simply wise to do this basic work now.

10. Final remark

70. The positive experiences with the Swiss HVF show that road pricing is a suitable means of managing transport demand. But it also shows that the possibilities it offers are limited. This is especially true for the transfer of goods from road to rail, a specific aim of the Swiss policy in freight transport. If the obstacles hindering international rail freight are not overcome, this policy will not be successful.

³⁸

In 1975, Singapore started with an Area licensing scheme, charging cars during the morning peak-time. In the years to follow, the system was continuously extended to additional vehicle categories and additional times of day. In addition to the Area Licensing Scheme, a Road Pricing Scheme was implemented progressively on the expressways from 1995 onwards. Both the ALS and the RPS were manual road pricing schemes which required the motorists to purchase paper licenses prior to their passage through control points set up on the roads. In 1998, both the ALS and RPS were replaced by an electronic version called the Electronic Road Pricing System (ERP) based on a Dedicated Short-Range Communication electronic system. Different In-vehicle Units were used for different classes of vehicles. When the vehicle passes under the ERP gantry, the appropriate charges are deducted from the smart card. The ERP system enables more frequent changes to the road pricing charges so that road usage can be optimised. The ERP system has enabled a finer graduation in rates e.g. currently for 2 types of roads: those in the Central Business District and expressways.

ANNEX 1. SETTING THE RATE

The amount of the overall fee to be paid depends directly of the level of the rate. Setting the rate is therefore particularly delicate and needs to be carefully substantiated. In the Swiss case this was all the more true for the following two reasons:

- to make up for the consequences of an increased weight limit it had to be high enough;
- the fee would be payable for the use of all roads.

It seems therefore worthwhile to describe in detail the step-by-step process of how the rate for the Swiss HVF was set. The underlying idea was that heavy goods transport should pay for all the costs it generates.

First step: Summarizing the uncovered Costs of Heavy Goods Traffic

In a first step, the uncovered costs of heavy goods traffic were summarized. This included on one hand the uncovered road costs, on the other hand the external costs caused by heavy goods vehicles. As the road costs were covered almost entirely by the users (mainly by fuel excise duties) the uncovered costs in this area amounted to only 10 million euros in this domain. In order to calculate the external costs, the Swiss Transport Ministry commissioned wide-ranging studies. These concentrated primarily on three areas of a significant size and that can easily be given a monetary value: health costs and damage to buildings caused by air pollution, the external costs of noise and the external costs of accidents (as the costs of accidents are mainly covered by insurance, the uncovered costs in this domain were relatively low). Altogether, the estimated external costs amount to 650 million euros. Non-considered costs comprised the damage caused by congestion and the greenhouse effect. Add to this the uncovered road costs and the amount to replace the flat fee, which was abolished in parallel to the introduction of the distance-related fee. The total of the uncovered costs caused by heavy vehicles therefore amounts to 750 million euros (see figure below). The calculations use 1993 as baseline year; the data is currently being updated.

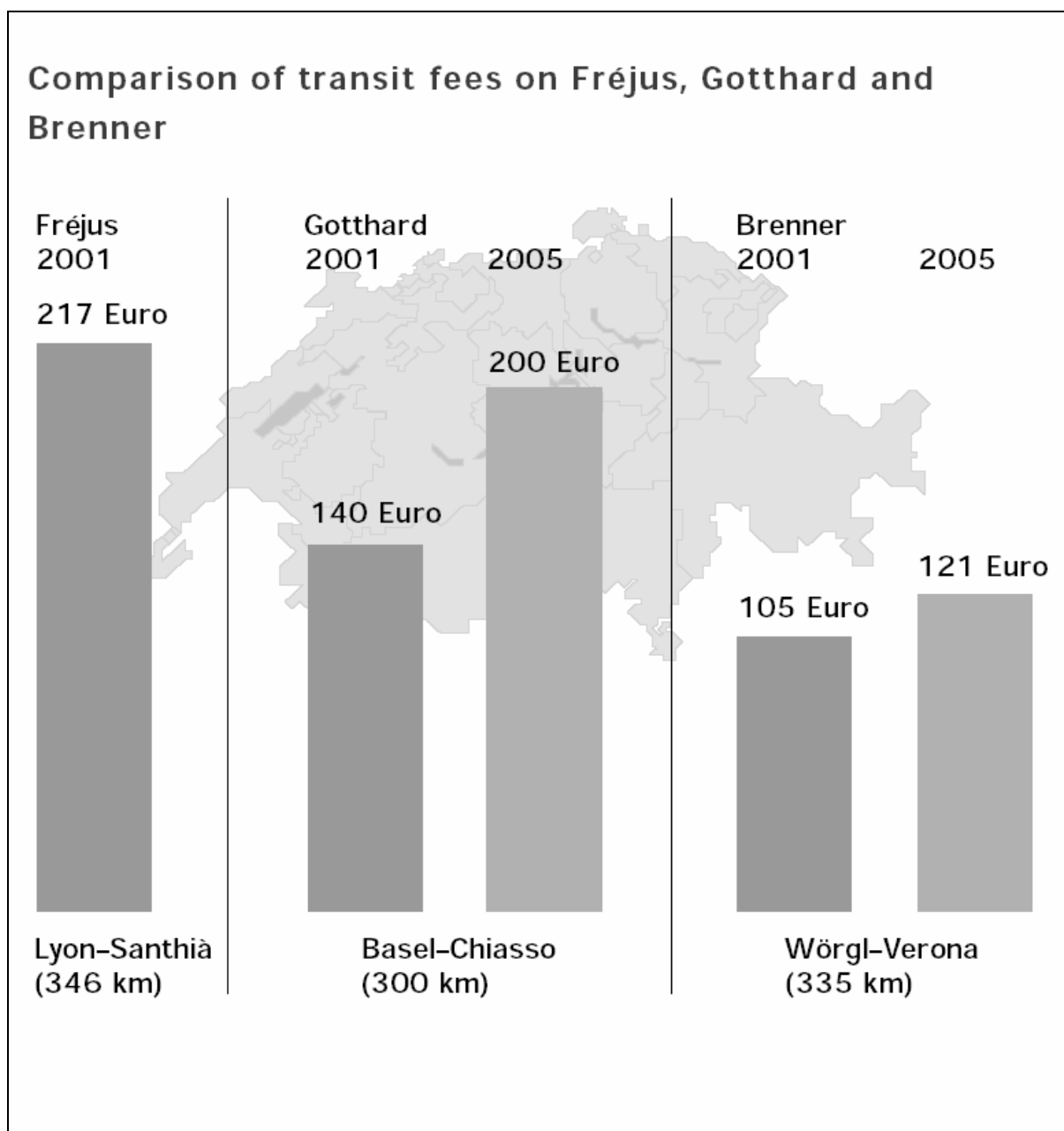
Second step: Calculation of the total transport performance

In a second step, the total transport performance (number of tonne-kilometres /tkm) had to be calculated. First, the corresponding performance for each weight category was calculated. These figures were then multiplied by the average laden weight in each category. For all classes combined, this gave the figure of 47 billion tonne-kilometres.

Third step: Fixing the rate

Dividing the uncovered costs of 750 million euros (as calculated in the first step) by the total transport performance in tkm (calculated in the second step) gives a value of 1.6 cents per tkm. This rate had to be brought in line with the result of the negotiations of the EU, where the setting of the charge level had been calculated using a different approach. After long and controversial discussions, the two partners agreed finally to the following compromise: The basis for the calculation was to be a transit trip from Basel to Chiasso with an assumed average distance of 300 km. For this journey a transit price of €200 (for a 40-tonne vehicle) was agreed. This amount is equal to a (maximum) rate of 1.8 cents. The outcome of the

deal with the EU has to be seen not only in the light of the Swiss calculations but also that of the charging levels in the neighbouring countries of Austria and France. As the figure below shows, the deal did not allow to Switzerland to ask for an exaggerated charge, but to reach a comparable level. The real difference from charging in other countries therefore is that Switzerland charges for the use of all roads.



The figure shows the transit fees through Switzerland (Basel-Chiasso) and on two comparable transalpine routes abroad (Lyon-Sanathià and Wörgl-Verona). The figure given for a 40t lorry is an average fee which can vary according to time of day, emissions etc.

Considering the fact that such a rate meant a huge increase (the average burden due to the former flat fee was about 0.2 cents), it was agreed with the EU to introduce the new fee in several steps and in parallel with the increase in the weight limit (see chapter 6.2 of the main text):

- 01.01.01 Introduction of the HVF at a rate of 1.0 ct/tkm for a vehicle in category 2. Simultaneous increase of the weight limit from 28 to 34 tonnes.
- 01.01.05 Increase of the rate from 1.0 to 1.6 ct/tkm and of the weight limit from 34 to 40 tonnes.
- Ca. 2007: Increase of the rate to 1.8 ct/tkm.

Fourth step: Varying the rate

To meet the requirement of differentiating the Fee according to the emissions, the vehicles were put into three categories according to their emission standards. The rates of the fee quoted above are average mean values, applying to the middle of the three emission classes. As the Land Transport Agreement limits the maximum difference between one category and the next to 15%, the following values are applicable (for the years 2001 to 2004):

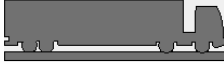
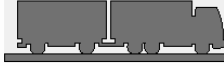
- Fee category 1 (corresponds to emission class Euro 0): 1.15 ct/tkm
- Fee category 2 (corresponds to Euro 1): 1.0 ct/tkm
- Fee category 3 (corresponds to Euro 2 and better): 0.85ct/tkm

As these rates refer to tonne-kilometres³⁹, the fee can now be calculated by multiplying the rate by the distance travelled in Switzerland and the maximum permitted laden weight of vehicle and trailer. The diagram below gives several examples (tariff level in Swiss Cents).

³⁹

The rate per t-km does not vary according to daytime, road type and different geographical locations.

Examples of the calculation of the fee (2001–2004)

tariff level in centimes ¹				kilometres travelled in Switzerland		truck and trailer ²		Fee in CHF
1	2	3						
2,00			X	300	X	Without trailer 	x 18 t	108,-
	1,68		X	300	X	truck and trailer 	x 30 t	151,20
	1,68		X	300	X	articulated lorry ⁴ 	x 30 t	151,20
		1,42	X	300	X	truck and trailer 37 t 	x 34 t ³	144,84

1) = tariff per tonne and kilometre (tkm)
 Level 1 = emission category 1 (corresponds to EURO 0)
 Level 2 = emission category 2 (corresponds to EURO I)
 Level 3 = emission category 3 (corresponds to EURO II/III)

2) = maximum permitted weight according to the vehicle registration documents. In case of trailers and other combined vehicles the total of the weights are added.

4) = separately matriculated articles: net weight articulated lorry and relevant weight of the trailer respectively.

3) = the national weight limit is since 2001 34t (and consequently this figure applies to the fee levied).

Some vehicles (e.g. coaches) are charged at the bases of flat rates.

Source: SCA

ANNEX 2. COMPLIANCE WITH MARGINAL COST PRICING PRINCIPLES

As it can be seen from the explanations in annex 1, the approach chosen for setting the charge level does not correspond with a number of requirements of marginal cost pricing principles. In this context it should be considered that some simplification of marginal costs into categories is always going to be necessary to derive a charging system in practice. Stephan Suter and Felix Walter from the Ecoplan office (an Economic Research and Policy Consultancy which was in charge of the economical design of the HVF), argued as follows in favour of the Swiss solution:

“...we analyzed the HVF along a narrow pricing or internalisation approach. The strong and pure foundation on neoclassical welfare economics of pricing in transport is not uncontested. Some authors claim, ”that there should be the possibility left to put an internalisation strategy into a broader context of policy goals and strategies than is presented by the narrow fairness/efficiency philosophy behind neoclassic” (Rothengatter in Christensen et al., 1998). Policy goals of internalisation can then be

- optimal use of existing capacity
- abolition of subsidies that are not justified by public good characteristics of the transport system
- allocation of the costs to the agent who is responsible for their production (polluter-pays principle)
- achievement of defined long term environmental/safety quality standards
- better balance of regional development
- better balance of social development
- development of new markets and new technology with lower consumption of natural resources

Without going into detail it is obvious that the HVF is very suitable to contribute to some of these objectives and shows advantages compared to a fuel taxation. It is in this light that, according to our view, the HVF should be judged.”⁴⁰

It should be noticed that a better consideration of social marginal cost pricing principles such as a variation of the fee according to daytime or to road type has not only political, but also technical limits. A first and indispensable step towards implementing social marginal costs would be to oblige vehicles to install an OBU. With such a first step, a variation according to daytime should be feasible. The same is not necessarily true for a variation of the fee according to road type. If such a variation has to include the

⁴⁰ Environmental Pricing – Theory and Practice – The Swiss Policy of Heavy Vehicle Taxation, see bibliography.

whole road network, as it is the case in Switzerland (and planned in Sweden and the UK) it will be possible only if the OBU includes both an updated electronic road map and, in parallel, a precise and a 100% reliable positioning system. For these reasons and due to a lack of corresponding political pressure other issues like a good interoperability with the charging systems in the neighbouring countries are of higher priority. It should be noticed however that the Swiss approach of charging all roads is certainly a solution much closer to social marginal cost pricing principles than the charging of motorways alone.

One specific approach to a better consideration of social marginal cost pricing would, however, be possible with the existing Swiss system: The charging system has been designed to incorporate an Alpine Transit Tax (ATT) at a later stage so as to have the possibility of managing transit traffic in particular. The ATT would be charged for passages of heavy goods vehicles on the major alpine routes, and the tariff could be varied according to route (road type), time of day, congestion levels or any other parameter which is applicable for a passage fee. Both Swiss Electronic Fee Collection schemes with and without OBU allow the collection of such additional passage fees.

ANNEX 3. HISTORY OF ORIGINS

1972	Setting up of a commission to elaborate an integral transport concept for Switzerland
1977	Commission proposes a special tax for heavy roads transport linked to transport performance
1985	Introduction of a flat fee for heavy goods vehicles
1986	Initiative for a performance related HVF rejected
1988	Coordinated transport policy rejected
1992	Project for two new rail tunnels across the Alps accepted
1992	Refusal to join the EEA
1994	Constitutional bases for a distance-related HVF accepted
	Alpine Initiative, demanding a transfer of transit traffic from road to rail, accepted
1998	Law for a distance-related fee accepted
2001	Introduction of the distance-related HVF at an average rate of 1.0 ct t/km, in parallel raise of weight limit from 28 to 34 tonnes
2005	Raise (envisaged) of the average rate to 1.6 ct t/km, in parallel to a raise of the weight limit to 40 tonnes

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**Manure Policy and MINAS:
Regulating Nitrogen and Phosphorus Surpluses
in Agriculture of the Netherlands**



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MANURE POLICY AND MINAS: REGULATING NITROGEN AND PHOSPHORUS SURPLUSES IN AGRICULTURE OF THE NETHERLANDS

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FOREWORD

This report has been prepared as part of the work programme of the Joint Meetings of Tax and Environment Experts under OECD's Fiscal Affairs Committee and Environment Policy Committee. It was prepared by Oene Oenema and Paul B.M. Berentsen of Wageningen University and Research Center.¹ Similar case studies on how the political obstacles to the introduction of economic instruments for environmental policy with potentially negative impacts on sectoral competitiveness have been overcome have been prepared concerning the Heavy Goods Vehicle fee in Switzerland and Climate Change Levy in United Kingdom. A similar study on the taxation of fuels used in domestic commercial aviation in Norway will be prepared in 2005.

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MANURE POLICY AND MINAS: REGULATING NITROGEN AND PHOSPHORUS SURPLUSES IN AGRICULTURE OF THE NETHERLANDS

EXECUTIVE SUMMARY

Environmental policies in agriculture have economic consequences.

Agriculture in Europe and especially in the Netherlands is increasingly affected by environmental policies and measures. The effectiveness of these environmental policies and measures in agriculture is still limited, while the economic cost associated with the implementation of environmental policy can be high. More than 10 years after approval of the EU Nitrates Directive (91/676/EEC), there is a delay in the implementation and enforcement in many member states, which reflects in part the large complications that arise from this Directive for intensive livestock farming. It also reflects that environmental policies in agriculture have economic consequences.

The nitrogen and phosphorous accounting system MINAS marks a shift towards use of economic incentives.

This report deals with the manure policy in The Netherlands, with a special focus on the effectiveness and efficiency of the economic instrument MINAS. The manure policy of the Netherlands is a complex policy that addresses a stubborn and complicated problem. The manure policy has a history of almost 20 years of changes, successes and failures. The nitrogen (N) and phosphorous (P) accounting system MINAS implemented at farm level in 1998 has been the core instrument of the third phase of the manure policy, and marks a shift in the manure policy from regulations and measure-oriented policies in the first and second phases between 1984 and 1998 towards target-oriented policies with stimulations via economic incentives. MINAS was intended to be also the main instruments to implement the EU Nitrates Directive.

The effectiveness of MINAS has varied between farm types.

Monitoring results indicate that the N and P accounting system MINAS is an effective policy for decreasing total nutrient losses from especially dairy farms. Potentially, it could be also an effective instrument for arable farms, but there is no clear evidence yet. MINAS has turned out to be not effective and efficient for pig and poultry farmers.

Additional instruments have been implemented to support MINAS.

Though MINAS is an integrated and flexible instrument and in principle applicable to all farms, the differences between sectors are so large and the complexity of the manure problem is so big that the results so far indicate that a single instrument like MINAS cannot solve the manure problem at once. As a consequence, additional instruments have been implemented to support MINAS, but not all these additional instruments appeared to be effective and supportive. There have been also quite some changes in MINAS and the additional manure policy instruments between 1998 and 2004, which often led to confusion and disbelief among farmers (and policy makers), which further complicated effectiveness and efficiency of these instruments.

Administrative costs have been high.

The economic costs for enforcement and monitoring of MINAS and other instruments have been increasing greatly over the last few years. The high cost for administration is in part caused by exploitation of loopholes, fraud, juridical procedures, and by the many changes that have been made in the MINAS system and in the additional policy instruments. Due to these many changes, there has been insufficient time for proper implementation and fine-tuning of MINAS in practice. As such, MINAS has not received the credits that it would deserve as an instrument to decrease nutrient losses from agriculture

MINAS will be replaced by application limits for animal manure and fertilizers.

A judgement of the European Court, the increasing administrative burden, increasing fraud, and the near absence of environmental benefits in the pig and poultry sectors (where manure surpluses are largest) have led to a very rapid erosion of MINAS. By the end of 2005, MINAS will be replaced by a (complex) system of application limits for animal manure and fertilizers, in compliance with the Nitrates Directive. It remains to be seen whether such a system is equally effective and efficient for dairy farms, arable farms and pig and poultry farms.

For more information about the **MANURE POLICY AND MINAS: REGULATING NITROGEN AND PHOSPHORUS SURPLUSES IN AGRICULTURE OF THE NETHERLANDS**, contact: Nils Axel Braathen, National Policies Division, Environment Directorate, OECD. Email – Nils-Axel.Braathen@oecd.org; Fax : +33 1 44 30 63 99.

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MANURE POLICY AND MINAS: REGULATING NITROGEN AND PHOSPHORUS SURPLUSES IN AGRICULTURE OF THE NETHERLANDS

1. Introduction

1. Agriculture exerts various effects on the wider environment. Until recently, these effects were considered to be beneficial, or were simply ignored. This general perception changed from the 1970s onwards, when the effects became more pregnant, following the large-scale intensification of agricultural production in developed countries, and were better understood through the advancement of science. Current perception is that especially intensive agriculture has various negative effects on the environment. Forecasts suggest that further intensification of global agricultural production using current technologies may even have dramatic effects on the wider environment during the next decades (e.g. Tilman et al., 2001; 2002). Main problems arise from excess nitrogen (N) and phosphorus (P) originating from animal manure and fertilizers, which contribute to eutrophication of natural areas, to contamination of groundwater, to acidification of soils and lakes and to the emission of the greenhouse gases (N₂O) into the atmosphere (e.g. Vitousek et al., 1997; Tilman et al., 2001; Robertson et al., 2000).

2. The first environmental policies and measures regulating the use of animal manure and fertilizers date from the 1980s. These governmental policies and measures were most pronounced in the European Union (EU), in particular in The Netherlands (e.g., De Walle and Sevenster, 1998; De Clercq et al., 2001). Nowadays, all farmers in EU are confronted with an increasing number of regulations and incentives, to transform current farming practices into more environmental friendly farming practices.

3. This paper discusses the manure policy in the Netherlands with emphasis on the N and P accounting system MINAS. MINAS was introduced by the Netherlands' government in 1998, to step-wise decrease the N and P surpluses at farm level in 5 to 10 years to environmental acceptable levels (e.g. Henkens and Van Keulen, 2001). Individual farms that exceed certain levy-free surpluses for N and P (expressed in kg per ha per year) are charged with a financial levy, so as to encourage farmers to decrease the N and P surpluses. Whilst the use of nutrient balances in agricultural research has a history of at least one century, using nutrient balances with levies on surpluses as an instrument to ecologically transform agriculture had no precedent.

4. Though the manure policy greatly affects agriculture in the Netherlands, it would be naïve to ascribe all changes in agriculture to the manure policy and all effects of the manure policy to MINAS. Agriculture in the Netherlands is heavily influenced by changes in the (export) markets for agricultural products in general and by (the reforms of) the common agricultural policy (CAP) of the EU in particular. This complicates assessment of the effects of the manure policy in general and those of MINAS in particular

5. The first two chapters of this paper provide background information about the development of agriculture and about the development of the so-called manure policy in the Netherlands, respectively. Chapter 4 discusses the environmental and economic effects of the manure policy, based primarily on two recent fact-finding studies (RIVM, 2002; 2004). Finally, Chapter 5 contains the discussion and summarizes the major conclusions.

2. Developments in agricultural in the Netherlands

2.1 Site description

6. The Netherlands (NL) is situated along the North Sea in the western deltas of the rivers Rhine, Meuse and Scheldt and the northern delta of the Ems. The surface area of the Netherlands (34,000 km²) is much smaller than that of the river basins of the Rhine (185,000 km²), Meuse (36,000 km²), Scheldt (22,000 km²) and Ems (85,000 km²). All four river basins are densely populated (100-450 inhabitants per km²), industrialized and have intensively managed agriculture. As a consequence, N and P discharges into the North Sea by the rivers Rhine (255 million kg N and 4 million kg P), Meuse (40 million kg N and 2 million kg P), Scheldt (39 N and 3 million kg P) and Ems (about 80 million kg N and 3 million kg P) are relatively large and together with the discharges from NL itself, greatly affect surface water quality in the deltas and North Sea.

7. About 60% of the total surface area of NL is agricultural land, 15 % surface waters, 15 % urban and infra-structural area and 10% natural area (forests, heath land, wetlands). Surface waters (lakes, canals, ditches and rivers) are diffusely distributed predominantly in the northern and western half of the country, which is below mean sea level. Natural areas (forests, pools, heath land) are found predominantly in the central, southern and eastern half of the country, which is above sea level. The northern and western half is characterized by clay and peat soils, with shallow groundwater levels (0.2-1.0 m below surface level). The central, southern and eastern half is characterized by sand and löss soils, with shallow to relatively deep groundwater level (1-10 m below surface level).

8. The northern and western clay soils are predominantly used for arable land (potatoes, sugar beet, cereals, flowers, vegetables) and dairy farming (using mainly grass as forage). Peat soils are predominantly used for dairy farming and some for ornamental culture (tree nurseries). The central, southern and eastern sand and löss soils are predominantly used for dairy farming (with grass and silage maize as forage crops). Also intensive animal production (pigs and poultry farms) is found in these areas.

9. Current agriculture in NL is highly intensive and productive. In monetary terms, it ranks among the first in the world as net exporter of agricultural products. Yields of potatoes, sugar beet, vegetables, cereals and flowers in NL agriculture are among the highest in the world. Livestock density, animal manure production, and fertilizer use are among the highest of all member states in the EU (Table 1; Figure 1). The average total amounts of N (corrected for ammonia losses) applied to agricultural land in the EU in 1997 via animal manure and fertilizers ranged from about 85 kg per ha in Austria to about 360 kg per ha in NL. Similarly, the average total amounts of P applied to agricultural land in 1997 via animal manure and fertilizers ranged from 31 kg per ha in Austria to 120 kg per ha in NL. The average N surplus in the EU-15 was 57 kg per ha in 1997, ranging from 30 kg per ha in Greece to 249 kg per ha in NL. There is strong correlation between livestock density, N fertilizer input and N surplus per ha; countries with the highest livestock density also have the highest N fertilizer input and highest N surplus on the soil surface balance (Figure 1). Correlation coefficients for linear relationships between fertilizer N, manure N and N surplus in the EU-15 range between 0.8 and 0.9.

10. Key factors for the intensification of agricultural production in NL were (Bieleman, 2000): (i) The geographical position of NL, between densely populated areas; (ii) The governmental policy, strongly supporting a competitive agriculture; (iii) Intricate relationships between agricultural research, education and extension; (iv) A strong agribusiness, with an innovative supplying and processing industry; (v) Abundance of cheap natural gas, supporting fertilizer manufacture and greenhouse horticulture and floriculture; and (vi) The foundation of the EU which greatly enlarged the markets and supported the intensification of agricultural production. A brief historic overview of the agricultural developments during

the last one and a half century further may help to understand the background of the intensification of agriculture in NL further (after Oenema et al. in preparation).

2.2 *From traditional to modern farming (1850-1950)*

11. The industrial revolution, developments in technology and markets, and governmental interference contributed to fundamental changes in agriculture and in the relationship between agriculture, nature and society of industrializing countries in the second half of the 19th century and first half of the 20th century. Availability of energy from fossil fuel, and scientific breakthroughs in technology, transport, plant nutrition and crop and animal husbandry increased agricultural production and contributed to enlarging of markets (e.g. Slicher van Bath, 1960; Van Zanden, 1985; Bieleman, 1992; Smil, 1994). These breakthroughs among others led to a flood of arable products from America and Eastern Europe on Western European markets. This dropped the prices for agricultural products and led to the agricultural crisis of the 1880's (e.g. Dovring, 1965). In response to these developments, the Dutch government for the first time started to systematically stimulate agricultural research and education, and introduced a market and price policy that focused on improving the structure of and productivity in agriculture and on enlarging the export of agricultural products. The government also stimulated reclamation of the remaining natural areas and common grounds, mainly heath land on poor soils, drainage of swamps, and the reclamation of new land from sea and lakes. The treaty on land exchange from 1924 facilitated the change from a patchy and highly diversified landscape into a more uniform landscape with larger fields, so as to farm more economically. All these governmental incentives increased productivity in agriculture, but it also led to the impoverishment of the rural landscape. A small group of people who considered these changes as highly negative to nature and humanity founded the private nature conservation society "Natuurmonumenten" in 1905. This is now the largest foundation and the largest landowner of The Netherlands.

12. In the beginning of the 20th century, farmers started to organize themselves via interest groups and co-operatives, for example for processing milk into butter and cheese, for breeding improved varieties of potatoes, cereals and sugar beet, and for breeding improved dairy cattle. This improved the yield, quality and marketing of the products.

13. Between 1850 and 1950, total population in The Netherlands increased exponentially from 3.0 to 10 million and population density increased from 100 to 300 inhabitants per km². The percentage of the labour force employed by agriculture decreased from 50% in 1800 to 44% in 1850 to 20% in 1950. However, the total number of people working in agriculture steadily rose from 0.4 million in 1800 to 0.5 million in 1850 and peaked at 0.75 million in 1947. The total number of farms steadily increased from about 130,000 in 1800 to 160,000 in 1880 and 235,000 in 1930. Especially the number of small farms increased up to 1930, but decreased thereafter. The increase in number of farms was made possible by the increase of agricultural land through reclamation of natural and common areas (see Table 2), and through splitting the farm in two or more farms. The area of cereals and cash crops (flax, rapeseed and madder) remained more or less stable, but the area of potatoes, sugar beet and grassland increased. Productivity per unit of land increased as a result of improved management, a change in crops and varieties, and the increased use of fertilizers (e.g. Table 2). Yields of crops doubled between 1850 and 1950, but the strongest increase occurred during the second half of this period, coinciding with the increased use of fertilizers (Table 2). However, most farmers did not benefit from the increased productivity, and remained poor.

2.3 *From modern to highly intensive farming (1950-1985)*

14. With two World Wars, a serious economic crisis and regular food shortages in mind, there were strong feelings and incentives in European countries after World War II to stimulate the economy and to

boost industrial and agricultural productivity. The establishment of the European Economic Community (EEC; later European Union, EU) in 1957 ensued from these general feelings. At that time, Western Europe was a net importer of food, and understandably, the Common Agricultural Policy (CAP) of the EU was strongly focused on stimulating agricultural production and stabilizing markets. Within a couple of decades, CAP indeed changed the EU from a net importer to a net exporter of food. Initially, these food surpluses were regarded as pleasant, but because of the price support, the surpluses became a financial burden.

15. The Netherlands is one of the six initial members of the EEC, and its agriculture has benefited from the CAP. The focus on food security and the establishment of common markets within the EU contributed strongly to intensification, specialization and increase in scale of agricultural production. Price support of cereals and butter provided farmers financial security and stimulated production. Subsidies provided incentives to farmers for land reclamation and land exchange, for building new stables and for buying machinery, so as to increase the competitiveness of the agricultural sector. Technological innovations contributed to increases in production. The demand for labourers by industry and services, and the pressure to work hard for relatively low incomes in agriculture stimulated the exodus of labour force from agriculture, firstly of contracted labourers, then assisting family and finally farmers themselves.

16. Changes in agriculture were most intense in the period 1960-1985 (Table 3). In this period, the production of crop and especially animal products increased strongly. The increasing agricultural production was only for a small part for inland consumption. By far the major part of the agricultural production was exported. The export market appeared to be economically attractive, especially for animal products, flowers and some vegetables. The ample availability of natural gas following the discovery in the province Groningen in the 1950's, and its supply to greenhouse farmers at reduced price boosted greenhouse horticulture and floriculture. The surface area of greenhouse s increased from 3,000 ha unheated and non-illuminated greenhouse s in 1950 to 10,000 ha heated and illuminated greenhouse s in 1980 (and to 16,000 ha in 2000). Because of this increase in production, and the high-market value of vegetables and flowers (mainly for export), the greenhouse sector became an important economic sector. The other side of the coin was that the greenhouse sector became a highly energy-intensive sector, consuming more than 80% of the fossil energy used in agriculture in The Netherlands.

17. The large increase in animal production was made possible through the fertilizer induced boost in animal feed production (mainly grass and silage maize) and through the large-scale import of cheap animal feed stuff from outside the EU, which was not prohibited by EU-tariffs. These changes led in part to uncoupling of crop production and animal production; animal production was not limited anymore by the local agricultural surface area and its crop production. Increases of scale, intensification and specialization were greatly facilitated by suppliers of animal feed, fertilizers, machinery and finance, and by the processing industry. They have greatly contributed to the economic strength of the agro-complex. The economic added value by of agribusiness has become three to four times as large as that of the primary producers.

18. However, the rapid increase of productivity and increased production volume surpassed the increasing demand for food by the growing population from the seventies onwards. This led to food surpluses and, consequently to decreasing prices for agricultural products that were not supported by the EU. The pleasure of food surpluses from food security point of view transformed into a financial burden because of vast surpluses of price-supported cereals and milk. This threatened the economic position of the EU. Further, the increasing animal density produced increasing amounts of animal manure, and the area of land needed for the recycling of the nutrients contained in the animal manure in an environmentally benign manner became insufficient. This led to a surplus of animal manure which threatened the environment. As a result, farmers were in danger to become ruined by their own success. The burden of both type of surpluses changed the position of the agricultural community in the society. The cost to the EU of getting

rid of the surpluses of butter and cereals increased dramatically. Surpluses of animal manure were associated with phosphorus saturated soils, forest dieback due to ammonia volatilization, nitrate contaminated groundwater, and eutrophication of lakes and seas. These developments fuelled the establishment of green action groups, which put increasing pressure on the government to take actions. Farmers were blamed for both pocketing subsidies and being environmental criminals (Krielaars, 1965; Bloemendaal, 1995; Lowe and Ward, 1997).

2.4 *From highly intensive farming to regulated farming (1985 to present)*

19. Increased awareness of environmental impacts of intensification of agricultural production, and of the relationships between the Common Agricultural Policy in the EU and surpluses of milk and cereals, drastically changed the agricultural policies of EU and The Netherlands from the mid 1980's onwards (e.g. Brouwer and Lowe, 1998). Marketable quotas of milk, sugar and starch potatoes, and marketable production rights for pigs and poultry based on the amounts of phosphate excreted via animal manure were implemented from 1984 onwards and greatly decreased the degrees of freedom for agricultural entrepreneurs (see also chapter 3). Decreases in the price support of cereals and milk, implementation of set-aside subsidies, and policies and measures on the application of animal manure and of chemical crop protection further restricted farming possibilities. Agreements between government and greenhouse farmers focused on a step-wise increase in energy use efficiency by up to 80% in the greenhouse sector. All these governmental policies were meant to set limits to emissions of ammonia, nitrogen, phosphorus, odors, heavy metals and chemicals into the wider environment. Codes of good agricultural practices and best management practices were developed and farmers were trained and encouraged to implement these in practice.

20. Effects of milk quota and policies on animal manure and fertilizers are noticeable through decreases in animal number and in the use of N and P fertilizers (Table 3). The number of dairy cows decreased from 1985 onwards. The number of pigs started to decrease from the end of the 1990's, because of the outbreak of classical swine fever and the buy-out of pig production rights by the government. The number of poultry continued to increase until poultry production rights were established in 2002, followed by a buy-out of poultry production rights by the government (see also chapter 3.6). The implementation (from 1998 onwards) of the N and P accounting system MINAS with levies on environmentally unacceptable high surpluses at farm level, forced farmers to lower the input of N and P via fertilizers, animal feed or animal manure, and to increase the N and P use efficiency. As a result, N and P surpluses in agriculture decreased.

21. In 1999, there were some 100,000 farm holdings left (Table 4). The dairy sector still used more than 50% of the agricultural land. Farms with the largest surface area were found in arable farming, while the smallest area per farm was in greenhouse horticulture and floriculture. In the 1990's the number of farms decreased at a rate of about 3% per year (CBS/LEI, 2000), while the total surface area of agricultural land decreased by 0.3 to 0.5% per year. This indicates that the average size of farms increased steadily.

3. *Developments in manure policy in the Netherlands*

3.1 *Too much of a good thing*

22. First signals that the rapid intensification of animal agriculture was not environmentally sustainable date from the end of the 1960s. However, the cause - effect relationships were initially not clear. From the beginning of the Industrial Revolution, the country-side was seen as natural and healthy compared to industrialized urban areas, and agriculture was seen as the country-side. This view changed slowly upon the appearance of an increasing number of reports about nitrate leaching to groundwater, copper accumulation in pig slurry treated soils, phosphorus saturated soils, surface water eutrophication by

N and P from agriculture, and soil acidification and suggested forest dieback due to ammonia from animal manure. These reports formed the basis for the foundation of green action groups, which put increasing pressure on policy makers to change policy from promoting agricultural productivity to environmental protection and nature conservation.

23. Element balances have played a key role in understanding the effect of intensification and specialization of agricultural production on nutrient use efficiency and nutrient losses (e.g., Frissel and Kolenbrander, 1977). Animal agriculture in NL heavily relies on imported animal feed, and although a large fraction of the animal products is exported again, the animal manure containing most of the nutrients of the animal feed and feed additives, was applied to the small acreage of land of the animal farmers. The manure surplus appeared to be a nutrient surplus, a surplus of especially nitrogen (N), phosphorus (P), potassium (K), copper (Cu) and zinc (Zn). These surpluses were perceived differently by the different actors involved. For some, it took many years to accept that there could be too much of a 'good thing'. Throughout history, animal manure had always been scarce, and suddenly there was a surplus.

3.2 *Three phases in the manure policy*

24. The general aim of the manure policy in the Netherlands is to decrease the losses of N and P from agriculture to the environment (atmosphere, groundwater and surface waters) to environmentally acceptable levels. An important constraint is the socio-economic impact; the manure policy should not deteriorate the socio-economic strength of the agricultural sectors (too much). Further, the manure policy must be effective and efficient. In practice, the instruments of the manure policy have to realize three common aims at the same time:

1. On intensive livestock farming systems, the surplus amount of animal manure has to be transferred to farms that can accommodate this manure or it has to be (processed and) exported;
2. On farms that accept animal manure from other farms, N and P losses may not increase above environmentally acceptable losses, even when it is financially attractive to buy animal manure from other farms;
3. On all farms, the N and P losses have to be decreased to environmentally acceptable levels, through a drastic improvement of N and P use efficiency.

25. This is common knowledge now, but it took quite some time to realize the implications of these three common aims in terms of designing effective policy instruments. Initially, the nature and complexity of the manure problem was not understood well, there was certainly no consensus about the severity of the problem and there was also no consensus about the instruments needed to solve the problem. Moreover, there was and is still a lack of understanding of the relationships between "type of policy instrument - behaviour of farmers - agronomical and environmental effects". The response of farmers to the implementation of manure policy and measures appeared to be more varied and complex than initially expected. In retrospect, there has been quite some trial and error in the manure policy of Netherlands.

26. The first governmental policies and measures regulating animal manure date from 1984. Roughly three phases can be distinguished in the so-called manure policy (Henkens and Van Keulen, 2001), namely (i) stop growing animal production (1984 to 1990), (ii) step-wise decrease of the manure burden (1990 to 1998), and (iii) balancing inputs to outputs as regards N and P (1998 to present). The step-wise implementation of measures in the subsequent phases allowed farmers to adapt gradually to increasingly tighter environmental requirements and to adopt environmentally friendly production methods. Initially, there was a strong belief that the manure burden could be solved by technological innovations. This belief was partly based on the conviction that structural measures, i.e. a decrease in the number of livestock, were politically not realistic.

27. The first phase of the manure policy banned further growth of pig and poultry sectors. These sectors grew almost exponentially in the sixties, seventies and first half of the eighties (Table 3), and initially the manure surplus was strongly associated with pig and poultry production. The ban on further growth of pig and poultry sectors coincided with the introduction of milk quotas in member states of the EU, to limit the growth of the surpluses of dairy products (notably butter) and thereby to limit the intervention costs for the EU. The implementation of the milk quota banned the growth of the dairy sector. As the milk quota decreased in subsequent years while the milk production per cow continued to increase, the number of dairy cows started to decrease for the first time. During the first phase limits were also implemented for the application of animal manure to agricultural land, based on the amount of P in the manure. Initially, these limits were much higher for maize land (350 kg P₂O₅ per ha per year) than for grassland (250 kg P₂O₅ per ha per year) and arable land (125 kg P₂O₅ per ha per year). These initial limits reflected where the pressure of the manure burden was highest. The first phase of the manure policy is further characterized by the belief that the manure surplus can be solved by technological innovations. Various pilot plants were set-up to explore the possibilities for manure processing and initiatives were made for marketing processed manure abroad. Most of these initiatives failed, except for those concerning drying and pelletizing poultry manure for export to surrounding countries.

28. The second phase started roughly in 1990/1991, and can be characterized by (i) lowering of the application limits for animal manure, (ii) restrictions on the timing of manure application and the resulting requirement to take care of sufficient storage capacity for animal manure, (iii) implementation of various measures to decrease NH₃ emissions, and (iv) further facilitation of manure distribution and manure processing. The application limits for animal manure were lowered step-wise, e.g. for maize land from 350 kg in 1987 to 200 kg in 1991 to 100 kg in 1998 and to 80 kg P₂O₅ per ha per year in 2002. Because of the rather fixed ratios between N and P in animal manure, the amounts of N in animal manure decreased also step-wise. Restrictions on the application of animal manure in autumn and winter forced farmers to build facilities for storing animal manure for up to 6 months. The policy decision to decrease NH₃ emissions by 65-70% in 2000 relative to 1980 led to various regulations, including the requirement to cover all manure storage facilities, to apply animal manure to land via injection into the soil or via immediate incorporation into the soil following surface spreading, and to build low-emission animal housing systems when old ones had to be replaced. An agreement was made with the suppliers of animal feed to lower the phosphorus and protein contents of the animal feed and thereby the P and N excretion of the animals and the emission of NH₃ from manure. Finally, the transport of animal manure from areas with a large surplus to areas with a potential demand for manure was subsidized and facilitated, to decrease the environmental burden in the areas with intensive livestock production.

