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Center for International Climate and Environmental Research - Oslo

Report 1998:4

Coordination of flexible instruments in climate policy

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ISSN: 0804-4562

CICERO Report 1998:4

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26 November 1998

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Aknowledgements

This report has been written at the request and with the support of MILJØSOK – Working group 6. Valuable comments from Per Schreiner are gratefully acknowledged.

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1 Introduction

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was formally adopted by the third session of the Conference of the Parties (COP-3) on 11 December 1997. The Protocol establishes a legally binding obligation on Annex I countries (the industrialised countries) to reduce emissions of greenhouse gases (GHGs) on average by 5.2% below 1990 levels by the years 2008-2012. Norway is committed to limit the emissions to below a level of 101% of the 1990-emissions. The quotas are defined as baskets covering the six (groups of) gases CO_2, CH_4, N_2O, HFCs, PFCs and SF_6.

There is a complex array of alternative approaches that can be adopted by individual Annex I countries to achieve their particular emission targets. At the domestic level the countries are free to choose their preferred policies and measures best suited to economic circumstances, community concerns and other national criteria.

Among the most important policy instruments domestically we have:

- taxes.
- tradable permits.
- regulations, voluntary agreements, joint projects and other non-market based instruments.

The Protocol provides however also flexible instruments or mechanisms – lately called the Kyoto mechanisms – at the international level. The individual countries are free to acquire quotas from other countries through:[1]

- Emissions trading with other Annex I countries.
- Joint implementation (JI) projects in other Annex I countries.
- The funding of emission reduction projects in developing countries verified and accepted by the Clean Development Mechanism (CDM).

The emission reduction commitments specified in the Kyoto Protocol will be achieved through a mix of the above listed policies and mechanisms. This complex set of policy instruments and flexible mechanisms therefore raises the question of how the different instruments interacts with each other.

How will for example joint implementation and CDM influence the international quota market? What is the future of domestic climate policies based on emission taxes if a well functioning quota market is established at the international level? How will a market for tradable permits at the domestic level relate to voluntary agreements, joint projects and other non-market-based instruments? These and other related questions are the topics of this report.

The report is outlined as follows. In the following section (section 2) we describe the non-market based instruments. In the third section we look at the market based instruments and

[1] In addition to the listed mechanisms, Article 4 in the Kyoto Protocol opens for establishing so-called “bubbles”. The article is specifically designed in order to let the EU reallocate its quotas among the EU member states. Also other groups of countries could establish bubbles and apply this article. The reallocation of quotas under this article has to be finalised before ratification. It will therefore not serve as a substitute for efficient emissions trading.

flexible mechanisms. In the fourth section we discuss how the instruments and the mechanism relates to each other both at the international and the national level, while the fifth and final section concludes.

2 Regulations, voluntary agreements and other non-market based instruments

2.1 Regulations

Direct regulations, often described as "command and control", can be classified as either technology-based or performance-based. Technology-based regulation typically requires use of specified equipment, processes, or procedures. In the context of climate change policy, technology based regulations could require application of particular types of energy-efficient motors, combustion processes, or landfill gas collection technologies.

Performance based regulations are specifying allowable levels of pollutant emissions or polluting activities, but leaving the specific methods of achieving those levels to the regulated private entities. Examples of performance based regulations for GHG abatement include, in addition to traditional firm-specific emission caps, for example minimum levels of energy efficiency for appliances and maximum levels of methane emissions from landfills.

Direct regulation can also take the form of absolute bans of certain products or processes, such as aerosol sprays containing ozone-depleting substances. Taking public administrative implementation costs of the policies into account, bans may actually be a relatively cost-effective policy instrument if low-cost substitutes for targeted products are available. In the case of the climate gases covered by the Kyoto Protocol, bans are however not of much interest.

Regulations are interesting options when we are dealing with for example pollutants causing non-linear[2] and highly local damages, as is the case with emissions of NO_x and non-methane Volatile Organic Compounds (nmVOC). In the case of climate gases, however, regulations are not to the same extent of interest. GHG emissions do not causes any local damages to neither humans nor nature. The consequences in the form of climate change should from a national point of view be considered as linear in emissions.[3]

The regulations of the type described above typically lead to economically inefficient outcomes since firms may be forced to employ unduly expensive means to control pollution. As mentioned above, such regulations are nevertheless suitable when dealing with certain local pollution problems. Due to the character of global warming as a global environmental problem, and due to the fact that costs of controlling emission of climate gases vary among firms, the use of market-based instruments should be preferred when dealing with climate gases.

[2] This implies for instance that the environmental damages could be neglected at emission levels below certain threshold values, but disastrous above these thresholds.

[3] We are of course aware of the fact that global warming and climate change are far from linear functions of the concentration of GHGs in the atmosphere. Nevertheless, it is a good approximation to consider the reduced damages as linear functions of national abatement levels when discussing reasonable and realistic emission reductions. The point is that the accumulation of GHGs in the atmosphere is a long term process where limited emission reductions in a single country at a certain point in time has limited effects on atmospheric concentrations.

