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# The evolution of emissions trading in the EU: tensions between national trading schemes and the proposed EU directive

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**Abstract**

The EU is pioneering the development of greenhouse gas emissions trading, but there is a tension between the 'top-down' and 'bottom-up' evolution of trading schemes. While the commission is introducing a European emissions trading scheme (EU ETS) in 2005, several member states have already introduced negotiated agreements that include trading arrangements. Typically, these national schemes have a wider scope than the proposed EU directive and allow firms to use relative rather than absolute targets. The coexistence of 'top-down' and 'bottom-up' trading schemes may create some complex problems of policy interaction. This paper explores the potential interactions between the EU ETS and the negotiated agreements in France and UK and uses these to illustrate some important generic issues. The paper first describes the proposed EU directive, outlines the UK and French policies and compares their main features to the EU ETS. It then discusses how the national and European policies may interact in practice. Four issues are highlighted, namely, double regulation, double counting of emission reductions, equivalence of effort and linking trading schemes. The paper concludes with some recommendations for the future development of UK and French climate policy.


*Keywords:* Emissions trading; Policy interaction; EU emissions trading scheme

## 1. Introduction

The recent adoption by the European Parliament and Council of Ministers of a directive establishing an EU-wide emissions trading scheme represents a landmark in the evolution of EU climate policy. But the development of this scheme has been paralleled by the development of Member State climate policy, including negotiated agreements (NAs) with energy intensive industry that include trading arrangements.

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Typically, these national schemes have a wider scope than the EU directive and allow firms to choose relative rather than absolute targets. There is a tension, therefore, between the 'top-down' and 'bottom-up' evolution of trading schemes in the EU.

The adoption of the EU directive has created uncertainty over the future of the 'bottom-up' schemes. If the directive is implemented as planned, many installations will need to join the EU scheme in 2005. But this would still leave a large group of companies continuing with their NAs and the associated trading arrangements. At the same time, installations may choose to opt-out of Phase 1 of the EU scheme (2005–2007) on the basis that existing NAs provide 'equivalent' emission reductions. A range of scenarios is possible, but each raises a number of issues.

The aim of this paper is explore the potential interactions between the EU scheme and the framework of NAs and emissions trading that have developed in the UK and France. The UK policy framework was introduced in April 2001 and is fully operational with trades underway, while the French scheme is still under development with only four companies having adopted NAs to date. There are similarities between the two schemes and also with the NAs in Germany and The Netherlands. The potential interactions with the EU directive highlight some important issues that are very relevant for the future development of EU and Member State climate policy.

The paper first describes the EU directive, outlines the UK and French policies and compares their main features to the European emission trading scheme (EU ETS). It then discuss how the national and European policies may interact in practice. Four generic issues are highlighted, namely, double regulation, double counting of emission reductions, equivalence of effort and linking of trading schemes. The paper concludes with some general lessons for the future development of UK and French climate policy.

## 2. The European, UK and French schemes

### *2.1. The EU emissions trading scheme*

On the 23 October 2001, the European Commission issued a proposal for an EU-wide scheme for greenhouse gas emissions trading (European Commission, 2001). Following an extensive process of negotiation, the European Parliament endorsed an amended version of the directive on 2 July 2003, which was then adopted by the Council of Ministers on 22 July 2003 (European Commission, 2003a). Implementation decisions must now been made within an extremely tight time-frame in order to meet the scheduled start date of 1 January 2005.

The EU emissions trading scheme will initially cover some 45% of EU $CO_2$ emissions, and as the EU is enlarged and more sectors and gases are brought into the scheme, it will cover an increasingly large proportion of total Annex I emissions under the Kyoto Protocol.[1] The ~12 000 participants[2] in the scheme will include electricity generators, oil refineries and energy intensive manufacturing installations in sectors such as iron and steel, paper and minerals. The first column in Table 1 summarises the main features of the scheme.

[1] Boemare and Quirion (2002) provide an assessment of EU ETS in the light of economic literature and experience from other trading schemes.

[2] The commission originally estimated that some 5000 installations would be covered by the scheme. But the final number is likely to exceed 12,000, largely as a consequence of the low size threshold (20 MW aggregate) for combustion plant, which brings in a large number of previously unregulated sources.

The directive was the subject of intense negotiation and the commission found. It is necessary to compromise in several areas in order to secure political agreement. Four particularly contentious issues were:

- *Opt-outs* (*Article 27*): The commission initially proposed a mandatory scheme, but this was opposed by the UK and Germany. The final text allows installations to opt-out during Phase 1 (2005–2007), but participation is mandatory during Phase 2 (2008–2012). Opt-outs will only be permitted if installations can demonstrate equivalence in terms of emission reductions, monitoring, reporting and verification requirements and the penalties for non-compliance.
- *Opt-in and phase-in* (*Article 24*): Installations in eligible sectors which lie below the relevant size threshold may join the scheme in 2005. In addition, from 2008 member states will be able to extend the scheme to additional activities, installations and gases (opt-in), subject to approval by the commission. Harmonised extensions of the directive to include other activities and gases will require an amendment to Annex I, together with suitable guidelines for monitoring and reporting.
- *Allocation* (*Articles 9 and 10 and Annex III*): A minimum of 95% of allowances must be freely allocated during Phase 1, and a minimum of 90% during Phase 2. National allocation plans are subject to approval by the commission and must be consistent with: national burden sharing targets; progress towards meeting those targets; national and EU energy and climate change policies; the technological potential of the installation to reduce emissions; and state aid and internal market rules. This mixture of top-down and bottom-up requirements will be difficult to interpret and disputes over allocation could lead to delays. In addition, the plan 'may accommodate' early action and must include information on how clean technology and competition from sources outside the EU will be taken into account.
- *Interfaces* (*Article 25 and 30*): Mutual recognition agreements may be signed between the EU ETS and trading schemes created by other parties to the Kyoto Protocol, while credits from JI and CDM projects will be eligible for use in the scheme, subject to the provisions of a proposed second directive (European Commission, 2003b). To ensure supplementarity, this directive contains provisions for the commission to impose a ceiling on the maximum number of imported JI/CDM credits.