29. The various regulations implemented in the second phase were partly successful. Manure distribution from the southern and eastern half of the country to the western and northern parts of the country was successful. The step-wise lowering of the application standards meant that more and more manure had to be transported while arable farmers got less and less room for accepting animal manure. This led to increasing pressure on the so-called "manure market" and increasing cost for manure disposal. Ammonia emissions decreased greatly, but the policy targets for NH₃ emissions have not been achieved yet. The counter effect of implementing low-emissions techniques was that more N remained in the manure and subsequently applied to land, while fertilizer N dressings did not decrease in proportion, initially. As a result, N supply to the land remained high and the N content of the grass too. As N excretion by cattle is related to N content of the ration, and NH₃ volatilization to N excretion, animal manure of cattle remained a large source of NH₃.

30. The third phase started with the implementation of the nutrient accounting system MINAS at farm level in 1998, following consultation between the agricultural sectors and the Government. This phase was meant to solve the remaining nutrient surpluses at once. This phase also marks a change in understanding and policy. Technological innovations were no longer seen as the main solution for the

manure burden. The insight grew that a drastic improvement of nutrient management would be needed to decrease N and P losses at farm level to environmentally acceptable levels. The third phase also marks a change from a policy that was largely based on regulations to a policy that is based on economic stimulations (e.g., Baumol and Oates, 1988). MINAS was seen as a flexible instrument that would be able to address the large differences between farms in environmental performance.

3.3 The N and P accounting system MINAS

31. The nitrogen (N) and phosphorous (P) accounting system MINAS was implemented at farm level in 1998 on livestock farms with more than 2.5 livestock units per ha, and in 2001 on all other farms. MINAS involves registration of all N and P inputs and output at farm level, using a farm-gate balance sheet approach (See Box 1 and Table 5). Inputs of N and P via fertilizers, animal feed, animal manure, compost and other sources, as well as the N and P output (export at farm level) in harvested products, including any animal manure have to be recorded accurately, using official documents for sales and purchases from accredited firms only.

32. The difference between total N and P inputs and outputs should not exceed certain 'acceptable' (levy-free) surpluses for N and P. When N and/or P inputs exceed the N and/or P outputs plus the levy-free surpluses for N and P, farmers pay a levy which is proportional to the exceedance to the levy-free N and/or P surpluses. Levies provide the incentive to both lower the import of N and P in fertilizers, animal feed and/or animal manure, and to increase the export from the farm of harvested products and animal manure. Levy-free surpluses are differentiated according to soil type and land-use, and have been lowered step-wise between 1998 and 2003. The levy-free surpluses are a compromise between agronomic and environmental objectives and interests, as they are the result of political debate in the Parliament.

33. Surpluses at farm level that exceed levy-free surpluses are charged. In 1998, levies were 0.68 euro per kg per ha for N and 2.6 - 10.4 euro per kg per ha for P. In 2002, levies were raised to 2.53 - 5.07 euro per kg per ha for N and to 20.60 euro per kg per ha for P, which is about 5 to 10 times the price of fertilizer N and 50 times the price of fertilizer P, respectively. Levies were increased in 2002 to make them prohibitive, in response to queries by the European Committee about the effectiveness of the initial levies.

34. The basic reasons for implementing a farm-gate balance approach for nutrient accounting (MINAS) was the need to regulate N and P from both fertilizers and animal manure. Further, there was need for an instrument that provides an incentive for good nutrient management at farm level. MINAS was seen as both a management instrument for farmers to improve nutrient management at farm level and as a regulatory instrument for the government to regulate N and P losses from agriculture to the wider environment, i.e. to groundwater, surface waters and atmosphere.

35. Levy-free surpluses have step-wise been decreased between 1998 and 2003, on the basis of (political) compromises between what is environmentally acceptable and agronomically feasible. Tables 6 and 7 provide an overview of the levy-free surpluses, according to the Manure Act. Levy-free surpluses for N on grassland decreased from 300 kg per ha per ha in 1998 to 140 and 180 kg per ha per year in 2003. Levy free surpluses are lower for grassland on nitrate leaching sensitive dry sandy soil (140 kg) than on other soils. Similarly, levy-free surpluses for N on arable land decreased from 175 kg per ha in 1998 to 60 to 100 kg per ha per year in 2003. Levy-free surpluses for P decreased from 17.5 kg per ha per ha in 1998 to 8.7 kg per ha per year in 2003. There is no difference between soil types in levy-free P surpluses, whilst differences between land use are small (Table 7).

36. The size of the levy-free surpluses and the size of the levies define the room to act by farmers. When levy-free surpluses are low, farmers have small room to act. They can not utilize all potentials of the

farm or have to pay the cost for disposal of excess manure to elsewhere. They are forced to decrease the import of N and or P via fertilizers, animal feed or animal manure and compost, and to increase the efficiency of utilization of the smaller amounts of N and P that can be imported, in order to maintain the yields at similar level. They are challenged to implement cost-effective measures to decrease N and P surpluses. In principle, farmers have the choice of decreasing the surpluses to the level of the levy-free-surpluses and pay no levy, or to decrease the surpluses less and pay a levy in proportion to the exceedance of the levy-free surpluses. In practice however, the levies are meant to be prohibitive, and taking measures is more economical than paying levies.

37. The size of the levy-free surpluses and the size of the levies define also the losses of N and P to the wider environment. MINAS presumes a relationship between the size of the levy-free surpluses and the size of N and P losses to the wider environment. In the long-term, in a steady-state situation, N and P surpluses according to MINAS are indeed a proper indicator for N and P losses to the environment. In the short-term, this is not the case, though there are differences between N and P (Box 2). The lack of a direct relationship between N and P surpluses in agriculture and N and P losses from agriculture is often confusing and an item for debate in practice (e.g., Schröder et al., 2003). Farmers often find it frustrating that their efforts to decrease N and P surpluses have so little direct impact on environmental quality. The lack of a direct relationship between N and P surpluses in agriculture and N and P losses from agriculture is also basis for skepticism about the environmental effectiveness of MINAS and at the same time the main argument in the political debate for decreasing levy-free surpluses less than initially planned.

38. There have been a large number (about 40) of alterations and changes in MINAS since its implementation in practice in 1998. These changes include changes in the size of the levy-free surpluses (Tables 6 and 7) and the size of the levies, but also in default values and various correction factors (e.g. RIVM, 2004; Schröder et al., 2003). These changes have been made in response to increased insights over time, complaints by farmers and political lobbying. Not all of these changes have made MINAS more effective and transparent; in some sense they have also led to confusion by farmers. A strongly debated change was the exclusion of fertilizer P as an input on the MINAS balance, in response to (political) pressure from arable farmers to block implementation of MINAS in arable farming in 2001, unless P fertilizer was excluded from the accounting.

39. Various documents are available to help farmers to complete the MINAS balance, but the diversity among farming systems and the many corrections make accounting still a complicated effort. In practice, specialized accountancy agencies do the job. Registration of the N and P inputs and outputs in MINAS can be done either via the standard refined accounting or via the fixed accounting using default values. In the standard refined accounting, all inputs via animal manure, compost and sludge, fertilizers, animal feed and animals, and all outputs via animal products including sold animals, animal manure, and sold crops at farm level have to be quantified using certified procedures. Corrections in the standard refined accounting include those for gaseous N losses from animal manure during storage. The fixed accounting focuses on animal manure, on the manure produced on the farm, and possibly on the manure imported from other farms. In general, it is easier to complete the fixed accounting documents than the standard refined accounting documents, but the room to act for farmers is also much smaller. Therefore, fixed accounting is mainly applied by animal farms with a low livestock density. In practice only about 10% of the farmers apply for the fixed accounting (RIVM, 2004).

40. The question remains why MINAS was implemented at *farm level* to regulate surpluses of N and P? Indeed, various alternatives have been discussed as well like taxes on N and P in fertilizers and on N and P in imported animal feed (concentrates). Also a general creaming off or buying out of animal production rights to lower the livestock density have been discussed. However, these alternatives were either deemed politically not acceptable or practically impossible. Taxes on fertilizers and concentrates negatively influence the competitiveness of the animal farmers relative to their colleagues in the member

states of the EU. Moreover, it is almost impossible to control the import of fertilizers and animal feed from the neighbouring countries.

Box 1. Objectives and approaches of nutrient balances (after Oenema et al., 2003)

Nutrient balances summarize nutrient inputs in and outputs from a defined system over a defined period of time. Balances can be made for all kind of elements (plant nutrients, metals), and for all types of ecosystems and scales. The purpose of nutrient balances is usually defined by the user of the nutrient balance. Three main purposes can be distinguished, i.e. (i) to increase the understanding of nutrient cycling within a system and of nutrient inputs and outputs, (ii) as performance indicator and awareness raiser in inventory and monitoring studies and in nutrient management, and (iii) as regulatory policy instrument. In many current studies, the purpose is a mixture of (i) and (ii); the studies provide information about the nutrient cycling process, contribute to the understanding of nutrient input-output relationships, and contribute to monitoring and evaluating of the effectiveness of nutrient management planning and agro-environmental policies.

There are various ways of constructing a nutrient balance, and there are various ways of collecting the information and data that are summarized in a nutrient balance. The agroecosystems under study can be very different in nature and in complexity, and these differences affect the ease and accuracy of constructing nutrient balances. Watson and Atkinson (1999) and Oenema and Heinen (1999) distinguished three basic approaches in nutrient balance studies, though there are variants within each of these:

1. *Farm-gate balance* or black-box approach; it records the amounts of nutrients in all kinds of products that enter and leave the farm via the farm-gate. The surplus, i.e. the difference between inputs and outputs, is a measure of total nutrient losses, adjusted for possible changes in the storage of nutrients in the farming system. Inputs via atmospheric deposition and biological N₂ fixation by leguminous crops are usually not included in this approach, as the inputs do not pass the farm-gate. Examples of the farm-gate approach include the MINAS regulatory nutrient book-keeping system and the OSPARCOM method (Oslo and Paris Conventions for the Prevention of Marine Pollution). In the latter example, the nutrient balance is used to monitor whether the N and P discharges into the North Sea and Baltic Sea from the surrounding countries have decreased by 50% relative to the reference year 1985 (OSPARCOM, 1994).
2. *Soil surface balance*; it records all nutrients that enter the soil via the surface and that leave the soil via crop uptake. Inputs via atmospheric deposition and biological N₂ fixation by leguminous crops are included in this approach. Nitrogen inputs via fertilizer and animal manure are usually adjusted for losses via ammonia volatilization and other gaseous losses of N from manure during storage (as this N does not enter the soil). The surplus, i.e. the difference between inputs and outputs, is a measure of the total nutrient loss from the soil, adjusted for possible changes in the storage of nutrients in the soil. This approach is being used for example by the OECD as environmental performance indicator for agriculture (OECD, 2001).
3. *Soil system balance*; it records all nutrient inputs and nutrient outputs, including nutrient gains and losses within and from the soil. The *system approach* allows also partitioning between the various nutrient loss pathways and the storage and/or depletion of nutrients in nutrient compartments within the system. A surplus/deficit is a measure of the net depletion (output > input) or enrichment (output < input) of the system, or simply of the 'unaccounted for' nutrients. This approach is often used in research studies that aim at the identification of the fate of nutrient surpluses. An example is the Nutmon approach for assessing soil nutrient depletion and enrichment (Janssen, 1999).

Differences between farm-gate and soil surface balances are small for specialized crop production systems without leguminous crops and without storage of products at the farm yard. For these systems, inputs and outputs at the farm-gate and soil surface balance are roughly the same. In contrast, differences can be significant for livestock farming systems that produce roughage. These systems include crop production and animal production, with connected nutrient cycles. As a consequence, inputs and outputs at farm-gate level and at soil surface level are quite different. Nutrient surpluses differ especially for N, as ammonia emissions are included in the surplus of the farm-gate balance whereas they are not included in the surplus of the soil surface balance.

The fertilizer balance referred to in the EU Nitrates Directive can be considered as a modification of the soil surface balance. The fertilizer balance addresses total nutrient supply from all sources and nutrient demand by the crop during the growing season. When the supply by the soil is relatively small and the harvest index (harvested fraction of the crop) is large, differences between fertilizer balance and soil surface balance are relatively small. But when the harvest index is small, the differences can be large.

The data summarized in nutrient balances often have different origin. Smaling and Fresco (1993) and Smaling and Oenema (1997) indicated that the data that serve as input for nutrient balances can be classified according to (i) type, i.e. primary data, estimates, and assumptions (guesstimates), (ii) source, i.e. measurements in the field and in the laboratory, observations, and statistics (computations), and (iii) frequency of measurements and data collection, i.e. continuously, seasonally, and annually. The combination of type-source-frequency defines the data acquisition strategy. This combination depends on the purpose of the study and the nutrient balance approach. Quite often, nutrient balances are based on a combination of data types (i.e. primary data, estimates and assumptions), and the data may come from various sources and are collected at different frequencies. Farm-gate balances are usually based on primary data (and some assumptions), obtained from statistical information collected annually. By contrast, a soil system balance is usually based on a combination of primary data, estimates and assumption, obtained from continuous to seasonal measurements in the field and in the laboratory, and supplemented with statistical data and results from model simulation. Note that a comparison of balances that have been constructed for different aims may be flawed, unless underlying assumptions and differences in scale, approach, data acquisition have been considered (e.g. Schröder et al., 2003).

Box 2. Relationship between N and P surpluses and N and P losses (after Oenema et al., 2004a,b)

The N cycling and N loss pathways in agriculture are complex, especially in animal agriculture. Nitrogen is a biogeochemical highly reactive element. It prevails in nature in different species (from highly reduced to highly oxidized), different forms (solid, dissolved and gaseous) and different reactivity (from inert N_2 to reactive NO and NH_3). The cycling of N is coupled to the cycling of carbon (C), but there is decoupling of N and C at various stages of the cycle and when decoupled N is much more vulnerable to losses to the wider environment (e.g. Hatch et al., 2004).

The N surplus of the N balance sheet is a distal indicator for the total N loss. The actual fate of the N surplus depends on the N loss pathway, which is depending on the farming system and site-specific conditions. In general, the fate of the N surplus depends on the balance between N immobilization and N mineralization, on ammonia volatilization, denitrification and on N leaching to groundwater and surface waters. Losses of N via ammonia volatilization are relatively large from animal manure and urea fertilizers exposed to the atmosphere. N losses via denitrification of nitrate (NO_3^-) may occur in wet soils rich in organic matter, while N leaching losses may occur when precipitation exceeds evapotranspiration for some time. As a rule of thumb for dairy farming systems in the Netherlands, 20-40% of the N surplus is lost via ammonia volatilization, 30-60% via denitrification and 10-30% via leaching to groundwater and surface waters. The point to make here is that N surplus has to decrease by 2.5-5 kg per ha to decrease N leaching by 1 kg per ha. Similarly, for arable farms, 2-20% of the N surplus is lost via ammonia volatilization, 40-60% via denitrification and 20-40% via leaching to groundwater and surface waters. Evidently, the relationship between N surplus and N loss pathways is rather diffuse. Furthermore, there exists the risk of swapping one loss pathway to another when measures are taken to decrease one loss pathway. For example, implementation of measures to decrease ammonia volatilization may increase the losses via denitrification and leaching (e.g., Hatch et al., 2004).

The P cycle in agriculture is less complex than the N cycle. P is less reactive than N, it does not exist in different oxidation states, it is rather insoluble and its dominant form in crops, animals, manure, soils and water nature is ortho-phosphate. It accumulates in soil, as organically bound P and as P bound to aluminum and iron oxy-hydroxides. Only a very small fraction in soil (<<1%) is dissolved P that can be directly taken up by the crop.

The soil is an effective sink for P applied in excess of what can be taken up by the crop, and little P is lost to the environment usually. However, the storage capacity of the soil for P is finite, and with a gradual build-up of P in soil, the soil starts to leak P from the topsoil to the subsoil to the groundwater and surrounding surface waters. The pathways of P losses from soil to the environment depend on soil conditions and the hydrological situation and are highly complex. Currently, a large acreage of agricultural land in the Netherlands has soils with a high P saturation index, which is indicative for the fact that P losses from these soils to groundwater and surface waters exceed or will exceed environmentally acceptable levels. Decreasing P surpluses will not have a strong immediate effect on P leaching, as the soil acts as buffer and will continue to leak P for some time. Hence, the soil P status or P saturation index is a more direct indicator for actual P losses from agriculture to the environment than P surpluses, but P surpluses greatly influence soil P status and the P saturation index of the soil. Various possible indicators for indicating the risk of P losses from agricultural land to groundwater and surface waters have been studied in the course of time (Sharpley et al., 2000; Schoumans and Groenendijk, 2000). All these studies emphasize that actual P losses are dependent on site-specific conditions. Further, incidental losses often have a large share in total P losses, but they are difficult to manage usually, as they are a response to extreme climate events.

3.4 *EU Nitrates Directive and MINAS*

41. Concerns about the use of large amounts of animal manure and fertilizers in the Netherlands have been diverse and have changed during the seventies, eighties and nineties. The approval of the EU Nitrates Directive in 1991 focused the attention very much to nitrate leaching. The Nitrates Directive obliges member states of the EU to decrease the nitrate load from agricultural sources to groundwater and surface waters, and to avoid further pollution from these sources. Member states have to (i) assign areas that are vulnerable to nitrate leaching (nitrate-sensitive zones), (ii) establish action plans to decrease nitrate leaching and to monitor the effectiveness of these plans, and (iii) develop codes of good agricultural practice to guide farmers. The core of the Directive is that a balance should be reached between N supply by soil, animal manure and fertilizers, and N demand by the crop. Further, member states have to guarantee that applications of N from animal manure do not exceed 170 kg per ha per year from the year 2002 onwards. However, a higher application rate can be allowed when justified on the basis of objective criteria, as laid down in Annex 3 of the Directive, provided that the objectives of the Nitrates Directive are achieved in time.

42. The consequences of the EU Nitrates Directive for animal agriculture in the Netherlands were underestimated initially. Upon the approval of the Nitrates Directive, there was still a belief that the manure burden could be solved using technological innovations, and that the Nitrates Directive provided enough flexibility and degrees of freedom so as to implement a regulatory system that fits agriculture of the Netherlands as long as the objectives of the Nitrates Directive were achieved, i.e., concentrations of nitrate in groundwater should not exceed the standard specified in the EU Drinking Water Directive of 50 mg nitrate per litre. This appeared to be not true, and the Netherlands' government has built up a complex dossier and a painful relationship with the European Commission as regards the implementation of the Nitrates Directive.

43. In response to the approval of the Nitrates Directive, the whole territory was assigned by the Netherlands' government as nitrate-sensitive zone. MINAS was seen as the main policy instrument for all grassland and arable and horticultural land to achieve the objectives of the Nitrates Directive, i.e., "to decrease the nitrate load from agricultural sources to groundwater and surface waters, and to avoid further pollution from these sources". Application limits for N from animal manure were not addressed in the first Action Plan (1995-1999). The Netherlands already had application standards for animal manure based on P (see section 3.2), and as the ratio between N and P in animal manure is rather narrow, the application of N from animal manure was indirectly also regulated, but this was not specified explicitly. Furthermore, the application limits for N from animal manure as set in the Nitrates Directive were considered too low and not realistic for agriculture in the Netherlands.

44. The EU Commission criticized the lack of application limits for N from animal manure and the lack of specific prescriptions and regulations for the use of animal manure and fertilizers in the first Action Plan (see also section 3.7). The responses of the Netherlands' government to the criticism of the European Commissions to the first Action Plan were diverse. One response was the implementation of additional regulations and prescriptions for the use of animal manure and fertilizers. A second response was the acceleration of the step-wise decrease of the MINAS levy-free surpluses by five years and the strong increase in the size of the levies. A third response was the application for derogation included in the Nitrates Directive, which would allow the application of a larger amount of animal manure on grassland than the maximum of 170 kg N per ha. Justification for a dose of 250 kg of N per ha from animal manure is based on the high N uptake and the long growing period of grass (Willems et al., 2000). The analyses made by Willems et al. (2000) suggests that up to 290 kg N per ha on dry sandy soils and up to 360 kg N per ha from animal manure on other soils may be applied to grassland without violating the standard specified in the EU Drinking Water Directive of 50 mg nitrate per liter in the groundwater. Scientific and policy reviews by the EU Commission expressed concerns about the size of the derogation, and challenged

the justification for grasslands on peat soils and for reseeded grassland, and thereby criticised the report of Willems et al (2000). As yet, the EU Commission has not approved the derogation.

45. A fourth response of the Netherlands' government to the criticism of the European Commissions to the first Action Plan was the implementation of the so-called manure transfer agreement system as of 1 January of 2001. Livestock farms that produce on a hectare and annual basis more N in animal manure than 170 kg per ha arable land and 250 kg per ha grassland are required to submit to the government a double-signed agreement which states that the surplus amount of animal manure is contracted by other farms that can adequately accommodate this manure. When farms with a surplus amount of animal manure are not able to submit such a manure transfer agreement by 31 December, the license for animal production for the next year is lost. The implementation of manure transfer agreements was facilitated by intermediates that organized the contacts and agreements between farms with a surplus of animal manure and farms with possibility to accommodate this manure. Farms with a surplus amount of animal manure paid for signing the agreement (goodwill fee). Annually, a large number of agreements had to be signed and verified. The amount of N in the animal manure was based on default values, which were different for different types and age of animals and animal housing systems. Whether the contracted amount of animal manure had to be transferred indeed was determined by the MINAS balance sheets.

46. The European Commission considered the responses of the Netherlands' government not sufficient. By the end of 1999, the European Commission brought the Netherlands government to the European Court, which subsequently condemned the first Action Plan of the Netherlands in its arrest released on 2 October 2003. Main arguments given by the European Court were (i) the MINAS system does not comply with the regulatory system prescribed by the Nitrates Directives, (ii) the application limits for animal manure and the levy-free surpluses set for the years prior to 2000 were too high, and (iii) essential regulations of the manure policy were implemented too late.

47. There are various subtle but essential differences in the balance approaches of MINAS and the EU Nitrates Directive. The core of the regulatory system of the Nitrates Directive is the fertilization balance at crop level during the growing season. Total N supply from soil (mineralization of organic N from soil and crop residues), atmosphere, biological N₂ fixation, animal manure and fertilizers should not exceed the total demand of a specific crop. Hence, the input of N via animal manure and fertilizers is depending on crop type, crop variety and soil type, whilst the input of N via animal manure may not exceed 170 kg N per ha per year. The fertilizer balance has to be established beforehand in the nutrient management plan that exactly states the amounts of N to be applied by the various sources. The core of the regulatory system of MINAS is also a balance between supply and demand, but the balance has to be achieved at farm level over a whole year. In MINAS, there are differences in levy-free surpluses between arable farms and dairy farms, and between dry sandy soils and other soils. Next, MINAS only considers the harvested part of the crop that is transferred from the farm, whilst the fertilization balance of the Nitrates Directive considers the total N uptake by the crop in the harvested part plus any roots, stubble, straw and any other crop residue. Further, only animal manure that is imported from other farms is explicitly recorded on the MINAS balance sheet, but the animal manure produced at the farm only implicitly itself (as the nutrients in the latter manure are part of the internal cycling within the farm. Finally, MINAS acknowledges a certain surplus (levy-free surplus), whilst the fertilization balance of the Nitrates Directive does not.

48. A strong point of the MINAS balance is that the nutrient contents of inputs and outputs is either based on standards, in case the variation of the nutrient content is small (e.g. for certified fertilizers and concentrates, but also for animals, milk and harvested crops), or on measurements (when the nutrient content is variable like in manure). This means that the surplus can be calculated quite accurately. Weak points of MINAS are that biological N₂ fixation by clover in grassland is not included and that corrections for NH₃ losses are based on standards, whereas it can differ substantially in practice depending on housing

system and management. Weak points of the fertilization balance is that the nutrient supply by soil, crop residues, animal manure, atmosphere and biological N₂ fixation can not be estimated accurately beforehand. The same is true for forecasting the total nutrient demand of the crop. As a consequence, the calculated fertilizer balance can differ significantly from reality, especially on mixed farms with crop and animal production.

49. In response to the decisions of the European Court and the European Commission, the Netherlands' government described in the third Action Plan (submitted by the end of 2003) that crop and soil specific N fertilization standards and the fertilization balance approach of the Nitrates Directive will be implemented by January 2006. At the same time, MINAS will be abandoned. Further, manure transfer agreements will be abandoned by 1 January 2005, as these have become redundant with the implementation of crop and soil specific N fertilization standards. Other reasons for dismissing manure transfer agreements are its administrative burden, high costs for intensive livestock farms and its low effectiveness. Moreover, production rights for pigs and poultry per farm, implemented earlier and which is still in practice, limit the amount of animal manure produced per farm already (RIVM, 2004).

3.5 Cost of manure disposal

50. The costs of manure disposal depend on manure supply and demand at the so-called manure market (Figure 3). When the supply of manure is large and the demand is small, the cost of manure disposal for livestock farms is high and farms that accept the manure get a goodwill fee. When the supply of manure is small and the demand is relatively large, the cost of manure disposal for livestock farms is low and farms that accept the manure have to pay for the manure. Hence, the price of the manure depends on supply and demand. The supply and demand depend on animal number, N and P excretion by the animals, application limits for animal manure, manure acceptance by arable farms, transport distance, and manure export. The ongoing tightening of the application limits from the mid 1980s onwards has increased manure supply and decreased manure demand, which has resulted in continuously increasing costs of manure disposal (Figure 2). The government has influences on the manure market by changing the limits for manure application, buying out animal production rights and by facilitating manure transport and processing, and research and extension services. In 2001-2002, the government bought out animal production rights and thereby decreased the number of pigs by about 10% at the cost of about 0.25 billion euro (35 euro per kg P; see also chapter 3.6; RIVM, 2004). In general, the cost of the production rights reflect the economic attractiveness of pig farming, and at the time of the buy-out a significant fraction of the pig farmers were willing to sell their production rights for 35 euro per kg P.

51. The costs of manure disposal rose especially after the implementation of MINAS in 1998 and following the step-wise decrease of levy-free surpluses between 1998 and 2003 (Figure 2). The cost of manure disposal for specialized livestock farmers was in the range of 5 to 15 euro per tonne; approximately 5 to 10 euro was for transport, the remainder for (arable) farmers accepting the manure. Evidently, manure disposal has become a financial burden for the intensive livestock farming systems. The costs have risen to 15,000 to 25,000 euro per farm per year in 2000-2003, while average farm income in pig and poultry production has been mainly below zero in the last five years. Currently, costs for manure disposal of more than 10 euro per tonne are considered too high for economically sustainable pig and poultry farming. The high cost for manure disposal also put pressure on the manure policy, as farmers try to find escape routes to lower costs. Manure is called 'grey manure' or 'black manure' when creative, but partly illegal, solutions were found for manure disposal at low cost. This undermines the effectiveness of the manure policy.

3.6 *Additional policies to support the ecological modernization of agriculture*

52. In response to the complaints by farmer unions and politicians about the drastic economic and social impacts of the manure policy on agriculture, additional policy and measures were implemented to support the objectives of the manure policy and to support the ecological modernization of agriculture. These additional policies include:

1. Action plan for nitrate projects
2. Regulation for the termination of livestock farms
3. Social economic plan for animal husbandry.

53. The action plan for nitrate projects was implemented in 1999 to support nutrient management at farm level, in order to facilitate the acceleration of the step-wise decrease of levy-free surpluses for N and P in MINAS (see chapter 3.4). The action plan includes 20 projects focused on on-farm-research, concerning validation of measures to improve nutrient use efficiency at farm level and dissemination of the results into practice. The regulation for the termination of livestock farms focused on the buy-out of animal production rights by the government to decrease the manure surplus. The social economic plan for animal husbandry focused on advising livestock farmers about future developments and about termination of farming.

54. Figure 4 shows the coherence between the instruments of the manure policy and those of the additional policy. The manure transfer agreements and animal production rights of the manure policy, together with the regulation for the termination of animal production systems and the social economic plan for animal husbandry of the additional policy are the core instruments for controlling total manure production and disposal. Control of manure production at national level is a prerequisite for achieving proper balance between inputs and outputs of N and P at individual farms through the core instruments MINAS and supported by additional regulations for the use of manure and fertilizer (code of good agricultural practice) and by the Action plan for the nitrate projects. All together, these instruments are meant to achieve the national emission targets and environmental quality objectives, as well as the objectives of the EU Nitrates Directive.

3.7 *Social and political backgrounds of the manure policy*

55. The initial denial of the manure problem after its recognition by scientists in the late sixties and the subsequent postponement of effective measures was possible because the agricultural-policy community was strong and relatively insulated. Membership of the agricultural-policy community was restricted to leading farmers, experts from the Ministry of Agriculture, the farmers unions as well as members of the Parliamentary Committee on Agriculture. This group constituted a network of close mutual relationships and had a degree of interchange ability. They shared a firm belief in technical progress and modernization of agriculture (Frouws, 1997). During this initial period of manure policy making, the Ministry of Agriculture, supported by the farmers' lobby, succeeded in giving a definite agricultural emphasis to all legislation. The Ministry of Environment, which was not supported by a firm policy community, had to accept a manure policy based on existing livestock numbers. The taboo on reducing the intensive livestock sector affected all ensuing regulations, which allowed sufficient time and money so as to adapt farming methods and to develop technologies to reduce and absorb the manure surpluses. The decision was taken to develop manure legislation in three phases (see Section 3.2).

56. However, the manure policy became more restrictive with time and as a consequence produced conflicts between the Ministry of Agriculture and farmers' unions, and later also between farmers' leaders and farmers unions. The farmers' lobby disputed essentially all regulations and the legitimisation of the negotiated policies was frequently unsuccessful. The controversies within and between farmers' unions

caused a split between regions with manure surpluses and regions with manure “shortages”. The question came down to a single issue: who was to blame for the manure surplus and the ensuing pollution and who had to pay for it. The dispute about this basic question was also a major factor for the failure to set-up industrial manure processing and export facilities; the farmers’ unions and the livestock sector itself were unable to realize the necessary socio-economic conditions (Frouws, 1997). The lack of large-scale manure processing and export of processed manure heavily mortgaged the third stage of the manure policy, which should have been implemented between 1995 and 2000.

57. The preparation of the third phase of manure legislation, which was to bring about balanced fertilization, was a painstaking process. It started in 1991. In 1993, the Ministries of Agriculture and Environment, and the central farmers’ union agree upon choosing the mineral accounting systems as basic principle for the third phase of the manure policy. Provisional sizes of levy-free N and P surpluses were mentioned and it was agreed that these sizes would decrease stepwise until balanced fertilization was reached in 2000. The farmers union LTO emphasized that too stringent levy-free surpluses would be disastrous to the competitiveness of the livestock sector and that much research was still needed to determine the ultimate sizes of levy-free surpluses. This delaying strategy was partly inspired by the failure of large-scale manure processing and export, and the looming danger of a huge manure surplus, which would make a drastic reduction of animal numbers inevitable. Finally, in October 1995, the lay-out of the 3rd phase of the manure policy and of the nutrient accounting system was sent by the Ministries of Agriculture and Environment to the Parliament for approval.

58. The third phase of the manure marks a shift in the philosophy of the manure policy. Firstly, there was a shift from prescription and do’s and don’ts measures towards realizing targets, i.e., a shift from regulation towards stimulation. Secondly, it was stated that social support by farmers for the new policy is crucial, because farmers need to comply with the policy. Otherwise the policy can not be enforced. Thirdly, it emphasizes the importance of entrepreneurship, differentiation and technological innovation. A general and uniform policy for all farms and soils is ineffective; a farm-specific nutrient accounting systems is needed. MINAS was born. Together with the launching of MINAS in October 1995, it was mentioned however, that the foreseen levy-free surpluses of MINAS would be not sufficient for realizing the nitrate limit of 50 mg per litre in the upper groundwater of well-drained sandy soils in time. It was also mentioned that MINAS as instrument was different from that of the EU Nitrates Directive, and that negotiations would be needed with the EU Commission.

59. The Nitrates Directive was approved by all member states of the EU on 12 December 1991, under the presidency of The Netherlands. Approval had been a complex and painful process. The Netherlands’ government indicated in a letter to the EU Commission in March 1989 that the whole territory of the Netherlands needed to be designated as vulnerable to nitrate leaching. Further, it was emphasized in the letter that member states should have the freedom of choice of selecting proper measures. Two bottlenecks were envisaged; (i) the speed of implementation was not acceptable, the Netherlands’ agriculture needed more time to adjust to the new legislations, and (ii) the limits for the application of animal manure were too low. Despite these serious concerns, the Netherlands’ government approved the Nitrates Directive. Approval has been explained by the facts that environmental issues were high on the political agenda and that the Netherlands had positioned itself as fore-runner in the field of environmental policy. Evidently, not approving the Nitrates Directive would have led to loss of face (Van Bavel et al., 2004).

60. The first action plan, needed in the framework of the Nitrates Directive, was submitted by the Netherlands government to the EU Commission in December 1995 (see also Section 3.4). Emphasis in this action plan was on achieving objectives in stead of complying with limits for the application of animal manure. It was stated that objectives of the Nitrates Directive would be achieved for the largest part of the territory by 2010 (which is 7 years after the final date mentioned in the Nitrates Directive). Attached to the

action plan was a request for derogation; a request to apply 250 kg of N per ha via animal manure to all grasslands instead of 210 kg per ha according to the Nitrates Directive. The EU Commission did not respond positively to the action plan. As a result, The Netherlands' government withdrew the action plan and submitted a revised version two years later in December 1997.

61. The Commission noted various shortcomings in the revised action plan, as formulated in a formal letter to the Netherlands' governments on 29 September 1998. This led to various changes in the manure policy of the third phase, such as the introduction of the manure transfer agreements in 2000 (see also Section 3.4), tightening of levy-free surpluses and acceleration of its implementation (from 2010 to 2003). However, the Commission found these changes inadequate and too late. By the end of 1999, the European Commission brought the Netherlands government to the European Court, which subsequently condemned the first Action Plan of the Netherlands in its arrest released on 2 October 2003. The Dutch government accepted this view, and submitted two months later the third Action plan, now with application limits for animal manure and fertilizer as instruments for regulation of N and P in agriculture, in conformity with the Nitrates Directive.

62. Many questions have been raised following the sudden death of MINAS. What has been the role of the various actors involved in the implementation of MINAS as instrument to achieve the objectives of the Nitrates Directive? What went wrong? Why now? What are the alternatives? It is clear that The Netherlands government has underestimated the importance and consequences of the Nitrates Directives. For too long, MINAS was advocated as the superior instrument, and for too long it had not properly addressed the questions of the European Commission. Negotiations have been a clash of views and approaches; the juridical approach of the Commission with regulations as prime instrument, against the managerial approach of the Netherlands government with economic stimulation as prime instrument. There was also distrust by the Commissions about the willingness of the Dutch government to fully implement the Nitrates Directive (Van Bavel et al., 2004; Box 3).

63. The very rapid erosion of MINAS was not only the result of the judgement of the European Court, but also because of the many complexities of MINAS and the increasing administrative costs with time (e.g. RIVM, 2004; Mallia and Wright, 2004). Pig and poultry producers faced huge levies, because of exceeding the levy-free N and P surpluses. This appeared to be caused in part by inaccuracies in the standard figures used to determine the N and P content of pigs. The radical pig farmers union was strongly opposing against MINAS from the beginning onwards and unfair levies were used as basis for litigation proceedings against the government, disputing the outcome of MINAS balances sheets. MINAS met opposition from within the pig sectors because it adversely affected the economic standing of the pig producers. The MINAS levies were prohibitive, as were the manure transport costs that would be incurred in order to avoid the levies. MINAS provided no incentive for pig farmers to save money through lowering the N and P contents of the animal feed, which would have environmentally beneficial effects. MINAS was seen as a very expensive administrative burden, which did not produce any environmental beneficial result, and this undermined the legitimacy of MINAS. There were also inaccuracies involved in the sampling and analyses of animal manure. The Levies Office was forced to deal with increasing number of complaints and refusals to pay. The inaccuracies in standard figures resulted in the Legal Office being required to backdate all MINAS returns for pig farmers since the introduction of the policy, which increased the bureaucratic burden. They granted the farmers a credit, which in practice meant that pig farmers did not have to dispose of so much manure. According to MINAS, this 'grey manure' did not exist, and therefore there are no controls in place for its disposal. These outcomes had an undermining effect on MINAS. The administrative costs of MINAS increased with time as a direct result of exceptions, fraud, and exploitation of loopholes in the system by pig and poultry farmers. The ongoing court procedures, the increased bureaucratic burden, and the absence of environmental beneficial effects in the pig and poultry sectors have demoralised the policy makers and the controllers at the Legal Office (Mallia and Wright, 2004).

64. Evidently, there is no single reason why MINAS eroded so quickly.

Box 3: Role of actors involved in the implementation of MINAS as instrument to achieve the objectives of the Nitrates Directive (after Van Bavel et al., 2004)

Ministry of Rural Planning and Environment VROM

- Responsible for the implementation of the Nitrates Directive and therefore principal negotiator with the EU Commission
- Has strong focus on safeguarding the environmental good
- Had difficult relationship with the Ministry of Agriculture in the second half of the 1980s, but this relationship improved much when the manure policy became the joint responsibility with the Ministry of Agriculture

Ministry of Agriculture Nature and Food Quality LNV

(Earlier: Ministry of Agriculture and Fisheries).

- Responsible for agricultural policy and the manure policy (together with VROM); implementation of the Nitrates Directive and therefore principal negotiator with the EU Commission
- Underestimated the consequences of Nitrates Directive initially
- Put focus on proper balance between minimizing the social-economic consequences of the manure policy and achieving environmental objectives.

Parliament

- Responsible for decisions about implementation of the manure policy
- Has strong focus on national situation, and on minimizing the consequences of the Nitrates Directive for agriculture;
- Has been motor for the slackening of MINAS
- Has restricted the degrees of freedom of the ministries of LNV and VROM to act in the negotiations with the Commission

The Dutch government

- Until 1994 dominated by the Christian Democratic Party, CDA, which has many farmers as voters, and the Liberal Party VVD.
- From 1994 to 2002 dominated by the Social Democratic Party, PvdA, and the Liberal Parties VVD and D'66;
- From 2002 to present dominated by the Christian Democratic Party, CDA, and the Liberal Parties VVD and D'66.
- Strong managerial approach (and little juridical);
- Did not have much attention for the juridical culture and views of the Commission
- Minister of Agriculture is a painstaking job, because of the manure policy;

European Commission

- Powerful position relative to the Netherlands government with respect to the Nitrates Directive, as the Netherlands had approved the Nitrates Directive;
- Strong juridical approach in the negotiations;
- Considers reduction of animal number in the Netherlands' agriculture necessary to be able to comply with Nitrates Directive;
- Considers MINAS a very complex piece of regulation with lots of exceptions;

European Court

- Agreed completely with the view of the European Commission with regards to the first action program, which was not expected by the Dutch government

Farmers' union LTO

- Represents the social-economic interests of very diverse farmers groups
- Proposed many exceptions for various farming systems in MINAS, in response to the diversity of interest groups;
- Has no common view on MINAS, because of the diversity in farmers' interests
- Dominated by dairy farmers and building on consensus, which among others led to the separation of the radical pig farmers union in 1994, and later also of the arable farmers union and the dairy farmers union which all proposed a more radical approach to fight governmental regulations.

Green action groups

- Did not have much influence on Parliament and the Ministries of Agriculture and Environment initially;
- Started a juridical procedure against the Royal Kingdom of the Netherlands, because of the non-compliance to the Nitrates Directive;
- Established good relationship with the European Commission, gave background information to the European Commission, and thereby had strong influence on the European Commission

Research organizations

- Identified the manure surplus, which basically is a nitrogen and phosphorus surplus
- Supported the ministries of Agriculture and Environment with information and suggestions
- Independence of some researchers has been questioned by green action groups and also the European Commission, because of the funding by the Ministries of Agriculture and Environment and because of the limited number of refereed publications in international scientific journals about MINAS and the Nitrates Directive.