2.2 Voluntary agreements

The distinction between voluntary agreements and traditional regulation as described above is in principle not very sharp. However, one important difference is that while direct regulations are based on new laws coming into force, voluntary agreements are grounded on negotiated agreements between the regulating authorities and the emitting industries.

I some countries voluntary agreements have played an important role in national GHG-abatement policies. The threat of mandatory government interventions may be enough to encourage voluntary agreements. Forward-looking firms may undertake some steps in controlling GHG emissions if they fear more costly mandatory controls in the absence of voluntary reductions. Also, voluntary agreements are sometimes seen as a way of obtaining emission permits that later may become tradable. Voluntary agreements could furthermore be a reasonable alternative if there are only a small number of emitters, as is the case with the Norwegian emissions of SF_6.

2.3 Regulations and their relation to market-based instruments

Direct regulation and voluntary agreements will probably play a minor role in future climate policy, at least if the Kyoto-protocol enters into force and an international market for quotas emerge. We will return to this in the next section, where we discuss market-based instruments. The voluntary agreement between the Norwegian authorities and the Norwegian aluminium industry on GHG emission reductions will for example be of minor importance if a national system for emissions trading is established. When the flexible instruments are designed and implemented, the authorities must nevertheless take their commitments in existing voluntary agreements into account.

3 Market based instruments and flexible mechanisms

Due to the likeliness of considerable costs of meeting the targets specified in the Kyoto Protocol, one of the central issues in the negotiations have been the inclusion of so called *flexible mechanisms* in the Protocol. The flexible mechanisms included in the Kyoto Protocol are emissions trading and joint implementation among Annex I countries and the possibility for acquiring emission quotas through the Clean Development Mechanism (CDM). Also at the national level there are several different policy options. We now turn our attention to the two main market-based instruments; emission taxes and tradable permits and quotas. Later on we focus at joint implementation and CDM, instruments that can facilitate technology transfer, but that are not to the same degree cost-effective.

Before we discuss taxes and tradable permits, it should be made clear that these instruments are in many respects quite similar. In a perfectly competitive marketplace, and under either an emission tax or a tradable permit scheme, emitters would reduce emissions to the point where the marginal cost of control equals the emission tax-rate or the equilibrium price of an emission permit (quota price). If the total emission reductions are equal in the two systems, the permit price will be equal to the tax rate. In other words, the two systems give the emitters identical incentives to change their behaviour. Both instruments would also provide dynamic efficiency, since each provides a continuous incentive for research and development in emission abatement technologies to avoid the tax or permit purchases. If the permits are distributed through auctions, the collected revenues and consequently the double dividends are also identical in the two systems.

Double dividends

CO_2-taxes or auctioned tradable permits as domestic instruments to secure compliance with the Kyoto Protocol, may give rise to truly significant amounts of revenue. This revenue can be recycled, i.e. reimbursed into the private sector through reductions in existing taxes. It is well known that high tax rates are damaging to economic efficiency. Recycling revenue from environmental policies will therefore increase efficiency and is therefore welfare improving. Because CO_2-taxes both have a positive environmental effect and generate public revenue that could be used for welfare-improving tax reductions, we talk about double dividends.

There is no doubt that environmental policies generating public revenue will give rise to double dividends if the revenue is recycled properly. The discussion in economic literature on the double dividends is on the size, not on the existence of such dividends. Claiming the existence of double dividends does not imply, however, that the environmental goals can be reached at zero or negative costs. The point is that the use of policy instruments that generates public revenues reduces the costs compared to policies that do not generate such revenues. Cf. Bohm (1998), Hoel (1998) and Goulder (1995) for further readings.

3.1 Greenhouse gas emission taxes

The aim of using a GHG tax is to minimise the total economic costs of achieving a given overall emission target. If all emitters of GHGs have to pay the same tax pr. unit emission, they will all have identical incentives to reduce the emissions at the margin. This will lead to a cost-effective distribution of abatement efforts among emitters.

If, on the other hand, the emission taxes are differentiated across sectors, the allocation of abatement efforts will not be cost-effective. The sectors that pay high tax rates will have inefficiently high incentives to reduce their emissions, while the sectors with low or no emission taxes will have inefficiently small incentives for performing abatement efforts. In Norway a CO_2-tax was introduced in 1991[4]. For political reasons the Norwegian process industry was however exempted from this tax. Furthermore, the tax rates vary considerable across sectors and fuels, cf. figure 1.

After an adjustment of the CO_2-tax in 1998, the Norwegian offshore oil industry is subject to the highest tax rate; NOK 462.- pr. tonnes CO_2. Most manufacturing industries on the mainland are either exempted or subject to a tax-rate below NOK 200 pr tonnes CO_2. This system gives rise to costly CO_2-abatement efforts in the oil industry, while several low cost abatement measures on the mainland are not carried out. This leads to inefficient use of resources. Larger emission reductions could have been carried out with identical or even smaller use of resources.