The EU ETS will need to be implemented by member states who have either developed or are in the process of developing national climate programmes. In several cases, these climate programmes include NAs and in the case of the UK and France these agreements are associated with emissions trading schemes. The following two sections outline the UK and French policies and compare their main features to the EU ETS. The second and third columns in Table 1 above present the main features of each scheme, in order to allow a systematic comparison.

### 2.2. Negotiated agreements and emissions trading in the UK

The UK has introduced an elaborate system of NAs (termed Climate Change Agreements (CCAs)) in conjunction with both an energy tax and a wider emissions trading scheme. The Climate Change Levy (CCL) was introduced in April 2001 and is a downstream, revenue–neutral energy tax for business, commerce and the public sector.[3] The CCL is levied at different rates on coal (equivalent to about 7

[3] Overall revenue neutrality was achieved through offsetting the increase in energy prices by a 0.3% reduction in employer's national insurance contributions, although this was undermined somewhat by a subsequent increase in national insurance contributions in the March 2002 budget. The CCL is anticipated to raise around €1.5 billion per year.

€/t $CO_2$), gas (12 €/t $CO_2$) and electricity use (14 €/t $CO_2$), with oil products, CHP fuel and renewable electricity being exempt.[4] The UK chose to tax electricity at the point of consumption rather than the fuel input to electricity generation in order to avoid electricity price increases for low income households. Similarly, an energy tax was chosen over a carbon tax in order to protect the remaining UK coal industry. Both decisions have influenced the entire shape of the UK Climate Programme and have created serious compatibility problems with the EU ETS.

The CCAs are negotiated agreements between energy intensive 'facilities'[5] and the government and cover the period 2001–2013. CCAs give facilities exemption from 80% of the CCL, provided they take on binding targets for energy use or $CO_2$ emissions. The targets are defined for two-yearly intervals up to 2010 and may be either absolute (e.g. MWh) or relative (e.g. MWh per unit of output). The penalty for non-compliance is a return to paying 100% of the CCL for the following 2 years. Eligible facilities are those located in sectors which are regulated under the integrated pollution prevention and control (IPPC) directive and include many facilities which lie below the IPPC size threshold.[6] CCAs have been negotiated with 44 industrial sectors representing around 6000 industrial facilities, and the government estimates that these will reduce $CO_2$ emissions by 9.2 Mt $CO_2$ per year by 2010 (DETR, 2000).

The CCAs vary widely in their choice of base year, the improvement required over a business as usual baseline, the assumptions used about production levels and product mix, and the provisions for 'risk management'.[7] In all cases, the targets are based upon a percentage of the 'cost effective' energy efficiency potential, identified through modelling work by AEA technology (ETSU, 2001). Several commentators have argued that the targets are weak, as a consequence of information asymmetry, limited sectoral and technology disaggregation in the AEA database, the restriction to currently available technology, the choice of simple paybacks rather than discounted cash flow for investment appraisal, the very short paybacks used (2–4 years) and the fact that only a percentage of cost effective improvements are required (Sorrell and Smith, 1999; Waller, 2001). In response, industry has emphasised the importance of hidden costs, such as management time and constraints on capital availability (ETSU, 2001). But the ease with which most CCA facilities have met their first milestone targets suggests that the criticisms have some validity (ENDS, 2003).[8]

In addition to the basic agreements, the CCAs incorporate trading arrangements as part of the UK Emissions Trading Scheme (UK ETS). These arrangements allow individual CCA facilities to generate

[4] The exemptions for renewables and CHP form part of a package of measures to meet UK targets for deployment of these technologies. The exemption for oil products is ostensibly because heavy fuel oil and gas oil are liable for excise duties, which are in turn a legacy of policies imposed in the 1970s to reduce dependence upon imported oil. Since the UK is a net oil exporter, these policies lack an economic rationale.

[5] A facility comprises one or more IPPC installations and may also include other activities. For example, where an installation (or group of installations) consume more than 90% of a site's energy use, then all of the energy use at the site will be covered by a CCA (DEFRA, 2002).

[6] Regulation under IPPC is a poor proxy for energy intensive industry, but was chosen for administrative convenience. Some energy intensive sites in non-IPPC sectors (e.g. horticulture) are also included.

[7] Some sectors are allowed to adjust their targets if there are changes in product mix or output level, while others have adopted a 'tolerance band' around their target.

[8] Overall, CCA facilities reduced emissions by 15.8 Mt $CO_2$ per year below the baseline, or 13.5 Mt $CO_2$ per year below an 'equivalent' 2000 baseline (FES, 2003). This is more than three times the cumulative target for the first milestone period (2002) and significantly greater than the final target for 2010 (9.2 Mt $CO_2$). Some 70% (9.5 Mt $CO_2$ per year) of this was contributed by plant closures and output reductions in the steel industry, but the rest of industry reduced emissions by 4 Mt $CO_2$ per year, or 25% more (1 Mt $CO_2$) than required by the first milestone period.

'allowances' if they perform better than their target, and to use allowances for compliance if they perform worse than their target. Sale of allowances is only possible once compliance with the milestone targets has been verified. Allowances can be traded with other CCA facilities and also with the 'direct participants' in the UK ETS. Direct participants are a group of 32 companies from a variety of sectors which have volunteered to take on absolute targets for GHG emissions in exchange for subsidy payments from the government. The direct participants form the cap and trade component of the UK ETS and are expected to deliver emission reductions of 4 Mt $CO_2$e by 2006 (DEFRA, 2001). A third component of the UK ETS, for domestic emission reduction projects, is currently under development (Begg et al., 2002).