4. Technical, economical and environmental effects of the manure policy

65. The manure policy provides strong incentives to better utilize N and P in crop and animal production so as to decrease N and P surpluses. Better utilization of N and P from animal manure involved manure transport from areas with excess amounts to areas with little manure, next to improvement of nutrient management in crop and animal production. MINAS has been the core instrument behind the improvement of nutrient management and the better utilization of N and P in crop and animal production from 1998 onwards. The effectiveness of MINAS follows from the estimation that 80% of the decreases in N and P surpluses during the period 1998-2003 is the result of the manure policy and 20% of other policies and autonomous developments (RIVM, 2004)

66. In the first phase of the manure policy (see chapter 3.2), decreases in N and P surpluses at farm level were largest on specialized pig and poultry farms, as these farms were forced to transfer animal manure to other farms. In the third phase of the manure policy (from 1998 onwards), decreases in N and P surpluses at farm level were largest on dairy farms, following the implementation of MINAS. From the beginning of the manure policy, decreases in N and P surpluses were least in arable farming. The differences between these sectors are discussed further below.

4.1 Dairy farms

67. Average surpluses of N and P on dairy farms have decreased by more than 50% within a period of 15 years, i.e., by on average 3 to 5% per year. This decrease is the combined result of the implementation of milk quota in 1984, the mean increase in milk production per cow by about 1-2% per year, and the manure policy (e.g., Van Bruchem et al., 1999; RIVM, 2002; 2004). The largest decrease took place in the period 1998-2003 following the implementation of MINAS. Various individual farmers were able to lower the surpluses of N and P by 50% even within two years, when supported by direct guidance of advisors and researchers. Discussion groups of farmers were also helpful, as farmers learn from each others experiences.

68. Though the decrease of N and P surpluses went rapidly following the introduction of MINAS, it went not for all dairy farms rapid enough to keep up with the decreasing levy-free surpluses. The mean decrease in N surplus of dairy farms tended to be lower than the decrease in the levy-free surplus. Whilst the mean decrease in levy-free surplus ranged from 18 to 20 kg N per ha per year in the period 1998-2002, the decrease of the N surplus ranged from a mean of 14 kg per ha per year on 'intensive' dairy farms to a mean of 21 kg per ha per year on 'extensive' dairy farms. The mean decrease of pilot farms was in the range of 20 to 35 kg per ha per year. There were large differences between farms (RIVM, 2004).

69. The decreases in N surpluses were less over the period 2000 - 2002 than over the period 1998-2000, when the N surplus decreased by 30 to 50 kg per ha per year. Evidently, the easy-to-implement and most cost-effective measures were implemented already in the period 1998-2000 and before. A further decrease of the N surplus beyond the initial rapid decrease appears much more difficult and takes more time. A number of dairy farms had achieved the levy-free surpluses for the year 2003 already by 2001 or 2002. As a consequence, there was no incentive for these farms to decrease the surpluses further.

70. On average 85% of the 'extensive' dairy farms and 65% of the 'intensive' dairy farms met the levy-free surpluses for N and P in 2000 and 2001. Hence, 15% and 35% of the dairy farms had to pay levies, respectively (RIVM, 2004). However, the exceedance of the levy-free surpluses for N and P, and hence the levies paid were relatively low. On the other hand, a significant fraction of the dairy farms already met the levy-free surpluses of 2003 in 2001 and 2002. Most dairy farms did not have difficulties with meeting the levy-free surpluses for P, though it must be kept in mind that P fertilizer is not included in the accounting (see chapter 3.4).

71. Dairy farms took various measures in response to MINAS. A common measure was a decrease in the use of N fertilizer. Purchase of land, and lowering the number of young stock were also common measures. On average, dairy farms did not feel large economic disadvantages following the implementation of MINAS. Various farms noted beneficial economic effects of MINAS, through better (nutrient) management (RIVM, 2004).

4.2 Pig and poultry farms

72. Most pig and poultry farms are highly specialized. Essentially, these farms import all feed for their animals, whilst the land is used for manure disposal and growing silage maize for surrounding dairy farms. With the implementation of MINAS from 1998 onwards and the step-wise decrease of the levy-free surpluses, these farms had to transfer more and more animal manure to other farms, which could accommodate less and less animal manure in time. Currently, these farms have to transfer roughly 80% of the animal manure to elsewhere, whilst 20% can be applied to the land of these farm (on average about 10 ha per farm; in total 5% of the total acreage of agricultural land).

73. The costs of the manure policy are high for specialized pig and poultry farmers. The costs for manure disposal have steadily increased in the period 1985 to 2003, and were in the range of 15,000 to 25,000 euro per farm in 2000-2002. These costs were about 3-6% of the total costs of these farms. Expressed in percentage of farm income, the costs for manure disposal were very large, as average income was negative due to the poor economic situation for pig and poultry sectors in this period.

74. Specialized pig and poultry farms faced significant difficulties with MINAS following its implementation in 1998. Firstly, surpluses of N and P on specialized pig and poultry farms greatly vary between years, simply because of variations in stocks of animals, animal feed and animal manure at the end of the MINAS accounting year. Variations in stocks of animals, animal feed and animal manure are not included in the MINAS balance. Because of the large effects of these variations, the government introduced the possibility of clearing variations in N and P surpluses over years. Secondly, surpluses of N and P are expressed per unit of surface area per farm. As the surface area of these farms is small and the total input and output of N and P very large, calculated surpluses of specialized pig and poultry farms are very sensitive to small errors in input and output items (like errors in the measurements of N and P contents in animal manure transferred from the farm) of the MINAS balance sheet. This led to substantial over and under estimations of surpluses. Thirdly, there were errors in the official fixed N and P contents of animals initially. These errors were relatively small, but because of the large number of animals, the total annual error per farm was large. Fourthly, some farms had large stocks of animal manure in storage basins with P-rich sediment layers in 1998 when MINAS was implemented. All these complications did not ease the implementation and acceptance of MINAS by pig and poultry farmers. These farmers are in general well-organized in unions and against (environmental) regulations, more than dairy and arable farmers.

75. Sampling of animal manure and analysis of its N and P content remains a complicated issue. Animal manure is very heterogeneous, requiring thorough mixing before taking a representative sample, and special fraud proof equipment for sampling has to be used by the accredited transporters. Yet, there are

slight inaccuracies involved and there are also both systematic and random differences between different accredited laboratories in the determined N and P contents of the animal manure.

76. In 1998-2000, pig and poultry farms had to pay high levies for exceeding the levy-free surpluses. On average, they had to pay 4000 to 5000 euro per farm. More than 200 farms received a levy of more than 45,000 euro in 2000, while 1400 farms received a levy of 15,000 to 45,000 euro. On average 60% of the specialized pig and poultry farms met the levy-free surpluses for N and P in 2000 and 2001 (RIVM, 2004).

4.3 *Arable and horticultural farms*

77. With a few exceptions, specialized arable and horticultural farmers have not faced much influence of the manure policy so far. The first and second phases of the manure policy (Chapter 3.2) addressed especially animal farming. Though the application limits for animal manure and the code of good agricultural practices addressed all farms, the influence on arable farms was small. The third phase, with the implementation of MINAS on all farms from 2001 onwards, involved arable and horticultural farmers directly with the manure policy. Initially, there was opposition among arable and horticultural farmers as they felt to be saddled up with the problems of intensive livestock farmers. They considered the bureaucratic burden of N and P accounting useless, a waste of time and a curtailment of their freedom. Partly in response to their complaints, fertilizer P was excluded from the MINAS accounting, and the fixed defaults values for N and P in harvested products were set relatively high.

78. More than 90% of the arable and horticultural farms met the levy-free surpluses in 2000-2003 (RIVM, 2004). Basically, there have been no large changes in N and P surpluses in arable farming, except for some intensively managed horticultural farms, farms with a side branch of pig or poultry production, and farms that import relatively large amounts of animal manure from adjacent pig and poultry farms. In some areas, the surpluses of N and P have slightly but steadily increased during the last 15 years, because of the attractiveness of accepting animal manure from livestock farms.

79. On average, arable farms have benefited financially from the manure policy. Depending of the balance between supply and demand of animal manure (see Chapter 3.5), arable farmers received 0-5 euro per tonne of animal manure accepted from livestock farms, equivalent to about 1000 euro per farm. In addition, arable farms got paid for signing manure transfer agreements (see Chapter 3.4), which was equivalent to about 750 euro per farm. Moreover, the costs for fertilizer purchases decreased. All together, these benefits compensated to some extent the loss of income of arable farmers due to the decrease in the price support by the EU following the reform of the CAP.

4.4 *Changes in fertilizer use and net loading of the soil at national level*

80. On a national level, fertilizer N use decreased by 29% (116 million kg N) and fertilizer P use by 22% (6 million kg P; 14 million kg P₂O₅) in the period 1998-2002. These decreases are equivalent to a mean of 11 kg N per ha per year and a mean of 0.6 kg P per ha per year. Dairy farms had by far the largest share in this decrease, while the contribution of arable farms was negligible.

81. The total amount of N in animal manure has decreased by 22% (134 million kg N) and that of P by 9% (8 million kg P; 18 million kg P₂O₅). About 50% of this decreased was realized in the dairy farming sector, as a result of fewer dairy cows and young stock, and as a result of the lower protein content of the animal feed. The other 50% was realized in pig production. Between 1990 and 2002, the total amount of P in pig manure decreased steadily from about 30 to 20 million kg P per year as a result of a lower P content in the animal feed and a decrease in pig number (following diseases, the poor economic situation for pig production, and the buy-out of animal production rights by the government in 2001-2002). The total

amounts of N and P in poultry manure have not changed much over the last ten year; the total amount of P ranged between 15 and 17 million kg P per year.

82. The total amount of P in intensive livestock production (pig, poultry and veal production) decreased from 44 million kg P in 1994 to 36 million kg P in 2002. Approximately 20% of the manure produced by pigs and poultry in 2002 was disposed on own land, 30% was processed and exported to other countries, and 50% was transferred to other farms in the Netherlands. In total about 8 million kg P was processed and exported to other countries, mostly poultry manure. The amount exported to other countries has steadily increased over the last decade, suggesting in part that the room for disposal of manure at other farms in the Netherlands has diminished in this period. The potential total room for manure disposal within the Netherlands has been utilized for about 80% in 1998-2002, but in some areas it was (more than) 100%.

83. In the period 1998-2002, the total net loading of the soil with N and P has diminished by 35% (169 million kg N) and 33% (18 million kg P), respectively. The mean net loading of the soil with N was 240 kg per ha in 1998 and 155 kg per ha in 2002. Similarly, the mean net loading of the soil with P decreased from 31 kg P per ha in 1998 to 20 kg P per ha in 2002. The decrease in N loading was caused predominantly by the decrease in the use of N fertilizer and the amount of N in animal manure. The decrease in P loading was caused by a combination of the decrease in the use of P fertilizer, the decrease in the amount of P in animal manure and the increase in the export to other countries of P-rich poultry manure. The purchase of P fertilizer has steadily decreased from 1950 onwards, in response to the increased amount of animal manure and the steady increase in the P status of agricultural soils. The relatively poor economic situation in arable farming has also contributed to the decrease in the use of P fertilizer. There was no change in withdrawal of N and P with harvested arable crops, suggesting that the decreased input of N and P via fertilizers and animal manure did not yet affect yield and N and P contents of the marketed crops. The N content (protein content) of herbage (grass) did decrease significantly.

4.5 *Changes in N and P losses to groundwater, surface waters and atmosphere*

84. Nitrate concentrations in the shallow groundwater are related to the net N loading of the soil, but the relationship between net N loading of the soil and nitrate concentration in the groundwater differs greatly between soil types, and is also strongly affected by weather conditions (rainfall). Nitrate concentrations are highest on well-drained sandy soils with relatively deep groundwater level, medium high on clay soils, and lowest on peat soils with shallow groundwater level. The differences are related to N losses via denitrification (see Box 2). Measured nitrate concentration in the upper groundwater of well-drained sandy soils decreased from a mean of 134 mg per litre water in the period 1992-1995 to a mean of 76 mg per litre in the period 2000-2002, suggesting that the manure policy was effective in decreasing nitrate concentrations in groundwater of well-drained sandy soils. Rather similar decreases were noticed on clay soils. Nitrate concentrations in the groundwater of peat soils with shallow groundwater remained unaffectedly low.

85. Nitrogen concentration in surface waters decreased slowly but steadily in the period 1998-2002, suggesting that the manure policy was effective in decreasing N concentrations in surface waters. There was no change in the concentration of P in the surface water. The lack of a change in P concentration in the surface waters is probably related to the fact that the agricultural soils remained unaffectedly rich in P, and that P losses from soil to surface waters are more related to the soil P status than to net loading of the soil with P (see box 2).

86. Between 1995 and 2002, emissions of ammonia (NH₃) and nitrous oxide (N₂O) from agriculture into the atmosphere have decreased by 30% (56 million kg) and 18% (5 million kg), respectively. Between

1985 and 1995, NH₃ emissions decreased already by 63 million kg, following the implementation of various techniques for low-emission storage and application of animal manure.

87. Though the environmental quality of groundwater, surface waters and atmosphere improved following the implementation of the manure policy, and especially after the implementation of MINAS 1998, environmental quality objectives for groundwater, surface waters and atmosphere have not been achieved yet.

4.6 *Forecasting environmental effects of lowering N and P surpluses*

88. Various studies have been carried out to explore the effects of more stringent levy-free surpluses and of smaller N and P loading of the soils on environmental quality. This section summarizes some of these results of model calculations (see also Annex 1).

89. Lowering levy-free N surpluses decreases the concentrations of nitrate in the upper groundwater. Decreases are most significant for well-drained sandy soils, vulnerable to nitrate leaching. Nitrate concentrations in the upper groundwater of well-drained sandy soils decrease from a mean of 100-150 mg per litre when levy-surpluses for N are in the range of 100-150 kg per ha for arable land and 190-220 kg per ha for grassland to a mean of 50-100 mg per litre when levy-surpluses for N are in the range of 40-60 kg per ha for arable land and 100-140 kg per ha for grassland. Mean concentrations in sandy soils appear higher for maize land than for grassland, though levy-free N surpluses are lower for maize land than for grassland. Relatively high nitrate concentrations in maize land have been ascribed to residual effects of heavy manure applications in the past (net mineralization). It has been suggested that low levy-free N surpluses in combination with additional measures, such as cover crops on maize land in winter and restricted grazing of grassland in autumn, are needed to lower nitrate concentrations in the upper groundwater of dry sandy soils to below 50 mg per liter (RIVM, 2002; Oenema et al., 2003; 2004a,b).

90. Lowering the levy-free N and P surpluses decreases the leaching of N and P to surface waters. The relative decreases are less than the relative decreases in mean levy-free N and P surpluses and in mean net loading of the soil with N and P. This apparent ineffectiveness of decreasing leaching of N and P to surface waters by lowering levy-free N and P surpluses at farm level has been attributed to:

1. Spatial effects: the discharge of excess rain water to surface water is largest in the northern and western half of the country, where the decrease in net loading of the soil is less than in the southern and eastern half (because of differences in land use and farming practices);
2. Contribution of background leaching: nutrient-rich seepage from the marine and riverine subsoil is 30 to 40% of the total leaching losses from soils to surface waters, and this seepage is assumed to be invariable of variant; and
3. P leaching is primarily related to the P saturation index of the soil, which is also nearly invariable of variant in the short term considered here (but not in the long term).

91. Lowering levy-free N surpluses also decreases the mean emissions of NH₃ and N₂O to the atmosphere also significantly, but relative decreases are less than the relative decreases in levy-free surpluses.

92. The results of such explorative studies have been used by policy makers to find out the levy-free N and P surpluses that comply with environmentally acceptable N and P losses for various soil type and land use combinations. The studies help to explain the complex relationships between levy-free N and P surpluses and environmental quality. The studies can also help to identify areas where additional measures are needed. However, the uncertainty in the model explorations is often larger than policy makers can

accept. This is especially the case for nitrate leaching on sandy soils. Forecasting a mean nitrate concentration of 50 mg per litre with an error bar of 20 mg per litre in the upper groundwater of well-drained sandy soils in the Netherlands may be a good achievement from a scientific point of view. But the practical consequence is that the levy-free N surplus may be set too low (from the farmers' perspective) or too high (from an environmental point of view and from the perspective of Brussels), depending on the deviation.

4.7 *Costs and benefits of the manure policy*

93. Total annual costs of the manure policy for farmers have risen steadily from essentially zero in 1984 to about 200 million euro in 1998 and further to 400 million euro in 2002. Major costs were related to facilities for manure storage and manure disposal and administration. The increase in annual costs from 1998 onwards was related to increased costs for manure disposal and administration associated with the implementation of MINAS. The total administrative costs for farmers have been estimated at 155 million euro per year in the period 1998-2001. The total costs for farmers have been corrected for any beneficial effects, such as lower costs for fertilizer purchase (35 million euro) and goodwill fee for manure acceptance (RIVM, 2004).

94. Levies paid (on average 13 million euro per year) for exceeding levy-free surpluses are not included in the costs, as these levies are not withdrawn but returned to the common balance of the government. The imposed levies for exceeding levy-free surpluses steadily increased from 40 million euro in 1998 to about 200 million euro in 2002. However, the collected levies remained more or less constant and were on average 13 million euro per year. Main reasons for this difference is the introduction of the opportunity for averaging surpluses over years (compensation through under spending levy-free surpluses in following years), and delays in payment due to time-consuming objections. Evidently, levies for exceeding levy-free surpluses have not been large costs for farmers so far (RIVM, 2004).

95. The total cost of the manure policy for the government (or tax payer) has been significant. The annual cost for implementation and enforcement of MINAS, manure transfer agreements and animal production rights increased from 18 million in 1998 to 86 million euro in 2002. The non-recurring cost of the action plan of nitrate projects was 60 million euro. Total non-recurring cost for the buy-out of animal production rights was 255 million euro. Non-recurring cost for other buy-outs was 99 million euro and for additional structural measures 356 million euro. Total non-recurring cost of the structural adjustments was 710 million euro (RIVM, 2004).

96. The cost for purification of groundwater with too high concentrations of nitrate has been estimated at 16 million euro per year. The average annual cost spent for combating the effects of eutrophication caused by agriculture in the Netherlands has been estimated at 7 million euro per year, but the effects are as yet unclear. If the manure policy becomes fully effective, these costs for purification will become smaller (RIVM, 2004).

97. The decrease in net loading of the soil with N and P can be considered as the main benefit of the manure policy. Between 1998 and 2002, the net loading of the soil decreased by 169 million kg per year for N and by 18 million kg per year for P (chapter 4.4). Using these data it follows that the net loading of the soil decreased by about 0.2 kg P and 0.8 kg N per euro spent (RIVM, 2004). The cost of removal of N and P from surface waters are much higher (Chardon et al., 1996).

5. Discussion and Conclusions

98. Awareness of the negative side-effects of intensive agricultural production in the 1970s and 1980s marks a major change in the relationship between agriculture and society. Traditionally, agriculture

was a major source of natural values and according to Lowe and Ward (1997) a mediator of natural morality. The imposition of many regulatory controls has in part stigmatised farmers as environmental criminals, especially in countries with high livestock density, and as a consequence, environmental pollution by agriculture has become to some extent a politicised problem. Restoration of natural values and the multi-functionality of the rural area are needed to give farmers the position in the society that they used to have.

99. The MINeral Accounting System MINAS implemented in 1998 in the intensive animal agriculture in the Netherlands is designed in accordance with eco-modernist thinking. In response to many measure-oriented and rather ineffective command-and-control regulations implemented in the 1980s and first half of the 1990s, there was a quest for a target-oriented, integrated and flexible economic instrument for decreasing nutrient losses. MINAS gave farmers the responsibility and the freedom to choose the optimal way to realize the targets of the manure policy and to solve the nutrient problem of their farms. MINAS is designed with the aim of increasing the efficiency of nutrient utilization at all farms, and at the same time to drastically decrease nutrient losses. Through the application of a levy to surpluses exceeding the levy-free surpluses, the MINAS instrument is perceived as a steering mechanism for directing farmers' behaviour along more environmentally benign pathways. It presumes that farmers behave economically rational and that the economic incentive provided by the levy will lead to the implementation and acceleration of technical and technological changes and management improvements at the farm to increase the efficiency of nutrient utilization.

100. Implementation of MINAS implied that the environmental cost of over-use of nutrients is internalised in the decision making and economic costs of farming. Animal farmers have to feed the animals and to fertilize the crops closer to the edge of what is possible. They have to invest in for example manure storage facilities, manure applicators and manure disposal. Some of these changes appeared to be economically neutral or even beneficial, like nutrient management changes that do not require investments. Changes requiring investments, and especially manure transfer to other farms, are economically negative (RIVM, 2002; 2004). Low-emission techniques increased the costs for manure application by 2 to 5 euro per tonnes of animal manure. The annual cost of manure disposal for pig and poultry farms in the Netherlands had increased to more than 10,000 euro per farm (Figure 4). The annual costs associated with the administration of the MINAS farm-gate balance are estimated at 1,500 euro per farm. In addition, levies for N and P surpluses exceeding the levy-free surpluses have been imposed on many farmers, but few have paid these levies so far. All these costs impair the profitability of animal farming, especially of pig and poultry farming. On the other hand, these economic costs provide the incentive for improving farming practices and for increasing the efficiency of N and P use at farm level (RIVM, 2002; 2004).

101. Implementation of a nutrient balance at farm level with levies on N and P surpluses that exceed predetermined levy-free surpluses provide strong incentives to improve N and P use efficiency at farm level and thereby to decrease nutrient losses to the wider environment. It is an integrated instrument, in that it decreases all N and P loss pathways. In theory, N and P balances at farm level is the best instrument for decreasing total N and P losses from agriculture. It is meant to be fair, because it directly addresses N and P surpluses at farm level (polluter-pays principle). It is meant to be environmentally effective, because N and P use is improved and thereby total N and P losses are decreased. There are no substitutes for N and P as nutrients that would allow circumventing possible levies. It is meant to be economically efficient, as it is up to the farmer to decide which measures are cost-effective, practical and convenient to lower the N and P surpluses to the level of the predetermined levy-free surpluses. However, it does not provide an economic reason for farmers to continue to implement changes and innovations aimed at further decreasing N and P surpluses once levy-free surpluses have been achieved.

102. The two recent fact-finding studies (RIVM, 2002; 2004) conclude that in practice MINAS is an effective and efficient instrument for decreasing N and P surpluses from dairy farming. Dairy farming

covers more than 60% of the agricultural land and has a large share in total N and P surpluses in agriculture and in total N and P losses to the wider environment. Dairy farming is partly land-based and there are various possible ways of decreasing N and P surpluses environmentally effective and economically efficient. MINAS is an effective management instrument for integrated strategic nutrient management planning in dairy farming. Most dairy farmers have learned more about integrated nutrient management during three years of MINAS than during 10 years or more of using fertilizer recommendations and so-called fertilization balances.

103. MINAS is considered to be not a proper instrument for pig and poultry production (RIVM, 2002; 2004). It is fundamentally flawed for intensive animal production systems that have little land and import basically all animal feed, because MINAS expresses surpluses in units per surface area, and does not address variations in N and P stocks in animals, animal feed and animal manure (see also Chapter 4). A lot of effort has been made in practice to improve the accuracies of sampling and analyses, but the inaccuracies that remained are larger than MINAS can afford.

104. Further, MINAS has not proven yet to be effective for arable and horticultural farming, simply because P fertilizer was excluded from accounting, the fixed defaults for N and P in harvested crops were set at a (too) high level, and N and P surpluses at most farms were already below the levy-free surpluses. In theory, MINAS could also be an effective and efficient instrument for arable farming, if the fixed default values for N and P in harvested crops were made crop-rotation specific, P fertilizer was included in the accounting and the levy-free surpluses were adjusted to environmentally sound levels.

105. The results of the fact-finding studies (RIVM, 2002; 2004) also indicate that farmers need time to adopt new techniques and management styles to adjust to improved farming practices following the implementation of MINAS. They have to learn and they have to be convinced of the need for change, otherwise they remain reluctant to change and ignorant of improved practices. Direct guidance, demonstration farms and pilot farms are essential in this respect. On the other hand, government and governmental institutions also need time to learn and to fine-tune the instrument to the reality and complexity of the real-world (institution building). Initially, there were some errors in the fixed default values and these had to be adjusted. Also the size of the levy-free surpluses and the size of the levies have been frequently adjusted. Evidently, there need to be a balance between the step-wise lowering of the levy-free surpluses and the possibilities of farmers to adjust farming practices so as to lower the N and P surpluses to the level of the adjusted levy-free surpluses.

106. The manure policy of the Netherlands is a complex policy that addresses a stubborn and complicated problem. The manure policy has a history of almost 20 years of changes, successes and failures. The N and P accounting system MINAS implemented at farm level in 1998 has been the core instrument of the third phase of the manure policy, and marks a shift in the manure policy from regulations and measure-oriented policies towards target-oriented policies with stimulations via economic incentives. Though MINAS is an integrated and flexible instrument and in principle applicable to all farms, the differences between sectors are so large and the complexity of the manure problem is so big that there is no single instrument that can solve everything at once. Additional instruments have been implemented to support the manure policy, but not all of these additional instruments have been effective. Furthermore, the many additions and changes in the manure policy often led to confusion and disbelief among farmers (and policy makers), which further complicated its effectiveness. Yet, the nutrient accounting system MINAS has shown to be an effective policy for decreasing total nutrient losses from dairy farms. Potentially, it could be also an effective instrument for arable farms, but there is no clear evidence yet. MINAS has turned out to be not effective and efficient for pig and poultry farmers.

107. The economic cost for enforcement and administration of MINAS and other instruments have been increasing greatly over the last few years. The high cost for administration is in part caused by fraud,

exploitation of loopholes, juridical procedures, and by the many changes that have been made in the MINAS system and in additional policy instruments. Through these many changes, there has been insufficient time for proper implementation and fine-tuning of MINAS in practice. As such, MINAS has not received yet the credits that it would deserve as instrument to decrease nutrient losses from especially dairy farming, according to the polluter-pays principle.

108. The judgement of the European Court, the increasing administrative burden, increasing fraud, and the absence of environmental benefits in the pig and poultry sectors (where manure surpluses are largest) have led to a very rapid erosion of MINAS. By the end of 2005, MINAS will be replaced by a (complex) fertilization balance approach system with application limits for animal manure and fertilizers, in compliance with the Nitrates Directive. It remains to be seen whether such a system is equally effective and efficient for dairy farms, arable farms and pig and poultry farms.

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Table 1. Basic agricultural data of member states of the European Union (EU-15).

At the bottom, selective basic information of candidate countries (CC-10) and of the USA have been included.

Country	Population million	Employment in Ag., %	Agricultural area,		Cereals %	Grassland %	Livestock number (millions)			Livestock number ha	Farm size ha
			% of total	M ha			Cattle	Dairy	Pigs		
Austria	8	7	41	3	25	53	2.1	0.7	3.4	0,82	19
Belgium + L*)	11	2	46	2	22	47	3.1	0.6	7.7	3,14	84
Denmark	5	4	63	3	56	14	1.9	0.6	11.6	1,59	96
Finland	5	7	7	2	52	5	1.1	0.4	1.5	0,59	26
France	59	4	52	28	30	35	20.2	4.4	15.9	0,88	48
Germany	82	3	48	17	41	30	14.9	4.8	26.1	1,10	48
Greece	11	18	27	4	37	57	0.6	0.2	1	0,66	5
Ireland	4	11	61	4	7	69	6.6	1.2	1.8	1,60	48
Italy	58	6	49	15	24	28	7.2	2.1	8.4	0,72	15
Netherlands	16	4	56	2	11	53	4.2	1.7	14	3,85	104
Portugal	10	14	41	4	17	26	1.4	0.4	2.4	0,61	7
Spain	40	8	51	26	23	35	6.3	1.2	22.4	0,44	27
Sweden	9	3	7	3	41	15	1.7	0.4	2.1	0,68	37
United Kingdom	60	2	66	16	22	64	11.2	2.5	7	1,02	94
EU-15	378	5	40	128	28	37	82.7	21.1	125	0,90	33
CC-10	75	13	51	38							
USA	285	2	40	381							
											177

Table 2. Changes in some characteristics of agriculture of the Netherlands in the period 1810 to 1950, all expressed in millions

Characteristics, in millions	1810	1850	1880	1910	1920	1930	1940	1950
Surface area agricultural land, ha	1.8	1.9	2.1	2.2	2.2	2.3	2.3	2.3
Surface area natural land, ha	0.9	0.8	0.7	0.5	0.5	0.4	0.4	0.3
Surface area of greenhouses, ha	0	0	0	<0.01	0.01	0.01	0.03	0.03
Milking cows, number	0.7	0.8	0.9	1.1	1.2	1.3	1.5	1.4
Pigs, number	0.2	0.2	0.4	1.0	1.5	2.0	1.2	2
Poultry, number	1.5	1.8	2.5	6.7	5.8	12.9	21	11
Horses, number	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.3
Fertilizer N, kg	0	0	1	15	20	53	103	156
Fertilizer P, kg	0	0	2	24	33	46	47	52
Fertilizer K, kg	0	0	1	27	48	88	111	128

Sources: After Verslagen over den Landbouw in Nederland 1830-1950; Van Zanden (1985); Bieleman (1992) and unpublished data.

Table 3. Changes in some characteristics of agriculture of the Netherlands in the period 1950 to 2000, expressed in millions.

Changes in total energy use and in the use of natural gas by the whole society are given at the bottom of the table. The energy use by the agro-complex is about 12% of the total use.

Characteristics, in millions	1950	1960	1970	1980	1990	2000
Surface area agricultural land, ha	2,3	2,3	2,2	2,1	2,0	2,0
Area of greenhouses, ha	0.003	0.005	0.007	0.01	0.012	0.016
Milking cows, number	1,4	1,6	1,9	2,4	1,9	1,5
Pigs, number	2	2	6	10	14	13
Poultry, number	41	45	55	81	93	105
Horses, number	0.2	0.1	0.05	0.05	0.1	0.2
Tractors, number	0.02	0.08	0.14	0.18	0.18	0.16
Fertilizer N, kg	156	224	396	485	412	340
Fertilizer P, kg	52	49	48	36	33	27
Fertilizer K, kg	128	115	107	93	81	70
Energy use inland economy, PJ	606	925	2014	2732	2702	3024
Use of natural gas, PJ	0	11	635	1274	1290	1467

Sources: Smaling et al., 1999; CBS/LEI, 2000; CBS, 2001.

Table 4. Main types of current farming systems, number of farms, total surface area and mean surface area per farm in The Netherlands in 1999.

Horticulture and Floriculture include greenhouse cultures (between brackets). (CBS/LEI, 2000).

Farming system	Number of farms, thousands	Surface area, in 1000 ha	Average area per farm, ha	Share in total surface area, %
Arable farming	14	485	35	25
Horticulture	5 (3)	25 (7)	5 (2)	1
Floriculture	8 (5)	41 (9)	5 (2)	2
Fruit & tree nursery	5	37	7	2
Dairy & beef farming	49	1100	23	56
Pig farming	7	39	6	2
Poultry farming	2	9	5	0
Mixed farming	10	225	21	11
Other	1	5	4	0
Total	102	1967	19	100

Table 5. Example of a MINAS balance sheet for N of a dairy farming system.

Inputs	Kg/ha/yr	Outputs	Kg/ha/yr
Purchased fertilizer	150	Sold milk	80
Purchased animal feed	200	Sold cattle	10
Purchased manure	0	Transferred animal manure	100
Purchased cattle	10	Sold animal feed	0
Purchased bedding material	20	Levy-free surplus	180
Purchased compost	0	Levied surplus	10
TOTAL	380	TOTAL	380

Table 6. Levy-free surpluses for N according to the manure policy, in kg per ha per year.

Land use and soil type	1998	2000	2001	2002	2003
Grassland, dry sandy soils	300	275	250	190	140
Grassland, other soils	300	275	250	220	180
Arable land, dry sandy soils	175	150	125	100	60
Arable land, other soils	175	150	150	150	100

Table 7. Levy-free surpluses for P according to the manure policy, in kg P per ha per year.

Land use	1998	2000	2001	2002	2003
Grassland	17.5	15.3	15.3	10.9	8.7
Arable land	17.5	15.3	15.3	13.1	10.9

There is no differentiation according to soil type. Note that levy-free surpluses are usually expressed in kg P₂O₅ per ha (1 kg P = 2.29 kg P₂O₅).

Table 8. Levy-free N and P surpluses as function of variant, land use and soil type.

Variants	Area of dry sandy soils (ha)	Levy-free N surpluses, kg N/ha/yr		Levy-free P surpluses, kg P/ha/yr	
		Grassland clay soil/dry sandy soils	Arable land clay soil/ other soils/ dry sandy soils	Grassland	Arable land
A	0	300/300	175/175/175	17.5	17.5
B	140.000	220/190	150/110/100	11	13
D1	140.000	180/140	100/100/60	8.7	8.7
H	600.000	140/100	60/60/40	0.4	0.4

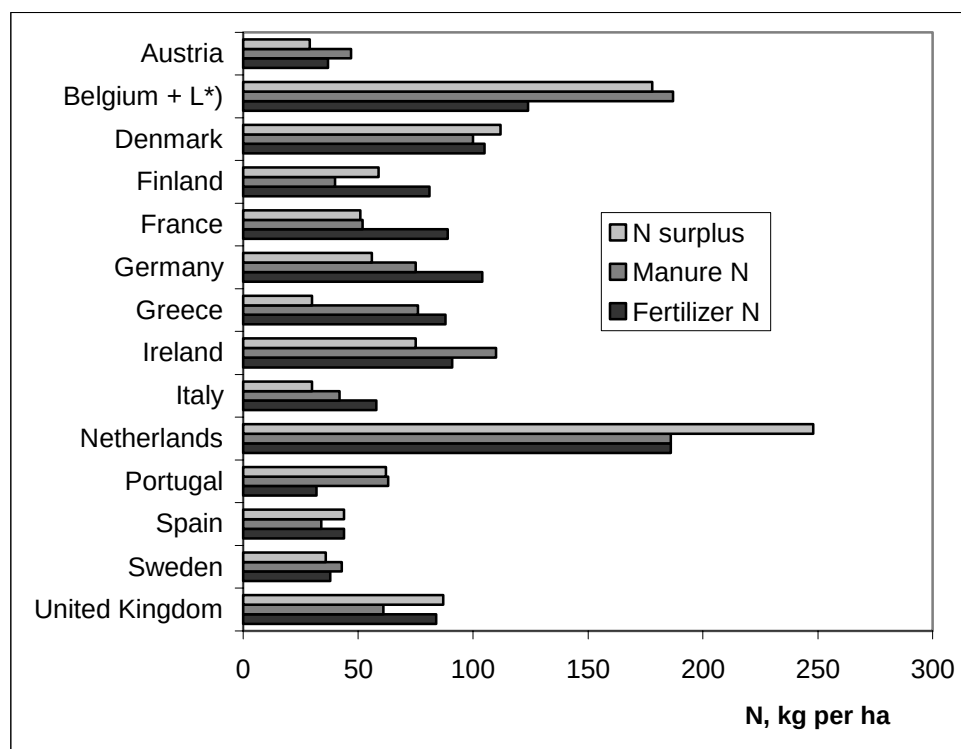
The definition of dry sandy soils differs between variants, and as consequence, the areas too.

Table 9. Calculated effects of implementing different variants of levy-free surpluses (A, B, D1 and H) on the mean net loading of agricultural soil with N and P

Variants	A	B	D1	H
Net Nitrogen loading of the soil, kg N per ha per year	168	133	119	98
Net Phosphorus loading of the soil, kg P per ha per year	15	14	11	2
Emissions of NH ₃ , kg per ha per year	80	68	64	53
Emissions of N ₂ O, kg per ha per year	13	11	10	9
Area with > 100 mg NO ₃ ⁻ per liter in groundwater, %	17	7	4	1
Area with > 50 mg NO ₃ ⁻ per liter in groundwater, %	33	25	21	14

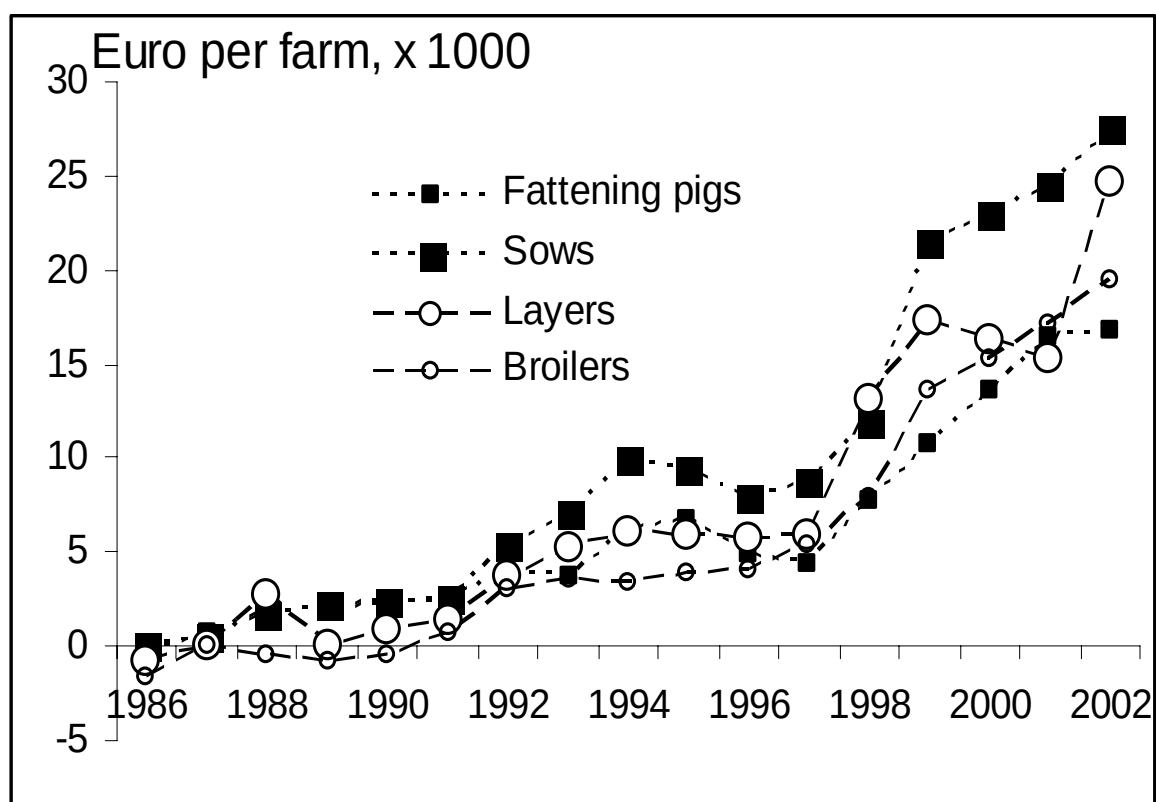
According to the soil surface balance method, emissions of NH₃ and N₂O into the atmosphere, and of area of agricultural land (in percent of the total of 2 million ha) with a nitrate concentration in the upper groundwater that exceeds 50 and 100 mg per liter (RIVM, 2002).

Figure 1. Total net Nitrogen input on agricultural land via fertilizers and animal manure, and total mean Nitrogen surplus in EU-15 in 1997.