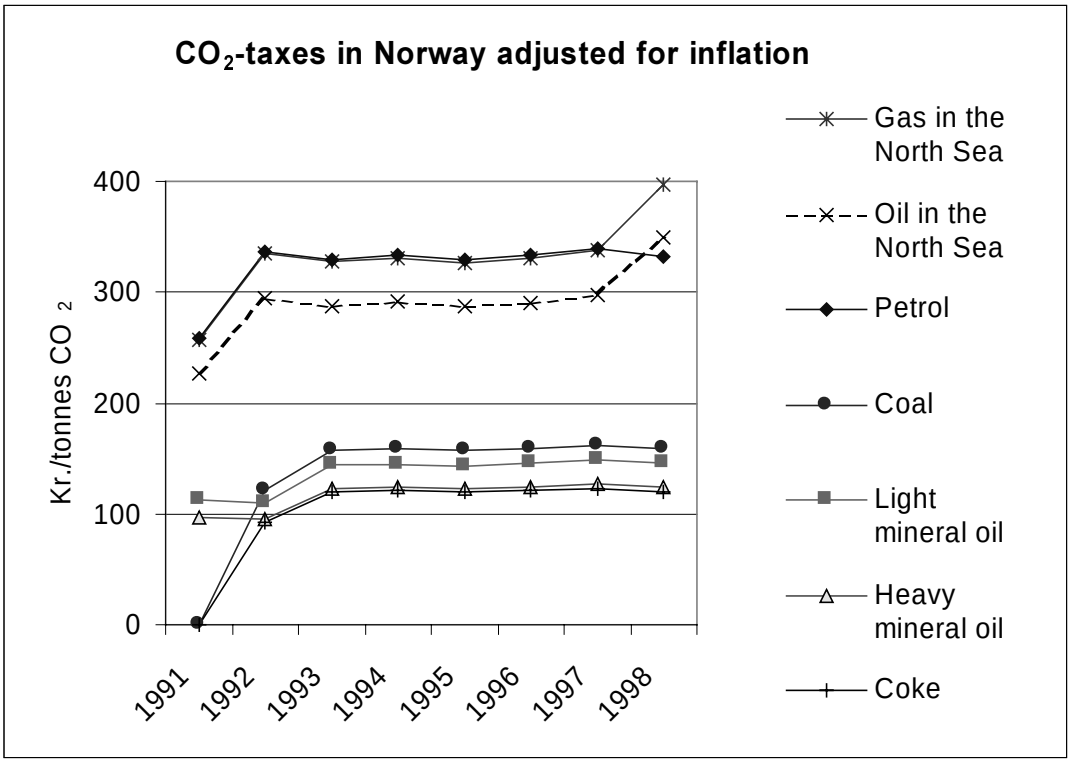

Figure 1: CO_2 taxes in Norway adjusted for inflation.

[4] It is to a large extent a misrepresentation to label this tax a CO_2-tax, because it, due to differentiation and exemptions, in reality is not proportional to the CO_2-emissions.

In section 4 we will return to the question of whether a domestic emission tax may be an appropriate and suitable policy instrument in the presence of a well-behaving international market for quotas.

3.2 Tradable permits at the national level

One very attractive feature of a competitive tradable domestic permit scheme is that the final allocation of abatement efforts will be the one that minimizes the total costs of reducing emissions. This will happen no matter how the initial permits are distributed, through auctions or by so called "grandfathering". Grandfathering of permits means that the permits are distributed without charge to emitters, most commonly according to the emitters' historical emissions.

A precondition for a tradable permit market to give rise to a cost-effective allocation of abatement efforts is that there are no restrictions on the trade. Firms will then want to buy permits if abatement costs exceed the permit price and sell permits in the opposite case. In this way, trade will continue until all firms have marginal abatement costs that are equal to the permit price.

3.2.1 Distribution of the permits

It is probably not very practical to involve households and small firms directly into a domestic permit market, although new information technology makes it more feasible to do so now than previously and individual emission permits certainly would give strong incentives for changes in our way of life. Nevertheless, it is probably more practical for the national government to issue emission permits to for example wholesale dealers in fossil fuels and allow them to trade on the domestic permit market. The small firms and the households will then indirectly pay for the emissions they are responsible for through the wholesale dealers who will include the permit price in the consumer prices.

As already mentioned, the governments could distribute permits to individual firms in two ways. In the first case, firms would be given - free of charge - shares of the total permit volume based on their historical emissions, for example 1990-emissions, or recent fuel sales ("grandfathering"). The other alternative is for the government to sell or auction the set of permits. A combination of these two distribution methods is also an option. The auctions could start with the seller announcing a high price, almost certainly too high for all permits to be sold. The bids could then be lowered until the price is reached which clears the market.