The inclusion of CCA trading arrangements is to the benefit of CCA facilities but has complicated the design of the UK ETS. Relative targets create problems as increases in output can lead to increases in emissions—although this is constrained in the short term by production capacity. To prevent any violation of the emissions cap for direct participants, a 'Gateway' had to be established to prevent the net sale of allowances from the CCA sector to the direct participant sector. Fig. 1 illustrates the interfaces between the different components of the UK ETS.

Trading offers CCA facilities a highly cost effective route to avoiding non-compliance penalties, since the cost of purchasing allowances to cover marginal exceedances of the CCA target is much less than the cost of CCL payments on all fuel and electricity use over a two-year period. This is especially the case in the oversupplied UK market, where 'hot air' surpluses from several of the direct participants have helped to push UK ETS allowance prices as low as €4/t $CO_2$ (ENDS, 2002). Trading also creates an incentive for overcomplying facilities to sell allowances outside their sector, rather than subsidise their competitors by contributing to overall sector compliance. As a consequence, the incentive for individual facilities to free ride is much diminished. Overall the trading arrangements have both increased the incentive for individual facilities to comply with their targets, and provided a cheap mechanism with which to do so.

### *2.3. Comparison of UK policies with the EU ETS*

The existence of the CCL/CCA package will complicate the implementation of the EU ETS in the UK and create problems of policy interaction. The scale of these problems may be illustrated by summarising some of the differences between the instruments.

First, there are substantial differences in the scope of the instruments, including the sectors covered, the size thresholds for eligible installations within each sector, the coverage of different fossil fuels, the coverage of emission sources within individual installations (e.g. combustion versus process emissions), and the incentives provided for emission reductions from electricity generation. Sorrell (2002, pp. 31–67) has shown how these differences may lead to individual sites facing up to 18 possible combinations of the CCL, CCAs, IPPC and EU ETS. Such differences create a complex set of boundary issues which may be difficult to administer, as well as potentially distorting competition by imposing differing requirements on companies competing in the same product market.

Second, the relative stringency of the EU ETS and CCAs is likely to differ. The stringency of the EU ETS will depend upon the interpretation of the allocation criteria and the resulting size of the cap relative to the overall abatement cost curve. Allocation should be consistent with both top-down criteria, such as national targets under the burden sharing agreement, and bottom-up criteria such as the technological potential to reduce emissions. In contrast, the CCA targets are based upon a percentage of the 'cost effective' potential to reduce emissions within a sector. For individual participants, an EU ETS allocation

consistent with 'technological potential' could be more stringent than the CCA targets, while an allocation guided by top-down criteria and allowing credit for early action could be less stringent.

Third, there are differences in timing. The EU ETS is in phase with the first Kyoto commitment period, but is due to begin well before the CCAs end. In contrast, the CCAs extend beyond the end of the first Kyoto commitment period, but targets are only negotiated up to 2010. The emissions trading provisions for the CCAs continue (in principle) up to 2013, but the UK market may diminish significantly in size after 2006 when the direct participant scheme comes to an end. The timing problems will be reduced if opt-out provisions are included in the EU ETS, as these may allow many of the existing CCAs to continue unchanged up to 2007. But as described below, this may create problems in demonstrating equivalence of effort and the opt-out provisions are not available in Phase 2. Most importantly, the UK electricity generators and other sectors such as oil refineries will need to join the EU ETS in 2005 since these are not subject to 'equivalent' national regulations.

Finally, there are important differences in objectives. The design of the UK CCL/CCA package reflects multiple explicit and implicit objectives, including the desire to protect domestic consumers, energy intensive industry, and UK coal producers, together with promoting energy efficiency and avoiding a 'windfall' to nuclear generators (Sorrell, 2002). Each of these objectives is threatened by the introduction of the EU ETS. The directive will disadvantage coal-fired electricity generation and accelerate its decline, raise electricity prices for household consumers, including the 'fuel poor',[9] and improve the economics of nuclear power. The political importance of these objectives has changed since the CCL was introduced and is likely to have changed further by 2005 or 2008. But it is clear that the EU ETS is in direct conflict with several of the objectives which have shaped the design of the CCL and wider UK climate policy.

### *2.4. Negotiated agreements and emissions trading in France*

On the 18 July 2002, the French government approved a framework for greenhouse gas emissions mitigation launched by three industry organisations: Mouvement des entreprises de France (MEDEF), Association française des entreprises privées (AFEP) and Entreprises pour l'Environnement (EPE) (MEDEF et al., 2002). The proposed scheme allows companies in the manufacturing, energy and service sectors to reduce their emissions on a voluntary basis, but does not provide any direct incentives for emission reduction. Targets are defined for 2004 and 2007 and penalties will be applied in case of non-compliance at the end of each commitment period. Enterprises willing to participate have to submit their objectives by mid 2003 to the *Association des entreprises pour la réduction des gaz à effet de serre* (AERES). This body includes representatives from most energy intensive French industries, together with government officials acting as 'experts or observers'. To date, it has approved four company commitments in the chemicals and cement sectors.

The official objective of French industry in proposing this framework was to gain experience in target setting and emissions trading. Hence, the framework foresaw firms trading GHG allowances in an experimental market within France. However, in addition to this official objective, industry had at least three other goals.

First, it wanted to reduce the prospect of an energy or GHG taxation scheme in France. Such a tax was proposed by the government and accepted (although somewhat watered down) by the Parliament in

[9] In the UK, some 5 million households suffer from 'fuel poverty'—defined as those spending more than 10% of their income on energy.