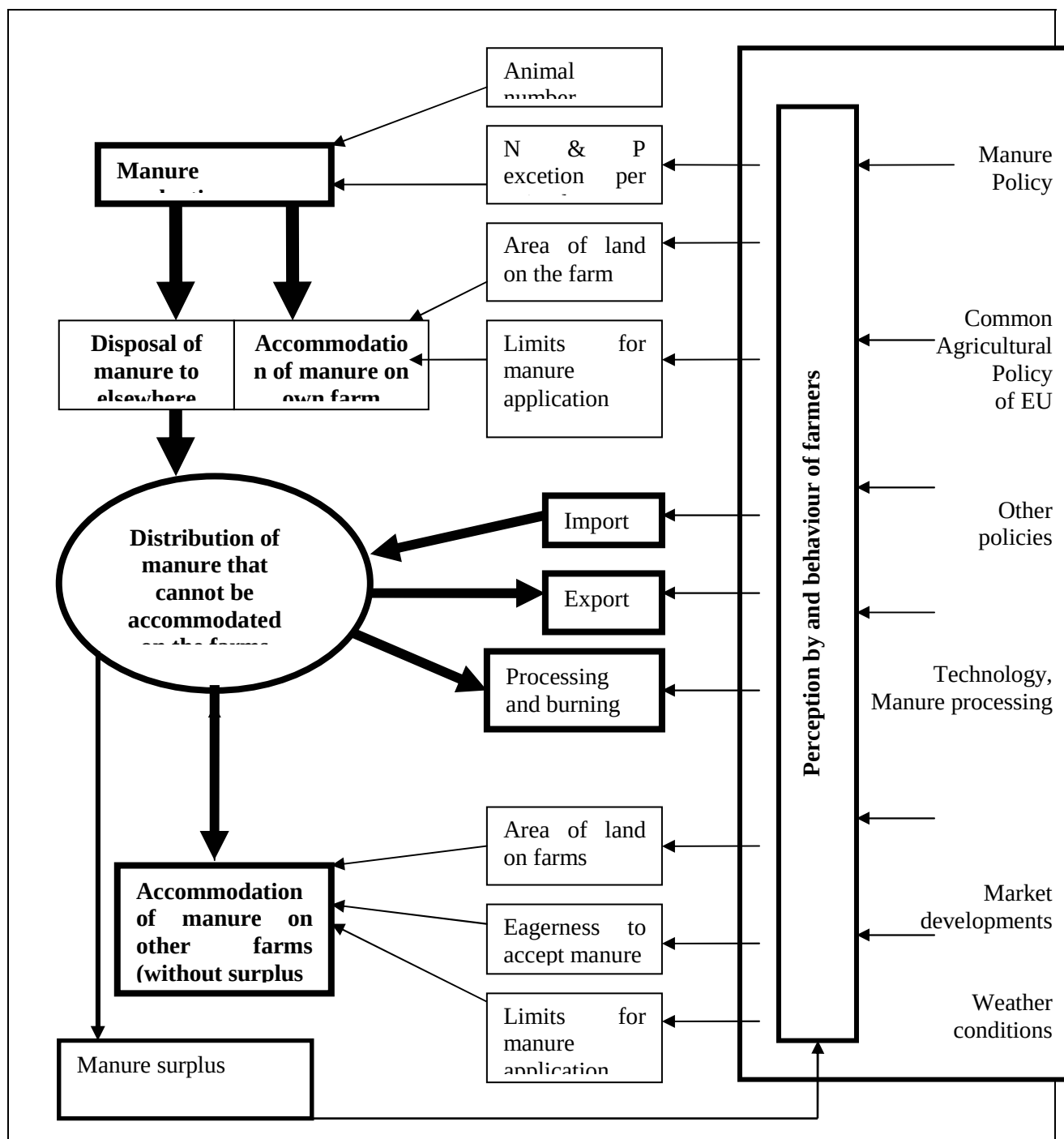
Inputs of N are corrected for ammonia emissions. Belgium + L* is Belgium + Luxembourg. (OECD, 2001; DG-AGRI, 2002; Eurostat, 2002).

Figure 2. Cost of manure disposal per farm for specialized poultry and pig producers in the period 1986-2002



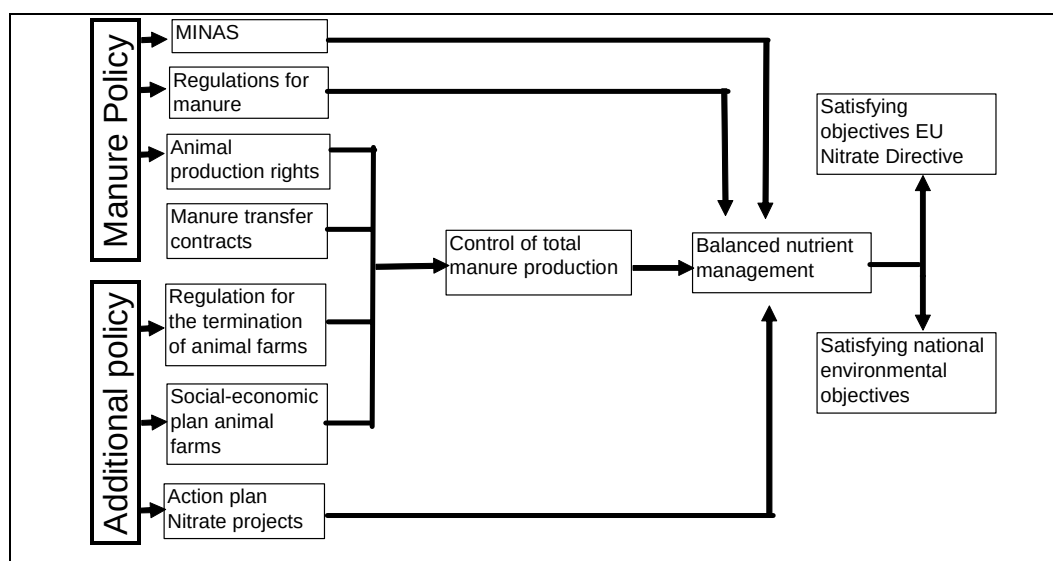
Source: after RIVM, 2004.

Figure 3. Supply and demand of animal manure on the manure market.



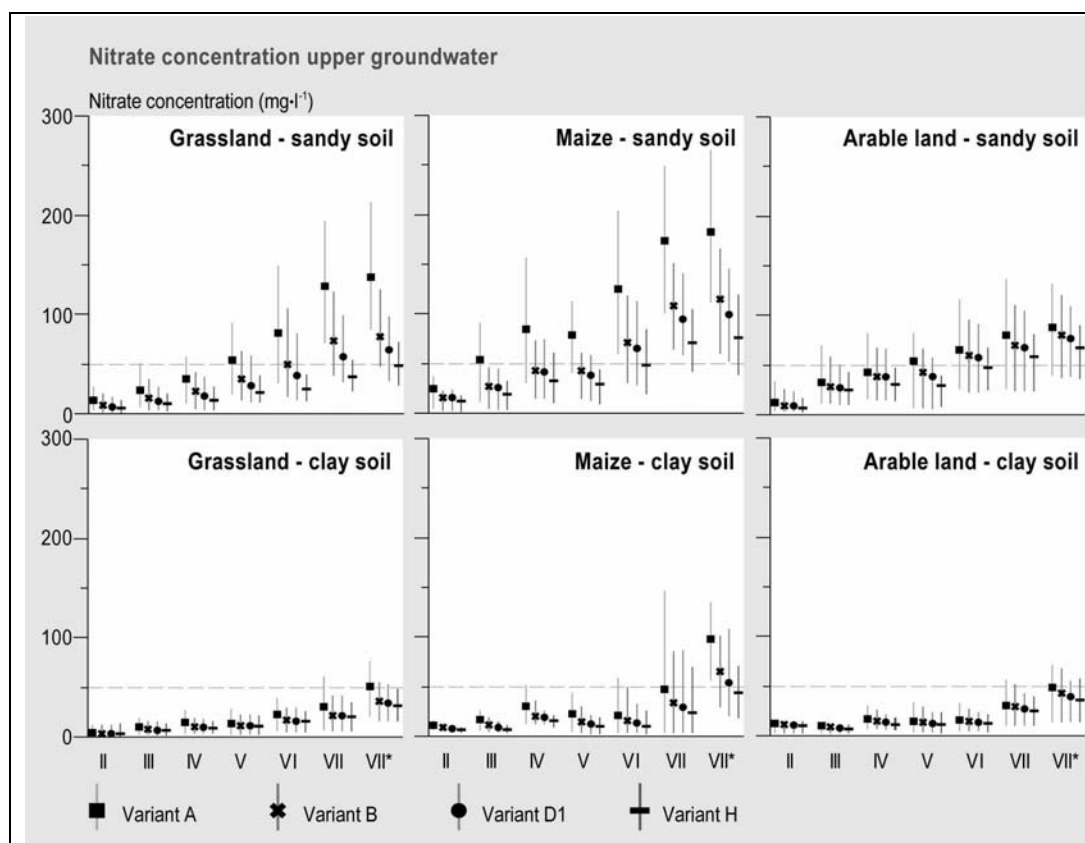
Farm external factors influencing supply and demand are listed at the right-hand side of the figure. Farm internal factors influencing manure production and manure disposal are listed in the centre. The upper half of the figure shows the factors influencing manure production and manure disposal on farms where manure is produced. The lower half shows the factors influencing accommodation of manure from elsewhere. Thin arrows indicate influences of factors; thick arrows indicate flows of animal manure.

Figure 4. Schematic representations of the connections between the current instruments of the Manure Act and the current instruments of the Additional policy.



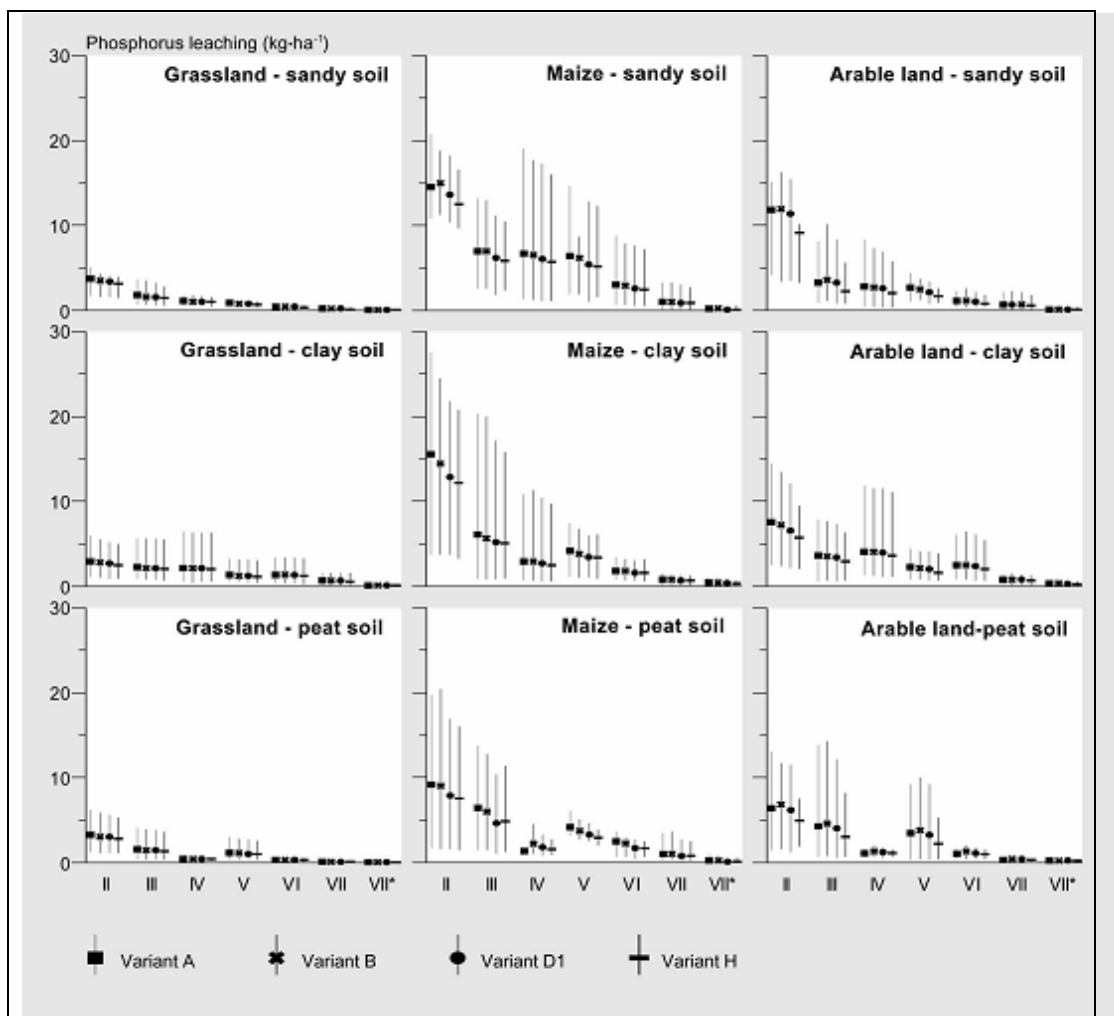
Source: After RIVM, 2004.

Figure 5. Calculated nitrate concentrations in the upper groundwater



Averaged over 15 years, as function of groundwater class (x-axis), land use (grassland, maize land and arable land), soil type (sand versus clay), and variant (A, B, D1 and H). Concentrations are presented as means (dots) and 5 and 95 percentiles (bars). Groundwater class reflects the mean upper (in winter season) and mean lower (in summer) groundwater level. For class I upper and lower groundwater levels are <20 cm, for class VII* upper and lower groundwater level are >120 cm. Note that surface areas differ between groundwater classes, from 48.000 ha for class I to 770.000 ha for class VI (after Oenema et al., 2004a).

Figure 6. Calculated phosphorus leaching to surface waters,



Averaged over 15 years, as function of groundwater class (x-axis), land use (grassland, maize land and arable land), soil type (sand, versus clay and peat), and variant (A, B, D1 and H). Total leaching losses are presented as means (dots) and 5 and 95 percentiles (bars). Groundwater class reflects the mean upper (in winter season) and mean lower (in summer) groundwater level: for class I upper and lower groundwater levels are both <20 cm, for class VII* upper and lower groundwater level are both >120 cm. Note that surface areas differ between groundwater classes, from 48.000 ha for class I to 770.000 ha for class VI (after Oenema et al., 2004a).

ANNEX 1. ENVIRONMENTAL EFFECTS OF LOWERING NITROGEN AND PHOSPHOROUS SURPLUSES²

This annex presents the results of model calculations of four variants of different combinations of levy-free surpluses. The results are expressed in terms of nitrate leaching to groundwater, ammonia and nitrous oxide volatilization to the atmosphere and N and P leaching to surface waters. Levy-free surpluses for N and P differ for grassland and arable land, and for different soil types. They decrease from variant A, to B to D1 and are lowest for H (Table 8). The calculations have been made to explore the effects of possible combinations of levy-free surpluses on environmental quality, and to analyze the spatial variations in effects.

Lowering levy-free N and P surpluses, i.e. implementing variants A, B, D1 and H decreases the net loading of agricultural soil with N and P (Table 9). Differences in net loading of the soil between variants A and H were almost a factor 2 for N and a factor 7 for P. These differences indicate that changes in levy-free N and P surpluses could be effective in decreasing the net loading of the soil with N and P. Note that numbers in Table 8 indicate calculated means for all agricultural land; differences between areas in net loading of the soil with N were up to a factor of 2, because of differences in land use and because of differences between land use systems and soil types in levy-free N surpluses.

Lowering levy-free N and P surpluses decreases the mean emissions of NH₃ and N₂O to the atmosphere also significantly (Table 9), but relative decreases are less than the decreases in net loading of the soil in N.

Nitrate concentrations in the upper groundwater are related to the net N loading of the soil, soil type, land use system and groundwater level. Concentrations are low when groundwater level is shallow, because of denitrification and leaching to surface waters. At a similar net N loading of the soil, concentrations are lower for grassland than for arable land, because of differences in denitrification and a difference balance between immobilization and mineralization of N in soil. Lowering levy-free N and P surpluses decreases the concentrations of nitrate in the upper groundwater (Figure 5). Decreases are most significant for dry sandy soils, vulnerable to nitrate leaching; nitrate concentrations decrease from a mean of 100-200 mg per liter for variant A to a mean of 50-100 mg per litre for variant H (Figure 5). Mean concentrations in sandy soils appear higher for maize land than for grassland, though levy-free N surpluses are lower for maize land than for grassland. Relatively high nitrate concentrations in maize land have been ascribed to residual effects of heavy manure applications in the past. Mean concentrations in sandy soils appear somewhat lower for arable land than for grassland, mainly because of lower levy-free N surpluses, especially in variant A. Nitrate concentrations in the upper groundwater of peat soils are negligible low (not presented).

The spatial variability and the variability between years are large. Related to the large spatial variability, there are still significant areas of agricultural land where the nitrate concentrations in the upper groundwater exceed the level of 50 mg per litre. The area of agricultural land with more than 50 mg nitrate per liter decreases from 33% to 14% (i.e. with about 400.000 ha) when lowering levy-free N surpluses from variant A to H (Table 8). The relative decrease of the area with more than 100 mg nitrate per litre in

² After Oenema et al., 2004a.

the upper groundwater is large, from 17% to (less than) 1%. Sandy soils with relatively deep groundwater level (>120 cm below surface; i.e. groundwater class VII*, and VII) in the southern and eastern half of the country appear most vulnerable for nitrate leaching. It has been suggested that low levy-free N surpluses in combination with additional measures, such as cover crops in winter and restricted grazing, are needed to lower nitrate concentrations in the upper groundwater of dry sandy soils to below 50 mg per liter (RIVM, 2002).

Leaching of N and P to surface waters is related to the net loading of the soil with N and P, hydrology (groundwater class and drainage), and to a lesser extent to land use and soil type. The most dominant factor is hydrology. Total leaching losses are the resultant of the water discharge (drainage, overland flow, and subsurface seepage) to surface waters and the concentration of N and P in the discharge, which are both but in different ways related to groundwater class. For groundwater class II, total discharge to surface waters and P concentration in the discharge are relatively high, but N concentration relatively low (because of denitrification losses). In contrast, groundwater recharge is large and discharge to surface water is low in soils with groundwater class VII*. The soils with groundwater class VII* also have low P concentration in the discharge, because of strong adsorption to iron (oxy)hydroxides, and high N concentration, because of little N loss through denitrification. These complex interactions indicate that total leaching of N and P to surface waters decrease exponentially with increasing groundwater class, i.e. from class I to class VII*, and that spatial and annual variability are large.

Lowering the levy-free N and P surpluses (from variant A to variant H) decreases the leaching of N and P to surface waters with 25% and 15%, respectively. The relative decreases are less than the relative decreases in mean levy-free N and P surpluses and in mean net loading of the soil with N and P (Table 9). This apparent ineffectiveness of decreasing leaching of N and P to surface waters by lowering levy-free N and P surpluses at farm level has been attributed to:

1. Spatial effects: the discharge of excess rain water to surface water is largest in the northern and western half of the country, where the decrease in net loading of the soil is less than in the southern and eastern half (because of differences in land use and farming practices);
2. Contribution of background leaching: nutrient-rich seepage from the marine and riverine subsoil is 30 to 40% of the total leaching losses from soils to surface waters, and this seepage is assumed to be invariable of variant; and
3. P leaching is primarily related to the P saturation index of the soil, which is also nearly invariable of variant in the short term considered here (but not in the long term).

Lowering levy-free N surpluses from variant A to variant H decreases mean N leaching to surface waters with 10 to 25 kg per ha per year for the wet soils with groundwater classes I to III. For the dominant groundwater classes VI and VII, decreases for N are in the range of 1 to 10 kg per ha per year, and that for P in the range of 0-2 kg per ha per year. The spatial variability in P leaching is large, and primarily related to the large spatial variations in groundwater class and P saturation index. Variations between years are also extremely large (up to factor 3), because of incidental P losses (Box 2).

Lowering the levy-free N and P surpluses from variant A to variant H has negligible effects on N and P concentrations of the rivers Rhine and Meuse in The Netherlands, and of the largest lake IJsselmeer. Concentrations of N and P in IJsselmeer range from 2 to 3 and from 0.13 to 0.18 mg per liter, respectively, and are independent of variant. Lowering the levy-free N and P surpluses from variant A to variant H decreases N and P concentrations of ditches and streams by about 20%. This decrease is insufficient to decrease the coverage of ditches by duckweed significantly. Approximately 80% of the ditches (total length approximately 600.000 km) in The Netherlands have duckweed coverage. This coverage is related to the P concentrations; when P concentrations are 0.3 or higher, duckweed coverage is 100% (Van Liere and Jonkers, 2002). In the short term, decreasing the levy-free P surpluses appears to be a relatively

ineffective policy for decreasing P concentrations in surface waters. For the long term however, decreasing levy-free P surpluses is a prerequisite. A combination of low levy-free surpluses in agriculture and additional measures (dredging of P-rich sediment, flushing) is needed for full ecological restoration of inland surface waters

Nutrient concentrations in the Dutch coastal waters are strongly influenced by riverine inputs (predominantly the river Rhine), whereas concentrations offshore are determined by Atlantic water. Lowering the levy-free N and P surpluses from variant A to variant H has small effects (<5%) on N and P concentrations of coastal waters. Basically, this is because of the dominant influence of the rivers Rhine, Meuse and Scheldt on nutrient concentrations in the coastal waters.

**The United Kingdom Climate Change Levy:
A Study in Political Economy**

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THE UNITED KINGDOM CLIMATE CHANGE LEVY

A study in political economy

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FOREWORD

This report has been prepared as part of the work programme of the Joint Meetings of Tax and Environment Experts under OECD's Fiscal Affairs Committee and Environment Policy Committee. It was written by Professor David Pearce, University College London. Similar case studies on how the political obstacles to the introduction of economic instruments for environmental policy with potentially negative impacts on sectoral competitiveness have been overcome have been prepared concerning the Heavy Goods Vehicle fee in Switzerland and the 'minerals accounting system' MINAS, that address nitrogen and phosphorous run-off from agriculture in the Netherlands. A similar study on the taxation of fuels used in domestic commercial aviation in Norway will be prepared in 2005.

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THE UNITED KINGDOM CLIMATE CHANGE LEVY: A STUDY IN POLITICAL ECONOMY

EXECUTIVE SUMMARY

The United Kingdom has an elaborate array of policy measures to tackle its emissions of greenhouse gases.

Apart from more conventional measures relating to energy efficiency standards, policies include a number of market-based instruments. Economic theory suggests that the adoption of such instruments should (a) minimise compliance costs relative to conventional regulation, and (b) provide a stimulus to the development of new technology to reduce emissions, a stimulus that is absent with normal means of regulation. Notable among the market-based approaches is a combined energy tax – the ‘climate change levy’ – and a set of negotiated agreements with industry whereby the levy is reduced in return for an agreed package of measures to reduce emissions. The current report addresses a ‘political economy’ issue, namely why this combination of measures does not approximate the kind of market based approach that would be recommended if we lived in a textbook world in which policy was designed efficiently. Political economy looks at the factors that influence the design of policy measures, factors which will include the relative influence of different pressure groups, political sensitivities of governments to concerns such as the effect of policy on the poor, and the existence of a past history of policy measures which cannot easily be swept aside to make way for the new policy measure. Moreover, the presence of regulatory agencies which may not have a strong incentive to adopt market-based approaches can further inhibit the optimal design of policy measures.

The United Kingdom has had a strong tradition of action on climate change, dating mainly from the early acceptance of the problem by Prime Minister Thatcher in 1988. While there is some evidence to suggest that early support for action was based on a view that UK science would be a beneficiary from understanding climate change better, it soon became apparent that policy measures would be needed. Early discussion of carbon taxes was inhibited by concerns for the effect of such taxes on industry in general, and the sensitive issue of electricity privatisation. Carbon taxes might appear to reduce the attractiveness of investment in the sector. Nonetheless, clear indications were given that energy prices would have to rise to help combat the increase in greenhouse gas emissions.

The advent of a Labour government in 1997 reaffirmed the commitment to act on climate change and to use market-based instruments where possible.

However, the new government had added concerns that made the design of such measures more complex. First, the previous government had faced difficulties in extending value added tax to the household sector, and the new government also did not wish to introduce measures that might have a disproportionate effect on the poor. Second, Labour owed an allegiance to the coalmining communities, in stark contrast to the previous government which had successfully made overt attempts to curtail the power of the mineworkers. Third, Labour had to escape a past image of ‘high tax and high public spending’, so that whatever measures were introduced had to be as friendly to industry as possible and had to avoid the impression that any new tax was simply for revenue-raising. The ‘Marshall Report’ of 1998 attempted to resolve the problems by proposing (a) an energy tax and (b) a permit trading scheme. The end result was the climate change levy and the UK (carbon) emissions trading scheme.

The UK has several greenhouse gas targets.

The first, under the EU-wide burden sharing agreement linked to the Kyoto Protocol sets a 12.5 per cent reduction in all gases relative to 1990 by 2008-12. The second is a domestic 20 per cent reduction in carbon emissions by 2010, subsequently effectively abandoned in 2004. The third is a longer run 'aspirational' and conditional target of 60 per cent reduction on 1990 emissions by 2050. The two domestic targets, which are not linked to international agreements, indicate the strength of government commitment to climate change control.

The levy itself has features that are readily explained by the need, as government saw it, to avoid taxing households, keep industrial cost burdens to a minimum, and bring industry on board with the UK climate change programme. The levy is 'downstream', i.e. is paid by energy users not extractors or generators, is levied on industry only, with households and transport being exempt, and is structured so as to encourage renewable energy but not nuclear power (users of nuclear electricity pay the tax). An 80 per cent discount could be secured if the industry in question negotiated a 'climate change agreement' –i.e. an industry package of measures to reduce emissions relative to some baseline. Anyone over-complying with their agreement could, in principle, trade the resulting credits into the UK emissions trading scheme, along with permits allocated under that scheme and renewable energy certificates under a separate renewable energy constraint on generators. In this way the levy is linked to the other measures in the climate change programme.

How far is the climate change levy effective?

The issue really reduces to asking how effective it is relative to what the alternative measure might have been. Different commentators use different counterfactuals, with most believing that a 'pure' carbon tax would have been better. In contrast, the levy is perversely related to the carbon content of fuels – gas being taxed more heavily in terms of carbon content, than coal. The electricity generators have no incentive to switch between fuels by carbon content because the tax is levied downstream rather than upstream. Coverage is limited because of the exemption of households, who must nonetheless bear some incidence of the tax, and transport which is subject to other tax measures. The climate change agreements appear to have been very successful with over-compliance with targets even in the first year or so of operation. Others believe this reflects the 'soft' nature of the targets from the outset, with the system being largely 'captured' by industry. What is clear is that the levy's design very much reflects the political economy considerations of government. A pure tax would have come into conflict with government goals concerning household vulnerability, competitiveness concerns and the sensitivity of some sectoral interests.

Is it a good tax?

It has made a contribution to the UK climate change targets, but this measure of effectiveness assumes that the alternative was doing nothing. It may well have fared better than some outright regulation measures, but whether it has done better than a pure carbon tax is very much open to debate. The problem, then, is one of the counterfactual against which the levy is compared. The political economy literature argues that there is little point in comparing actual measures against ideal measures if the ideal measures could never be implemented. Equally, there is a risk in the political economy approach that explaining why policy measures look as they do will amount to justifying those measures. This paper attempts to chart a course between the ideal and the realised measures.

For more information about **THE UNITED KINGDOM CLIMATE CHANGE LEVY: A STUDY IN POLITICAL ECONOMY**, contact: Nils Axel Braathen, National Policies Division, Environment Directorate, OECD.
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THE UNITED KINGDOM CLIMATE CHANGE LEVY: A STUDY IN POLITICAL ECONOMY

1. Introduction¹

1. While economists have long set out the theoretically desirable features of market-based instruments for environmental policy, those theoretical prescriptions are rarely met in practice. The main reason for this disparity between theory and practice is fairly obvious: governments cannot simply design and implement policy measures without taking account of political realities. First, what economists may regard as an 'optimal' instrument design tends to serve one overriding goal – economic efficiency. Political reality demands that other goals, which in practice are not necessarily consistent with each other, also play a part in practical design and implementation. Second, governments are not all-knowing, all powerful guardians of social wellbeing. Rather, they have to contend with pressure groups and lobbies which, in turn, represent sets of conflicting interests. As a result, actual policy and 'optimal' policy rarely coincide. This 'gap' is very much the subject of a political economy approach to policy analysis. One goal of political economy is to analyse how large the policy gap is, why it occurs, what the social cost of the gap is, and what might be done to reduce that cost through better policy design.

2. This report focuses on one environmental instrument which is part of the UK's wider programme of policies to deal with its various obligations to control climate change. The instrument is the Climate Change Levy (CCL) which takes the form of a tax on energy. However, the CCL cannot be viewed in isolation – it is part of a fairly elaborate package of measures, and its interaction with the other instruments in that package need to be understood. Accordingly, we first set out a brief history of the UK's approach to climate change control, and describe the various components of the policy package. A detailed history of the CCL is then provided, and this is followed by an analysis of the features of the CCL, focusing particularly on the political factors that influenced its design, and the various reactions to it. Finally, we look at the likely future of the CCL in light of developments in climate change policy in the wider Europe.

¹ Comments would be very much appreciated, especially corrections to statements of facts and to numbers. Please send to David Pearce, d.pearce@ucl.ac.uk as an e-mail or Word attachment to an e-mail. I am very much indebted to the following for comments on earlier drafts: Dieter Helm of New College, Oxford University; Robin Smale of OXERA Consultants, Oxford; Michael Common of the University of Strathclyde, Glasgow; Chris Heady and colleagues at the OECD, Paris. Staff at the European Commission, Brussels kindly provided some corrections to the description of the EU emissions trading scheme. Paolo Agnolucci of the Policy Studies Institute, London, kindly supplied me with an advance copy of his paper on an event analysis of the climate change levy. Staff in the UK DEFRA and HM Treasury also kindly offered comments on earlier drafts. None of them bears any responsibility for the remaining errors or for the interpretation placed on events. These are my responsibility alone. An early version of the paper was presented to the EFTEC 'EnvEcon' conference at the Royal Society, London in March 2004.

2. Why political economy?

2.1 What is political economy?

3. Why should a study of an environmental tax be prefixed by the term ‘political economy’? The contrast between economics and political economy is now quite a sharp one, even though the two terms were used interchangeably from the end of the 19th Century to, say, the 1960s. An economic analysis of a policy measure would, by and large, be confined to an analysis of the aggregate gains and losses in wellbeing (welfare, utility) arising from a policy intervention such as an environmental tax. Such analyses are termed ‘efficiency’ analyses, or ‘welfare’ analyses, since they compute the changes in wellbeing for each individual or agent affected by the tax. These gains and losses are then aggregated, usually on the basis of the money value of the changes in wellbeing. Such an approach typifies cost-benefit analysis, for example. Some writers (e.g. Boyce, 2002) argue that political economy differs from economics in that the former would additionally analyse the distributional impacts of the policy: i.e. who gains and who loses. There are two aspects to this distributional concern. The first is *positive* and argues that the distributional incidence of the policy will do much to *explain* why the policy is designed in the way it is. This is because those who lose (or who do not gain as much as others) may well lobby against the measure, leading to its redesign. The second aspect is *normative*: what is or is not socially desirable depends in part on whether gains and losses are distributed fairly. In this case, some distributional judgement relating to the deserts of the gainers and losers would be added to the efficiency criterion. For example, if losers were the poor and gainers the rich, an equity criterion would pronounce the policy to be unfair, even though it may be efficient in the economic sense. (Pearce, 2003a, provides an extensive survey of equity approaches).

4. While political economy would certainly concern itself with the distributional implications of a policy, distributional assessments of this kind have been integral to most policy analysis, and it does not seem reasonable to confine ‘political economy’ to an analysis of distribution, important as it is². It is true that efficiency and equity can and do trade-off against each other: for a policy to be fair there may well have to be sacrifices in efficiency. Then, some ‘meta’ principle is required to decide what that trade-off is, and the political process may well be the means of deciding it. Moreover, if ‘distribution’ is construed widely enough to encompass different impacts on different interest groups, then distributional concerns certainly account for a significant part of the wider political concerns about policy. But it is the general interaction between the political process and the theoretical optimal design of policy instruments that defines political economy. As Drazen (2000) puts it:

‘If economics is the study of the optimal use of scarce resources, political economy begins with the political nature of decision-making and is concerned with how politics will affect economic choices in a society’ (p.5).

5. Optimality in economics is based on the notion of maximising net benefits. In turn, a benefit is defined as any gain in human wellbeing, and a cost as any loss in human wellbeing. A benefit is anything that is preferred by an individual, and a cost is anything that the individual ‘disprefers’. Hence, preferences are the basic data of welfare economics. To convert this analysis into something measurable, preferences are measured by willingness to pay to secure a benefit, and willingness to accept compensation to tolerate a

² For overviews of political economy see the special issue of *Journal of Economic Surveys*, December 2000 and especially the introductory article by Sayer (2000). For an overview of political economy and the environment, focusing on the political difficulties of introducing market-based instruments, see Kirchgässner and Schneider (2003) and Pearce (2002a).

cost³. In the case of an environmental tax, such as the CCL, economics would pronounce on its desirability or otherwise according to whether or not its benefits exceed its costs. Formally, the assumed social welfare function appears as:

$$\Delta SW = \sum_{i,t} \Delta W_{i,t} \dots [1]$$

where Δ signifies 'change in', W is wellbeing, SW is social wellbeing or welfare, and ΔW can be positive for some individuals and negative for others, i is the i th individual and t is time (discounting is ignored, for convenience). For a policy to pass a CBA test $\Delta W > 0$.

6. In practice, few political decisions are made on the basis of maximising net benefits in the sense defined above. 'Politics' intervenes in the process, even where the notion of optimality is accepted as a working goal of policy design, as it is in those countries, including the United Kingdom, where some comparison of costs and benefits is required by regulatory agencies⁴. In other contexts, the economist's notion of optimality may be rejected anyway, and some other goal or set of goals may be substituted for economic efficiency. Thus, the actual policy outcome may vary, often substantially, from the economic optimal design because of (a) rejection of the underlying goal of economic efficiency, or (b) the need to meet other interests which conflict with economic optimality (Oates and Portney, 2001). In the case of UK environmental policy the latter factor is probably the more important. Essentially, any policy imposes costs and benefits, setting up an array of conflicting interests. In turn, gainers and losers vary substantially in the political power and influence they wield, for good or bad reasons. Accordingly, a dynamic political process gets under way which can influence both the initial and subsequent design of policy and its implementation. The classic formulation of these interactions expressed as a simultaneous game is Becker (1983). For any issue there will be competing interest groups, each with a political 'influence function' which translates the interests of the group into political influence. The outcome is a game equilibrium.

7. However, Becker viewed political decisions as the equilibrium outcome of competing interest groups, leaving little room for the traditionally perceived role of government as a provider of the 'public interest'. Modern political economy accepts that actual decisions are not made on the basis of a textbook social welfare function. A function such as the following captures the essence of what might happen in practice (e.g. Kalt and Zupan, 1984; Grossman and Helpman, 1994; Aidt, 1998; Goldberg and Maggi, 1999):

$$\Delta PW = \alpha \sum_{i,t} \Delta W_{i,t} + (1 - \alpha) \sum_{n,t} \Delta W_{n,t} \dots [2]$$

In this case there are two broad groups in society: individuals i , as in the traditional social welfare function shown by [1], and 'interested parties' or 'pressure groups', n . To emphasise the difference, political welfare, 'PW' is substituted for 'SW'. The weights α and $(1-\alpha)$ reflect the strength of political regard for social wellbeing and the wellbeing of interest groups. In the limit, if $\alpha = 1$ the PW function is equivalent to

³ And, more comprehensively, willingness to pay to prevent a cost and willingness to accept compensation to forego a benefit. The resulting four main measures of welfare change are the four 'consumer's surpluses'.

⁴ In the UK, all policy measures of any significance must be accompanied by a Regulatory Impact Analysis (RIA). The relevant guidance can be found in UK Cabinet Office (2003) and in UK HM Treasury (2002a).

the SW function. If, on the other hand, $\alpha = 0$ then government is totally ‘captured’ by interest groups, as in early models of political economy (Becker, 1983). In the context of environmental policy, interest groups can be pro- or anti-environmental so that political decisions may over- or under-regulate for environmental quality. The conditions for successful organisation of lobbies are not of direct relevance here – Olson (1965) remains the *locus classicus* in this respect.

8. Equation [2] can be subjected to a broad interpretation. For example, as we shall see, the UK government, along with most other governments, has long had a concern with the effects of regulation on ‘competitiveness’⁵. Since any damage to UK competitiveness with other countries would harm most of the population, this can be thought of as a component of ΔW_i in [2]. But political lobbying will also reflect this concern since industrial lobbyists in particular will be concerned with competitiveness effects because of the implications for profit margins and hence shareholders’ interests and managerial rewards. Governments therefore react to issues of competitiveness with two interests at heart: (a) its role as provider of the public interest (ΔW_i) and (b) sensitivity to the effects of impairing competitiveness on lobbyists (ΔW_n).

9. The contrast between the two welfare functions [1] and [2] immediately explains why an optimally efficient tax is likely to be rejected at the political level: it simply fails to capture the various pressures on governments in making decisions. In turn, governments are sensitive to those pressures for their own reasons, which may be as simple as staying in power, or a concern to ‘buy’ support in order to realise some social or economic programme. The essential point is that the textbook recommendation is formulated in a context that is very different from the political context. However, great care is needed in pursuing the political economy perspective. *Explaining* differences between optimal and actual design of policy measures does not *justify* them. The role of normative economic analysis remains one of explaining how a decision should look if the economist’s social welfare function approach is adopted. Normative political economy then has the role of asking whether the various institutional and political constraints really are as limiting as the political economy model might suggest. Alternatively, if the constraints are accepted as being, in some sense, unalterable, the analysis shifts to asking whether the final design of policy really is the only possible one. In other words, given the constraints, could the actual outcome be improved? The risk in political economy analysis is that these later stages are not pursued: *what is* becomes *what should be*, simply because what is can be explained by the various ‘immutable’ factors faced by real-world decision-makers. This ‘Panglossian’ analysis needs to be avoided⁶.

2.2 Optimal environmental taxes in the UK

10. Interestingly, the UK introduced two environmental taxes that, initially anyway, mirrored exactly what an optimal externality tax should look like. The Landfill Tax, introduced in 1996, was based on a detailed study of the monetised externalities from waste disposed of to landfill sites (CSERGE et al. 1993)⁷. Since then the tax has been raised beyond the initial externality levels because of the need to comply with the EU Landfill Directive. In turn, if the original externality levels were correctly computed, and if the landfill Directive requires more externality reduction than is dictated by the tax, then the Directive itself must fail a cost-benefit test, i.e. the Directive is economically inefficient. How far this is true depends on the way externalities are estimated, and especially on the issue of whether or not a ‘user

⁵ Just what ‘competitiveness’ means is considered later in the report.

⁶ In Voltaire’s *Candide* Dr Pangloss was noted for arguing that, regardless of the misery he found himself in, ‘in this best of all possible worlds... all is for the best.’

⁷ Norway’s landfill tax was also based on an assessment of externalities, producing a significantly higher figure equivalent to £23 per tonne of waste, way above the UK’s initial tax rate of a £3-4. (OECD, personal communication).

cost' element for scarce landfill space is incorporated in the analysis (Pearce, 2004a). The second example of an economically efficient tax in the UK is the Aggregates Levy, a tax on the extraction of minerals such as sand, stone and gravel. This levy was introduced in 2002 and was based on an extensive stated preference study of the externalities associated with aggregates extraction (London Economics, 1999; Pearce, 2004b). The tax has remained at the initial level since 2002.

11. If the UK could set some environmental taxes at their optimal efficient level why has it failed to do so with other environmental taxes, and notably, as we shall see, the Climate Change Levy (CCL)? In the case of the Landfill Tax the answer is almost certainly that there was only a limited political opposition to the tax. Non-organic waste was taxed at a low level (£UK 2 per tonne) because of the lower externalities associated with inert materials (no carbon dioxide or methane emissions). Had the tax been higher, there may well have been an orchestrated campaign against it by the construction industry, since significant amounts of demolition and construction waste go to landfill. Taxing organic waste, which is associated with the higher externalities, essentially means taxing commercial and municipal waste, with the former being able to pass costs on fairly simply, and with the latter being dealt with by local government. In turn, municipal authorities would have the capacity to build the costs of the tax into their negotiations with central government over grants for expenditure. Turning to the Aggregates Levy, there was a spirited opposition to the tax from the aggregates industry but it seems fair to say that the opposition was not very strong. To some extent the industry misread government determination to impose some measure of externality control on the industry. The issue is discussed in detail in Pearce (2004b).