The two distribution methods differ primarily with respect to the wealth distribution between the public sector and the individual firms. Grandfathering implies a "transfer" of wealth in the form of tradable permits to the firms. Auctions imply that the wealth is transferred to the public sector. The government would then collect revenue similar to that from a GHG tax, giving rise to the same total emission reduction. As with taxes, auctions could be used to reduce pre-existing, distorting taxes and consequently give rise to a double dividend, cf. the text box above. Due to the loss of the double dividend, the society's total cost of reaching a certain emission target will be higher if grandfathering is used instead of taxes or auctioned permits.

In Norway grandfathering has been proposed in order to avoid closing down some of the export oriented energy intensive firms. From the above it should be clear that this proposal has to be supplemented by some restrictions on the possibilities for permit sale when firms are closed down. Fully tradable permits, whether distributed by auction or grandfathered, as well as taxes will imply identical allocation of abatement efforts and the same firms will choose to shut down in all instances. Basically, this is because the alternative cost of holding a fully tradable permit will be equal to the tax rate.

Thus, if grandfathering as such should prevent firms from closing down, grandfathered permits can not be fully tradable. For example the permits could be given conditional on the size of the production or the number of employees. Such restrictions on the permit market will, however, increase the aggregate emission reduction costs, and we can no longer talk of a cost-effective policy measure. It is important to keep in mind that if a free permit market causes firms to shut down, this is part of the cost-effective allocation of emission reduction efforts. Any restrictions on the permit trade in order to prevent such closedowns will move the market away from a cost-effective allocation.[5]

As already stated, a combination of grandfathered and auctioned permits is possible. Tradable permits could also be combined with taxes. Some sectors could be included in a tradable permit system, while other sectors are subject to an emission tax. If, however, the permit market becomes very restricted and limited in size, the degree of cost-efficiency will be reduced. This is because reductions cost will vary less across the limited number of firms etc. allowed to participate in the quota market. The potential cost savings of a market-based approach is thus reduced. In addition a small quota market may be less efficient due to possible strategic behaviour and market power from some of the participants.

Although an emission tax is a cost-effective policy instrument, the development of the Kyoto Protocol might reduce the importance of GHG taxes in the future. An important precondition is ratification by the number of parties required for the Protocol to enter into force[6]. In that case an international market for quotas might emerge. If the emerging quota market is well behaved, it is an adjacent option for the national governments to replace eventually existing GHG taxes with auctioned tradable permits. The number of auctioned permits could be set in accordance with the Kyoto Protocol commitments.

3.3 Domestic Joint Implementation (DJI)

We have so far discussed direct regulation, voluntary agreements, taxes and permit trading. A fifth possibility in the domestic arena is that one firm could finance emission reduction projects in another firm domestically either as a stand alone project or as part of a larger investment project. We are in other words talking about a national version of Joint Implementation.

[5] As part of a policy to prevent close downs the grandfathered permits could be given a limited lifetime. To have an effect on the number of closedowns, it must be announced that firms that are shut down will not receive free permits for the succeeding periods. This is however also a type of restrictions on the permit market that will move the market away from the settlement or market solution that generates a cost-effective allocation of abatement efforts.

[6] At least 55 parties to the protocol having more than 55 per cent of the total Annex I CO_2 emissions in 1990.

The motivation behind domestic joint implementation projects is presumably for the investor to buy future rights to emission permits at a lower price than own reduction costs. Such transactions will of course have a certain degree of uncertainty associated with them before a domestic permit market is established.

Even with a domestic permit market in place, three situations need to be distinguished:

1. Both firms (the investor and the reducer) are included in the domestic permit market,
2. Only one of the firms is included, while the other is either directly regulated or subject to a greenhouse gas tax,
3. Neither of the firms are included in the market.

In the first case, the joint project is nothing more than a barter trade in permits and should as such pose no special problems vis a vis the regulating authority.

In the second case we need to distinguish whether the investor or the reducer is included in the permit market. If the reducer is included, and thus have permits to sell, the question arises whether the investor will be allowed to sell the acquired permit from 'outside' the market; either to the government in return for GHG tax concessions or in return for a comparable reduction in emission regulations, or on the international market. As national GHG emissions are in fact lowered by the joint project and will be recognised in the national emission inventories, it can be argued that the authorities should in fact recognise the generated permits as genuine and tradable in the same sense as the permits generated and traded within the domestic market. If only the investor is included in the domestic permit market, the acquired permits should of course be as valid as any other permits on the domestic market.

A problem will arise if the GHG tax rate outside the permit market is different from the going permit price. Tax compensation in return for the generated permit or due to emission reductions will then entail a loss of public revenue and a similar gain for the regulated firm. This illustrates a problem with operating several policy regimes at the same time.

Given that the international as well as the domestic permit price is likely to be well blow the current CO_2 tax rate in Norway, the above complications point to the difficulties and arbitrage opportunities likely to emerge from a mixed policy system comprising both tradable permits and a tax or regulation scheme. Thus, it seems far better to design a national system around only one common mechanism or instrument. As the Kyoto protocol already opens for an international quota market and quota generation through international joint implementation and CDM, and as major Norwegian emission sources are to be included in a domestic permit market, it seems only natural to suggest that tradable permit system should be the only control policy in Norway.