December 1999, but then rejected by the Conseil Constitutionnel (the highest court). The government did not table a new proposal, and the project has been stalled since then. However, GHG taxation is still part of the *Programme national de lutte contre le changement climatique* (PNLCC) and could resurface, especially if the government looks for new sources of taxation to reduce the national deficit.

Second, industry wanted to challenge the target in the PNLCC for a 28% reduction in industrial sector emissions compared to 1990 levels by 2010. It hopes that France will submit a national implementation plan that includes a weaker target for industry.

Third, industry wanted to influence the negotiation of the EU ETS. In particular, it wanted non-$CO_2$ GHGs to be included in the EU ETS, possibly on an opt-in basis, in order to benefit from the low-cost abatement opportunities for $N_2O$ that are available (and partly already implemented) in the chemicals sector. To achieve this, it needed to demonstrate to European institutions that adequate monitoring methods were available. In the event, Phase 1 of the EU ETS remains confined to $CO_2$, although opt-in of non-$CO_2$ GHGs is possible in Phase 2.

The proposed French scheme has serious drawbacks. A profit-maximising firm has no reason to undertake costly abatement commitments unless it expects to be a net seller. While firms may have the subsidiary objective of gaining experience with emissions trading before 2005, this incentive is likely to be relatively weak. Since a market cannot exist with only sellers, the emergence of a significant French allowance market appears unlikely, as does GHG abatement above business-as-usual.

However, a final objective of the scheme is to prepare the French national allocation plan under the EU ETS. Most firms that are eligible to take on commitments under the French scheme will become eligible for joining the EU ETS in 2005. If the French government uses the voluntary commitments as a basis for setting its allocation plan, as expected by French industry, a firm may have an incentive to voluntarily take on a commitment rather than directly negotiating its allowance allocation with the government. Conditions for real abatement under the French scheme then becomes:

1. the government makes clear that it will base its national allocation plan on the voluntary commitments provided these are consistent with the allocation criteria in the directive and the targets in the PNLCC; and
2. 'peer pressure' among industries ensures that the commitments under the French scheme are consistent with these criteria.

If these conditions are met, the commitments under the French scheme will form the basis of the national allocation plan. If this plan is approved by the European Commission, it will form the basis of French targets under the EU ETS. The French voluntary scheme will thus have no rationale from 2005 onward for sources covered by the directive, but might foster early mitigation in 2003 and 2004. For emission sources not covered by the directive, the commitments under the French scheme will continue until 2007, creating a three year period during which the scheme will coexist with the EU ETS. However, since relatively few sources are likely to be covered by the French scheme, but not by the EU ETS during this period, the French-only market from 2005 onward may be relatively small. If the above conditions are not met, the French scheme will most likely fail to provide both real abatement and real experience in emissions trading.

In contrast to the UK CCAs, the objectives of the French NAs relate solely to climate change and have been developed only after the commission issued the EU ETS proposal. As a consequence, the French NAs are closer to the EU ETS than the UK CCAs, but important differences remain. First, the voluntary nature of the French scheme and the absence of a credible threat from the State makes

ambitious emissions targets unlikely. Second, the French scheme includes a number of provisions that were not included in the original commission proposal, but which French industry hoped to get adopted. These include the choice between absolute and relative targets, a price cap, full inclusion of non-$CO_2$ GHGs, unrestricted inclusion of CDM and JI projects, and the provision to include diffuse sources through domestic emission reduction projects, especially in the service and transport sectors. This last provision is analogous to the project proposals in the UK scheme, although less developed and applying only to direct emissions.

## 3. Key interaction issues

The EU ETS will be introduced into a crowded 'policy space' in each Member State, in which complex interactions between the EU ETS and existing instruments are unavoidable (Sorrell et al., 2003). These interactions could be complementary and mutually reinforcing but there is also the risk that different instruments will interfere with one another and undermine the objectives and credibility of each. The UK and French examples described above are representative of existing negotiated agreements in a number of member states which must now either coexist with the EU ETS or be replaced by it. However, the associated trading arrangements in the UK and France create a number of additional complications.

In exploring these interactions, it is useful to distinguish between directly and indirectly affected groups. A *directly* affected group has obligations and incentives imposed upon it directly by the policy instrument, while an *indirectly* affected group is influenced in some way by the behavioural changes that are made by a directly affected group. So for example, electricity generators are directly affected by the EU ETS, while electricity consumers are indirectly affected as they face higher electricity prices as a consequence of the abatement costs incurred by the generators. While indirect effects permeate throughout the economy, it is the first order impacts on the electricity market which are of particular interest for the EU ETS.

The potential interactions between the EU ETS and the UK and French NAs relate to both directly and indirectly affected target groups, with the additional option of allowing the trade of allowances between the different schemes ('linking'). These three types of interaction—direct, indirect and trading—are explored in the rest of the paper.

How the instruments interact in practice will depend upon how the EU ETS is implemented and whether and how the existing NAs are modified. For the UK, the main options for eligible CCA facilities during Phase 1 are to join the EU ETS and terminate the CCAs, or to opt-out of the EU ETS and continue with the CCAs. Eligible facilities appear most likely to choose the second option, but this still leaves a large number of non-eligible facilities continuing with their CCAs and complex issues in relation to the treatment of electricity. In France, eligible installations have the opportunity either to participate up to 2005 in an experimental market through the voluntary framework, or to wait until 2005 and then join the EU ETS. Issues arise regarding the acceptability of voluntary targets as a basis for allocation and the treatment of installations and gases that are covered by the NAs, but not eligible for the EU scheme. In each case, the choice of policy options will be shaped by the relative importance that is given to the following four issues:

- policy interaction and double regulation;
- compliance obligations and double counting;

- differential treatment and equivalence of effort; and
- linking trading schemes and the fungibility of trading commodities.

The following sections introduce these issues and describe how they arise in the UK and French contexts.