12. The contrast between these environmental taxes and the CCL is stark. Fossil fuel energy, and hence carbon, is pervasive to any industrialised economy. Raising the price of energy or carbon thus affects a large array of interests. Moreover, the effects in some cases could represent significant cost increases and hence pressures on profit margins. The whole history of energy taxation in industrialised countries is a history of very powerful political pressures against such taxes. The examples of the failed BTU tax in the USA and the failed 1992 EU energy/carbon tax are sufficient to illustrate the point. Whereas the Landfill and Aggregates taxes attracted some opposition, it paled into insignificance compared to what could be expected for an energy tax.

2.3 *A diagrammatic illustration*

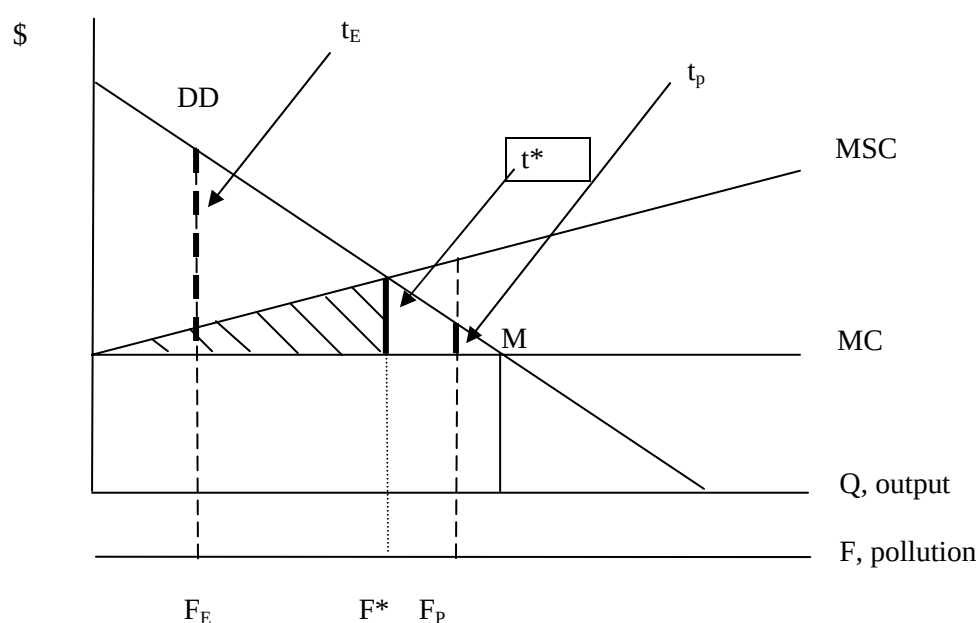
13. Politics is very much the study of the mechanisms for making collective choices in contexts where there are conflicting interests. To see why economics and politics produce very different answers, consider the standard economic analysis of an environmental tax in Figure 1. DD is the demand curve, and MC is the (assumed constant) marginal cost curve. MSC is the marginal social cost curve and the difference, $MSC - MC$, is the (marginal) environmental externality that is to be the subject of policy. The economist's prescription in this context would be for a (Pigouvian) tax of ' t^* ' such that price $P = MSC$, or a tradable permit system that brought about the optimal quantity of pollution F^* , or some control system that forced polluters to produce F^* pollution. The policy measure produces the economically optimal level of environmental damage, equal to the shaded area shown. Less damage than this involves a sacrifice of consumer surplus (the vertical difference between DD and MC) greater than the reduction in the environmental externality. More damage than F^* involves more environmental damage than any gain in consumer surplus.

14. Now introduce political power. Two stylised political equilibria can be illustrated. Suppose environmentalists have the balance of political power. Then they may force policy towards a situation such as F_E which is clearly non-optimal in the economic sense. They may do this by successfully arguing for a tax rate t_E rather than t . Similarly, if polluters have the balance of political power, they could force an outcome such as F_P , again a non-optimal outcome, and again brought about by lobbying for a tax rate different to the optimal tax, i.e. t_P rather than t . It is thus easy to see that 'politics' produces outcomes that

are not consistent with economic optimality. But this is hardly surprising. Unless policies are determined precisely using cost-benefit analysis, political outcomes will always be non-optimal in the economic sense.

15. There is, however, a far more subtle argument linking the notions of optima and politically determined outcomes. This emanates from the 'Public Choice' school's critique of welfare economics – see, for example, Buchanan and Vanberg (1988)⁸ – and tends to suggest that far more scrutiny needs to take place in terms of the need for policy interventions at all. Whereas the preceding discussion compared the efficiency optimum with politically determined equilibria, the Public Choice critique asks whether the policy is worthwhile in the first place. The two states that are compared are the politically determined equilibrium (F_E or F_P in Figure 1) and the no-intervention market equilibrium (M in Figure 1, i.e. the point where $P = MC$ and the polluter's profits are maximised). The argument is that intervention is not going to achieve the economic optimum because, in the real world, governments have to generate some sort of consensus out of conflicting interests. Hence there is little political point in analysing positions such as F^* in Figure 1: they may be an efficiency ideal, but they are not going to materialise. What matters, then, is how the likely political equilibrium compares with doing nothing at all, i.e. not intervening with, in this case, environmental taxes.

Figure 1. Economically optimal environmental damage and politically determined damage



16. Figure 2 repeats Figure 1 but this time focusing on a comparison of M with F_E and with the diagram constructed to illustrate the point in question. The question is whether society is better off, in

⁸

The Public Choice school of thought emphasises the interaction between economics and politics, or the 'application of economics to political science' (Mueller, 1989). Its later writings tend to criticise welfare economics for offering policy prescriptions that are independent of the set of political institutions and interest groups that define the political context of decision making, or, more crudely, for being politically unrealistic. Classics in the Public Choice literature include Downs (1957); Buchanan and Tullock (1962); Riker (1962); Olson (1965) and Niskanen (1971). Modern guides are Mueller (1989, 2003) and Stevens (1993).

efficiency terms, with the ‘forced’ equilibrium of F_E than a situation in which no policy intervention is undertaken at all, i.e. the externality is left uncorrected. To find this out, it is necessary to compute the relevant net surpluses, i.e. consumers’ surplus minus any environmental damage. For M, the net surplus is given by

$$\text{Area } (A+B) - \text{Area } G = A + B - G$$

For F_E , the net surplus is given by

$$\text{Area } (A) = A$$

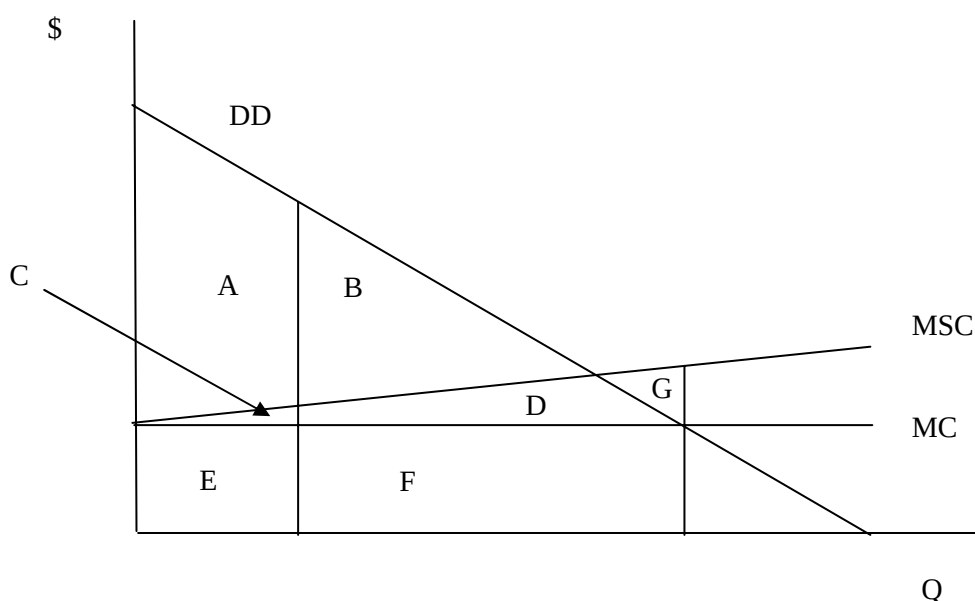
The no intervention solution, M, is to be preferred to the forced equilibrium F_E , if

$$(A+B-G) > A$$

or $B > G$

17. By inspection, this is the case in Figure 2 which means that the politically determined equilibrium is inefficient *relative to* doing nothing at all about the externality.

Figure 2. Comparing no intervention with forced equilibrium



18. The practical implications are potentially significant. What the Public Choice critique is arguing is that techniques like cost-benefit analysis are based on a false comparison of the ‘with policy’ and the ‘without policy’ situation. The ‘with policy’ situation is assumed to be that approximating the economic optimum, or a state of moving towards that optimum. But, if real-world policy forces governments to settle for compromise solutions, there is no guarantee that the compromise solution is better in efficiency terms than the ‘without policy’ situation. Real world ‘solutions’ may be worse than no policy at all.

19. The purpose of this illustration of a political economy argument is a methodological one, namely that the design of economic instruments in practice needs to come as close as possible to the theoretical optimum to avoid the risk that what happens in practice may be no better than taking no action at all⁹. Some of the criticisms of the UK CCL effectively argue this, i.e. that the CCL is an environmental measure that should not have been adopted at all (e.g. Helm, 2003). In principle, of course, this doubt about a measure such as the CCL should be overcome by conducting a more rigorous cost-benefit analysis of the change. This issue is revisited when looking at the Regulatory Impact Analysis of the CCL.

2.4 *The questions to be asked*

20. Political economy suggests that there are several questions to be asked in respect of the UK Climate Change Levy.

- Why do anything at all about climate change?
- Why choose a tax rather than more traditional command and control regulations?
- Why is the chosen tax not like a textbook tax?
- Could policy design be better?

21. Suggested answers to these questions are provided as the history of the CCL and its effects are analysed in the following sections. The concluding section revisits the questions and summarises the suggested answers.

3. *A brief history of UK climate change policy*

3.1 *A Prime Minister's conversion*

22. The UK Climate Change Levy (CCL) is an integral part of the UK's policy to tackle climate change by reducing emissions of greenhouse gases. UK climate change policy is usually regarded as dating from 1988 and, in particular, from September 27th of that year when Prime Minister Margaret Thatcher made a speech to the Royal Society. A small part of the speech referred to mankind having 'unwittingly begun a massive experiment with the system of this planet itself' (Thatcher, 1988). The Prime Minister went on to identify climate change, ozone layer depletion and acid rain as three examples of these 'experiments'. The speech did not entertain any explicit commitment to action on climate change, being primarily concerned to advertise the UK's leading role in climate change scientific research. Indeed, the references to climatic threats occupy only a small part of the speech. But, in terms of political significance, the fact that a Prime Minister should choose this topic at all is what mattered, rather than the detailed content of what she said. The speech cannot be seen in isolation of other events in 1988. The Montreal Protocol on ozone depleting substances had already been negotiated the year before and it needs to be remembered that, at that time, chlorofluorocarbons were seen as both an ozone depleting gas *and* greenhouse gases. Issues of global pollution were therefore already on the political agenda. Moreover, earlier in 1988 the UK Department of the Environment had published its own assessment of the effects of climate change on the UK, a report that was seized upon very widely in the newspapers because of its suggestion of Mediterranean climates for the southern areas of England (UK DoE, 1988). Also in mid-

⁹ There are also critiques and extensions of the Public Choice arguments. For example, the choice of a single policy instrument may alter political allegiances which in turn may alter other policies – see Besley and Coate (2003). The Public Choice argument also tends to insist on the need to consider the politically determined equilibrium, rather than arguing that what is needed is some improvement in decision-making that would get closer to the economic optimum. In part, this reflects the political preference of the Public Choice school for free markets over managed ones.

1988, an international conference of scientists had met in Toronto and called for a global programme of reducing carbon dioxide emissions by (an arbitrary) 20 per cent on the base year of 1988. While never an official conference, the 'Toronto targets' were widely discussed at the time (Maddison and Pearce, 1995). Finally, successive UK politicians have always sought to 'sell' UK scientific expertise, and it is no accident that Prime Minister Thatcher's Royal Society speech stressed the leading role that UK science played in climate research. This role was reinforced by the appointment in 1988 of UK meteorologist Dr (now Sir) John Houghton as the first Chairman of Working Group I of the United Nations Intergovernmental Panel on Climate Change (IPCC).

23. The Prime Minister's cautious embrace of climate change as a big issue has therefore to be seen in context. The agenda was seen initially as one of research from which the UK scientific community could gain, rather than one of immediate radical action. Nonetheless, no politician ventures into new and potentially controversial areas without some expectation that action would be called for, and Prime Minister Thatcher was no exception. Within government at that time there was substantial internal discussion about potential climate policies. However, it seems likely that no-one in government at that stage envisaged the scale of actions that would be necessary to have any significant effect on rate and levels of warming. In one sense, acknowledging climate change as a policy issue was not therefore a radical act, even if the subsequent scientific research revealed the implications to be far more serious than most people thought at the time. In another sense, the government of the time need not have volunteered to place climate change high on the political agenda. That they did so reflects a genuine persuasion of its importance, and the power of a scientifically-trained Prime Minister whose Cabinet was very probably not entirely convinced that climate change was a leading issue of the times¹⁰.

24. One answer to the question, why do anything about climate change?, is therefore that the leading politician of the time had decided that it was a serious issue. While seemingly simplistic, the answer has a lot to commend it. All Prime Ministers have more than proportionate power but Mrs Thatcher had more power than most. The influence of intellectual persuasion should also not be underestimated. But politicians are always suspected of other motives, and a political economy perspective would have to give potential credit for those motives. Helm (2003a) advances two other possibilities, and there is a third. The first is that Prime Minister Thatcher was bidding for the 'green vote' in the UK. Certainly, conversion to a stance of doing *something* on climate change would have been attractive to environmentalists. From the government's standpoint, provided the gesture was not going to prove costly, 'going pale green' would have hardly any political cost for at least a modest political gain. As the next sections discuss, modern environmental policy in the UK dates from the late 1980s. Contrary to most expectations, it was a Conservative Government that produced the first structured attempt at a cohesive environmental policy in the UK. Climate policy was just part of a more general 'greening' of government at this time.

25. Helm's second candidate explanation is that Prime Minister Thatcher was persuaded of the importance of environmental policy by various individuals, i.e. the intellectual stance of other key personalities was at work. One set of candidates was the scientific advisors and certainly at least one of them has claimed credit for the conversion. But others have made similar claims and it seems more likely that the Prime Minister listened generally to those around her and made up her own mind. No one individual was crucial. Helm cites the appointment of an environment-friendly Secretary of State for the Environment (Chris Patten) as a potentially important factor. But this probably inverts the sequence of events: Patten was appointed *because* he was environment-friendly. He was part of the plan, not the creator of it.

¹⁰

For example, Prime Minister Thatcher called a conference of leading climate experts in No. 10 Downing Street in which senior Cabinet Ministers were encouraged to listen to the experts.

26. The other significant feature of Patten's appointment suggests the third factor, however. Patten was (and is) a confirmed Europhile, and there had been a dawning realisation in the UK that environmental policy (and other policy) was increasingly going to be made in Brussels rather than London. It made political sense to 'Europeanise' the relevant Ministry dealing with environmental policy (Jordan, 2002). Moreover, continental Europe appeared to be 'greener' than the UK and the UK had in the very recent past suffered considerably from an image of the 'dirty man of Europe' because of its early stance on acid rain control¹¹. The late 1980s have also been described as the 'heyday' of EU environmental policy (Collier, 1996). A more positive stance towards Europe would do several things. It would help to modify the early image on an environmental laggard in Europe, it would even raise the possibility of the UK taking a European lead in environmental policy as part of a wider bid to secure political leadership in Europe (as others tried to do, notably with the EU carbon tax proposal – see Grant et al. 2000), and it would certainly enable the UK to secure more control over Brussels-initiated environmental policy. This last factor was important since a common theme of Conservative politics was the need to prevent Brussels from initiating expensive over-regulation.

27. Overall, explaining the UK's commitment to climate change policy rests in part on the intellectual persuasion of individual personalities, perhaps on the desire to command some of the green vote in the UK, but of more likely importance was the bid to correct a past European image and secure some leadership potential.

3.2 *Blueprint for a Green Economy*

28. In the late 1980s, no political party in the UK was wedded to the use of market-based instruments, such as taxes, for environmental policy. In 1988, the then Department of the Environment commissioned a report on 'sustainable development' (Pearce et.al. 1988, 1989), with the aim of informing a structured response by the UK government to the Brundtland Commission's report of 1987 (Brundtland, 1987). The 'Pearce report' attracted extensive press attention, primarily because of its advocacy of a switch in environmental policy away from 'command and control' solutions to market-based approaches. (The immediate history of these events can be found in Pearce, 2002b). Media coverage focused very much on 'the polluter pays' principle and the idea that the polluters include all citizens, not just industry. These notions were not new, having been advanced nearly twenty years before by the OECD itself¹² and in the environmental economics literature. But the reference to the 'market' in market-based solutions appealed to the then Conservative government with its belief in a regulated but predominantly free market. (Subsequently, market-based approaches proved to be appealing to all of the main UK political parties, so that the measures were generally not divided along party lines. Indeed, both Labour and Liberal parties quickly produced their own manifestos supporting market-based approaches just after 'Blueprint' was published). The report, and the subsequent book (Pearce et al. 1989) marked the watershed in UK environmental policy between the 'old' regulatory style and the market-based approach, although there is

¹¹ The UK had refused to sign the First Sulphur Protocol – the Helsinki Protocol –under the Convention on Long Range Transport of Air Pollution in 1985. There was a rational economic reason for not signing, namely the fact that the Protocol was economically inefficient since it required equal percentage reductions in acidifying emissions from each signatory – the so-called '30 per cent Club'. Nonetheless, the UK earned a politically very bad reputation in Europe as a result. For discussion see Park (1987) and Boehmer-Christiansen and Skea (1991). The UK has since been a major player in the extension of the Convention through various successive Protocols.

¹² Indeed, the polluter pays principle was one of the first matters addressed by the new Environment Directorate of OECD in 1971. The author of this report was a member of the Directorate in that year.

some evidence that civil servants had tried in previous years to advance the cause of environmental taxes and tradable permits, in keeping with the environmental economics literature of the time¹³.

29. Explaining the conversion of government, and political parties generally, to market-based environmental policy is not easy. As with the conversion to some sort of pro-active climate change policy, the intellectual arguments were seen as persuasive by key individuals, notably by Prime Minister Thatcher and her Secretary of State for the Environment, Chris Patten. The message that market-based approaches could, ultimately, be cheaper for industry also played a part, although it is fair to say that there was continuing opposition, especially to taxes on the part of industrial lobbies¹⁴. Language also mattered: traditional policies were dubbed 'command-and-control' with all the emotive impact of soviet-style regulation that would be inimical to a market-oriented government. In contrast, market-based approaches appeared less coercive, as indeed they are so described in the economics textbooks.

30. What does political economy say about the political rationale for a move to market-based approaches? First, political economists do not see regulation *per se* as something that is imposed on industry, but as something that is demanded by them. The idea is that those who are regulated are effectively 'harnessing the coercive power of the state to restrict entry, support prices, or provide direct cash subsidies' (Keohane et al. 1998). Rent-seeking behaviour is also relevant: many regulations create rents which can be captured by industry and pressure groups. Second, this 'demand' side analysis ignores the public interest motives for regulation (the 'supply side') which need to re-enter the equation. But while this supply and demand analysis of regulation may generate insights, it tells us little about why politicians may convert to market-based approaches. One answer is that the conversion is very limited: the *extent* of market-based policy is easily exaggerated. Environmental policies in industrialised countries still tend to be based on standard-setting and especially technological standard setting (under various names, but in Europe as 'Integrated Pollution Control'). Political economy argues that regulators and the regulated have a preference for these 'command-and-control' approaches because they have the potential to be captured by the regulated and fit into preconceived notions of regulation by the regulators. So, one political economy hypothesis would be that there has not been any 'real' conversion at all. What market-based instruments exist do so because they are marginal to the more general command-and-control profile of environmental policy. They are perhaps better seen as fringe experiments than an ideological shift.

31. But this argument is not valid for the UK where the range of market-based instruments is extensive, and especially so for the one market-based instrument, a tax or levy, where one would expect the greatest opposition. Interestingly, the political economy literature is strong on explaining why market-based instruments are *not* adopted, and generally silent on why they may *be* adopted!¹⁵ Moreover, the few efforts that have been made – e.g. Keohane et al. (1998) – focus on the USA where opposition to taxes is widespread, as political economy would predict, and where industry preference for tradable permits is easy to understand: grandfathered permits act just like environmental standards, providing a barrier to

¹³ The author of this report served as a Special Advisor to the Department of the Environment, 1989-1992 and was party to the preparation of the 1990 UK White Paper on the Environment.

¹⁴ The arguments were not always understood. Taxes may be cheaper in compliance terms than command and control regulation in one respect, but since they are paid on optimal as well as non-optimal emissions they could be more expensive in some respects. It is the net effect that matters. Some lobbyists certainly understood this. Others did not.

¹⁵ A helpful attempt to do this is provided by Wallart (1999) but his arguments are difficult to relate to the UK and concern low unemployment (true, but not peculiar to the late 1980s); divided industrial opposition (not really true of the UK); a civil service lobby in favour (true but this had failed once in the mid 1980s); and genuine public interest ideology (true).

competitive entry and hence rents for those already in place. It remains difficult to explain why the UK's approach has found 'acceptance' in the sense that environmental taxes have been introduced on a fairly wide scale.

32. The probable explanation for the UK's success in introducing environmental taxes is as follows.

33. First, and very sensibly from a political stance, political statements favouring the market-based approach were always conditional on the nature of the problem at hand and the general costs and benefits of introducing different instruments. In other words, no government ever argued that taxes or permits were 'the' solution in all cases. Indeed, the UK Treasury set out a list of conditions that had to be met before an environmental tax would be considered (UK Treasury, 1997; 2002b). Taxes had to be well designed, have no undesirable side effects, minimise deadweight compliance costs, have acceptable distributional impacts and be consistent with maintaining international competitiveness of the sectors most affected. Notably, no similar list of conditions was provided for other types of market-based instrument (e.g. tradable permits), nor for the traditional methods of control such as technology-based standards. Effectively, the Treasury was providing an insurance policy to polluters that taxes would only be introduced on a case-by-case basis and in a manner protective of industrial interests.

34. Second, each and every UK environmental tax has had some kind of 'sweetener' attached to it, making the tax acceptable over some alternative. The incentives included recycling of most of the revenues to other tax reductions (aggregates levy, landfill tax, CCL), recycling some revenues to special funds designed to improve the environment, or major reductions in the tax in return for a negotiated agreement to self-regulate the relevant externalities (the CCL and the Climate Change Agreements – see later). These measures have some appeal for polluters and environmentalists alike, provided the alternative is made clear, i.e. if there was no tax, some other form of regulation would be applied. Polluters see the return of their taxes, albeit in some other form, and environmentalists secure dedicated environmental funds. Thus, potential opposition to the taxes has been bought-off.

35. Third, from the government standpoint, taxes have a lower regulatory impact than command-and-control. 'Better regulation' has been a theme of all UK governments, the aim being to reduce rather than expand the regulatory burden. Market-based approaches help to achieve this whilst at the same time minimising the chances of regulatory capture.

36. Fourth, market-based instruments were an idea whose time had come. Their virtues had been expounded for thirty years by bodies such as the OECD. There was also some international experience to borrow from. In short, there had been a 'paradigm shift' in policy thinking and it finally gained acceptance, albeit cautious acceptance, at the political level.

37. Fifth, the UK's approach to market-based environmental policy has to some extent been experimental. Taxes might then be seen as part of a wider portfolio of measures designed to tackle seemingly tougher and tougher environmental targets across an array of problems. This view is consistent with the UK's subsequent embrace of quantity-based market approaches, i.e. tradable permits and quotas for landfill waste, packaging waste, and industrial carbon emissions.

38. Christiansen and Wettstad (2003) argue that a 'path dependency' does much to explain the evolution of market-based approaches to environmental policy in the European Union generally. They note, correctly, that making wholesale changes in the philosophy of regulation tends to be rare, because existing regulatory mechanisms are 'locked in' and are difficult to change. While not cited by them, the dominance of technology-based standards based on Integrated Pollution Control is a case in point. These standards require that the same, or similar, technology be employed plant-by-plant, the so-called 'best available technology'. But once standards are set on this basis there is little or no room for emissions

trading or even tax measures, the efficiency of which is conditional on marginal abatement costs varying across plant. If each plant has adopted the 'best' technology and no plant is allowed to employ less than best technology, it is hard to see what leeway there is for market-based approaches. Moreover, new instruments require set-up and switch-over costs which regulators may be reluctant to incur. So far, the path dependency approach is consistent with the view that command-and-control measures will prevail, because they are already there. How is the theory to explain what Christiansen and Wettestad (2003) call 'break out'? They suggest several reasons why new and radical measures might be adopted:

- Disaffection with existing command and control measures in the face of stricter and stricter regulatory demands;
- Changes in the perception of switching costs –i.e. a realisation that new instruments are not as expensive as might be thought.

39. Their remaining arguments have more to do with the adoption of emissions trading in the European Union than adopting taxes in the UK. For example, they argue that trading had to be pursued to keep other countries 'on board' with climate change negotiations (notably Japan and Canada, and with the hope that the USA might re-enter the agreement). While path dependency has some virtues in the context of international policy instruments, its role in explaining why any one country might choose to pursue a specific policy change such as the CC is harder to accept.

3.3 The 1990 Environment White Paper

40. The first major outcome of this change in environmental policy philosophy was the 1990 White Paper on the Environment (UK Government, 1990), the first significant attempt at a comprehensive statement of environmental policy in the UK. An Annex was devoted to the principles of economic instruments and their advantages over conventional regulation. While the White Paper (which ran to nearly 300 pages) covered most of the then current environmental issues, it was the fact that an entire chapter and a separate annex were devoted to the greenhouse effect and policy measures that attracted most attention. This was in keeping with Prime Minister Thatcher's personal elevation of the issue to the forefront of policy. Within government there had been extensive discussion of carbon taxes, especially in an Inter-departmental Group on Environmental Economics (IGEE), although the Prime Minister, in particular, was careful to avoid the use of the term 'tax' in public, preferring the notion of a 'charge'¹⁶. Nor was there unanimous approval of such taxes. The White Paper entertained the idea of some sort of price change, although the language used was carefully chosen, once again avoiding the term 'tax'. In large part this was because the then government was implementing the privatisation of the electricity industry via the Electricity Act of 1989, and it was feared that privatisation followed by an unanticipated carbon or energy tax might result in a legally compromising position for the government. (Legally, the possibility existed that investors could sue the government). Hence, potential investors had to be warned in the privatisation prospectus that future energy prices could be manipulated upwards through some policy-induced change. The White Paper made explicit mention of privatisation, arguing that it would (as it did) lead to a significant switch away from coal contracts to natural gas, with a resulting reduction in carbon dioxide emissions. But the White Paper went on to say that 'more needs to be done', not least because it had been decided that the UK would set a target of reducing CO₂ emissions to their 1990 levels by 2005 conditional

¹⁶ Language matters in politics. It is no accident that most subsequent taxes were not given that name: e.g. the Climate Change *Levy* and the Aggregates *Levy*, but there is a *Landfill Tax* and both 'charge' and 'tax' have been used in the context of a possible pesticides tax.

on other nations doing the same, a target that, at the time, was seen as being quite stringent¹⁷. The White Paper then stated:

‘In the long term these [further measures] will inevitably have to include increases in the relative prices of energy and fuel. This could be achieved by taxation or other means, such as tradable permits.’ (UK Government, 1990, para 5.25).

41. The same part of the White Paper further entertained the idea that any energy price increase need not be inflationary since other taxes could be offset by the revenues obtained, an explicit reference to revenue-neutrality. The White Paper softened the warning:

‘Longer term measures affecting the relative price of energy can only sensibly be taken when competitor countries are prepared to take similar action....In the immediate future the reduction of inflation is of overriding importance. Given this, and our best assessment of how long it will take to achieve an international consensus, tax or other measures directly raising the relative price of energy *outside the transport sector* will not be introduced in the next few years’. (UK Government, 1990, para 5.26). (Our italics).

42. The White Paper notably excluded transport from near-term price rises because of the rapid escalation of emissions in that sector, so the scope for some form of carbon tax in transport was held open. Later in 1990 the European Community as a whole set its target as being one of stabilising 2000 emissions of CO₂ at 1990 levels, a stricter goal than the UK government had initially advanced, but one that now seemed achievable because of the judgement that the earlier forecasts of emissions had been exaggerated (Maddison and Pearce, 1995). In 1992, these targets were confirmed at the United Nations ‘Earth Summit’ in Rio, although the targets were voluntary: there were to be no sanctions under international law for not meeting them.

43. The White Paper was the subject of annual reviews. Significantly, in the 1992 review the term ‘carbon tax’ appeared for the first time:

‘A price based mechanism (i.e. a carbon tax) allows individuals and companies to respond to the need to save energy in the way best suited to them and helps to ensure that reductions in emissions come from those who can achieve them at least cost’ (UK Government, 1992, para.45).

3.4 *The transport carbon tax*

44. The 1990 White Paper implied that transport might well be the subject of an early energy/carbon tax. In 1993, the then Chancellor of the Exchequer announced a 10 per cent rise in transport fuel duty, along with a commitment to raise the duty by 3 per cent per annum in real terms in each future year. This was the ‘fuel duty escalator’ (FDE). The escalator was *additional* to the prevailing excise tax on gasoline and diesel, but it was explicitly introduced as an environmental tax designed especially to reduce carbon dioxide emissions from the transport sector. Since carbon is in fixed ratio to the quantity of fuel, the FDE very roughly approximates a carbon tax.¹⁸ It is important to understand that the FDE was *not* introduced as

¹⁷ This was because, at the time, CO₂ emissions were projected to rise by around 30 per cent by 2005 compared to 1988. The UK’s 2005 deadline was subsequently replaced with a 2000 deadline since other European countries adopted this date and the UK could not be seen to be out of step.

¹⁸ But not exactly. Most externalities arise in urban contexts, and fuel taxes cannot be varied between urban and non-urban areas since arbitrage would take place. Given the fact that most environmental damage arises in urban peak travel contexts where existing transport prices are well below the full social costs of travel, this suggests that transport policy measures should focus more on: (a) urban traffic at peak times through congestion tolls and parking charges, (b) differentiated fuel taxes such that high externality fuels

part of a revenue-neutral reform, unlike the CCL. Had it been so, it could be argued that it would not have met with such political resistance. Only in its last days was the notion of recycling some of the revenues introduced, but too late to placate the anti-FDE lobby which by 1999 was becoming very vociferous.

45. The FDE was expected to continue until 'at least' 2002. The mechanisms whereby the FDE were to operate included (a) changes in driving behaviour to conserve fuel, and (b) incentives for manufacturers to produce more fuel-efficient vehicles. The fuel efficiency target was subsequently set in the EU context by a 1998 agreement to reduce CO₂ emissions levels in new vehicles from 186 gC per km to 140 gC/km by 2008. Had it been retained, it was estimated that the annual 6 per cent tax increase from 1996 to 2002 would have produced savings in carbon emissions of 2-5 mtC by 2010 (a significant reduction of 5-12 per cent of projected transport carbon emissions in 2010)¹⁹.

46. The historical development of the FDE is set out in Table 1. While the tax was introduced by a Conservative Administration, it was continued by the new Labour Government of 1997. The transport lobby had long been vociferous in its criticisms of the FDE, and of the reductions in roads investment, for quite some time. The lobby was successful, and late in 1999 the FDE was cancelled as an *automatic* levy increase, but it remained on the statute book as a discretionary tax. In that year, however, it was announced that revenues would be earmarked for investment in transport. By March 2000 the FDE was modified to be a tax increase that rose only in line with the rate of inflation. At the same time, extra money was announced for investment in the roads network, reversing previous policy which had downgraded road construction as a solution to congestion. In September 2000 direct action was launched by heavy vehicle drivers and by farmers who blockaded oil depots and undertook 'go slows' on the motorways, even though, by then, the policy reversal on road investment and fuel taxation was well under way. Ironically, it was not the FDE that triggered the protests, although it is what protesters said was the cause. The jump in oil crude oil prices had led to an escalation in fuel prices (and subsequent changes in fuel tax in 2004 were similarly postponed because of high crude oil prices). The protests helped to kill off the FDE in November 2000 when *reductions in real* rates of fuel tax were announced for the coming 2001 Budget. Significantly, then, the UK's only 'real' carbon tax, the FDE, failed in the face of the political storm it provoked. In money terms, the past increments in the FDE remain in force. In real terms, the increments have been reduced by the rate of inflation since the last increments in 2000.

3.5 *Conceding to anti-tax lobbies*

47. The design of the CCL cannot be fully understood without an appreciation of the lobbies against fuel duties in the transport sector. The FDE was a 'pure' environmental policy measure in that it had no revenue-recycling associated with it. If there was to be opposition, therefore, it would inevitably have been targeted at a tax of this kind. By the time of the late 1999 pre-Budget report, the Labour government was showing clear signs of nervousness about energy taxes. As will be seen, the CCL itself was revised in that year. In the transport sector, concessions were made to the commercial transport lobby. Controls were announced on 'cowboy' road hauliers – road hauliers who tended to escape tax liabilities by using unregistered vehicles – one of the demands of the road freight lobby. The way was opened for the

are taxed more than low externality fuels to encourage substitution, (c) direct emission taxes, (d) vehicle taxes which vary by vehicle age and (e) vehicle mileage taxes.

¹⁹

The basis of the government's projections was, however, unclear. Salmons and Smith (1999) argue that, against a baseline where the average rate of fuel duty is held constant in real terms, the FDE would have secured far higher reductions in CO₂ emissions. Against a baseline where real fuel duties increased at the 1990-1995 rate, the net gains in CO₂ emissions would be zero. Against a baseline of 1990 transport emissions, the FDE would have secured 4-8 per cent reductions by 2010 provided the 6per cent real increase per annum continued.

introduction of 44 tonne ‘super’ heavy goods vehicles, also a demand of the lobby. Complex changes were announced in the duties on ultra-low sulphur petrol (ULSP) and ultra-low sulphur diesel (ULSD), the latter being a disguised price cut benefiting road hauliers. Previously fairly strong advocacy of road congestion charging faded, with only a handful of schemes being envisaged by 2010. Other concessions included: reductions in vehicle excise duty on lorries; announcing that, in future, foreign hauliers would be charged to use UK roads in the same way that UK hauliers are charged to use continental European roads (the ‘vignette’ system, or ‘Brit Disc’ system as it has become known); and an additional £100 million was allocated for early retirement of old (and hence more polluting) lorries. Pearce (2001) estimates that the concessions totalled around £1.5 billion. The UK was not alone in seeking to pacify the haulage industry: Belgium, Italy, France and the Netherlands had all granted concessions of one form or the other. Whatever the rights and wrongs of the fuel duty protests, the anti-tax lobby had demonstrated just how easily market-based approaches to environmental policy could be blocked or modified²⁰.

48. How can the blame for failure be apportioned between the tax being poorly designed and political mismanagement? Pearce (2001) points to a number of political misjudgements. The speed with which concessions were made to the anti-FDE lobbies showed political weakness. Efforts to explain why the tax existed at all became very confused. It was described as a climate tax, a general air pollution tax, and a revenue raiser without which other taxes would have to be increased. In economic terms it could have been all three since the goals are not inconsistent. But the problem was that government pronouncements never settled on which it was. Added to this, as most politicians know, explaining a technical case to a non-technical press and public can be counter-productive. In a display of economics ignorance, one major daily newspaper, for example, regarded the argument that the FDE was needed to raise revenue as false, arguing that the government was ‘awash with money’ (Pearce, 2001).

49. A more subtle argument is that the FDE had gone beyond the optimal level that would be demanded by a Pigouvian style optimal tax. On the basis of fairly rough calculations, Newbery (1998), Newbery and Santos (1999) and Pearce (2001) noted that, as a carbon tax, the cumulative tax went beyond most central estimates of the marginal damage from carbon emissions. A more sophisticated analysis by Parry and Small (2002) suggests that as an externality tax, covering all emissions and congestion, the *overall* gasoline tax in the UK (i.e. including the FDE element) is twice the second-best optimal level²¹. Could it be argued that this non-optimality argument fed through to pressure groups? If it did, it was almost certainly of marginal political importance. As noted above, while the UK has introduced two almost pure Pigouvian style environmental taxes, all other measures have simply been designed to meet pre-ordained targets. Economic optimality has had little to do with the design of these measures.

50. The central point remains that the experience of the FDE showed how hard it can be to secure the introduction of a carbon tax. This experience also had an impact on the final design of the Labour Government’s other main energy tax, the Climate Change Levy.

²⁰ Even economists were not united on the issue of the FDE. Some argued that it was the correct notion, but had escalated beyond a level that could be justified on climate change grounds. Others spoke of the protests as demonstrating that there exists a ‘taxable capacity’ for taxpayers, a level beyond which some form of direct action would be taken. Yet others regarded the FDE as sound in principle and practice.

²¹ Second-best because other distortions exist so that the gasoline tax cannot be a first-best tax.

Table 1 Evolution of the fuel duty escalator (RPI = Retail Price Index)

Date	Rate of duty increase ¹	
	Gasoline	Diesel
Apr 1993	3per cent over RPI ('RPI+X')	3per cent over RPI
Nov 1993	5per cent over RPI	5per cent over RPI
1997	6per cent over RPI	RPI+6per cent+1p/litre
Mar 1999	6per cent over RPI	RPI+6per cent+1p/litre
Nov 1999	Cancelled as an automatic levy increase, with decisions being made on a budget-by-budget basis but with X<6per cent. Real increases in fuel duties to be earmarked for a fund to improve public transport and the road network.	Cancelled as an automatic levy – see gasoline
Mar 2000	No increase in fuel duty in real terms, i.e. increase = 0 per cent over RPI	
Nov 2000	Budget 2001 to have a cash (nominal price) freeze, i.e. a decrease in tax equal to the RPI, i.e. increase = minus RPI.per cent	

Notes: thus, '3 per cent over RPI' means that the tax was equal to the rate of inflation plus 3per cent; '6per cent over RPI' means the tax was equal to the rate of inflation plus 6 per cent, and so on.

3.6 The UK's climate targets

51. Despite the problems the Labour Government was having with the road lobby over fuel and vehicle taxation, it committed itself to the international negotiations on climate change, culminating in the Kyoto Protocol of 1997 and its subsequent revisions at the Bonn and Marrakech Conference of Parties, knowing that any agreement would require further policy measures, including measures directed at the transport sector. Governments of all political persuasions were already committed to the Rio Framework Convention on Climate Change voluntary target of 2000 CO₂ emissions being no more than 1990 emissions. By the late 1990s it was clear that the UK would meet this voluntary target very largely by virtue of the switch by the privatised electricity supply industry out of coal and into natural gas. (Annex 1 traces the history of UK emissions). Additionally, in its Manifesto, and when not yet in office, the Labour Party committed itself to a *unilateral* target for carbon dioxide (only) emissions. It set a target of a 20 per cent reduction by 2010 on 1990 emissions. How far this was ever a very 'hard' target is debatable, the language describing it changing from time to time between the extremes of a 'commitment' and an 'aspiration'. A 2003 review of progress towards the target concluded that the UK 'is unlikely to achieve even two-thirds [of the target] and maybe even less than half' (SDC 2003)²² – see also Annex 1.