3.4 International quota trading[7]

Under the Kyoto Protocol the industrialised countries have been allocated legally binding obligations to limit emissions of GHGs on average by 5.2% below 1990-levels by years 2008-

[7] We use the term "quotas" for the national emission limitations specified in the Kyoto Protocol, while "permits" are used when we talk about domestic emissions trading.

2012. The Protocol will enter into force 90 days after ratification by at least 55 countries, which account for at least 55% of the industrialised countries' total CO_2-emissions in 1990. The USA accounted for 36% of industrialised countries' total CO_2-emissions in 1990. Hence, it is unlikely that the Protocol will enter into force if the USA does not ratify.

Emission trading is allowed, although the rules for the trade has to be further developed at future meetings of the parties to the Protocol. The USA will however probably not ratify the Protocol if there are obstacles in establishing reasonable modalities and rules for the quota market. If and when the Protocol eventually enters into force, an international market for quotas will therefore probably emerge.

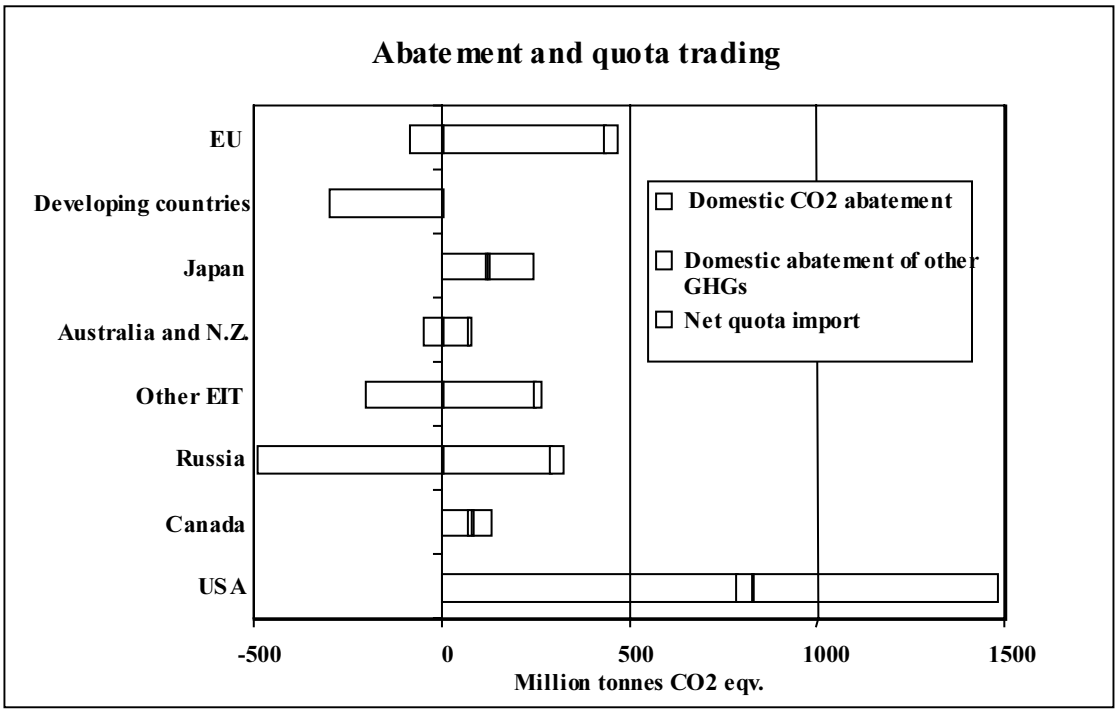

Figure 2: Abatement and quota trade.

In order to give an impression of what an international quota market might look like, figure 2 presents the trade pattern predicted by the simulation model ACT[8]. Russia and the other economies in transition to a market economy (the EIT-countries) are likely to be the main quota sellers in the quota market. The USA is the main quota buyer due to the high-expected emission growth in this country. The quota price is estimated to be USD 21.6 pr. tonnes CO_2 equivalent.

The negative CO_2 reductions predicted in the developing countries is due to so called carbon leakage: The abatement efforts in the industrialised countries imply reduced demand for fossil fuels, and consequently lower fossil fuel prices. Lower fossil fuel prices imply increased combustion of fossil fuels in the developing countries. This carbon leakage is estimated to be around 14% of the total abatement within the industrialised countries and of approximately the same size as the total abatement within EU.

[8] ACT (Achieving Commitments by Trading) is a model developed at CICERO, cf. CICERO Working Paper 1998:9.