### 3.1. Double regulation

Double regulation may be loosely defined as a situation where a group is directly or indirectly affected by two instruments that have very similar objectives. The existence of double regulation may be seen as imposing unfair burdens upon particular target groups. While 'double regulation' is a negative term, there may be instances where the interaction between policy instruments is either acceptable or positively beneficial (Sorrell et al., 2003; Johnstone, 2002; Smith, 1999).

In the present context, double regulation arises in the UK as a result of fossil fuel electricity generators participating in the EU ETS. This will lead to price increases for electricity consumers, many of whom are either subject to the CCL on electricity, or signatories to CCAs that include targets for the indirect emissions from electricity consumption. Price increases from the EU ETS should be independent of the method of allowance allocation,[10] but the absence of auctions means there is no revenue–neutral mechanism to compensate consumers. This could lead to pressure to remove the CCL from electricity or to modify the CCAs so that (as with the EU ETS) they cover direct emissions only.

The economic consequences of this double regulation will depend in part upon the allowance price in the EU ETS. High prices (from a stringent cap) could lead to substantial economic impacts for the affected groups, while low prices (from a weak cap) could lead to relatively small economic impacts. Low allowance prices could also result from trading links between the EU ETS and the international carbon market, since the latter is expected to be heavily oversupplied (Den Elzen and de Moor, 2003). The impact of the EU ETS on electricity prices will also depend upon the carbon intensity of the marginal generating plant on the UK system. During Phase 1, this is expected to be coal fired for a significant proportion of the load duration curve. Under a number of simplifying assumptions,[11] an allowance price of € 7/t $CO_2$ could increase average electricity prices by as much as 0.7c €/kWh, approximately equivalent to the current level of the CCL on electricity.

Double regulation of electricity will be unpopular (CBI, 2002) and will distort the incentives to substitute between electricity and fuel. However, the retention of the CCL may partly compensate for the absence of allowance auctions in the EU ETS.[12] This is important, because free allocation distributes the economic rent entirely to shareholders and prevents the government from using the scheme to raise revenue. In these circumstances, the retention of the CCL provides a means to recover some of the windfall rent

[10] Freely allocated allowances carry an opportunity cost, so they should be treated identically to real accounting costs in pricing decisions (Harrison and Radov, 2002).

[11] Namely: (a) the trading scheme is introduced overnight without companies having the opportunity to change behaviour; (b) the full costs of meeting the emission target are passed on to consumers through electricity price rises, with none being passed on to suppliers or absorbed through lower returns; (c) the impact on electricity prices is independent of the method of allowance allocation and (d) the price impact is proportional to the average carbon intensity of UK coal fired plant, which is ~1.0 Mt $CO_2$/TWh (Sorrell, 2002).

[12] The directive allows Member States to auction up to 5% of allowances in Phase 1 and 10% in Phase 2. In practice, Member States appear very unlikely to use this provision.

from allowance allocation and ensures that the €1.5 billion annual revenue from the CCL is maintained, together with the R&D and tax allowance programmes that the CCL supports.[13]

If both fossil fuel and allowance prices are expected to be low, there may also be appeal in retaining the CCL on electricity as a 'back-up', to incentivise end-use efficiency. This is a second-best alternative to either tightening the EU ETS cap or restricting the links between the EU ETS and the international carbon market, but has the advantage of being entirely within the UK's control. 'Back-up' regulation may be justified by the UK's professed adherence to ambitious $CO_2$ targets that go beyond its obligations under the EU burden-sharing agreement,[14] the value placed upon 'supplementarity' within the Kyoto regime, and the non-$CO_2$ benefits of improving energy efficiency, such as supply security. However, the net result will be to increase abatement costs within the UK, reduce emissions from UK participants, and either increase allowance sales to or reduce allowance purchases from participants in other member states. The aggregate emissions covered by the EU ETS and hence the overall environmental impact of the scheme will remain unchanged. This suggests that the acceptability of such double regulation is likely to depend upon a range of factors, including: the clarity, legitimacy and relative importance of different policy objectives; the appropriateness of different policy instruments to meet those objectives; and contextual factors such as the expected allowance price in the EU ETS.[15]

Similar double regulation problems apply to CCA facilities, whether or not they are eligible to join the EU ETS. These will face electricity price rises at the same time as having CCA targets that include their electricity consumption. One possibility would be to modify the targets so that they cover direct emissions only. But this would imply substantial administrative work to: (a) isolate the portion of the target which refers to the EU ETS installation (as opposed to the CCA facility), (b) isolate the portion referring to direct emissions, (c) convert from energy to carbon and (d) convert from relative to absolute. At present, the CCA targets do not distinguish between the relative contribution from direct and indirect sources and since the abatement opportunities may differ between the two, a proportional translation of the target to direct emissions may be problematic. A relevant issue here is the relative effectiveness of indirect electricity price increases versus direct targets in incentivising electricity efficiency. The UK government's view is that price signals alone are relatively ineffective, given the range of other barriers that inhibit energy efficiency. This view is backed up by modelling studies (ETSU, 2001)[16] and, if correct, means that abandoning the CCA targets on electricity could reduce the level of improvement in downstream

[13] CCL revenue supports a €75 million annual R&D fund, managed by the newly formed Carbon Trust, together with a €150 million system of first year capital allowances for energy efficiency investments. This represents approximately 15% of the expected €1.5 billion to be raised from the CCL, with the remainder going to fund cuts in employers' national insurance contributions.

[14] This includes both the 'goal' of reducing UK $CO_2$ emissions to 20% below 1990 levels by 2010 (DETR, 2000) and the objective of 'putting the UK on a path' to reducing $CO_2$ emissions by some 60% below current levels by 2050 (DTI, 2003).