52. An additional complication arises from the European Union Emissions Trading Scheme for carbon, due to start in 2005. Each EU Member State must agree a National Allocation Plan (NAP) under this scheme. Technically, the UK could have offered the lower target under its commitment to the EU Burden Sharing agreements which are linked to the Kyoto Protocol (- 12.5 per cent by 2010) or it could have offered the domestic target of -20 per cent. If it had chosen the former, the political status of the

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The SDC is the Sustainable Development Commission, an independent body but appointed by the government and charged with advocating sustainable development as a goal, advising on progress towards sustainable development, and acting as a 'critical friend'.

20 per cent target would have seemed fragile. On the other hand, the UK is not legally obligated by the 20 per cent target, whereas it is by the 12.5 per cent target.²³ In its November 2004 revision of its earlier NAP (in April 2004) the UK Government chose to allocate emission allowances more in keeping with the stricter, domestic target. Annex 3 details the allocations.

53. Finally, in 2003, the Labour Government announced that it accepted the Royal Commission on Environmental Pollution's recommendation (RCEP, 2000) that a long term goal should be a 60 per cent reduction in carbon dioxide by 'about' 2050 (UK DTI, 2003a)²⁴. The language describing this target varies. Most of it makes it clear that it is a *conditional* target, i.e. unlike the 1997 20 per cent target, it is conditional on other countries agreeing to similar targets. Thus:

'The government believes longer term targets [for GHGs beyond the Kyoto end period] must be agreed internationally, reflecting the global challenge of climate change, and that the UK could place itself at a disadvantage in future negotiations by setting a target unilaterally'. (UK DETR, 2000, para.17).

54. This conditionality was repeated in the *Energy White Paper* issued early in 2003 (UK DTI, 2003a) in which it was argued that a 60 per cent target might cost the UK 0.5 – 2.0 per cent of GDP in 2050, and that the cost to developed countries as a whole might be 1 per cent 'assuming that the world's leading industrial nations act together' (UK DTI, 2003a, para.1.12). In other statements, the language suggests that the UK will seek to show leadership by adopting the long-run target or, at least, its 'path' by 2020.

55. However hedged the printed language was, the 60 per cent target quickly came to be regarded as a firm target. Moreover, there was little sign of politicians seeking to emphasise the conditional nature of the goal. Given the deep political concerns over earlier climate change goals and their cost, how could such a seemingly dramatic goal of reduced carbon intensity have come about? Helm (2003a revised in 2004) argues that the relevant government departments, and especially the Department for Trade and Industry, convinced themselves that, after all, strict carbon reduction targets were virtually costless, reducing *annual* GDP by no more than 0.01 per cent. In turn, this reversal of faith rested on the MARKAL energy model (DTI 2003c). Helm's criticism of this model is that it assumes the result it produces – by assuming energy efficiency measures and renewable energy are low cost, a future based on them must also be low cost²⁵. If Helm is right, the UK's long run climate change goal is based on a huge self-delusion. Politically, however, it is easy to see that any discovery of this self-delusion in the future could easily be corrected. First, the goal is a very long-term one, nearly 50 years, and hence way beyond normal political memory. Second, the conditional nature of the goal can easily be resuscitated.

56. Table 2 summarises the various UK climate change policy targets.

²³ The obligation exists regardless of whether the Kyoto Protocol is ratified by the requisite number of countries.

²⁴ In the UK, Royal Commissions have a varied membership but usually contain representatives of industry and academia. They take written and oral opinions from anyone who wishes to make a representation and they are independent of government. However, whatever a Royal Commission says officially must be responded to by the government of the day.

²⁵ Helm argues that the DTI ignored various cost elements associated with energy efficiency and renewables: costs of network needed to support energy technologies with low and variable load factors; transaction costs; costs of capital associated with higher political and regulatory risk, and even the health costs of energy efficiency (Helm, 2003a, revised 2004, pp.403-4).

3.7 *The late 1990s context*

57. The 1990 White Paper on the Environment was conceived at a time when energy prices were falling, a trend that continued for most of the following decade. But in 1999/2000 the price of crude oil suddenly rose to between \$US 20 and \$ US 30 per barrel, and the price of natural gas also rose. As noted earlier, the oil price rise played no small part on the fuel duty protests, with the protesters blaming the tax rather than the oil price for high fuel prices²⁶. The price rises generally reinforced the environmental focus on getting out of fossil fuels and into more renewable ones. The problem, of course, was that renewable sources were either significantly more expensive than fossil fuels, even with the increased oil and gas prices, or, if potentially competitive (almost entirely wind power), could not be relied upon to secure major shares of the market. Nonetheless, as Helm (2003b) notes, the new need to reflect again on the management of energy markets came at an opportune time in that significant parts of the supply system were becoming due for renewal anyway, notably the nuclear power stations, but a number of the fossil fuel stations as well. Whatever the technology mix, new investment in the electricity sector would be needed, creating a potential window of opportunity to introduce low carbon technology²⁷.

²⁶ An unexplored issue is why price of \$30 barrel contributed to fuel duty protests in 2000, but prices of around \$50 per barrel in 2004 produced no protests.

²⁷ Helm (2003b) notes that the same set of circumstances, plus the depletion of North Sea gas and the UK's switch to becoming a gas importer, plus the privatised electricity sector's unwillingness to keep the same reserve margins as the nationalised electricity sector had, produced a security of supply problem. This issue lies outside the remit of this report but needs to be kept in mind, not least because the major outages in California attracted a lot of media attention in the UK, primarily focusing on the question 'can it happen here'?.

Table 2 The UK climate targets

Year agreed	Gases covered	The target	Comment
1992 Framework Convention on Climate Change, Rio	CO ₂ only	2000 emissions no greater than 1990 emissions: voluntary agreement	Achieved very largely via electricity privatisation introduced by Conservative Government
1997 Labour Manifesto	CO ₂ only	2010 emissions 20per cent less than 1990 emissions	Language of commitment varies, e.g. Energy White Paper 2003 (UK DTI, 2003a) para. 2.14 states it as 'to move towards a 20 per cent reduction', repeated in UK DEFRA (2004d)
1997 Kyoto Protocol, agreed in EU 1998	GHGs	2008-12 emissions 12.5per cent below 1990 emissions	UK's share under the EU burden sharing agreement for the Kyoto Protocol
2003 Energy White Paper	CO ₂ only	c2050 emissions 60per cent less than in 1990 'with real progress by 2020' (UK DTI 2003a, para.1.18) = goal of 110-120 MtC by 2020 ² .	Commitment is to be 'on a path towards' the target. In absolute terms it equals 'around 65 mtC' in 2050. Also stated as a global goal for the 'world's developed economies' ¹

Notes: ¹ See UK DTI (2003a). The Royal Commission's 60per cent cut was against a baseline of 1997. ² The existing climate change policies are predicted to produce emissions of 135 MtC by 2020, so the 60 per cent target adds a further reduction target of 15-25 MtC by that year.

3.8 The climate change policy mix

58. In November 2000, the UK Government published its climate change programme (DETR et al. 2000). The programme set out the emission reduction targets that the UK intended to achieve, and the policies to achieve these targets. The main parts of the policy package (excluding the FDE) are summarised as follows:

- A set of measures designed to reduce business GHG emissions, focusing on (a) the Climate Change Levy (see Section 4); an emissions trading scheme (ETS) in which firms would be induced by payments to reduce emissions and trade permits; a Carbon Trust which would receive some revenue from the CCL and would encourage the take up of cost-effective low carbon technologies; and energy labels and standards at the product level, designed to improve the energy efficiency of products.
- The placing of an obligation on electricity suppliers (i.e. sellers of electricity to final consumers) to obtain 10 per cent of their electricity supplies from generators from renewable sources by 2010. This is the 'Renewables Obligation' (RO). The RO is to be facilitated by allowing the trade of Renewable Obligation Certificates (ROCs) so that electricity sellers over-complying with the target can sell ROCs to those who under-comply. Additionally, combined heat and power (CHP) capacity is to be doubled by 2010.
- Participation in EU-wide agreements to improve the average fuel efficiency of cars by a minimum of 25 per cent by 2008/9. In the UK, this goal is to be assisted by changes in company car taxation, vehicle excise duty (the tax on vehicles before they can be used on the road).

- The 10 year Transport Plan, involving substantial capital expenditures, is also aimed at reducing congestion and hence emissions of various kinds, including carbon. Various changes in vehicle taxation which vary the Vehicle Excise Duty by carbon emissions have been introduced.
- A wide range of measures and initiatives targeted at the household sector. These include obligations on electricity retailers to assist customers to save energy; targeting of older houses and vulnerable groups to secure adequate heating; and energy efficiency improvements in new building regulations.
- Other measures targeted at agricultural emissions from fertiliser (N₂O) and enhancing forests sinks for CO₂, and various policies on public buildings.

3.9 *The Energy Review and the Energy White Paper*

59. Under the previous Conservative government regimes, there was a process of significant disengagement from intervention in energy markets in the name of ‘energy policy’²⁸. As far as possible, nationalised energy concerns were to be privatised and mechanisms for inducing competition within privatised markets were to be encouraged. Indeed, the separate Department (Ministry) for Energy was closed down in 1992, a signal that energy was ‘off’ the political agenda and that policy would broadly coincide with whatever the market dictated.

60. By the end of the 1990s it was clear that there would have to be a partial reversal of this minimum management regime. No-one was suggesting re-establishing public ownership, but several driving forces came together to suggest that government could not leave long-run energy prospects to the market alone. Undoubtedly, the environment was one of the driving forces, and within that, climate change continued (and still continues) to dominate. The Royal Commission on Environmental Pollution’s call for a long term goal for GHG reduction reinforced the demand for a rethink on energy policy (RCEP, 2000) But there were the other factors noted above and which had emerged sharply at the end of the 1990s – the short-run prospect of the UK becoming an oil importer, the drama surrounding the electricity outages in California and the associated fear that it could happen in the UK because of low reserve margins, and the rapidly ageing structure of the nuclear power industry and its seeming inability to compete in a world of liberalised energy prices. All this suggested a long term look at energy security and the links between energy and environmental goals.

61. In an effort to map out the implications of these various future challenges, including climate change, in 2001 the Labour Government commissioned a review of long run energy prospects and policy. In Helm’s view (Helm, 2003a, p.392) this was a ‘classic response’ to a situation in which the Government had ‘little idea what to say’ about the RCEP’s long term goal for GHG emissions. The Review was published in 2002 (UK Cabinet Office, 2002). The Review suggested that the long run goal of a 60 per cent reduction in emissions by around 2050 could be achieved but would require ‘step changes’ in measures such as energy efficiency, and significant expansions of renewable energy electricity. Theoretically, nuclear power expansion was not ruled out, but there were serious political problems of placing it centrally on the agenda, not least the problems it was having with low electricity prices as markets were liberalised. Policy instruments do not figure significantly in the Review, but there are

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The defining moment was probably the speech of the then Secretary of State for Energy, Nigel Lawson, in 1982. The speech, ‘The Market for Energy’, made it clear that there was to be an end to energy ‘planning’ and that markets would be given the dominant role in determining how energy demand was to be met. Environmental issues were not, at the time, at the front of the political agenda. As Helm (2003a) notes, this market philosophy did not sit easily with the then government’s goal of expanding energy sources such as nuclear power in order to remove power from the coal mining unions.

quantified estimates of the contributions that various technologies could make to achieving long run targets. Thus, for 2020, nearly all measures would have to focus on energy efficiency and wind power. By 2050 the focus on energy efficiency is even more pronounced, but wind, energy crops, solar power, nuclear power and carbon sequestration come into play. The Review counselled against any *unilateral* attempt to meet a long run 60 per cent carbon emission reduction goal, but this was really restating the obvious since the Royal Commission on Environmental Pollution itself had never argued for a unilateral target, and all government statements were fairly clear in making the target conditional on international action. Arguably, however, the Energy Review was concerned to make the position clear since there had been calls from some environmentalists for a unilateral policy²⁹. Overall, the Review carefully avoided direct challenges to the major industrial pressure groups, whilst pleasing the environmentalists at least to the extent of taking long run climate goals seriously³⁰. In the opinion of Helm (2003a), the *Review* was weak analytically and reflected the confusion of objectives that government now seemed to have for an energy policy: ‘cheap energy’, climate change goals, other environmental goals, security of supply (especially gas) and reliability of supply (electricity). Helm argues that, whereas the previous government’s reliance on the market produced an implicit energy policy in which efficiency alone mattered most, the Labour government had added a set of complex and inconsistent goals which were hard, if not impossible, to secure in the absence of clear guidelines on the trade-offs involved.

62. Indeed, it could be argued that this process of multiplying goals without giving very serious consideration to trade-offs characterises UK policy on sustainable development generally. Pursuing ‘sustainability’ is risky if the term is allowed to describe almost any goal that one or other pressure group believes is important. In order to appease the pressure group, its own-serving goals are added to the menu of the objectives of sustainable development, gradually debasing the value of sustainability as a goal.

63. Backed by the *Energy Review*, early in 2003 the Labour Government issued another White Paper on energy (UK DTI, 2003a), the previous one being the 1998 White Paper which made short-run efforts to appease the coal industry in the face of electricity privatisation and the ‘dash for gas’. The 2003 White Paper reaffirmed the climate change goals listed earlier. Like the *Energy Review*, the White Paper added little that was new as far as policy instruments are concerned. Overt reference to increasing energy prices to meet environmental goals would have foundered on the government’s belief that low energy prices were good for consumers, and especially good for those in fuel poverty. But the White Paper acknowledged that the EU-wide emissions trading scheme would be adopted in the UK with the expectation that it would further reduce UK carbon emissions. A role for the CCL was thought to remain because the trading scheme will not cover all carbon emissions. (In the event, the coverage is similar, so this argument for retaining the CCL has diminished). Nonetheless, the White Paper openly acknowledges that the future of the CCL will be partly dependent on the EU trading scheme and the form it takes³¹. The White Paper adopts the *Energy Review* target of a 20 per cent renewables electricity target for 2020. In both cases wind power is seen as the main contributor.

²⁹ And not just environmentalists, see Parker (2002).

³⁰ While not the subject of this report, the political economy of the Energy Review is addressed in Helm (2002), Hartley (2002) and Parker (2002). Helm (2002) writes: ‘...the [Energy Review] process was one which lent itself more to a political objective of keeping as many interests happy as possible’ (p.11). Similarly, see Helm (2003a, b) for a critique of the Energy White Paper. Helm’s view is that the government’s reliance on large scale energy efficiency benefits is misplaced and that its renewables target cannot be met without a significant change in policy instruments towards a carbon tax.

³¹ ‘We will now consider the impact of the proposed EU trading scheme on the climate change levy, while bearing mind that this will ultimately depend on the precise nature of the future emissions trading scheme which has yet to be agreed’. (UK DTI 2003a, Para 2.30).

64. In keeping with the *Energy Review*, the White Paper concluded that there would have to be a judicious mix of renewable energy investment plus energy efficiency. Tension over the role of nuclear power remained in the White Paper. The issue was whether renewables and energy efficiency could achieve the RCEP 60 per cent reduction target alone, or whether nuclear power would be needed as well. Bearing in mind the end-of-life profile for existing nuclear stations, reliance on renewables and energy efficiency alone to achieve such a long run target appears groundless. The renewables component of an energy future would be needed just to offset the decline in the contribution of nuclear power, leaving energy efficiency with the dominant burden of achieving emission reductions. But nuclear power was already in trouble in the UK, with the nuclear power company, British Energy, collapsing financially at the end of 2002. There are also divided political views on nuclear power within government, so that reducing the role for nuclear power in the future energy mix avoids addressing the opponents of it. Helm (2003a) notes further problems in linking the EU emissions trading scheme with these goals. Given the difficulties of meeting targets with energy efficiency and renewables, coal re-enters the energy mix as a vital balancing fuel. Yet the EU ETS is likely to put most pressure on coal as the technology with the lowest emission abatement costs. Pressures to reduce coal further sit uneasily with its role as a balancing fuel. The White Paper fosters a view that many would regard as unrealistic, namely that the UK's long run climate goals can be achieved at only moderate cost in a context where nuclear power will be declining in terms of its contribution to energy supply; where renewables will, at best, offset that decline; where energy efficiency bears the major brunt of the policy goals, without hard evidence that it can do this³²; and where gas imports will have to expand considerably. As noted above, the UK DTI underwent a conversion of belief about the extent to which renewables and energy efficiency are low cost options. The new *credo* assumes they are low cost (or will be, with technological change and 'learning') so that (a) the 60 per cent target can be achieved with serious economic disruption, and (b) nuclear power is not needed. It is hard to attach much scientific credibility to this view.

4. The Climate Change Levy

4.1 The Marshall report

65. Table 2 showed that, even on its accession to government in 1997, the Labour Party had set itself some potentially difficult climate change goals. It was committed to the Kyoto process and it had argued in Opposition that it could and should achieve a 20 per cent unilateral target with regard to carbon emission reductions by 2010 relative to 1990. In contrast, the Conservative Government's privatisation of the electricity industry and the consequent new build using gas rather than coal ensured that the 1992 UN FCCC target of 2000 CO₂ emissions equal to 1990 emissions would be achieved. The array of policy weapons was clearly not enough to achieve probable targets, and the debacle of the FDE had illustrated just how hard it would be to tackle the transport sector where carbon emissions were rising at the fastest rate. Moreover, energy prices had been falling because of world economic conditions and because of market liberalisation measures, making it all the more difficult to encourage energy conservation and reduced use. Indeed, commentators such as Helm (2003a) see the simultaneous pursuit of energy market liberalisation and environmental goals as an instance of inconsistent policy goals, illustrating the political economy argument that governments are rarely 'rational' in the sense of having fully co-ordinated goals (or 'joined up' government, as it became to be known in the UK). Others would argue that market liberalisation simply ensured that one market distortion – monopoly – was removed, leaving the way open to control the other distortion – environmental externality – through taxation or tradable permits.

³²

A more recent statement on energy efficiency (DEFRA, 2004c) indicates a recognition that there are serious barriers to energy efficiency of an organisational and behavioural character, with payback periods in excess of those dictated by capital constraints. Nonetheless, it appears to be assumed that these barriers can be overcome.

Technically, this second argument is correct, but relative to the pre-liberalisation baseline, the fact remains that competition expands emissions.

66. In March 1998, the government appointed a distinguished businessman, Lord Marshall (then President of the Confederation of British Industry) to head a Task Force investigating the ways in which economic instruments could be used to make effective reductions in GHG emissions. Marshall reported in November 1998 (Marshall, 1998). Marshall's remit was effectively constrained to discuss taxes or permits, or some combination of both. But, as Helm (2003a) notes, Marshall could not embrace a 'pure' carbon tax. The reason lay in the historically close links between Labour and the coal industry. In 1998 the last contracts between the electricity supply industry (ESI) and the coal mines were due to expire. Without them, yet more contraction of the industry – already accelerated by the privatisation of the ESI earlier by the Conservatives – was inevitable. But Labour was politically sensitive to the mining industry and the remaining workforce which had already been dramatically reduced under the Conservative government³³. The government's response was a new 1998 White Paper which offered some further protection of the coal industry. The government expressed concern about the speed with which the newly privatised ESI was switching to gas and out of coal, and hence slowed the switchover down by limiting consents for new gas-fired stations³⁴. The central point is that Lord Marshall, despite his own view favouring a tax differentiated by carbon content, could not have produced a report fully supporting a carbon tax. If there was a tax, it had to be an energy tax in order not to damage the coal industry any further. The Climate Change Levy was born.

67. Marshall was also mandated to consider tradable permits. He was cautious, arguing that the UK should move slowly and set up an experimental scheme to learn about the practicalities of trading. In the event, this recommendation formed the basis of the subsequent UK Emissions Trading Scheme (UK ETS). Why, then, did the recommendation about an energy tax take priority over permit trading? The apparent reason was that UK governments were familiar with taxes and not familiar with permit trading. Hence the former could be launched quickly and the latter only gradually. But, as a businessman, Marshall could also see that taxes raised revenues, while, unless auctioned, permits did not. Strong arguments could be presented for 'recycling' energy tax revenues back to industry to secure a 'double dividend' – i.e. a reduction in emissions and an encouragement to employment by reducing labour taxes. This recycling provision would also make an energy tax easier to sell to industry. Marshall also sought to ease the burden of energy intensive industries by advocating some system of rebates. On this argument, taxes won over permits because taxes generated revenues which could be used in this way, whereas permits could not.

68. On the other hand, it could be argued that a truly bold initiative would have been to introduce an auctioned system of permits. That auctions have so far played only a minimal role in tradable permit systems – some permits under the US acid rain programme are surrendered and auctioned to ensure new entrants are not disadvantaged – suggests that industry opposition would be enormous³⁵. They would have

³³ That outcome reflected Prime Minister Thatcher's personal drive to reduce the power of the national Union of Mineworkers.

³⁴ These restrictions were intended to be temporary while the government sought a reorganisation of the electricity trading system which it regarded as having undesirable distortions. The government argued that slowing the dash for gas would protect 'diversity and security of supply'. Helm (2003a) provides a spirited critique of the decisions about the coal industry at that time – see his Chapter 16. He remarks: 'In the history of energy policy, the White Paper is one of the best examples of the triumph of spin over substance' (p.303).

³⁵ Under the UK's provisional (2004) National Allocation Plan for entry to the EU there is also a 'new entrant reserve' of permits to be allocated to those entering various sectors – see Annex 3.

to transfer wealth to the government rather than having wealth conferred on them by grandfathered permits. Nonetheless, the EU permit scheme envisioned for 2005 includes provision for *some* auctioning of permits. Moreover, the UK has auctioned other assets, with huge financial transfers taking place as a result, e.g. the spectrum auction resulted in over £20 billion being paid to the government by the successful mobile phone companies. Finally, economic theory suggests that permits (a quantity restriction) will be preferred by politicians and decision-makers if what matters is meeting a quantity target, as is the case with the way climate change policy has evolved. Overall, then, there are powerful arguments for a tradable permits approach. This has proved to be the case with the European Union where an emissions trading scheme is due for introduction in 2005. The EU has a very unsuccessful record of trying to introduce carbon/energy taxes.

69. Finally, Labour government policy was explicit in trying to isolate the household sector from energy price rises. This policy was partly motivated by the traditional concerns of a Labour Party for the impacts of any price changes on the poor. But the government was also mindful of the recent history of value added tax (VAT) on household energy. Household energy was zero rated to 1993 when the then Conservative Government announced its intention to impose VAT, initially at 8 per cent and eventually at 17.5 per cent, the standard rate in the UK. These measures were very much for purposes of revenue raising, but environmental considerations played some part. In response to concerns about the impact on vulnerable households a compensation package (based on the Home Energy Efficiency Scheme) was announced. The 8 per cent rate was introduced but met with a political backlash from Members of Parliament, forcing the 17.5 per cent rate to be abandoned. In June 1997 the new Labour Government immediately reduced the rate to 5 per cent. Smith (2004) remarks:

‘This unhappy experience seems to have been etched into the consciousness of politicians of all the major UK parties, and higher taxes on consumer energy for environmental or any other reasons seem to be regarded as politically impossible’.

70. The fear of losing votes from price-sensitive householders thus motivated the desire to ring-fence the household sector. In fact, of course, it is not possible to isolate final consumers from tax-induced cost increases, as simple supply and demand analysis shows. But it is easy to obscure the effects of taxes when so many other factors were determining energy price changes at the time.

71. In the event, both of Marshall’s recommendations were adopted. There would be an energy tax and there would be an experimental tradable permits system. The ‘textbook’ solution would have been a carbon tax and/or a reasonably widespread permit trading system. But auctioned permits were never going to stand a chance because of the effective ‘tax’ they would constitute on industry. The energy tax, on the other hand, could be recycled to ‘buy in’ industry’s cooperation, could be imposed on industry and commerce without appearing to affect transport or the household sector, and could incorporate significant concessions to energy-intensive industries. A pure carbon tax was also never viable in political terms because of the impact on the coal sector. Helm (2003a) argues that the resulting energy tax – the CCL – was a tax that operated virtually entirely on the demand side, doing little or nothing to address the supply-side issues that should have been necessary to move towards a long-term low-carbon economy.

4.2 *The nature of the CCL*

72. The Chancellor of the Exchequer announced the CCL in his Budget of March 1999. The CCL was to come into effect in April 2001. The basic elements of the CCL are:

- The CCL is levied on industry only and applies to all non-household use of coal, gas, electricity, and non-transport LPG. Industry is taken to include agriculture and the public sector. Household and transport sector uses of fuels are exempted, as are fuels used for electricity generation and

non-energy uses, and waste-derived fuels. Renewable energy, including ‘good quality’ CHP, is similarly exempt since 2002, the argument being that good quality CHP comes close to performing like renewable energy. The definition of ‘renewable’ has evolved. For example, electricity generation from coal-mine methane capture was not exempt from the Levy originally but was slated for exemption in 2002 and was confirmed as being exempt late in 2003³⁶. Further amendments were made in 2003 with respect to some categories of CHP.

- The CCL is applied at the ‘time of supply’ to industrial and commercial users of energy. For example, the tax is payable on electricity supplied by an electricity utility to an industry and, for that matter, for its own use. In effect, the CCL is a single stage sales tax.
- Most revenues from the CCL are ‘recycled’ back to CCL-paying industry in the form of reductions in employer contributions to social security taxation. These taxes are effectively taxes on labour employed. The aim of recycling is to encourage employment. The aggregate net tax burden from the CCL is theoretically zero since revenues are, in the main, recycled. From the standpoint of any individual industry, however, the tax may be positive or negative according to whether payments exceed NIC reductions. Moreover, while designed to be revenue-neutral in the aggregate, the CCL could generate net receipts or deficits since the labour tax reductions are a fixed percentage (0.3per cent) of whatever the overall labour tax is for that year, and CCL revenues depend on energy consumption by the affected parties and the various exemptions.
- Some revenues are used to stimulate energy efficiency schemes and to develop renewable energy resources through the ‘Carbon Trust’ – see later.
- Energy-intensive industries face lower rates of CCL (20per cent, i.e. an 80per cent discount) than other industries provided the industries concerned adopt energy efficiency measures to achieve targets agreed on the basis of government criteria. This they can do via Climate Change Agreements (CCAs). However, not all energy-intensive industries are embraced by the CCAs because the government’s definition of ‘energy-intensive’ follows that of the European Integrated Pollution Prevention and Control (IPPC) Directive and this is not all-encompassing. In 2003 the government promised to review the arguments for extending the CCAs to other industries. In the Budget of April 2004 two additions were made to the IPPC test. First, any sector with a 12per cent ‘energy intensity threshold’ (ratio of energy expenditure to value of output) would also qualify to enter a CCA. Second, any sector with an energy intensity threshold in the range 3-12per cent will qualify for a CCA if, in addition it has an import penetration ratio of 50per cent or more, or an export-to-output ratio of 30per cent or more. These latter tests are referred to as ‘international competitiveness’ tests.

73. Initial illustrative rates of charge were published in 1999 (UK HM Customs and Excise, 1999a). These were modified in the pre-budget statement of November 1999 where they appear as intended rates (UK HM Customs and Excise, 1999b). The Budget 2000 confirmed the rates as shown in Table 3 and they have not changed since.

74. It is possible to translate these rates of charge into an implicit carbon tax by taking account of the carbon content of fuels. The results are (ECOTEC, 1999):

³⁶

The delay is explained by the need to secure European Commission clearance under state-aid regulations.

	Original rates	Nov 99 rates
Coal	£23 per tonne C	£16 per tonne C
Gas	£42	£30
Petroleum	£31	£22
Electricity ³⁷	£43	£31

75. The figures make clear the disparity between the CCL and a pure carbon tax. Indeed, natural gas, which has the lowest carbon content, attracts nearly the highest rate of CCL. Since the tax per kWh of gas and coal is the same, and given the lower carbon content of gas, the effect is to produce a differential tax rather than a uniform one. Hence the tax is potentially inefficient as long as there are opportunities to switch between fuels. The carbon content of gas is only 54 per cent of that of coal³⁸. While one would therefore expect encouragement of a switch between fossil fuel uses and non-fossil fuels, the CCL does not encourage gas to be supplied at the expense of coal.

76. As originally formulated, the flat rate for electricity, however it was generated, provided no incentive at all for electricity users to switch to cleaner fuels, and no incentives to use energy more efficiently (since the tax is charged per unit of electricity). This problem was ameliorated slightly in the November 99 revisions since renewable energy and CHP were then exempted.

77. One argument for not reflecting carbon intensities in the CCL is that of administrative simplicity. Since the tax is levied 'downstream' it is not possible, the argument goes, to identify the fuel sources 'belonging' to any given unit of electricity. This is largely true, but only arises because of the way the tax was designed. There was, in principle, no difficulty in designing a pure carbon tax. At the time, the CCL was also argued to provide 'fair competition between fuels' (UK HM Customs and Excise, 1999a, para.5.3), but this appears to involve a very narrow definition of fairness, since if one fuel pollutes more than the other, economic efficiency would demand that it be taxed at a higher rate. Again, the justification really reflects the concerns at the time about the impact on the coal industry.

78. Another important point relates to the exclusion of the transport and household sectors. The exclusion of transport can be explained by the fact that, at that time, separate market-based instruments were being directed at the transport sector. The FDE was in place, although its foundations by this time were shaky. Other differential fuel taxes were coming into being, along with company car tax reform, changes to vehicle excise duty, and so on. But the FDE experience was beginning to show that imposing a further tax on transport would risk political protest on a significant scale. Excluding transport was therefore as much a political necessity as anything else. Arguably, environmental taxation of road transport was also adequate in terms of the marginal damage costs of carbon were concerned. As noted earlier, the exclusion of the household sector also had a political motivation, but additionally reflected the goals of government as set out in a 1997 Treasury statement that environmental taxation must be 'well designed, meet objectives without undesirable side-effects, keep compliance costs to a minimum, have acceptable distributional impacts, and take account of implications for international competitiveness' (UK HM Treasury, 1997b). The exclusion of the household sector from the CCL would therefore have a justification because of the probable regressive impacts of an energy tax³⁹.

³⁷ Based on the prevailing fuel mix for electricity generation.

³⁸ Natural gas has 14,000 grams of CO₂ as C per GJ, whilst coal has 26,000.

³⁹ Households in 'fuel poverty' were estimated at 1.75 million in 2002, compared to 4 million in 1996 (UK DTI 2004).

4.3 Revenues from the CCL and the role of nuclear power

79. Table 3 shows projected and actual revenues from the CCL

Table 3 Projected and actual revenues from the CCL £ million

Year	Projected	Revised projection	Actual
2001-2 (part year)	800	-	585
2002-3	1030	900	837
2003-4	N/A	NA	786

Source: House of Commons Written Answers, April 23 2002, Cols 127-8; May 2002, Cols 884-5. ENDS Report, 238, May 2002 and 350, March 2004. Office of National Statistics – www.statistics.gov.uk.

Table 4 Climate change levy tax rates and provisions

Fuel	Customs and Excise (1999)	Revisions in pre-budget statement November 1999	Budget 2000
Coal	0.21 pence/kWh	0.15 pence/kWh	0.15 pence/kWh
Gas	0.21 pence/ kWh	0.15 pence/ kWh	0.15 pence/kWh
Electricity	0.60 pence/ kWh	0.43 pence/ kWh	0.43 pence/kWh
LPG*		0.14 pence/kWh	0.07 pence/kWh**
Exemptions***	household sector transport fuel/feedstock	add: 'new' renewable energy; 'good quality' CHP ⁺ ; rail freight traction electricity	Same
Discount for energy intensive industries subject to CCA	50 per cent	80 per cent	Same + 50 per cent discount and special help for horticulture
NIC reduction	0.5 percentage point	0.3 percentage point	Same
Fund for energy saving investments	£50 m	£50 m + £100 m for first year depreciation allowances on energy saving investments	Same
Expected revenues	£1.75 billion (2001/2)	£1.00 billion (2001/2)	Same
Expected CO ₂ reductions	1.5 mtC (2010)	2 mtC from levy (2010) 2 mtC from CCAs	2.5 mtC ⁺ 2.5 mtC
Inflation	Levy to rise with inflation	Levy to rise with inflation	
Other		Tradable permits schemes within a CCL industry can be part of a CCA.	

Note: a CCA is a Climate Change Agreement – see text and Annex 2. NIC is the National Insurance Contribution in this case payable by employers on labour employed (employees also pay NIC but this is unaffected). 100 pence = £1.

*) Other than LPG used in road vehicles, i.e. LPG used for heating does attract the CCL. **) = 0.96 pence per kg.

***) Technically, the law distinguishes exclusions from exemptions but they are regarded as one category here. ⁴⁾ In 2002, some changes were announced to take effect in 2003 and relating to the provisions for the exemption of 'good quality' CHP electricity from the CCL. 'Good quality' CHP had been defined as electricity that was certified under a quality assurance programme run by DEFRA and with the stations in question holding a certificate of exemption from the CCL (a Levy Exemption Certificate, or LEC). The 2003 revisions set out in more detail the provisions for allowing CCL relief on the onward supply of good quality CHP electricity via third-party electric utilities ('indirect' supplies). See UK HM Customs and Excise (2003).

80. One way of 'decomposing' the CCL is to ask what the revenues would have been without any exemptions and without the reduced rates for CCAs. Table 5 illustrates the analysis.

Table 5 Decomposition of the CCL – simulation for 2001

Sector	Energy TWh	CCL revenues £m
Total industrial electricity use	210	901
(of which, nuclear)	(94)	(403)
(of which, hydro)	(6)	(24)
Less renewables exemption	5	21
Less good quality CHP	22	96
Less CCA reduced rates		232
Equals Revenue from actual CCA		553

Source: based with some modifications on *The Utilities Journal*, October 2002: 20-1. Note that the figures 'simulate' calendar year 2001, not the tax year April 2001-April 2002, so the correlation of final revenues with the revenue figure in Table 3 is not precise. Note: nuclear includes the inter-connector between France and the UK.

81. The main point revealed by Table 5 is that CCL revenues would be some 20 per cent higher but for the exemptions of renewables and CHP, and would be 40 per cent higher but for the CCA rate reductions.

82. The other important point is the role of nuclear power. Nuclear power is not exempt under the CCL despite being a zero carbon energy source⁴⁰. This is because, despite its name, the CCL is an energy tax, not a carbon tax. Had it been a carbon tax, the competitive position of nuclear power, already seriously compromised in the UK because of price falls in the liberalised energy markets, would have been enhanced. But had nuclear been exempt, the CCL would have been seriously compromised in the sense that revenues would have been drastically affected, and coal would have been exposed to further contraction. Given that revenues from the CCL are recycled and hypothecated (see below), the revenue raising effect of including nuclear power would appear to be irrelevant. But including nuclear power nonetheless increased revenues, enlarging the fund available to 'buy in' cooperation from industry. One other argument for including nuclear power in the CCL has been advanced in some quarters. Had nuclear power been exempt, it would have secured a competitive advantage that would have favoured imports of electricity from France via the interconnector. In short, while including the sector in the CCL was clearly going to damage UK nuclear power, excluding it would only be to the advantage of France. At the time of

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This is true as long as emissions are measured from generation only. On a life cycle basis, i.e. including fuel extraction, station construction etc., nuclear power is not carbon free. However, even with life cycle effects allowed for, emissions from nuclear power are still small relative to other fuel cycles – see Bates (1995).

writing (2004), British Energy continues to exert pressure on government, arguing that it could save UK£ 80 – 100 million p.a. if it was exempt from the CCL⁴¹.

4.4 *The recycling and hypothecation debate*

83. The CCL was introduced in a revenue-neutral reform. This means that the government secures no net revenues since these are recycled to reduce other taxes, and a small fraction is hypothecated to specific expenditures⁴². In the case of the CCL, recycling involves a reduction in employers' social security contributions, while hypothecation involves using some of the revenues to finance carbon technology improvements.

84. The interesting feature of the recycling is that it purports to capture what has widely been regarded as a 'double dividend' arising from environmental taxation (Pearce, 1991). Since the tax remains in place, albeit on energy rather than carbon, there is some inducement to reduce energy consumption and hence carbon emissions. Thus, an environmental goal is achieved. By using the revenues to lower labour taxes, the goal of inducing employment is also allegedly achieved since labour now becomes cheaper. This is the sense in which there are two 'dividends', sometimes called a 'green' dividend and a 'blue dividend' (de Mooij, 1999). At the time the tax was announced, it seems fair to say that the literature on the double dividend probably did support the view that a single recycled tax could achieve both goals. Since then, the evidence has proved to be far more ambiguous. While the literature confirms that an environmental tax will generate a 'green dividend', i.e. an environmental improvement, the real problems arise because the environmental tax interacts with pre-existing tax distortions. Essentially, any environmental tax is a tax on labour because the tax ends up affecting goods that people buy. This underlines the earlier reference to the illusion that the household sector can be isolated from the effects of a business tax such as the CCL. In this respect the environmental tax produces changes in the mix of consumption goods which produce losses in wellbeing that could be larger than the gains from reducing labour taxes. The central point is that environmental taxes cannot be analysed solely in terms of their environmental benefit – they interact with other taxes – the 'tax interaction effect' – and the net effects may not be beneficial. Needless to say, like needs to be compared with like. If the environmental externality is not addressed by the tax, it has to be addressed by some other form of regulation and there are no guarantees that these other forms of regulation will not have similar counterintuitive effects (Stern, 2003). After all, all regulations raise prices initially. The overall conclusion, however, is that the double dividend is not such a forgone conclusion as the early literature implied. Nonetheless, recycling revenues to reduce labour taxes (which is what social security contributions are) does reduce labour market distortions. Hypothecation, on the other hand, may not generate the double dividend.

85. The links between the double dividend debate and political economy are fairly obvious. If the double dividend argument is correct, it provides a kind of 'icing on the cake' justification for environmental taxes such as the CCL. That is, while the main reason for revenue-neutrality and recycling is likely to be a political one – polluters will not come 'on board' otherwise – the double dividend argument helps to persuade other tax-doubters that the tax is a good idea. There are also 'public choice' arguments for recycling and hypothecation. The standard economic argument against recycling and hypothecation is that they target public revenues to a use that may not be the highest social rate of return use of those funds. The public choice response is that, politically, taxpayers like to know where their taxes have gone and that

⁴¹ As quoted in *Accountancy Age*, November 25, 2003.

⁴² 'Recycling' is used here to mean a reduction in other taxes and 'hypothecation' is reserved for tax revenues that are used to finance other public expenditures. The economic effects of recycling and hypothecation are different.

they have not been ‘swallowed up’ in general funds. Hence taxpayers may prefer recycled and hypothecated taxes to general taxes. It seems fair to say that the UK Treasury was historically opposed to recycling and hypothecation, but, significantly, it subsequently relaxed its opposition⁴³. While the public choice argument may have been persuasive to some extent, it seems more likely that the use of recycling and hypothecation to get new taxes on to the agenda largely explains the support that such taxes now attract from industry (even though individual sectors may lose), from the public (who see that the ‘tax pound’ is being used to a good purpose), and from policy makers who see the flexible uses to which revenues may be put.⁴⁴

4.5 *Gainers and losers*

86. While the CCL was designed as part of a revenue-neutral reform, this does not mean that each and every industry would find itself in a tax-neutral position. An early effort to estimate which sectors would gain and lose was that of ECOTEC (1999). This analysis was based on the early 1999 CCL proposed levy, not on the eventual levy. However, the study did suggest that the net effects of the CCL and the employment tax rebate would be very modest – either beneficial or a very small cost – for most industries. The exceptions were food products (net cost of UK£ 87 million p.a.), iron and steel (£80 million); oil extraction (£54 million), pulp and paper (£48 million), and a few other industries. Even then, the net tax is very small relatively to sectoral turnover. Moreover, for those industries facing a net tax, most are energy-intensive and they could take advantage of the provision for a CCA. It is difficult to argue, then, that the CCL was unjust in creating sectoral opposition, although, of course, lobbies against it from affected industries still continue.