An international tradable quota scheme could coexist with domestic permit schemes within each country, or particular countries might choose to meet their commitments by other means as for example taxes. Both in the case of a domestic tradable permit scheme and in a tax regime, the government could allow private domestic entities to trade directly on the international quota market. In the tax case private entities buying quotas on the international market should have the tax bill reduced when handing the acquired quotas over to the government. When private entities in the tradable permit case are engaged in cross-border trade, this must also involve the governments in question. At least the cross border trade must be reported to the governments, because only the governments have legally binding emission limits in the Kyoto Protocol.

A system of domestic emission taxes linked to an international quota market as indicated above is only cost-effective if the domestic tax is equal to the quota price at the international market. Such a system would in other words require that the tax vary in step with the international quota price. That would constitute an unconventional form of taxation and is probably not very practical. If the domestic emitters should be linked to the international flexible mechanisms it is probably more appropriate to introduce tradable permits, cf. the discussion in section 4.

3.5 Joint Implementation (JI)

In addition to quota trading, the Kyoto Protocol opens for Joint Implementation (JI) between industrialised countries, i.e. between countries with quantified emission quotas under the Kyoto protocol. Joint Implementation under the Kyoto Protocol involves co-operation between two industrialised countries, with one (the investor country) funding and possibly also conducting emission reduction projects in the other (the host country). It is important to note that joint implementation under the Kyoto Protocol only can take place between two countries both having an emission quota.

The difference between emissions trading and joint implementation can be somewhat unclear. In the JI-case the host country should transfer emission quotas to the investor country corresponding to an agreed upon estimate of the emission reductions brought about by the JI-project. In ordinary quota trading, quotas should be transferred from one country to the other based an agreed price. JI quotas can thus be characterised as “quality assured” compared to ordinary quotas bought on the international market.

Although it gives an impression of complexity, there are probably no difficulties in taking part in JI and quota trading at the same time. The Protocol states, however, that private entities should be authorised to participate in JI-projects. As in the case with quota trading, such participation must be co-ordinated with the instruments applied domestically. A firm in an investor country funding a JI-project in a host country has to be compensated in one way or another. The compensation should be related to the size of the legal emission rights transferred from the host country to the investor country as a result of the actual JI-project. If emission taxes are used in the investor country, the compensations could be in form of reduced emission taxes. If the company is trading in a domestic emission permit market, the compensation could be an appropriate amount of emission permits.

Future negotiation rounds are going to specify detailed rules both for quota trading and JI. These rules will be decisive for the importance of the two mechanisms and will clarify the concepts.

3.6 Clean Development Mechanism (CDM)

The Kyoto Protocol does not commit the developing countries to any quantified emission targets. It is however little doubt that there is a considerable amount of low-cost emission reduction options in this part of the world. Consequently, there is demand for a mechanism that allows the industrialised countries to move parts of their abatement efforts to the developing countries. The Clean Development Mechanism (CDM), which was defined and established by the Kyoto Protocol (Article 12), is the mechanism for this. Its purpose is to assist developing countries in achieving sustainable development with respect to GHG emissions, and to assist industrialised countries in achieving their commitments under the Kyoto Protocol.

Under CDM the developing countries will benefit from abatement projects taking part in their countries. The host countries will acquire certified emission quotas corresponding to the achieved emission reductions. The industrialised countries may use the certified emission reductions accruing from such project activities to contribute to compliance with part of the emission reduction commitments.

In addition to Joint Implementation and quota trading, the CDM is in other words a third mechanism by which the industrialised countries could achieve certified emission quotas abroad. It is too early to say how important CDM will be. Although it probably is a large number of low-cost emission reduction projects in the developing countries, there might turn out to be considerable difficulties in carrying out these projects within the context of the CDM. In the absence of binding targets in developing countries it will be difficult to determine the net emission reduction effects due to specific CDM projects, since nation-wide indirect and direct effects must be counted. The net emission reduction effects of low-cost abatement projects are particularly uncertain, since such projects may be close to being profitable and, hence, may be carried out by the market itself in the near future. Moreover, there are incentives to misrepresent the effectiveness of projects. The developing country in which the projects are going to be carried out may have incentives for exaggerating the project's total net emission reduction effects as has also the investor country. It will be an important task for the CDM to reveal such behaviour by host and investor countries.

The potential driving force behind CDM is that both industrialised and developing countries would benefit from this mechanism. For industrialised countries taking part as buyers in the ordinary quota market within the industrialised region, the CDM will serve as an important outside option. If the sellers in the quota market lay claim to very high quota prices, the buyers could refer to the possibility for acquiring low-cost quotas through CDM as a credible threat in the bargaining process. It is in other words likely that the price on "CDM-quotas" will constitute as a ceiling on the price in the quota market. It is however possible that CDM-quotas could turn out to be a rationed good because of the obstacles mentioned above. In that case the price on CDM-quotas will not constitute a ceiling on the price in the ordinary quota market.

4 Implementation issues

In the previous sections, a considerable number of instruments and mechanisms were described and discussed. It is however not unlikely that for example the Norwegian authorities will use more or less all these different instruments and mechanisms in order to achieve the Kyoto commitment.