[15] Cap & trade schemes give certainty in achieving a particular environmental outcome, but uncertainty in marginal abatement costs. Environmental taxes do the opposite: providing an upper limit on the marginal cost of abatement but uncertainty in the environmental outcome. The 'back-up' proposals are analogous to imposing a floor on marginal abatement costs, in order to meet objectives other than those represented by the emissions cap. A more common proposal is to impose an effective ceiling on marginal abatement costs, in order to improve the political acceptability of the emissions cap (Mckibbin and Wilcoxen, 2002). Both proposals mitigate the cost uncertainty of the emissions cap in order to achieve wider policy objectives.

[16] ETSU (2001) estimated that the CCAs would deliver 9.2 Mt $CO_2$ annual reductions by 2010, compared to 4.6 Mt $CO_2$if 'all cost effective measures' were adopted. In contrast, ETSU estimate that the reductions resulting from the price effect of the CCL on its own (i.e. with no agreements and no associated discounts) would be only 0.9 Mt $CO_2$. However, the behavioural assumptions that underlie these results are open to question.

electricity efficiency. Since electricity emissions would still be covered by the cap, compliance would most likely be achieved through alternative measures such as fuel switching in electricity generation. This has implications for other government objectives, such as supply security, and hence may not be considered desirable.

Since the French voluntary commitments do not cover electricity use, double regulation of electricity is not an issue. However, double regulation of direct emissions may arise if an installation has *both* a commitment under the French scheme *and* an allocation under the EU ETS for the same emission sources. This situation has been analysed in theoretical terms by Sorrell (2002) who examines two cases: first, where there is no trading in the national scheme and second, where there is trading. In the first situation, if the NA target is binding relative to the EU ETS allocation, both marginal and total abatement costs are increased relative to a situation with no NA target. In the second situation, marginal abatement costs for the affected installation are equal to the sum of the allowance prices in the two separate markets, while total abatement costs are less than in the non-trading scenario but higher than in the absence of the NA. Such a scenario holds no benefits for the affected installation, which may be expected to reduce abatement costs by relinquishing the NA commitments. However, in some circumstances the affected emissions sources at an installation may form a subset of the total number of sources covered by the NA. Dividing these sources between the EU ETS and the NA is likely to involve renegotiation of the NA target, which will entail additional transaction costs.

CCA facilities eligible to participate in the EU ETS will also face double regulation of direct emissions if their existing CCA targets are retained. This will raise abatement costs and be complex to administer, but (in contrast to the French situation) the double regulation could benefit the installation if it allowed the CCL exemption on fuel use to be retained. To avoid such a situation, it may be sensible to extend exemption from the CCL (on fuel) to EU ETS participants, thereby allowing them to drop their existing CCA targets.

### *3.2. Double counting*

Double counting problems arise when compliance obligations for particular emission sources are disputed between two trading schemes. As with double regulation, this applies in particular to the treatment of emissions from electricity generation in the UK. The EU ETS gives compliance obligations for these emissions to electricity generators, while much of UK climate policy effectively gives obligations for a portion of these emissions to electricity consumers. The control that these two groups can exercise over these emissions is very different. For example, electricity generators have full and direct control over the carbon intensity of electricity generation but only indirect and partial control over electricity demand. In contrast, electricity consumers have full and direct control over their electricity demand but, in the absence of disclosure[17] provisions, no control over the mix of generation from different sources.

Disputes may arise where an individual source is simultaneously participating in two emissions trading schemes, or where fuel or electricity is being traded between participants in two separate trading schemes with different designs. In these situations, compliance obligations for the same physical emissions may

[17] Disclosure, or carbon labelling of electricity would allow consumers to discriminate between high and low carbon sources and to identify zero carbon and nuclear sources. At present, some Member States have schemes which allow renewable electricity to be identified, but none have full disclosure provisions.

be either given to two separate parties, or given to the same party under two separate terms. Such disputes may have two consequences (Zapfel and Vainio, 2001):

- *double coverage*: where two separate carbon allowances or carbon credits are surrendered for a 1 t increase in physical emissions; and
- *double crediting*: where two separate carbon allowances or carbon credits are generated from a 1 t decrease in physical emissions.[18]

Such disputes introduce complexity into the regulatory situation. But it is important to distinguish between: (a) situations where double coverage and double crediting are present simultaneously and where the first effectively cancels out the second and (b) situations where only double crediting is present and there is scope for inflation in the number of allowances. Both are possible, but the second is more important as it could threaten the environmental integrity of an emissions trading scheme.

The trading provisions within the UK give compliance obligations for electricity emissions to industrial consumers, but the EU ETS gives compliance obligations for these emissions to electricity generators. The coexistence of the two creates double counting problems. If all the CCA facilities had absolute targets, an emissions increase (decrease) in electricity-related emissions from CCA facilities would lead to a decrease (increase) of twice the size in the total emissions covered by the CCAs and EU ETS (Sorrell, 2002, pp. 103–109). This is because allowances would be bought (sold) in *each* scheme to cover the increase (decrease) in CCA emissions. The final total of emissions covered by the CCAs and EU ETS may be greater or less than the initial total of emissions before the change. But it will always be less than or equal to the sum of the allowance cap in the EU ETS and the target emissions for the CCAs. This sum provides an overall cap on the total emissions from the combined schemes.

The double crediting does not breach the cap in the EU ETS and if all the CCAs had absolute targets, total emissions from the CCA sector would remain below the target emissions. Environmental integrity would be maintained even if there were fungibility between EU ETS allowances and those in the national trading schemes. In effect, the double crediting is cancelled out by the double coverage.

In practice, most CCAs have relative targets so aggregate emissions in the CCA sector and hence the UK trading scheme overall could increase. But this is an inherent feature of a scheme with relative targets and is not due to the double crediting. In the absence of Gateway arrangements, fungibility of UK and EU allowances would undermine the environmental integrity of the EU ETS. But again this is due to the relative targets and not the double crediting.