4.6 *The RIA of the CCL*

87. Section 2 noted that politically determined regulations need not improve overall social welfare relative to a position of taking no action at all. This tends to underline the need for an effective cost-benefit appraisal of the regulation, something that, in the UK, is meant to be covered by a Regulatory Impact Assessment (RIA). An early RIA issued in 2000 (UK HM Customs and Excise, 2000) was disappointing in this respect, although it was clearly faced with the problem of not knowing at that time what the extent of exemptions would be under the CCAs. The RIA suggested that the levy package as a whole (levy plus CCAs) might reduce carbon emissions by 5 MtC p.a. by 2010. If savings are linear with time, this would suggest a saving of some 25 MtC cumulatively over the period 2000-2010. The RIA could have multiplied this figure (technically, suitably discounted) by prevailing estimates of the marginal damage from a tonne of carbon. These estimates are controversial (e.g. see Pearce, 2003c) but suggest perhaps £15 tC. The UK government currently (2004) uses a figure of £35-150 tC but has this estimate under review. At £15 tC, the levy package would generate benefits of £375 million, while at, say, £70 the benefits would be £1750 million, over the ten year period 2000-10. The RIA does not engage in this kind of analysis.

88. The RIA also argued that compliance costs at the national aggregate level are broadly zero since the levy simply transfers tax revenues from industry back to industry via the employment tax cuts. Any other costs are outweighed by the energy efficiency gains which cut energy bills. The obvious weakness of

⁴³ Several other environmental taxes in the UK are revenue neutral and recycled/hypothecated: the aggregates levy and the landfill tax are two such taxes. Later stages of the FDE were also intended to be hypothecated for transport investment but the fuel protests precluded this happening.

⁴⁴ Helm (2004) notes that within a year of the start of the CCL, labour taxes were raised by 1 per cent across the board starting in the tax year 2003-4. This is three times the reduction finally agreed under the CCL. The labour tax rise was very much due to revenue needs because of the Labour Government’s increased public expenditure policies.

this analysis is that the recycled revenues to industry must still have a cost. The CCL and CCA make industry do what they otherwise would not have done, which in turn means that there must be a cost to complying with the CCL. While it is hard to see how these costs could be estimated, it is difficult to argue that they are zero. The House of Commons Environmental Audit Committee similarly noted that ‘the Government has no figures on total compliance costs for government or industry for these energy-related policy instruments’ (House of Commons EAC 2001). Strictly interpreted, then, it is not possible to say if the CCL/CCA package passes a cost-benefit test.⁴⁵

4.7 Price and revenue effects of a tax

89. One argument against environmental taxes is that, unless the externality can be taxed directly, they work least well when the good being taxed is in inelastic demand. Suppose the externality cannot be taxed directly, but that the good associated with the externality is taxed. Inelastic demand will mean that the tax has little effect on the quantity of the good produced and hence little on the level of the externality. This contrasts starkly with the standard public finance rationale for taxing goods with inelastic demand, namely that this is a good way to generate tax revenues. One reason for demand inelasticity is lack of substitutes for the good in question, i.e. the ‘substitution effect’ of the tax is low. Energy tends to fall into the category of a good with a relatively low short-run demand elasticity. Hence an energy tax, such as the CCL, will, initially, have little effect on the level of carbon emissions. On the face of it, this means that the CCL seems like a non-starter in terms of an efficient environmental tax. Two arguments tend to soften this criticism.

90. First, so long as the tax is regarded by polluters as *permanent*, polluters will have a strong incentive to institute longer run measures to reduce the carbon content of their processes and products. This means that it is the long-run elasticity of demand for energy that matters, not the short-run demand, and long run elasticities tend to be larger than short-run ones. The second way in which the tax can induce longer run substitution is via the revenue effect of the tax. In a world where tax revenues are not hypothecated, for whatever reason, tax revenues go to general government revenues. Once the notion of hypothecation is accepted, then some of the tax revenues can be used to fund, say, research into low carbon solutions to process technology and so on. As noted above, the UK government has acknowledged the rationale for hypothecation with several of its environmental taxes. Part of the CCL revenues have been allocated to a Carbon Trust for this purpose.

4.8 The use of CCL revenues: the Carbon Trust

91. Since the CCL is a revenue-neutral tax and since the Marshall Report was clear in its recommendation that the tax must not harm ‘competitiveness’, the major part of the CCL revenues is recycled directly back to the corporate sector in the form of employment tax refunds. Along with substitution effects arising from the resulting price increases, the substitution argument also requires that some of the revenues be invested in measures designed to encourage longer-run switches to low carbon technologies. As of April 2001, the Carbon Trust was established as a private company with grants given via DEFRA and using CCL revenues. The main purpose of the Trust is to stimulate the adoption of low carbon technologies. It has a Low Carbon Investment Programme (LCIP) which aims to invest in low-carbon technologies, taking a higher risk perspective than conventional investors since part of the ‘return’

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Indeed, RIAs associated with the climate change programme as a whole have been very disappointing in terms of their failure to quantify benefits and costs. An example is the RIA of the whole programme – see Annex 1 of UK DETR et al. (2000) which fails to cite any monetised costs or benefits. The RIA of the emissions trading scheme is similarly very limited in terms of cost and benefit information – see UK DEFRA (2001e).

is taken in the form of carbon reductions as opposed to financial benefit. In 2002 the Trust also took over the government's Enhance Capital Allowances scheme for stimulating low carbon investment through up-front capital allowances. Part of the Trust's programme has secured carbon emission reductions with a cost range of £8-39 tC (Carbon Trust, 2003). Total expenditure by the Trust was some £24 million in 2001/2 and £36 million in 2002/3, or around 4 per cent of CCL revenues per annum. The obvious question with respect to these expenditures is how far they take on board the 'revenue effect' argument previously. Since the sums are very modest, it can be argued that the use of such revenues to secure long-run substitution effects is unlikely to be effective. However, the Trust cannot be seen in isolation since the CCAs themselves also have the effect of shifting energy conservation and hence, to some extent, lower carbon technologies to the fore.

4.9 *The Climate Change Agreements (CCAs)*

92. Like all governments, the UK government has always been sensitive to the effects of any regulation on international competitiveness of given economic sectors. By and large, this concern relates to actions which may raise UK industrial costs without similar cost increases being experienced in competitive countries. How far this is a valid economic concern is debated, but it is certainly a pervasive concern in political circles – see below. These concerns surfaced quickly in the discussions about the CCL and the approach to dealing with them was to offer conditional exemptions to energy-intensive industries. To overcome definitional problems it was decided that energy-intensive industry sites would be regarded as those who were already registered under the EU Integrated Pollution and Prevention Control (IPPC) Directive. IPPC regulations require that the sites in question operate in an energy efficient manner. Any sector within this legal ambit can then enter into a Climate Change Agreement (CCA) which requires them to adopt and implement an energy saving or carbon emission reduction programme. The CCA is legally binding. In return, the sector will be exempt from 80 per cent of the CCL. Failure to comply with the targets at the interim target dates (2002, 2004, 2006, 2008) means that the firm in question loses its tax reduction for the following two years. Failure to comply with the final 2010 target means that the firm would have to repay all tax reductions over the whole period. The compliance incentives within the CCAs are thus very powerful, and may explain what appears to be the high level of over-compliance in the first interim target year, 2002. An alternative explanation for this high degree of compliance may, however, be that the targets themselves were not very different from 'business as usual' emission levels (see below).

93. Annex 2 lists the CCAs at the time of writing (2004). In their review of CCA performance up to the first target period of 2001, ETSU (2003) find that over half of the CCAs have achieved their targets. Inspection of the data suggests that around a quarter of the agreements are adrift of their targets by 5 per cent or more. Arguably, the first target period is too short a period for some of the sectors concerned to implement effective energy saving programmes, and the true effectiveness of the agreements remains to be seen. Nor are there any data to indicate what costs businesses adopting CCAs have borne. ETSU (2003) notes that one effect of the CCAs has been to motivate corporations to raise energy saving up the corporate agenda. There is an argument to suggest that energy savings are low-cost precisely because energy is not usually the subject of special boardroom interest or expertise, at least in the lower energy intensive industries. What the CCL and the associated CCAs do in this context is to make energy a managerial concern. Nonetheless, it remains the case that the costs and benefits of the CCAs appear not to be known with any precision⁴⁶.

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The issue is made even more complex if household energy efficiency is targeted. This is because of the so-called 'rebound effect' whereby improvements in energy efficiency are seen by households as the equivalent of real energy price reductions. Such reductions induce more energy consumption. For households in energy poverty this is, of course, a desirable outcome, even though it generates

94. In the pre-Budget statement of November 2003 the Chancellor of the Exchequer announced that he was persuaded of the case to extend the CCAs to other energy-intensive sectors not currently embraced by the IPPC Directive. Other currently excluded sectors include some that are within the remit of IPPC but with activities too small to qualify for a CCA.

4.10 *The CCAs and ‘competitiveness’*

95. The CCAs came into being because of the very strong political lobby, led by the Confederation of British Industry, against the effects of the CCL on the competitiveness of energy-intensive industries. That there is a ‘competitiveness’ problem is deeply ingrained in political culture, but it is not always clear what the problem is meant to be. Krugman (1996) notes that most of the concerns about ‘competitiveness’ are inconsistent with basic international trade theory and remarks:

‘While influential people have used the word ‘competitiveness’ to mean that countries compete just like companies, professional economists know very well that this is a poor metaphor. In fact, it is a view of the world so much in conflict with what even the most basic international trade theory tells us that economists have by and large simply failed to comprehend that this is what the seemingly sophisticated people who talk about competitiveness have in mind’.

96. While Krugman’s remarks hold for nations, competitiveness has more meaning at the level of the firm. Moreover, while many studies have concluded that environmental regulations generally have little or no impact on international trade flows, Baron (1997) notes that the conclusions of these studies may not be transferable to contexts where the regulatory instrument is a tax. This is because the tax is on all emissions, optimal and non-optimal, whereas command-and-control style regulations regulate only emissions beyond the standard set. Offsetting Baron’s argument, however, is the widely held view that taxes have lower compliance costs than command-and-control regulations. But Baron is correct in concluding that past experience might not be a very good guide to assessing the competitiveness impacts of taxes. After assessing the available evidence, Baron (1997) concludes that competitiveness effects on energy-intensive industries could be significant in a few cases, but that much would depend on the other factors affecting costs – e.g. exchange rate movements – and on any compensatory measures. The CCAs are a significant compensatory measure.

97. Whatever the analytical nature of competitiveness effects, the fact remains that the issue is a highly charged one at the political level. Lobbies against the CCL stressed the issue repeatedly and politicians have systematically embodied the concern in all policy formation and guidance.

4.11 *The effectiveness of the CCL and CCAs*

98. While the CCL clearly diverges substantially from a textbook carbon-tax and while the CCAs appear to be a politically convenient way of getting energy-intensive industry to sign up to the CCL, one obvious test of the CCL package is whether or not it has secured significant carbon emission reductions. Such a test is obviously incomplete because one would want to know what emission reductions would have been secured by the textbook solution – a carbon tax and/or a comprehensive tradable permit system. Nonetheless, any criticism of the CCL must be supported or tempered by an assessment of the environmental impacts.

environmental costs. For other households it clearly has benefits but the environmental costs can be considerable. If rebound effects are important, it may help to explain why it is so politically difficult to secure an effective household conservation policy and why targets in the industrial sector, such as the CCA targets, are easier to secure.

99. Agnolucci et al. (2004) provide an assessment of the emissions effect. They define the *general effect* of the tax as comprising an *announcement effect* and an *implementation effect* (see also Agnolucci and Ekins, 2004). The announcement effect tries to account for industrial responses to the fact that the tax has been announced and will be implemented. The implementation effect accounts for the residual, i.e. any effect not accounted for by the announcement effect⁴⁷. Using regression analysis, Agnolucci et al. (2004) test for the presence of an announcement effect in three broad sectors: the industrial sector, the commerce and other final users sector (basically commerce and public administration), and the economy as a whole. They find an announcement effect (i.e. energy reductions in 1999-2001, the period between the announcement of the tax and its introduction) only for commerce and other final users. Agnolucci et al. (2004) conclude that:

‘...this is a positive result as it shows that a credible Government policy of pre-announcing new taxes can lead to early action by firms. The study has shown that this change is ... permanent and not transitory’.

100. However, the effect is found only for the commercial and other users’ sectors which, together, account for only 10 per cent of final energy demand or 15 per cent of non-household final energy demand. The announcement effect appears to be absent for industrial and economy-wide demand. This does not mean that the CCL package has not had a general price effect but, unfortunately, Agnolucci et al. do not estimate what this might have been.

101. An assessment of the CCA component of the CCL package by UK DEFRA regards the achievements of the CCAs up to the end of the first target period ending 2002 as ‘massive’⁴⁸. The long run goal of the CCAs was to achieve a 2.2 MtC reduction in emissions by 2010. Yet the 2002 figures suggest a reduction of 3.7 MtC from the baseline, implying substantial over-achievement well before the final target date⁴⁹. There are considerable complexities in interpreting performance under the CCAs since, after the CCL was introduced, the CCAs were linked to the new emissions trading scheme in the UK (ETS) – see later. Another debate surrounds the ‘additionality’ of the CCA achievements, i.e. whether they represent energy/emission reductions that would not otherwise have occurred. The original attempt in the CCAs to prevent non-additionality involved estimating ‘business as usual’ energy consumption figures, then setting a limit target that would have involved all conceivable cost-effective measures being undertaken, and finally setting the actual targets to be 60 per cent of the gap between business as usual and these limit targets. The 2002 targets were then calculated as a step on the way to this ‘60 per cent gap closure’.

102. Whatever the truth about additionality, the achievements by 2002 certainly look impressive, although some have argued that the energy efficiency improvements would have occurred anyway⁵⁰.

⁴⁷ ‘Event studies’ encompass this kind of analysis but are usually more concerned with effects on company worth, e.g. via changes in stock market valuations. Hayler (2003) was unable to detect such an event effect for the CC, but this is probably due to being unable to capture the complexity of the entire CCL/CCA package in defining the ‘event’.

⁴⁸ The CCAs have interim target dates of 2002, 2004, 2006 and 2008 before the final target date of 2010.

⁴⁹ A significant part of this reduction is accounted for by the UK steel industry, primarily one company - Corus - which experienced economic downturn conditions in the relevant years. There has been some debate about the extent to which steel’s emission/energy reduction is due to the CCA. The CCA for steel does have conditions built into it about renegotiating targets if output falls by more than 10per cent. See ENDS Report 339, April 2003, 23-26.

⁵⁰ Notably, the Association for the Conservation of Energy. One argument here is that the extent of over-compliance indicates the ‘soft’ nature of the targets originally agreed. See also Dressner et al. (forthcoming). It is hard to evaluate this argument.

Taking the figures for the ‘units’ undertaking commitments (i.e. the individual companies rather than the sectors as a whole), some 5000 of the 5700 units met their target for 2002. 1500 units have withdrawn from the CCAs, and just over 200 units failed to meet their targets. As noted, the emission reductions appear to have been significantly greater than the targets set for 2002.

103. Finally, a purely theoretical analysis by de Muizon and Glachant (2004) suggests that *environmental effectiveness* of the CCAs is improved by the link to the CCL rebate scheme, and *cost-efficiency* of the CCAs is improved by the link to emissions trading (see below). But if the tax rebates secure environmental effectiveness and trading secures cost-efficiency, the CCAs become technically irrelevant since their effectiveness is secured by the two market-based instruments which could have been introduced together and separately from the CCAs.

4.12 *The CCAs and emissions trading*

104. The CCAs entitle participants to an 80 per cent discount on the CCL provided the targets agreed in the CCA are met. A natural extension of the CCA is emissions trading and this arises if some participants over-achieve their targets and others under-achieve. In such circumstances, over-achievers could be given credits for the excess achievement and they could then sell them to the under-achievers. While not envisaged as part of the original CCL/CCA package, this trading option became available when the UK developed its emissions trading scheme (ETS). The Marshall Report had recommended cautious progress on emissions trading. Encouraged by government, a business consortium studied the ways in which an ETS could be implemented in the UK. It published its outline proposals late in 1999 (ETG, 1999) and the government published a consultation paper late in 2000 (UK DETR, 2000) followed by draft and final Framework Documents in 2001 (DEFRA 2001a, 2001b). The UK ETS is worthy of a separate study in itself,⁵¹ but the immediate concern is the link between the ETS and the CCAs.⁵²

105. The ETS was launched through an auction in March of 2002 and trading began a month later. Initially, some 34 organisations bid successfully and others joined later. The auction process involved bidders bidding absolute levels of emission reduction that they would pursue in return for progressively

⁵¹ A notable and possibly unique feature of the ETS was the fact that participants are paid some £215 million to take part, in return, of course, for binding commitments to emission reductions. The argument for financial incentives were (a) that the scheme was voluntary and part of a learning experience, and (b) there were worries that, without incentives, the resulting market would be too thin to derive meaningful results. The familiar debates about ‘additionality’ also arose, with some critics arguing that much of what was eventually traded was ‘hot air’, i.e. emissions reductions that would have occurred anyway, usually because of other regulatory requirements (see ENDS Report 326, March 2002 and 338, March 2003; Roeser and Jackson (2002); UK National Audit Office (2004), and Varma 2004). The UK government has strongly resisted these criticisms.

⁵² The UK ETS also incorporates two other types of trading: (a) trade in renewable (energy) obligation certificates and (b) trade in energy efficiency certificates. The former derive from obligations on electricity utilities to supply 10 per cent of their electricity from renewables sources by 2010. Interim targets are set for intervening years. Political recognition that the 10 per cent target will not be met can be found in UK DTI (2004) where the target is repeated but ‘as long as the cost to the customer is acceptable’. Over-compliance with targets generates certificates that can then be traded with under-suppliers. There is also a ‘buy out’ clause which sets a maximum price of 3 pence per kWh, i.e. no compliance can be ‘bought at this price. Revenue from this effective tax is then redistributed to utilities in proportion to their use of renewable energy. The Energy Efficiency Certificate Scheme similarly arises from obligations on utilities to secure energy efficiency targets in the household sector.

lower incentive payments per tonne carbon.⁵³ Participants agreed to targeted reductions in emissions with two main paths to entry to the scheme: (a) as *direct participants*, i.e. those who bid emission reductions in the auction in return for incentive payments; and (b) as *agreement participants*, i.e. those who could trade credits under a CCA, some 6000 firms.⁵⁴ Those entering via a CCA are not eligible for the incentive payments. As with most permit trading, various kinds of transaction are allowed. Thus trades may take place with immediate effect of transferring an allowance (a 'spot' trade), or trades may take place 'forwards' in which the seller agrees to deliver an allowance at a future date, or trades may involve options in which participant acquires the right to buy or sell at a future date. Banking is also permitted (up to 2007 at least).

106. One complexity involves a 'gateway' between the 'relative' and 'absolute' sectors. Recall that the CCAs – see Annex 2 – have varying ways of expressing targets, but the main distinction is between *relative targets* (energy or carbon per unit output) and *absolute targets* (absolute reductions). Someone in the relative sector could secure their target (in terms of carbon per unit output, say) but actually increase emissions because their output has grown. As de Muizon and Glachant (2004) note, relative targets have an associated inefficiency since expanding output secures more emission credits. In light of this, it becomes important to regulate sales of credits between the relative and absolute markets.

107. To avoid such trades between the two sectors threatening the overall emission reduction target, no *net* transfers of allowances may take place from the relative to the absolute sector. Thus, anyone seeking to transfer allowances out of the relative sector must go through the 'gateway' such that the trade will only be allowed if there has been a net flow of transfers into the relative sector. Inspection of Annex 2 shows that most of the CCAs involve relative targets, so CCA participants are restricted in the ways in which they can trade under the ETS.

108. In its first year the UK ETS had some 200 trades involving about one million allowances. As noted earlier, the parties to the CCAs substantially exceeded their aggregate targets for 2006 in a single year. Significant surplus credits were therefore available for purchase by under-compliers. The actual reduction achieved was 4.5 mtCO₂ compared to the target of 0.8 mtCO₂ (Smith 2004). As with other commentators, the UK National Audit Office (2004) suggested that the over-achievement reflected soft baselines in a number of individual cases, i.e. actual baseline emissions were already close to targets. The National Audit Office suggested this was due to the undue haste in setting the scheme up and the difficulty of finding enough agents to take part in the auction. As Smith (2004) notes, the auction was postponed twice in order to attract more participants. If there was a failure to set demanding targets it may have been due to 'asymmetric information', i.e. the fact that the emitters possessed more information about actual emissions and the ease of reducing them compared to the government. Finally, the UK ETS trades have taken place at a very low carbon price, further suggesting that participants have found it relatively easy to make emission reductions.

⁵³ Known as a 'descending clock' auction. The auctioneer first states a price per tonne carbon. Potential participants bid quantities of emission reduction they are willing to undertake at that price. The auctioneer sums the bids and if the price multiplied by the aggregate quantity is less than £215 million the auction ends. If it is more, the auctioneer lowers the price, and so on until the £215 'budget' is exhausted. See UK DEFRA (2001d).

⁵⁴ There is one other category of participant involving emission reduction projects, but for current purposes these are the ones that matter.

4.13 The EU trading scheme

109. The difficult interactions between the various components of UK climate change policy are further complicated by the impending European Union Trading Scheme (EU ETS) for carbon. Draft proposals were issued in 2001 and the Directive came into force in October 2003. The EU ETS covers industrial sources of emissions only - basically, installations in any sector with combustion facilities above 20MW rated thermal input, but installations below 20 MW may also be listed. The sources covered are power generation, oil refineries, offshore installations, and heavy industry⁵⁵. According to Boemare and Quirion (2002), the EU's bad experience with the proposed carbon/energy tax early in the 1990s mainly explains the absence of an 'upstream scheme', since an upstream scheme would look very similar to a carbon tax, but others dispute this judgement. The EU ETS is a 'cap-and-trade' system whereby each plant will have an absolute cap on emissions and must hold allowances equal to that cap. The period planned for the introduction of the scheme is 2005, the initial planning period if 2005-7, and the second is 2008-12 to coincide with the Kyoto target period. Initial coverage is 45 per cent of all EU carbon emissions. Other GHGs may be included in the second period. Permits will mainly be allocated for free, but 5 per cent of permits will be available for auctioning in the first period. Land-based sequestration is not eligible under the EU ETS. Penalties (for each missing allowance) exist for non-compliance. Use of Clean Development Mechanism (CDM) credits (under the Kyoto Protocol) will be permitted within the EU ETS, with each Member State being allowed to decide the limits to the use of CDM credits under the 'Linking Directive'.

110. The real problem for the UK is that the EU ETS appears to be incompatible with the UK ETS and with the CCL/CA systems. The main reasons for supposing this to be the case are:

- The EUETS is a mandatory scheme whereas the UK ETS is voluntary, so that the two together may result in leakage issues (*Utilities Journal*, November 2001).
- The CCL, CCAs, and EUETS all have different coverage, despite the fact that the EUETS and the CCAs are based on industry definitions under the IPPC, which is itself a regulatory instrument. Sorrell (2002) observes that some sites may face up to 10 instruments! This coverage problem is further exacerbated by the differing treatments of within-plant technologies, carbon versus other GHG emissions, and combustion and non-combustion sources. However, multiple regulation is not necessarily bad in itself and trading schemes may well be able to handle variable coverage. One issue of concern is the potential for double counting problems where direct and indirect emissions are covered.
- The EU ETS has links to the Kyoto Flexibility Mechanisms (e.g. the Clean Development Mechanism), which in turn raises the prospect of 'cheap' carbon allowances in Europe (due, for example, to East European 'hot air'). If so, it may be cheaper to buy these credits than to reduce emissions domestically. However, with the expansion of the EU membership, the hot air issue effectively becomes 'internalised' to the National Allocation Plans (NAPs) and it remains to be seen how far hot air trades take place. Moreover, Joint Implementation projects will be disallowed as part of the EU ETS after 2012, and this is likely to limit the number of such trades going ahead now.
- Sorrell (2002) argues that, if the CCAs survive and if CCA trading is still allowed, it is difficult to see how CCA credit trading can co-exist with wider permit trading in Europe (p5). The co-existence of two trading schemes would be potentially burdensome, but it seems more likely that the UK CCL package would have to give way to the EU trading scheme.

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Heavy industry includes coke ovens, metal ore roasting and sintering installations, iron and steel, cement/lime, ceramics including bricks, glass, pulp and paper.

- The co-existence of the CCL/CCA regime and EU ETS, unlikely as it is, would threaten double regulation of some sectors. For example, electricity generators might shift forward some of the EU ETS allowance costs to customers who are already paying the CCL.
- The various instruments treat electricity differently. Under the EU ETS, electricity generators will be responsible for electricity emissions. The UK CCL places that responsibility on consumers of the generated electricity (including those who retail it to households). The two types of responsibility are incompatible.
- The EU ETS is a 'permanent' scheme beginning in 2005 but timed to meet Kyoto targets whereas the CCAs are legal agreements expiring in 2012 but with legally binding targets to 2010. The UK ETS has a target date of 2006, but could, presumably, be extended if there was any merit in the UK and European scheme coexisting.
- The EU ETS should act like a textbook trading scheme in that trading will be determined by the various marginal (carbon or GHG) abatement costs of the participants. The UK ETS, on the other hand, has a less direct link to abatement costs. The bidding system ensures some link since firms bid for shares of the available incentive fund and presumably do so on the grounds that they will secure their emission reductions at less cost than the cash they get from the fund (Cornillie, 2003).

111. Some leeway exists for keeping the CCL/CCA system for a few years since there is an 'opt-out' provision from the first trading period 2005-8. Thus, technically, participants in the UK ETS and CCA schemes could opt out, provided they can satisfy the European Commission that they will achieve emission reductions equal to what they would have been required to achieve had they joined the EUETS. However, the separate treatment of electricity under the EU and UK schemes is not resolved since it appears that electricity generators may have to join the EUETS at the outset, i.e. will not have the capacity for an opt out. It should be noted that the pre-Budget statement November 2003 informed CCAs that they would keep their 80 per cent discounts if they joined the EUETS, suggesting that the UK government does not view the incompatibility problems as being as serious as Sorrell's critique suggests.

112. The linkages between the UK CCL/CCA package, the UK ETS and the EUETS are immensely complex.⁵⁶ One influential commentator has stated:

'If the [EUETS] Directive goes ahead as planned, the UK Government will be faced with a choice between either accepting the coexistence of the EU ETS with UK climate policy, or replacing or modifying a number of policy instruments only a couple of years after they were introduced. The first option leads to double regulation, complexity and additional cost burdens for affected groups, while the second implies changing a complex and finely balanced policy mix that took several years to negotiate and was anticipated to remain stable until 2013. Neither option is attractive and both will attract opposition. The extent of disruption will depend on the nature of the changes that are proposed, but at the time of writing the UK government does not appear to have given a great deal of thought to the specific options available' (Sorrell, 2002, p2).

113. One of the problems that would be generated by the changes that would probably have to occur to UK policy, and especially the CCL/CCA package, is that industry's suspicions about environmental taxes will have been fulfilled, albeit without anyone intending the result. These suspicions centre on two things: (a) whatever the environmental rationale for taxes, industry suspects that, if they survive, they will

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These interactions extend way beyond those listed here. For an excellent analysis see Sorrell (2002).

eventually become revenue-raisers⁵⁷; and (b) the tax will be changed after a short while to escape some other political problem. In the case of the CCL, the revenue-neutrality of the reform suffered a serious blow when labour taxes were raised significantly across the board in the 2002 Budget, and the advent of the EU ETS also looks as if it will spell the end of the CCL/CCA regime, at least in its present form.

5. The political economy of the UK Climate Change Levy

114. The preceding sections have shown that the CCL is itself a complex tax since it is part of a 'package' of measures which, in turn, is linked to other climate change policy measures in the UK. The CCL is the subject of various exemptions, whilst non-exempt energy-intensive industries are subject to negotiated agreements which reduce the CCL to just 20 per cent of the formal rates of tax. Moreover, the tax is a downstream sales tax with an explicit goal of excluding the household and transport sectors. The CCAs are further linked to the UK ETS. Finally, the entire structure – CCL, CCAs and UK ETS – has an as yet unknown relationship with the impending EU ETS.

115. Section 2 of this report noted that one purpose of political economy analysis is to look for the political factors that *explain* why the CCL takes the form it does. In so doing, there need be no particular normative implication that the final version of the CCL is 'wrong'. Much depends on the benchmark used to judge the effectiveness of the tax. For example, if that benchmark is economic efficiency, and if the purpose of the tax is to help achieve a climate target for the UK, then the CCL appears to be inefficient. In terms of the analysis in Section 2, the gap between the economically efficient solution and the political economy outcome is likely to be very large. In terms of the government's perception of political constraints, however, the CCL could be argued to be the 'best' that could be done in the circumstances. Any appraisal then has to consider whether the political constraints were as binding as the policy outcome implies. As noted in Section 2, the risk is that an uncritical acceptance of the political constraints could result in a Panglossian judgement that whatever is the outcome of the political process must be for the best. Whatever happens, happens for good reasons. The issue becomes one of judging whether an alternative, such as a textbook style carbon tax, would have been better, and whether it could have been introduced. Finally, if the CCL package actually achieves 'significant' emission reductions, there is a *prima facie* case for supposing that, however divergent it is from the 'ideal', it has been effective. The unknown here is the counterfactual – namely, how effective a carbon tax or full trading scheme would have been.

116. In what follows, we first focus on explanations for why the CCL and its associated measures took the form that they did. A number of these explanations have already been indicated in the previous sections. This section brings the observations together. Later we look at some of the critiques of the CCL, again from a political economy standpoint.

5.1 Understanding the CCL

117. The CCL is central to the history of the UK's changed commitment to market based environmental policy instruments. That change in policy came about fairly suddenly in 1989/90 and the landmark was the 1990 White Paper *Our Common Future*. From the time of the White Paper there has been a fairly open discussion about a carbon tax or an energy tax, the aim of which is to help meet the UK's initial Rio climate emissions target for 2000, and, subsequently, the Kyoto GHG target and the Labour Party's self-imposed target for carbon emissions for 2010. The interesting feature is that this

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In the UK this suspicion was certainly fostered by political announcements or comments on the Fuel Duty Escalator which unquestionably had its original rationale in the form of a carbon tax. Later it appeared to be a general environmental tax and then a tax to finance much needed social expenditures.

discussion did not vary much by political party. The 1990 White Paper was a Conservative Government document, but the CCL was a Labour Government instrument.

118. All this suggests that the CCL was the political compromise emerging from discussions about a carbon tax, i.e. that the energy tax cautiously referred to in the 1990 White Paper and the CCL were, effectively, one and the same. Put another way, even if there had been no change of government in 1997, some form of energy/carbon tax would have been introduced. If this interpretation is correct, the first question that needs to be asked is why the CCL was not in fact a carbon tax. The previous sections have suggested some of the answers.

119. First, a carbon tax would have further accelerated the demise of the UK coal industry. Reducing the political power of the National Union of Mineworkers was a quite explicit goal of the Thatcher government administrations, so it is possible that, had Labour not secured power in 1997, the final form of the CCL would have been closer to a carbon tax. But the Labour government has historically very close links to the mining industry and the associated communities. A carbon tax would have affected coal adversely and the Labour government were not willing to allow that. Indeed, the 1998 White Paper that tried to slow the build of gas-fired power stations is evidence of this concern. Hence the tax was not differentiated by carbon content of the fuel, was applied downstream as a sales tax, and was applied to nuclear power. Without nuclear power, revenues from the tax would have been seriously depleted.

120. Second, the tax had to be confined to industry. Transport had to be excluded because (a) transport fuels were already the subject of excise taxes, but also (b) the experience of the Fuel Duty Escalator had shown the political risks of further transport fuel taxation. While the first justification for excluding the transport sector was the one cited by government, political reality suggests that the second was probably more important, especially as other new measures were being taken on e.g. company car taxation and vehicle excise duty. The other sector that needed to be excluded was the household sector. The stated rationale for this exemption was the Labour Government's concern with fuel poverty, i.e. the social incidence of taxes mattered. The other major factor at play was Labour's concern not to appear to be taxing household energy consumption. Politically, this would have confirmed its old image of being a 'high tax, high spend' party, with all the electoral consequences. Again, had the Conservatives continued in government, this feature of the CCL (or whatever name it might have been given) might not have survived. As noted earlier, the Conservatives had already applied VAT to household fuels and Labour lowered it in keeping with its concern about household taxation.

121. Third, the reform had to be revenue-neutral, or nearly so. The Marshall Report had already made industry's view clear that a tax without any recycling of revenues would be unacceptable. While it was thus politically expedient to make the reform revenue-neutral, it seems fair to say that the intellectual rationale for revenue-neutrality was also a leading issue at the time – the double dividend. As noted in previous sections, the double dividend argument is less compelling now than it was several years ago. But it is how it was perceived then that matters. It is also important to note that other taxes were being introduced in a revenue-neutral manner as well – the landfill tax, the aggregates tax and, had it been implemented, the later stages of the FDE. Overall, then, the political and economic arguments for revenue-neutrality converged. As the previous sections explained, this revenue-neutrality remains in the sense that revenues are still theoretically linked to a 0.3 per cent reduction in employers' labour tax, but the subsequent 1.0 per cent rise in this tax makes it very difficult to sustain the argument. Essentially, one would have to be arguing that, but for the CCL, the 1.0 per cent rise would have been 1.3 per cent, a counterfactual it is not possible to prove or disprove.

122. Fourth, the energy intensive sectors had to be brought into the agreement on the CCL. Politically, these sectors could have caused problems for the government but, as previous sections noted, government was also genuinely concerned about the impact of the CCL on these sectors' competitiveness. Quite what

the intellectual foundation is for this concern is, as we saw, open to some debate, but the reality of this concern as seen from the government standpoint cannot be in dispute. Reference to government websites (especially HM Treasury and the Department of Trade and Industry) make this concern very clear. Once again, then, there was a convergence of political need and genuine concern, and this resulted in the Climate Change Agreements.

123. Fifth, one other factor explains the CCAs as well. Despite only bringing market-based instruments on to the environmental policy agenda in the early 1990s, the UK has experimented with most types of instrument, making it one of the more adventurous governments in the OECD in this respect. One of the experiments has been with ‘negotiated agreements’ whereby government makes a threat of, say, a tax, but withholds the threat if polluters come forward with some package of measures to regulate themselves. The attraction of these measures is that they appear to less intrusive and heavy-handed than outright regulation⁵⁸. Moreover, polluters get to be part of the regulatory design. The CCAs thus fitted this increased portfolio of market instruments. Not only did the CCAs fit the negotiated agreements model, but linking the CCAs to the UK ETS, which had also been recommended by the Marshall Report, was a logical extension of the agreements.

124. Overall, then, there are sound political economy reasons to explain the structure of the CCL and the resulting CCAs. Certainly, they explain why, despite its name, the CCL is an energy tax and not a carbon tax, why it is set downstream rather than upstream, and why it excludes transport and the household sector. But politics alone did not determine the CCL/CCA package. Some of the structure is also explained by the prevailing environmental economics philosophy of instruments: mixing taxes and trading reflected the emerging literature on hybrid instruments; the double dividend gave a rationale for revenue-neutrality; and the arguments for ‘smart’ regulation gave a justification for negotiated agreements⁵⁹.

125. Finally, it could be asked why the UK went on its own down the CCL/CCA route when the European Commission was developing its own proposal for an EU ETS. There appears to be no clear answer to this question. The UK may well have believed that taxes and trading could co-exist, as indeed they should in theory, and that the sole issue would be the compatibility of the UK ETS with the EU ETS. Perhaps they believed that these would also be compatible, or that the real purpose of the UK ETS was to invest in learning about trading in order that, when the EU scheme was launched, London would be well placed to act as the clearing centre. Certainly, the Marshall Report had used an argument of this kind to justify a UK trading scheme. In that case, the UK scheme could be quickly abandoned – its finish date being only one year later than the planned start date of the EU scheme. Part of the incompatibility problem is that the CCL/CCA system changed bit by bit as the CCAs were negotiated and as trading was added to the CCAs. In other words, no-one had a clear vision at the start of the process of what the package would

⁵⁸ Softer still are ‘voluntary agreements’ where, on paper anyway, there is no threat of some other form of regulation. The experience with voluntary agreements has been ambiguous – see ten Brink (2002) and OECD (2003). A negotiated agreement, on the other hand, contains the formal threat. As examples, in the UK, there is a voluntary agreement on pesticides backed only by statements to the effect that a pesticides tax is not ‘off’ the agenda. There could have been a negotiated agreement on aggregates extraction, but the industry failed to satisfy the government that it could do better than a tax, and hence the threatened aggregates tax was introduced.

⁵⁹ There have been suggestions that the CCL was actually not an environmental tax at all, but a revenue-raiser in a context where the Labour Government could be predicted, on historical and philosophical grounds, to be a larger public spending party than the Conservatives. Thus, Labour would need some revenues to fund the eventual increase in social spending. But the CCL was devised to be revenue-neutral, so this argument appears to be difficult to sustain unless the subsequent rise in labour taxes is seen as a way of effectively nullifying the neutrality feature of the tax.

like at the end. But it could also be that the UK was keen to honour its compliance record with internationally agreed goals. The belief may have been that UK climate policy needed to start before the EU ETS for the UK to ensure it would meet its Kyoto target.

5.2 *How good a tax is the CCL?*

126. Once the focus shifts from explaining the CCL to asking whether it a good policy instrument, views can easily diverge. Surprisingly, independent views about the efficacy of the CCL are few, while those from industry are understandably more numerous.

Academic/policy analysis commentary

127. The most vocal critic of the CCL has been Dieter Helm⁶⁰. His views have been recorded in a number of papers and in a major book on UK energy policy (e.g. Helm 2001; 2002; 2003a, b). Helm's views are essentially that the CCL is not an effective instrument because it is not a carbon tax, and the reasons for it not being a carbon tax are, in the main, those discussed above. In particular, Helm emphasises the Labour Government's commitment to the coal industry and the problems that had arisen with the introduction of VAT on the household sector. He also considers the CCL to have little environmental effectiveness relative to its elaborate structure of penalties and dispensations and conditional incentives. He stresses the income and substitution effects, arguing that the CCL fails to address the supply-side incentives to move to a low carbon economy. Helm is just as critical of the UK ETS which, as noted above, has been interlinked with the CCAs. He argues that emitters had to be paid to participate in trading because they had to be persuaded to go beyond the emission reductions already embodied in the IPPC Directive, that the restrictions on who can trade with whom are symptomatic of inefficiency, and that the exclusion of electricity generators as trading agents also reduces effectiveness. One may note, however, that paying ETS participants to go beyond IPPC standards might just as well apply to other instruments, including the carbon tax that Helm favours. Helm's view is that it is necessary to start again rather than continue amending the prevailing instruments. His own preference is for a carbon tax, starting at a low level and then rising through time. Revenues would be used more effectively than via the Carbon Trust at the moment, and would be directed at the long run substitution effect. How far this radical approach is politically feasible is open to question, but the previous sections noted the very likely incompatibility of the CCL/CCA regime with the EUETS, which may bring an opportunity for the kind of reappraisal Helm argues for.

128. More general criticisms of the CCL/CCA focus on the inconsistency of government objectives (Helm, 2003a; Pearce 2001, 2002a). For example, energy market liberalisation, and consequently lower energy prices, are not consistent with the role of the CCL in raising energy prices, whatever the textbook answer. Actions on fuel poverty which exclude the household sector from price impacts of the CCL impede energy efficiency. Underlying some of these criticisms is the presumption that, where policy goals conflict, governments should choose between policies. Political economy suggests that such options are rarely politically feasible since they would amount to an abandonment of some measures which have a political constituency: i.e. the measures are there to meet some self-imposed goal or to respond to some lobby group. In such circumstances the trade-offs between objectives need to be made clear, but it may not be in the interest of government to make those trade-offs transparent. Such transparency might reduce the flexibility to react to new situations. Specifying trade-offs, e.g. between equity and efficiency or consumer interests versus environmental interests, in advance might make subsequent decision-making more, not

⁶⁰ Helm is an Oxford University academic, a consultant, and serves on several panels and advisory boards for the UK government.

less, difficult. The end result, however, is a risk that policy is adapted and modified as events unfold, rather than reflecting a clear goal, or set of goals, at the outset.