So far direct regulation, CO_2-taxes and voluntary agreements are the instruments applied in Norway. A majority of the Norwegian parliament (Stortinget) has however already stated that they want a domestic market for tradable permits established in Norway. In the international arena it is likely that the Norwegian government will buy quotas in the ordinary quota market and achieve certified emission rights through CDM. It is moreover likely that the Norwegian government will, in accordance with the Kyoto protocol, allow Norwegian private entities to invest in JI projects in for instance former Soviet Union (FSU) and the other economies in transition to a market economy (the EIT-countries) as well as participate in CDM projects. It is also probable, but not certain, that Norwegian firms may be allowed to participate in international quota trade.

An issue then is whether the use of this complex set of instruments and mechanisms will give rise to co-ordination problems. In broad terms one should at the outset underline that all the instruments and mechanisms are supplementary to each other. The use of one instrument or mechanism should not constitute a general hindrance towards the use of another tool. There are however some exemptions to this rule. The most important one is that the choice of instruments domestically must be seen in relation to what extent the flexible mechanisms are applied and not least whether or not the private entities are allowed to buy quotas internationally as well as nationally.

4.1 One quota price internationally

At the international level one could acquire certified emission rights through both the CDM, by Joint Implementation and through the ordinary quota market. Certified emission rights from these three different sources will probably be fully interchangeable. That means that if free access to the different mechanisms is provided, the price of quotas from these three different mechanisms will converge. In the following we therefore assume that we could talk about a single international quota price.

4.2 Governments choice of climate policy instruments

According to the Protocol private entities should be allowed to participate in JI projects and the CDM.[9] If the governments want to involve the domestic private entities in the flexible mechanisms internationally, the domestic choice of climate policy tools must be closely related to the flexible mechanisms.

[9] Article 6 paragraph 3 on JI and Article 12 paragraph 9 on CDM.

4.3 Tax in combination with flexible mechanisms

Theoretically, private entities that have bought or acquired quotas on the international markets may have any emission tax payment refunded when the acquired quotas are handed over to the government. Let us have a look at two cases; when the domestic tax is either higher or lower than the quota price.

If the domestic emission tax is above the international quota price, the domestic private entities will reduce their emissions until the marginal abatement costs are equal to the quota price. Furthermore, the private entities will buy a number of quotas equal to the residual emissions internationally. These quotas are afterwards handed over to the government. Consequently there will be no public net revenue from the GHG tax if this tax is above the quota price.

If, on the other hand, the domestic tax is below the price level in the international market, no domestic private entities will acquire quotas internationally. This solution is however not cost-effective because the private entities in that case will abate only until the marginal abatement costs are equal to the domestic tax, which is below the quota price internationally.

In other words, combining a domestic GHG tax with private entities' participation in a well functioning international market for quotas will cause problems. If the domestic tax is higher than the international quota price, it will not generate any revenue. The government will instead hold a set of quotas. If the domestic tax is set lower than the quota price, the domestic abatement efforts will be inefficiently low. A solution could be to let the domestic tax vary in accordance with the quota price just as another market set variable like for example the domestic interest rate. It is, however, probably better to take the full step over to a system with tradable emission permits, which we discuss below.

4.4 Domestic markets for emission permits

If there is a well-behaved international market for quotas supplemented by CDM and JI, a domestic market for permits is a natural solution. The government could sell all its quotas according to the Kyoto Protocol. At the same time it must be required that all legal entities in the country must acquire permits corresponding to their emissions. Due to the influence of the international market, large sellers or buyers with substantial market power will not reduce the efficiency of the domestic market for permits.

A national permit market seems like the obvious solution to the problem of choosing a domestic control policy adapted to the Kyoto protocol. However, the potential public revenue loss has to be considered, especially if permits are grandfathered to certain industries. Without grandfathering, a domestic market for permits covering all gases and sources will require a permit price of approximately NOK 110 pr. tonnes CO_2 equivalent in order to avoid a public revenue loss.[10]

[10] The current Norwegian CO_2-tax generates approximately 6 billion NOK. The Norwegian Kyoto quota is 55.75 mill. tonnes CO_2. Such an amount of permits auctioned at a price equal to 107 NOK pr. tonnes CO_2 mean a revenue neutral reform.

4.5 Effects of possible access to the national and international quota markets

As mentioned the Kyoto Protocol establishes JI, CDM and international quota trade as so called flexible mechanisms. It is furthermore explicitly stated that private entities are to be allowed to the use the JI and CDM mechanisms. A similar statement is not found with regard to access to international quota trade. National control policies will closely interact with the Kyoto mechanisms depending on whether or not private firms are allowed access to the international quota market. In order to illustrate this interaction we look at two domestic firms, one (firm 1) of which want to invest in the other firm (firm 2) with the purpose of reducing GHG emissions in this latter firm. Possible compensation from firm 2 (the reducer) to the firm 1 (the investor) is explored below with the help of two tables.