In sum, the double counting of electricity emissions creates some confusion, but does not threaten the environmental integrity of either the CCAs or the EU ETS. As Sorrell (2003) demonstrates, the same result does not apply to the coexistence of the EU ETS with the UK emission reduction project scheme. In this case, double crediting is not cancelled out by double coverage and any trading of project credits into the EU ETS could undermine the environmental integrity of the scheme.

In France, double counting may arise if a firm has both a commitment under the French scheme and an allocation under the EU ETS for the same emission sources. In practice, several installations are likely to

[18] An example of double coverage is the export of electricity from country A, which has an emissions trading scheme with direct accountability (electricity generators hold allowances), to country B, which has an emissions trading scheme with indirect accountability (electricity consumers hold allowances). Both the seller of the electricity (generators) in country A and the purchaser of the electricity (consumers) in country B would need to surrender allowances to cover the emissions associated with this electricity, which means the emissions would be covered twice by two separate trading schemes. A primary motivation for introducing a harmonised EU trading scheme was to avoid such problems (Zapfel and Vainio, 2001).

have some sources covered by both schemes (e.g. $CO_2$ from combustion plant) and some sources covered by only the French scheme (e.g. $N_2O$ from process emissions). As indicated above, in such a situation the incentive to reduce emissions from the double counted sources is equal to the sum of the allowance prices in the two markets, while the incentive to reduce other emissions is only equal to the price on the French market. As a consequence, abatement is distorted, with more effort on some emissions than on others. Furthermore, since the EU ETS provides an incentive to reduce emissions from the double counted sources, and since these emissions are also covered by French scheme, the EU ETS will reduce the allowance price on the French market. If there was fungibility between French and EU ETS allowances, the dual participation of these sources in both schemes would allow any Gateway arrangements to be circumvented and thereby create a risk of inflation in the number of EU ETS allowances (Sorrell, 2002, p. 120). As before, double counting problems may be avoided if the installation relinquishes the NA commitments for the affected sources.

### 3.3. *Equivalence of effort*

Problems may arise when the economic impact of environmental regulation appears to be different for competing firms, or when the apparent differential treatment of non-competing firms is perceived to be inequitable. Differential treatment may be challenged on legal grounds through competition law at the national, EU and international (WTO) level; on political grounds through rent seeking behaviour or challenging such behaviour; and on environmental grounds if there appears to be a risk of carbon leakage between installations, sectors or countries.

The demonstration of 'equivalence of effort' may be required in order to avoid differential treatment when an emission source, installation, company, sector or Member State is exempted from a particular policy instrument. But in practice, equivalence of effort may be extremely difficult to assess owing to differences in the scope of the instruments, the nature of the targets (e.g. relative or absolute), the provisions for modifying and updating those targets and the marginal abatement costs under each instrument. For many instruments, abatement costs may be difficult to estimate ex-ante or to observe ex-post. Industry has private information on abatement costs, together with an incentive to reduce the stringency of regulation by exaggerating cost estimates (Bailey and Haq, 2001). While trading schemes provide a clear signal of marginal abatement costs in the allowance price, there is no comparable signal from measures such as NAs. At the same time, the importance of equivalence of effort may be overstated, given the large differences in factor prices, fiscal policies and other regulatory requirements that distort the level playing field (Sorrell, 2002, pp. 28–29).

The opt-out provisions of the EU ETS raise these issues in a particularly acute form. For example, NA facilities may choose to minimise the expected sum of abatement and transaction costs by opting-out of Phase 1. If by opting-out the NA facility avoids a 'stringent'[19] target, this should lower allowance demand in the EU ETS, lower allowance prices and reduce overall marginal abatement costs. Conversely, if by opting out the NA facility avoids a non-stringent target, this will lower allowance supply, increase allowance prices and increase marginal abatement costs. The choice to opt out will depend upon expectations regarding abatement and transaction costs in each scheme, the future evolution of the NAs and EU ETS, and the fungibility of EU ETS and national trading scheme allowances.

[19] Defined here as one which would make it a net buyer of allowances in the EU ETS.

The opt-out provisions may have facilitated political consensus but they have reduced the environmental effectiveness of the EU ETS, reduced the market size in Phase 1, created additional administrative costs, and (arguably) distorted competition. Equivalence of effort will be very difficult to demonstrate owing to differences in:

- *Scope*: The EU ETS and NAs cover different emission sources in different ways. For example, the EU ETS covers process $CO_2$ emissions while the UK CCAs do not. Similarly, the French NAs cover non-$CO_2$ GHGs while the EU ETS does not.
- *Form*: Relative targets are not equivalent to absolute targets because they give no certainty in the environmental outcome and lead to higher emissions for the same level of marginal abatement cost (Gielen et al., 2002). Furthermore they distort competition by creating an incentive to locate in member states with relative rather than absolute targets.
- *Stringency*: The basis on which NA and EU ETS targets are derived and the process through which they are developed is different. The NA targets in both France and the UK appear weak, but their stringency compared to the EU ETS will depend upon how the allocation criteria are interpreted.

The process of demonstrating equivalence of effort could be burdensome. One option would be to estimate the allocation to different installations under the EU scheme and to assess whether their existing targets are equivalent to this estimated allocation. But this implies considerable effort to assess bottom-up allocations, which seems unnecessary when the intention is not actually to allocate allowances. Conversely, if member states choose to interpret equivalence in a loose way, this may leave them open to challenge under EU competition law.