129. The other major critic of the CCL/CCA system has been Steven Sorrell of Sussex University. Sorrell's critique does not, however, fit neatly into a political economy mode. His criticisms are based on the fact that the UK has an elaborate system of policy instruments in the climate arena and that the interactions between the various component parts of the policy have not been thought through carefully enough. The end result may well be an inefficiency of unknown proportions. The target of this argument has primarily been the EU ETS, but is applicable to the CCL as well (Sorrell and Sijm 2003). More specifically, Sorrell has also argued that the CCL/CCA package is not compatible with the EU ETS (Sorrell 2002). By implication, the criticism is that the UK should have investigated these issues of compatibility earlier than they apparently did, and that they should have developed some options for making the schemes compatible. As of November 2002 Sorrell was arguing that 'the UK government does not appear to have given a great deal of thought to the specific options available' (Sorrell, 2002, p.2). Reasons why the UK may have decided to 'go it alone' on the CCL were suggested at the end of the previous sub-section.

130. As far as policy interactions are concerned, Sorrell and Sijm (2003) note that evaluations of policy instruments tend to focus on the instruments in isolation, rather than on the efficiency of the package of instruments as a whole. Thus, given that the EU ETS is a *downstream* trading scheme⁶¹, taxation of fuel use by any sector participating in the ETS results in marginal emissions being priced twice, whereas non-participants in the ETS face taxation only once. The result will be a distortion of substitution incentives. This criticism applies to the co-existence (if it continues) of the CCL and the EU ETS, but is not peculiar to the UK since other EU countries have forms of energy or 'carbon' taxes⁶². At the political economy level, however, Sorrell and Sijm accept that the co-existence of taxes and an ETS may have several justifications.

131. First, the ETS is dominated by the grandfathering of permits and this is arguably not consistent with the Polluter Pays Principle (PPP). Carbon/energy taxes, on the other hand, are consistent with the PPP. The 'first best' solution would be to allow complete auctions in the ETS. Given that this will not happen – because of the guaranteed industrial opposition to the resulting transfer of rents – a combined grandfathered ETS and tax system could be thought of as a 'second best' outcome. The tax, for example, helps capture some of the rent for government. Second, the tax can be thought of as a 'back up' system to ensure that ETS participants undertake some level of abatement, rather than simply buying in permits. This would be a valid criticism if the EU ETS becomes more comprehensive over time. Given that Russia has announced (October 2004) its intention to ratify Kyoto, the prospects of securing 'paper' reductions in emissions through the purchase of 'hot air' is a real one. How far the problem develops depends in part on the interactions between the EU ETS and non-EU trading under the Kyoto mechanisms.

132. Effectively what Sorrell and Sijm are arguing is that because policy proceeds by 'incremental evolution' rather than via one 'grand design', the end result is very unlikely to be one of overall cost-efficiency. It is open to question just how far this loss of efficiency is offset by the benefits of the pragmatic arguments for retaining potentially inconsistent elements in the overall policy package. Sorrell and Sijm do not attempt to quantify the respective gains and losses. As far as the CCL is concerned, the

⁶¹ 'Downstream' refers to the fact that permit allocation is to fossil fuel *users*. An 'upstream' scheme would allocate permits to fossil fuel *producers*.

⁶² Arguably, no country has a 'pure' carbon tax in the sense that the tax is directly proportional to carbon content of fuels and no industrial exclusions are allowed.

issue is not so much whether it is a ‘good’ tax or not, but whether it is part of an internally consistent overall package of measures. Sorrel and Sijm are clear in arguing that the end result is ‘a series of examples of double regulation and double counting’ (2003, p.14). They conclude that:

‘Unless resolved, these interactions [between individual policy elements] could lead to substantial economic impacts for the affected groups, and/or threaten the overall environmental integrity of the policy mix’ (p.14)

Industry

133. Industry criticisms of the CCL were vocal from the point in time at which the CCL was first mooted. As noted above, anticipation of and reaction to these protests account for several of the main features of the CCL/CCA regime – notably the revenue-recycling feature and the discounts for energy-intensive sectors. Substantial lobbying has taken place both generally at industry level, and by specific industries seeking dispensations or some form of special treatment⁶³. A notable example has been the revival of the criticism that the CCL embraces nuclear power despite its non-carbon status as an energy source. The revival of this concern owes much to the financially difficult position of the UK nuclear industry in the face of falling electricity prices.

134. One interesting feature of the industrial lobbies has been that few of them argued for no action at all, perhaps judging that the high profile that climate change policy has in UK environmental policy generally would make that form of opposition counterproductive. Put another way, industry was obliged to acknowledge the conversions that had taken place in all political parties in the late 1980s. This may be contrasted with the opposition to the EU proposals for an energy/carbon tax in the early 1990s. That lobby was almost exclusively concerned with ensuring that the tax was never introduced at an EU level. Not much attention was paid to suggesting constructive alternatives. But in the context of the CCL many industries criticised the CCL for not being a carbon tax, i.e. if there was to be a tax, which most accepted, it needed to be a carbon tax and not an energy tax. Some have sought the gradual modification of the CCL into a carbon tax, and have argued that the CCL should rise over time. Thus, the then Director-General of the Confederation of British Industry 1995-9, Adair Turner, argued:

‘...the climate change levy should increase steadily over time, and the decision to exempt the domestic sector from energy taxation effects...was I believe mistaken given that the desirable policy objective of avoiding fuel poverty could have been pursued by other means.’ (Turner, 2003).

135. Turner’s remarks raise an interesting possibility. If this was the view of the leader of the Confederation of British Industry (CBI) just before the tax was first announced, and given that the CBI was the leader of industrial opposition to the tax, it suggests that government may have misread industrial opposition. There may, after all, have been a chance to get a carbon tax put in place. If so, it was government itself that created the complexity of the final package of measures by imposing its own political constraints on a carbon tax.

136. Industrial criticism of the CCL/CCA regime resurfaced once it was clear what the general nature of the EU ETS was likely to be. As noted earlier, this was inevitable given that industry places a high premium on being reasonably certain what near-term environmental policy is. In the absence of that uncertainty, investment decisions are made that may commit firms for years ahead. Additional criticism

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These activities are too numerous to document. The ENDS Report, issued monthly, documents virtually all of the claims by individual industries. Also useful are the memoranda submitted to the UK House of Commons Select Committee on Trade and Industry – see its *Ninth Report*. A number of these submissions call for a carbon tax rather than an energy tax.

arose as the sectors gathered their own information on the net gains and losses from the CCL and the labour tax refunds. A 2002 survey by the Confederation of British Industry suggested that the manufacturing sector was making net payments of some £140 million, and the service sector was gaining by about £60 million (reported in *ENDS Report* 334, November 2002).

137. While industry generally continues to voice criticism of the CCL, some surveys have found that a sizeable fraction of firms aware of the CCL found it a spur to energy efficiency. More alarming, however, is the finding that many firms were not aware they were paying the CCL and receiving reductions in labour taxes in return. Smaller firms, exempt from the CCL, seemed unaware that they were nonetheless benefiting from the labour tax reductions (Agnolucci, 2004). As noted earlier, one political economy argument in favour of hypothecation of revenues is that it reduces opposition to the tax. But if firms are not aware that they are paying the tax or benefiting from other tax reductions, this argument loses some of its force.

138. Large firms tend to be very aware they are paying the CCL. A survey by the Engineering Employers' Federation and the Confederation of British Industry (2002) found that those involved in CCAs were generally active in measures to reduce energy consumption. 50-65 per cent of CCA firms were considering emissions trading and energy efficiency schemes. Only 6 per cent of non-CCA firms were considering trading and only 20-25 per cent energy efficiency schemes.

Politicians

139. The UK Parliament has a number of standing committees that regularly investigate government policy issues. Within the House of Commons, the Environmental Audit Committee (EAC) has frequently commented on progress within the UK on environmental taxation. In its 2004 report (EAC, 2004) the Committee criticised the UK Climate Strategy for being 'seriously off course' with respect to its domestic target of minus 20 per cent CO₂ emissions by 2010 on the base of 1990. The EAC argued that the government's own predictions would mean emissions of some 140 MtC in 2010 compared to the 132 MtC required for the domestic target (see Annex 1). The basis for the predictions does, however, change. Annex 1 shows that the UK Department of Industry (DTI 2003) projected that the 'with climate change policy' scenario would result in 139 MtC emissions in 2010, and the later DEFRA (2004) projections suggest 136.5 MtC. In both cases, the projections still imply a shortfall on the domestic carbon emission reduction target, by 5 per cent in the DTI case and just over 3 per cent in the DEFRA case. Arguably, these are small degrees of 'failure', but the EAC also argues that some elements of the climate change policy are unlikely to be fulfilled, notably those relating to the transport sector, energy efficiency and renewable electricity generation. The EAC also notes that actual emissions increased 1999 to 2001, and again 2002 to 2003 (see Annex 1). The EAC concludes that:

'...the Treasury is failing to exploit opportunities for more imaginative policy initiatives which might deliver the step changes needed rather than steady incremental progress' (Para.21).

140. As with other commentators (e.g. Helm, see above), the EAC expressed serious doubts about the effectiveness of energy efficiency and renewable energy measures. Thus, the annual improvement in energy efficiency of around 2 per cent per annum would need to double to achieve even the 140 MtC forecast. Similarly, the target of just over 10 per cent of electricity from renewable sources by 2010 will also, in the EAC's view, not be met. The percentage share of all renewables in electricity generation in the UK remained at under 3 per cent in 2003 (EAC, 2004, p13).

6. The political economy questions revisited

141. Section 2 suggested that there were four political economy questions that could be asked about the UK's Climate Change Levy in its climate policy context:

- Why do anything at all about climate change?
- Why choose a tax rather than more traditional command and control regulations?
- Why is the chosen tax not like a textbook tax?
- Could policy design be better?

142. This concluding section briefly summarises the suggested answers and takes a brief look at the role of economic instruments for long term climate policy..

6.1 Why do anything about climate change?

143. Understanding the CCL and its related measures first of all involves understanding the UK's commitment to climate change policy. Section 3 looked at the evolution of this commitment from the 'conversion' of Prime Minister Thatcher in 1988 to the present day. While not always fashionable with political economy theorists, the role played by personalities and the intellectual case in question should not be underestimated. A scientist Prime Minister was genuine persuaded of the fact of human-induced climate change. How far she understood the policy consequences of placing climate change high on the political agenda, and certainly at the top of the environmental agenda, is open to debate. Section 3 suggested that Prime Minister Thatcher may not have foreseen the implications of the policy debate in its entirety. But she did see one of the implications – doing *something* about the price of energy – because her government quite explicitly allowed that policy instrument to figure prominently in the 1990 White Paper on environmental policy, and much of the discussion about environmental policy 1988-1990 was about carbon taxes and energy prices. Other factors were certainly at work. While a bid for the green vote in the UK may have had some role to play, of more likely importance was the bid to correct an only recent image of being the 'dirty man of Europe' in the context of acid rain, and to secure some European leadership potential. In turn, these concerns reflected the growing 'Europeanisation' of environmental policy – the recognition that the UK would not be in immediate control of major environmental decisions in coming years – and the need to be a central political influence in the European Union.

6.2 Why choose a tax?

144. The UK's espousal of the CCL was part and parcel of a wider commitment to market-based instruments as tools of environmental policy. The nature of this conversion needs to be placed in context. It was not a wholesale conversion at the time (the late 1980s) nor is it now. Most environmental policy remains in the traditional technology-based standards mode. Thus the market-based 'revolution' should not be exaggerated. Moreover, political statements favouring the market-based approach were always conditional on the nature of the problem at hand and the general costs and benefits of introducing different instruments. No government ever argued that taxes or permits were 'the' solution in all cases. The UK Treasury's list of conditions that had to be met before an environmental tax would be considered a suitable instrument were stringent, more so, it seems, than the conditions for adopting conventional solutions. This asymmetry undoubtedly reflects political nervousness about environmental taxes and their transparency, compared to the hidden costs of command and control. Nonetheless, there was a paradigm shift in so far as arguments in favour of market-based approaches were now accepted. The challenge became one of how to design taxes and permit systems in practice, not whether or not they were good ideas. As with climate change itself, the role of intellectual persuasion should not be underestimated. Advocacy of market-based instruments was close to thirty years old if we date the highest European profile for this from the founding of the OECD Environment Directorate in 1971. The arguments were not new. The Brundtland Report on 1987 and the UK's response to that – *Blueprint for a Green Economy* in 1988/9– set out the case for a change in the way environmental policy should be conducted. For reasons that may never be fully apparent, the late 1980s were 'just right' for these arguments to be accepted. Undoubtedly, however, the messages resonated with governments increasingly concerned with reducing public expenditure and with reducing regulatory burdens on industry. The language of market-based approaches was also politically

convenient – reliance on the market to solve problems contrasted with soviet-style command-and-control measures. It was also recognised that taxes could be made acceptable by including some kind of ‘sweetener’: recycling of most of the revenues to other tax reductions, recycling some revenues to special funds designed to improve the environment, reducing the tax in return for a negotiated agreement to self-regulate the relevant externalities. Potential opposition to the taxes could be bought-off. These side-payments are not available with technology-based standards which dictate what is to be done and how it is to be achieved. In short, the market-based approach promised not just the flexibility for adapting to policy, as is stressed in the textbooks, but political flexibility as well.

145. The array of market-based instruments is wide: taxes and levies, tradable quota and permit systems, voluntary and negotiated agreements, tax-subsidy schemes, hybrid tax/permit schemes, liability laws, etc. Why did the UK choose a tax? The first answer is that it chose a tax because it chose the entire package of market-based instruments. Indeed, this is what makes the UK environmental policy experience unique. It contains at least one example of every market-based instrument so far thought up. The climate change context alone has taxes, subsidies, tradable permits and negotiated agreements. The CCL was just part of the wider set of measures. To a considerable extent, then, the choice of a tax is explained by the fact that the UK chose market-based instruments and explaining why it did that is discussed above.

146. But taxes do, as Section 4 discussed, have certain advantages. As noted above, they raise revenues which, if not retained in general funds, can be used as levers to secure acceptance of the measure, and also as a means of reducing other distortionary taxes. The scale of revenue raising thus matters *even if* the tax revenues are hypothecated. The scope for ‘buying in’ polluters is therefore also greater. Not only can the revenues be used to secure polluters’ acquiescence in the policy, taxes are readily varied through discounts in return for which compliance agreements can be sought. This was the role played by the CCAs. Just announcing taxes can secure some compliance, although in the case of the CCL this may not have been very large. Taxes can also be changed. So far (2004), the CCL has been left unaltered. The experience with other taxes suggests that government is well aware of the benefits of altering the taxes – as with the landfill tax⁶⁴ – and the costs – as with the FDE. In short, taxes offer policy flexibility from the government side, just as the textbooks explain. This perspective is largely missing from the environmental political economy literature which tends to focus on the many reasons why direct controls tend to be favoured over market-based approaches, and especially taxes. One useful message for political economy is the suggestion that it is as important to explain why some countries, such as the UK and a number of other European countries, have adopted taxes, as it is to explain why yet others, notably the USA, have rejected them.

6.3 *Why is the CCL not a carbon tax?*

147. Perhaps the dominant political economy question is why the CCL does not look like a carbon tax which tends to be the textbook solution? Sections 4 and 5 suggested a number of reasons. A carbon/energy tax had been proposed and failed miserably at the EU level in the early 1990s in face of a massive industrial lobby. The major lesson from that failure was to be careful in introducing such measures and to ensure that there are many compensating features – the political flexibility point made above. A ‘tax alone’ was never going to succeed. A carbon tax was fairly openly considered by the Conservative Government at the end of the 1980s, but there were serious concerns about the impact on industry, a concern that pervades all governments, even if the detailed effects of such taxes on competitiveness is open to some argument.

148. In the end, a change of government to Labour in 1997 ensured that the tax could not be a carbon tax. Any measure could not be seen to harm the remains of the coal mining industry – the 1998 White

⁶⁴ This tax has been changed repeatedly and increases each year in order to assist with compliance with the EU Landfill Directive.

Paper had even made an attempt to halt the effects on that industry of electricity privatisation. Labour also had to avoid the ‘high spend, high tax’ party image. It had already lowered VAT on household fuel consumption. There was also a concern that household taxes would harm the vulnerable, although this aspect of policy is less credible given the tax and allowance systems in place. It had to ensure that any tax at least appeared to ring fence the household sector. It also had to exclude the transport sector, perhaps because that sector already had its ‘fair share’ of taxes, but more likely because the political problems with the Fuel Duty Escalator precluded increasing the taxation of that sector again with a surrogate carbon tax, at least in the short term⁶⁵. Once the constraints were acknowledged, the nature of the tax was circumscribed: it could apply to industry and commerce only and it had to be on energy, not carbon.

6.4 *Is the CCL a good tax?*

149. To explain is not to justify. The problem with ‘political economy’ is that it risks taking the political factors that generate the political-economic ‘equilibrium’ as exogenous. Whatever happens does so because those factors set the constraints, or are part of the political objective function. Such an approach leaves little room for criticism. What the civil servants in question end up doing is choosing between nth-best solutions. But the basic criticism of the CCL is precisely that it deviates too far from the ‘public interest’ design of an economic instrument, i.e. that it might have achieved more had it looked more like a carbon tax and less like a hybrid emerging from all the political pressures that had to be juggled to get any policy at all. Several arguments can be provided in favour of this view. First, by surrendering to the FDE lobby, government had already signalled its weakness in standing up to lobby groups. In terms of the political objective function in Section 2, special interests were triumphing over public interest. Second, sensitivities over the vulnerability of low-income households reflect an ideology which is not consistent with practice: there are ways of dealing with the fuel poverty issue that do not require the clumsy exclusion of the entire household sector from the province of the CCL. Third, fears about impacts on competitiveness are also very understandable, and they are just as much reflected in other countries where some form of carbon/energy tax has been introduced (especially the Scandinavian countries). But it can be argued that governments should be more critical of the competitiveness arguments than they have been, and hence less reluctant to introduce a tax closer in design to a carbon tax. Finally, going to considerable lengths to protect the coal industry involves a balancing of costs and benefits that seems very skewed. Whilst the exercise has not been attempted here, there must be more than a suspicion that the efficiency costs of having the CCL instead of a carbon tax greatly outweigh the social costs of further damage to the coal industry.

150. Others will see such criticism as being unduly harsh. Whilst accepting that the final package – CCL, CCAs and the UK ETS – was never planned as a coherent whole from the outset, there is some evidence to suggest that they have been effective in environmental terms, although some caution is needed on this conclusion. The counterfactual is impossible to demonstrate, namely that a carbon tax without all the exemptions and escape routes would have been more effective. If the CCL package ‘works’ much of the criticism that it is not a carbon tax is weakened. Moreover, the idea that a ‘pure’ carbon tax could be introduced without it facing all the special pleading that influenced the CCL is fanciful. As noted earlier, some critics argue that the UK’s ‘mix’ of policy instruments is inefficient because of the failure to analyse and design for interactive effects between the instruments. But in the real world it is hard to see how incremental approaches can be avoided. If there had been a clear vision and understanding of what was needed to tackle climate change, and far more certainty about how other countries would react to the climate threat, then perhaps a more consistent mix of policies would have been developed. But the policy

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Critics of fuel taxation in the UK also drew (and continue to draw) attention to the fact that UK automotive fuel taxation is the highest in OECD countries. While in itself not a valid criticism of tax levels, the argument carries considerable political force.

needs have changed in light of greater awareness of the environmental threat, and greater understanding of the implications for the economy of undertaking action. Incrementalism thus seems unavoidable to a considerable extent. Against this, advocates of ‘purer’ carbon taxes would argue that a carbon tax could embrace this need for flexibility as scientific and economic knowledge changes. An initial tax could be set and varied in response to informational change, but with the long-term signal being that the tax would rise over time.

6.5 *The CCL and the long run climate future*

151. Finally, what of the future? Section 3 noted that the UK has a conditional long run (c2050) target for reducing carbon emissions. In this it appears to be alone in the world and the target can be taken to reflect the UK’s very real commitment to climate change policy. A political economy perspective might take a more cautious view. The target is long run and no government can commit its successors more than forty years hence. It is a conditional target, with the evasive language suggesting it is not going to be unilaterally pursued. It arose from a context in which government was obliged to respond to the Royal Commission on Environmental Pollution: saying there would be no long run target would have been politically more embarrassing than adopting a target couched in the way it was.

152. If this target is real, and the policy statements suggesting interim targets along the way to the 2050 target suggest some substance to it, then how is it to be achieved? The 2003 White Paper on Energy Policy is not convincing on a UK energy future with environmental goals being achieved by huge increases in energy efficiency and renewables, all in the face of an almost inevitable decline in the substantial contribution currently made by nuclear power. But if the long run climate goal is to be achieved, energy futures must look like the White Paper’s vision – the only alternative is a politically infeasible reduction in economic growth.⁶⁶ Other than renewables and energy efficiency there is no other technical alternative unless nuclear power is revived on a major scale. It is not inconceivable that a renewables policy could come in by *diktat*: the UK already has a 10 per cent ‘Renewables Obligation’ imposed on electricity retailers. But the social cost of this kind of policy is very high. Assuming similar kinds of measures would meet with strong and perhaps fatal resistance, long term energy policy has to come full circle to the position reached by the Conservative Government in 1990 – energy prices must rise. Whether this is by a tax or tradable permits is an open question. There are signs that Europe is now following the US model of preferring permits to taxes. The UK, has more experience with taxes than permits, some of it politically very costly, some of it reassuring. The chances are that the UK will continue on a pragmatic basis, choosing taxes and permits and traditional regulatory forms where they are best suited. In other respect, the UK will not be the agent choosing the instrument. Climate policy has to be pursued mainly in Brussels, although the UK’s unique long run climate goal is a reminder that not even climate policy will be wholly decided there. The basic fact is that future climate policy, wherever it is formulated, will have to involve radical shifts in energy prices, ideally through taxes approximating far better a carbon tax than the CCL. Whether the CCL survives in its current form is therefore academic in one sense – some form of energy/carbon tax will have to exist. Helm (2003b) argue strongly for such a carbon tax under the management of an independent agency, rather as interest rates in the UK are set by a Monetary policy Committee independent of government.

153. There is an alternative and that is that long run climate policy will fail. Already there are commentators suggesting exactly that – e.g. Böhringer (2003) and Pearce (2003). This is a prediction, not a prescription. The central conclusion remains. If these gloomy predictions are not to be fulfilled, there must be radical changes in energy prices.

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This is not a passing remark. There are lobbies in the UK, including the Sustainable Development Commission, who argue exactly this.

ANNEX 1. GHG EMISSIONS IN THE UK⁶⁷

Table A1.1 sets out data on emissions of greenhouse gases in the UK, including projections to 2050. These are then compared to the various targets discussed in the text.

Table A1.1 Emissions in MtCe

	1990	2000	2010	2020	2050
CO ₂	164.4	151.4	150.9	158.2	103.0-167.0
Non-CO ₂	44.0	28.9	26.7	25.8	
Total	208.4	180.3	177.6	184.0	
Rio CO ₂ target. (per cent relative to 1990)		164.4 (-0.0 per cent)			
Domestic CO ₂ target. (per cent relative to 1990)			132.0 (-20.0 per cent)		
Kyoto target GHGs. (per cent relative to 1990)			182.4 (-12.5per cent)		
All Climate Change Programme				135 ¹	
RCEP ² target CO ₂				110-120 ¹	62.0 (-60 per cent)
Actual change relative to 1990: CO ₂		- 7.9 per cent	- 8.2per cent	- 3.8 per cent	
Actual change relative to 1990: GHGs		-13.5 per cent	-14.8 per cent	-11.7 per cent	

Sources: 1990 to 2020 from DEFRA (2001; 2004). 2050 from DTI (2002). DTI has recently changed some of the figures – see DTI (2003b) – and below. Notes: ¹) DTI (2004); ²) Royal Commission on Environmental Pollution

The emission levels can be compared with the various targets. Thus the 2000 CO₂ emissions met the voluntary Rio target; the 2010 GHG projection meets the UK's burden sharing target under the Kyoto Protocol; the 2010 CO₂ emissions do not meet the domestic target of -20per cent.

Table A1.2 shows some of the 2003 revisions to the carbon emissions data, including an assessment of the contribution of the Climate Change Programme (CCP). It also shows yet later revisions to the estimates (DEFRA, 2004c). It is important to understand what is and what is not included in the CCP in Table A1.2. In the first set of figures, measures included are: the CCL/CCA, the Renewables Obligation, the UK emissions trading scheme, the Carbon Trust, building regulations, vehicle taxation and EU agreement on fuel efficiency, the fuel duty escalator (to 1999), the 10 year transport plan, various energy efficiency measures in the household sector, afforestation and some public sector schemes. Excluded is the EU emissions trading scheme. As noted in the text, the CCAs may produce even higher carbon savings

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Note: sources vary, and projections are revised in a fairly regular basis as information changes.

than anticipated. In the DEFRA (2004c) estimates, the EU ETS is included. Table A1.3 shows the breakdown of 2010 emission reductions by main policy measure.

The UK's Kyoto targets are agreed under the EU Burden Sharing agreement. From the standpoint of the Kyoto Protocol, therefore, it is EU compliance that is sought, not UK compliance. Currently (2004) greenhouse gas emissions in the EU lie above the linear trajectory required for the EU to comply by 2008-12. Germany and the UK dominate the GHG emission reductions achieved so far, due in the main, respectively, to reunification and energy market liberalisation – see EEA data in DEFRA (2004).

Table A1.2 Revised CO₂ emissions and effects of Climate Change Policy (CCP). MtC

	1990	2005	2010
No CCP	159.3 – 159.6	146.6-148.8	148.6 – 151.5
With CCP DTI(2003)	159.3 – 159.6	140	138.9
DEFRA (2004c)			136.5
Savings from CCP			- 12.1

Source: DTI (2003); DEFRA (2004c).

Table A1.3 Contribution to 2010 emission reductions by policy measure

Measure	Contribution to emission reduction in 2010 MtC
Household	
Energy efficiency and building regulations	4.2
Non-household:	
CCAs and revisions	3.8
UK ETS and EU ETS	2.0
Carbon trust and capital allowances	1.0
Other	1.1
Total	12.1

Source: DEFRA (2004c)

Table A1.4 Actual UK CO₂ emissions 1990 to 2003 MtC (data rounded)

Year	CO ₂ Emissions MtC	Shortfall on Domestic (- 20 per cent) target: linear basis ¹
1990	165	0
1991	166	3
1992	163	1
1993	157	-3
1994	156	-2
1995	154	-3
1996	160	5
1997	153	0
1998	154	2
1999	152	2
2000	153	4
2001	156	9
2002	150	4
2003 (prov)²	153	9

Source: Data from UK DTI *Energy Trends*. *Notes:* ¹⁾ Deviation from a straight line projection of emission levels required to meet the 132 MtC domestic target by 2010. This procedure will overstate policy failure in the early years since measures take time to develop and have effect. ²⁾ The rise was due to increased coal burn in power stations.

ANNEX 2. THE CLIMATE CHANGE AGREEMENTS

The Climate Change Agreements (CCAs) relate to those industries that secure a discount from the climate change levy (CCL) in return for which they enter into energy efficiency agreements with the government. There are 44 such agreements. The targets for these agreements are set out in Table A2.1 below. Each agreement projects a 'business as usual' (BAU) level of energy use to the year 2010. For most agreements there is also an 'all cost effective' (ACE) level of projected emissions: emission levels that are judged by independent auditors (in all cases, the Energy Technology Support Unit, ETSU, with occasional assistance from specialist bodies) to be feasible and cost-effective. The agreements are then negotiated between government and industry and in virtually all cases the targets set within the agreement are better than BAU and lower than ACE. Targets can be expressed in various ways:

- 'absolute energy' (AE) is a target set in terms of reductions in delivered or primary energy consumed relative to BAU;
- 'absolute carbon' (AC) is a target set in terms of tonnes of carbon reduced relative to BAU;
- 'relative energy' (RE) sets the target in terms of energy per unit of economic activity;
- 'relative carbon' (RC) sets the target in terms of carbon emissions per unit of economic activity.

All targets are, however, capable of being expressed in tonnes of carbon reduction. Targets are expressed in terms of years to 2010, with the first target period being 2001-2. Each sector is made up of 'target units' and it is these units that have to secure the agreed efficiency targets. Those achieving them are re-certified up to the next target period.

Table A2.1 Climate Change Agreement targets: summary

Industry	Nature of target	Per cent reduction in energy use in 2010 relative to 2000 in terms of target units			Total carbon saved 2010 relative to BAU 2010, 000 tC
		CCA	ACE	BAU ¹	
Aerospace	AE	8.5	-	-	0.5
Agricultural supply	RE	6.9	10.5	1.7	7.9
Aluminium	RC	14.0	20.0	4.0	150.0
Baking: Bakeries Shops	RE	9.0 4.5	- -	- -	1.7
Brewing	RE	11.0	14.5	5.0	16.0
Cathode ray	RE	21.0	-	-	7.4
Cement	RE	8.0	15.0	5.0	170.0
Ceramics	RE	13.0	22.0	6.0	44.0
Chemicals	RE	18.0	27.0	6.0	790.0
Dairy	RE	7.6	16.9	1.9	17.2
Egg processing	RE	9.3	-	-	0.4
NFU - eggs	RE	11.5 ²	17.9	-	1.5
Food and drink	RE	13.4	14.0	1.0	420.0
Foundries	RE	11.0	16.0	8.0	20.0
Glass	RE	9.0	21.0	6.0	20.0
Gypsum	RE	7.2	-	-	7.2

Leather	RE	9.8	-	-	0.7
Lime	RE	7.9 ⁴	-	-	6.0
Malting	RE	7.8 ³	-	-	5.0
British Meat Fdtion	RE	9.5	11.9	0.8	3.8
Metal forming	RE	7.0	-	-	0.8
Metal packers	RE	9.0 ³	-	-	2.5
Mineral fibres	RE	14.9	-	-	6.7
Motor manufacture	RE	15.3	-	-	19.2
Non-ferrous	RE	19.0	28.0	8.0	50.0
Paper	RE	36.0	37.0	14.0	430.0
Pig industry	RE	16.0 ⁵	17.6	-	4.5
Poultry processing/feed	RE	12.7	11.1	0.9	13.2
Poultry meat	RE	13.7 ³	19.2	-	7.9
Poultry meat rearing	RE	13.0	19.2	-	4.5
Printing	RE	12.0	-	-	4.2
Rendering	RE	9.0	-	-	4.5
Rubber	RE	8.7	12.0	5.0	5.0
Semi conductors	RE	59.0	-	-	220.0
Slag grinders	RE	10.0	-	-	2.0
Spirits	RE	3.3	6.0	0.2	6.5
Steel	AE	8.0	13.0	5.0	200.0
Supermarkets	AE	4.5 to 9.0	-	-	5.0
Surface engineering	RE	10.3	-	-	2.5
Textiles	RE	9.0 ³	-	-	9.5
Vehicle building	RE	10.0	-	-	0.02
Wallcovering	AE	9.0	-	-	2.0
Wood panel	RE	7.3 ³	-	-	1.9
TOTAL					2691.8⁶

Source: ETSU (2001), Future Energy Solutions (2003). The targets shown are those originally agreed. In some cases these have been modified over time.

Notes: ¹⁾ BAU here refers to projected BAU energy consumption in 2010. In many cases this shows a decline due to expected efficiency changes that are independent of the CCA. ²⁾ Base year varies 1995-2000. ³⁾ Base year 1999.

⁴⁾ Base year 1998. ⁵⁾ Base year 1995. ⁶⁾ Total of savings shown ignoring different base years.

ETSU (2003) reports the performance of the CCAs up to the first target reporting date 2001-2. Out of the 44 sectors, 24 met their targets fully. Inspection of the data suggests that 10 sectors were 5 per cent or more adrift of their targets. ETSU (2003) estimates that some 2.8 MtC has been saved relative to the current year through energy efficiency improvements. By and large, this appears to be in keeping with the original projection of annual savings for 2010 –see the final column of table A2.1.

ANNEX 3. PROVISIONAL EMISSIONS ALLOCATION FOR CO₂ FOR THE UK UNDER THE EU ETS

Table A3.1 sets out the *provisional* allocation of industrial sector emission allowances for the UK under the EU ETS for the trading period 2005-7. The allocation shown here is that set out in April 2004 and submitted to the European Commission for approval. In November 2004 the UK Government announced its intention to seek revisions to the April 2004 allocation primarily because of revised energy projections. The effect of the new projections was an upwards revision of the 'business as usual' level of emissions by 56 mtCO₂. Figure A3.1 illustrates the nature of the change. The original 'cap' for UK participants was set at 0.7 per cent below business as usual (BAU₀). The effect of revising BAU₀ to BAU₁ means that a new target has to be set and this has been put at 5.2 per cent below BAU₁. Figure A3.1 shows that the net effect of the increased BAU emissions and the revised target is to *increase* the 'allowed' emissions in absolute terms, but also to *increase* the target reduction relative to BAU. It is easy to see therefore how the revised NAP generated both criticism from environmentalists that emissions targets had been relaxed, and criticism from industry that the targets had been made stricter.

Table A3.1 Provisional allocations of CO₂ emission allowances (MtCO₂) as at April 2004 (see text for revisions).

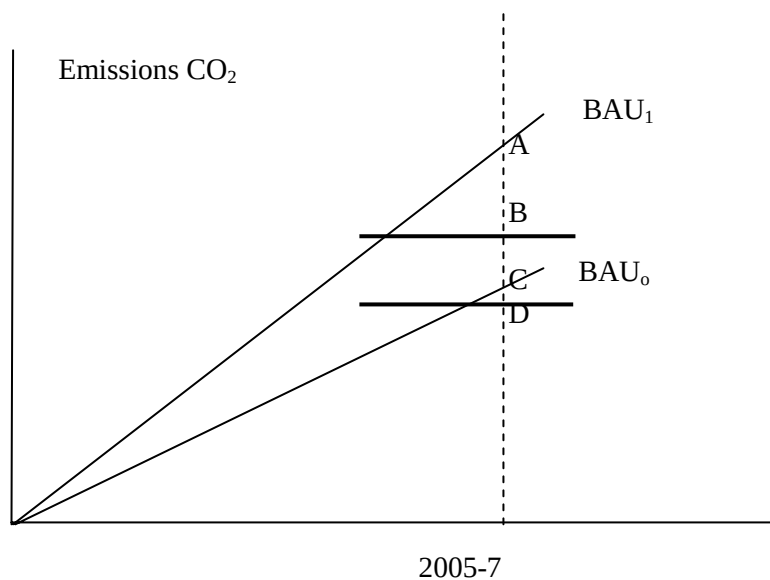
Sector	Annual allowance gross of new entry reserve	Annual allowance net of new entry reserve	Reduction relative to 1998-2002 actual emissions (rounded) per cent
Electricity generation	146.2	134.3	- 13
Iron and steel	21.9	21.5	+10
Refineries	18.1	18.1	- 10
Cement	9.3	9.2	- 1
Lime	2.5	2.4	- 17
Bricks/ceramics	3.1	3.0	- 10
Glass	1.8	1.7	+ 2
Pulp and Paper	4.6	4.6	+ 6
Oil and gas	13.8	13.4	- 38
Food and drink	3.7	3.6	0
Chemicals	7.6	7.5	+ 9
Non-ferrous metals	2.7	2.6	- 8
Other	2.8	2.8	+15
TOTAL	238.2	224.6	- 11

Source: DEFRA (2004b).

A 'new entry reserve' (NER) of around 6 per cent of allowances is designed to allow for potential competitors to enter the sectors. In the case of pulp and paper and refineries no new entrants are expected so that pre and post NER allocations are the same. Relative to 2000, the percentage changes vary significantly across sectors, with oil and gas being particularly hard hit. However, the percentage changes conceal other factors leading to changes in output and hence emission levels. The major share of the reductions borne by electricity generation is explained by the fact that UK electricity output is subject to very little international competition, i.e. impacts on competitiveness are thought to be minor, whereas they could be significant for international trading sectors.

While the November revisions – which have to be agreed by the European Commission – affect the aggregate level of emissions, the allocation to sectors will not be known until early January 2005 (UK DEFRA 2004e). Hence table A1 will be subject to further amendment. It is included here because it is not anticipated that there will be major changes to the overall allocation shares.

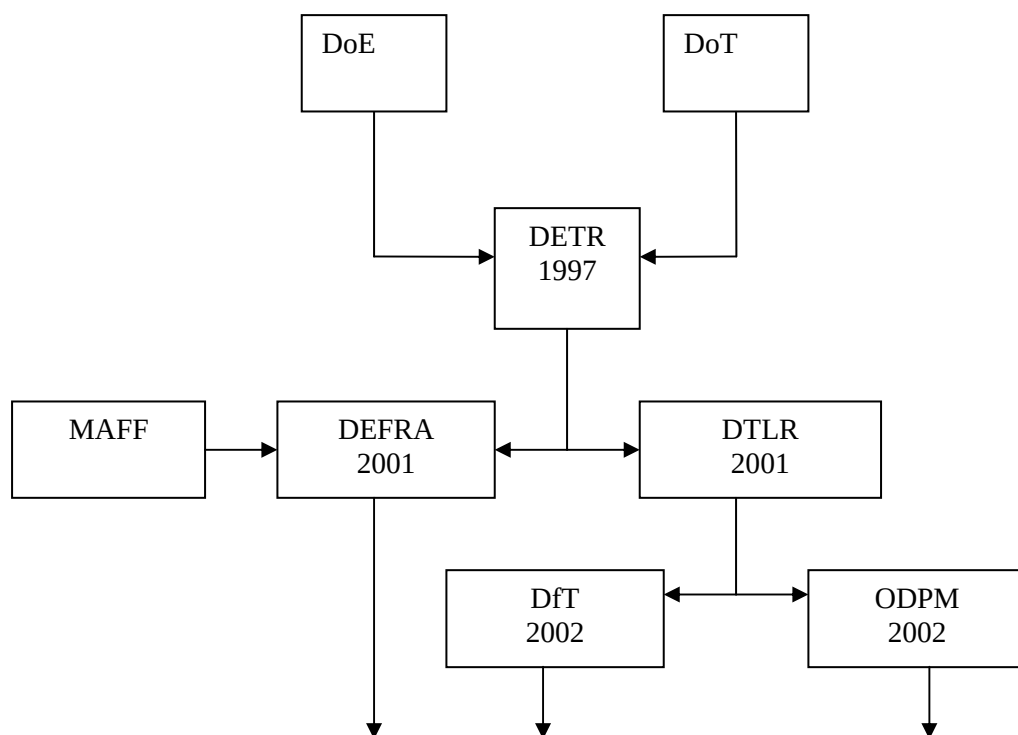
Figure A1: Revisions to the UK NAP 2004



$C - D = -0.7\%$. $AC = 7.6\%$. $A - B = -5.2\%$. Since $B > D$ the targets appear to be 'softer' than under the earlier NAP. But $(A-B) > (C-D)$ so the targets are in fact harder than previously. A is regarded as being 'inconsistent with the UK's leadership role on climate change' but C (and hence D) 'would risk damaging UK competitiveness' (UK DEFRA 2004d)

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Institutional note: the government department in the UK responsible for environmental policy has changed its name several times. This may cause confusion. Until 1997 the environment ministry was the Department of the Environment (DoE). In 1997 DoE merged with the former Department of Transport (DoT) to become the Department of the Environment, Transport and Regions (DETR). In 2002, the two parts separated again to become Department for Environment, Food and Rural Affairs (DEFRA) and Department for Transport, Land-use and Regions (DTLR), the former merging with the old Ministry of Agriculture, Fisheries and Food (MAFF), and the latter taking over regional and planning functions of the old DETR. In 2002, DTLR was again split into transport (Department for Transport – DfT) and a ministry dealing exclusively with housing, land use and regions (the Office of the Deputy Prime Minister – ODPM). The chart below shows the evolution⁶⁸.



⁶⁸

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