Table 1: Possible compensation from firm 2 to firm 1 in the case where no participation in international quota trade is allowed

Firm 1\2	No	Yes
No	t_2	p
Yes	t_2	p

In table 1 it is assumed that domestic firms are <u>not</u> allowed to trade freely on the international quota market. Four situations are illustrated where none, one or both firms are included in a domestic permit market. Inclusion in this market is indicated with a ”Yes” in the tables. The firm(s) not included in the domestic permit market is/are assumed to be subject to a GHG tax with a tax rate of t_i (i=1,2). The permit price is denoted by p.

If the firm where the reduction takes place (firm 2) is outside the domestic permit market, the reducer can compensate the investor (firm 1) with the GHG tax avoided due to the investment project (t_2 per tonnes CO_2-equivalent reduced) whether or not the investor is included in the domestic market. If, however, the reducer is included in the national permit market, the reducer can sell the acquired permits at the price p and compensate firm 1 with this amount.

If, on the other hand Norwegian firms are allowed to trade internationally, the situation will be as depicted in table 2.

Table 2: Possible compensation from firm 2 to firm 1 in the case where participation in international quota trade is allowed

Firm 1\2	No	Yes
No	t_1/t_2	p/t_1
Yes	t_2/p	p

If both firms are outside the domestic quota market, the reducer can compensate the investor with the GHG tax t_2 stemming from the reductions undertaken. Alternatively, the reducer can sell the newly created permits on the international quota market where the investor can buy them and claim compensation from the authorities for its GHG tax t_1. If the reducer is participating in the domestic permit marked while the investor is not, the reducer can either compensate the investor with the permit price p or sell the permits on the international markets. In the latter case, the investor can buy them and claim tax credits as before. If the investor is part of the domestic quota market while the reducer is outside, the maximum compensation to the investor is the GHG tax credit t_2. Alternatively, the new permits may be sold internationally for a price p, which then can be transferred to the investor. Finally, if both parties are included in the domestic permit market, permits corresponding to the achieved reductions can be transferred corresponding to the value of the permit, p.

Given the likely situation that $t_1 > t_2 > p$, the above analysis illustrates the problems associated with the operation of a limited domestic permit market together with a GHG tax regime for those firms not included in the permit market. It also shows how international trading, if allowed, can short circuit the division between the two systems.

5 Conclusion

The Kyoto Protocol must be the starting point for the choice of domestic climate policy instruments. It is so far uncertain whether the required number of Parties will ratify the Protocol for the Protocol to enter into force. At least emissions trading, but possibly also Joint Implementation and the Clean Development Mechanism are, however, flexible mechanisms that must be established before ratification by for example the USA can take place. Making national preparations for domestic abatement efforts in order to be in compliance with the Kyoto Protocol should therefore assume that the mentioned flexible mechanisms are important elements of the international framework. The chosen domestic policy instruments should in other words fit to an international market for quotas.

It has to be taken into consideration that if the Protocol enters into force all private entities will have the right to acquire emission permits through CDM and JI-projects. It would be a sort of undermining of the Protocol if the national authorities at the same time do not accept these permits as legal emission rights. Thus, the corresponding emissions should not be subject to for example emission taxes. In other words, the national policies can't be seen in isolation from the flexible mechanisms. Through these mechanisms the private entities are linked to the international quota market and national policies must take that into consideration.

Regarding the relationship between the flexible mechanisms and the different domestic policy instruments, we have concluded as follows:

- The international market for quotas will be competitive only if governments do not dominate it. That is the main reason why private entities should be allocated quotas from their respective governments and be allowed to trade at the international market. Such a regime would induce both a cost-effective division of domestic abatement efforts and a cost-effective allocation of abatement internationally.
- Limiting the permit market to only some few industries combined with emission taxes in other parts of the economy will reduce the cost-effectiveness if we rule out the possibility that the emission tax varies in step with the permit price. Furthermore, if private firms are allowed to trade quotas internationally, this will short circuit the barrier between firms inside and outside a domestic permit market. Large traders in the domestic market will also reduce the cost-effectiveness because a smaller market for permits may lead to strategic behaviour.
- "Grandfathering" of national permits will not reduce the number of shutdowns unless there are restrictions on the possibilities for selling the "grandfathered" quotas. Such limitations on market transactions will reduce the cost-effectiveness of the instrument. Future rules for the international quota market might furthermore ban such restrictions on the tradable permits and might already be in conflict with the rules for free trade in the European Economic Area (EEA).
- A GHG tax is a cost-effective instrument if the tax rates do not vary across sources and sectors. In principle the domestic emitters could be allowed to acquire quotas through the flexible mechanisms internationally and have the emission tax repaid in accordance with the acquired number of quotas. Allocating tradable permits is however probably a more convenient method for linking domestic abatement to the flexible mechanisms internationally.

- CDM is a supplement or enlargement to the ordinary quota market. The relationship between Joint Implementation and emissions trading is somewhat unclear. The development of the rules for JI and quota trading will probably elaborate that relationship.

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