The opt-out provisions of the EU ETS also requires equivalence in the monitoring, verification and compliance provisions. The French system clearly fails to provide equivalence of sanctions, since the penalty is only 10 €/t $CO_2$, versus 40–100 €/t $CO_2$ plus restoration of missing tonnes in the EU ETS. It also fails to provide equivalence of verification, since this is the responsibility of AERES rather than an independent organisation. The UK CCAs are much better in this regard, with high standards for monitoring and with verification by independent bodies accredited by the UK Accreditation Service (UKAS). While the penalty rate of the CCL (7–14 €/t $CO_2$) is lower than the penalty in the EU ETS, it applies to *all* emissions for a 2-year period and not only to missing tonnes.

In sum, while it would be difficult to justify opt-outs in France, many CCA facilities in the UK may seek to use these provisions. A combination of severe information asymmetry, the tight time schedule for approving allocation plans and the desire of all parties to minimise the obstacles to implementing the EU ETS may allow such opt-outs to proceed unchallenged. But there is a risk that allowing opt-outs could lead to distortions of competition.

### *3.4. Linking and fungibility*

The directive allows for linking to third party schemes. Although the idea is to link the EU ETS to non-European schemes, there is also the possibility of linking the EU ETS to the French and UK schemes. This may create a number of problems.

If the NAs chose to opt-out of the EU ETS, they will gain the advantage of (arguably weak) relative targets. In many cases these are measured in energy use rather than carbon emissions and have generous 'risk management' provisions that allow targets to be adjusted if (for example) the product mix changes. Permitting these companies to secure the benefits of EU-wide trading as well may be seen as an unaccept-

able distortion to competition. In addition, the use of relative targets means that production increases could inflate the number of allowances in circulation and violate the emissions cap. Such problems could be avoided through the use of Gateway arrangements to interface the NAs to the EU scheme, but this would add to administrative costs. In addition, the use of a fixed factor for the carbon intensity of electricity in the UK leads to a discrepancy between the estimated and actual emissions from electricity consumption, the size of which will increase over time.

The UK CCAs are already linked to the wider UK ETS, including the direct participant scheme and the UK project scheme. Interfacing these to the EU ETS raises further issues. First, there may be objections to trade with the direct participants, since these have been given a competitive advantage through subsidised abatement.[20] Second, several of the emission targets adopted by the direct participants are caught up in an ongoing controversy over 'hot air' (ENDS, 2002). Third, the inclusion of credits from the UK project scheme leads to a double crediting problem which may violate the environmental integrity of the EU scheme (Sorrell, 2003). And finally, over half the emission reductions in the UK scheme result from non-$CO_2$ GHGs which are not at present included in the EU scheme. The last of these problems also applies to links between the EU ETS and the French scheme.

Faced with these problems, the commission may decide to prevent any linking between the schemes. The rationale for linking—expanding emission coverage and reducing overall abatement costs—may best be achieved through opt-in provisions or by expanding the sectoral coverage of the EU ETS over time. But if linking is prevented, the size of the UK and French markets will significantly decline, exacerbating the current oversupply and reducing the value of banked allowances.

## 4. Summary and conclusions

While both the UK and French governments have welcomed the EU ETS, neither has provided details on how it will interact with existing instruments, or how this transition will be achieved. As this paper has demonstrated, this question now requires serious consideration. While a number of scenarios are possible, several lead to complex problems of double regulation, double counting, equivalence of effort and linking. While a range of policy options are available, these have varying implications for economic efficiency, environmental integrity and political acceptability, as well as for the attainment of wider policy objectives such as supply security. In general, the problems are substantially greater for the UK than for France, while the problems of double regulation and equivalence of effort provide a greater challenge than either double counting or linking.

The significance of these problems will depend upon a range of factors, including the allowance price in the EU ETS. In the UK, a combination of low electricity prices, generous allocation criteria and the strong desire of all parties to minimise the obstacles to implementing the EU ETS may allow these problems to be circumvented in the short term with relatively minor changes to existing policies. But there is a risk that such expediency will add complexity to an already overcrowded policy mix. The design of the French trading scheme is already seriously flawed because only sellers would have an interest in joining. Its most useful contribution may be to offer a first step toward the national allocation plan to be submitted to the EU.

[20] On the other hand, the number of direct participants is relatively small, most do not complete with the sectors covered by the EU ETS and the UK scheme has been given state aid clearance by the commission.

While the opt-out provisions of the EU ETS allow some policy changes to be postponed, these provisions are only available up to 2008 and do not resolve core issues such as the double regulation of UK electricity emissions. Furthermore, such provisions create potential distortions to competition and undermine the environmental effectiveness of the EU scheme.

In the long-term, it is likely that the EU ETS will replace the UK and French NAs. The former is flawed by the attempt to meet multiple policy objectives within a single instrument package, while the latter is flawed by the limited incentives achievable within a voluntary scheme. Both compare poorly with the EU ETS, which provides a pragmatic compromise between economic efficiency and political acceptability and looks set to provide the foundation for EU climate policy throughout the first commitment period. While the UK must inevitably face a range of transitional issues and France must adapt its NAs for the national allocation plan, it is likely that the NAs will be progressively displaced as the EU ETS is extended to cover more sectors and gases. The speed with which this occurs will depend upon the willingness of the French and UK governments to rationalise the policy mix, together with the strength of the countervailing factors contributing to policy inertia.[21] Any postponement of these changes is likely to complicate the policy mix, increase abatement costs for the affected participants and increase administrative costs for government authorities.

## Uncited reference

Mckibbin and Wilcoxen (2002).

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[21] For example: a legislative framework will have been established which may be difficult to change; regulatory institutions will have been established, or responsibilities assigned to existing institutions; procedures and standards will have been established for functions such as monitoring, reporting and verification; a network of private organisations will have become involved in implementation; and the target groups themselves will have invested substantial time and money in gaining familiarity with the policy instruments and putting the appropriate procedures in place. All these activities are separate from investment in abatement, but each will cultivate vested interests and encourage resistance to change.

[22] Details are available at the project web site: http://www.sussex.ac.uk/spru/environment/research/interact.html.

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