



ACHIEVING MORE CLIMATE AMBITION IN THE EU: DISTRIBUTION OPTIONS

A discussion paper by IEEP and the Öko-Institut for WWF, Greenpeace and CAN-Europe

Authors:
Pernille Schiellerup
Sean Healy
David Baldock
Hauke Hermann
Jakob Graichen
Vicki Duscha

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EXECUTIVE SUMMARY

The EU currently faces the challenge of finding a consensus on the way to move forward in climate policy, beyond the current commitment to a 20 per cent reduction in greenhouse gas (GHG) emissions by 2020. Government officials, primarily environment ministers, from several Member States have expressed their support for moving to a 30 per cent reduction target. However, several governments have reservations about taking this step, partly on grounds of cost and perceived economic impacts. Consequently the distribution of the additional effort required to move to 30 per cent is a matter of political sensitivity as well of technically and economically robust policy making. It is far from axiomatic that the distribution of additional effort would follow the same pattern as was followed when the 20 per cent target was adopted.

This paper explores how the additional effort of moving to a 30 per cent target might be distributed among the EU Member States and what resources could be mobilised in support of such a move. The principal focus is on the sizeable proportion of the emissions currently covered by the Effort Sharing Decision. Since the other major component of emissions, covered by the ETS, would be addressed within the current trading regime there is relatively limited leeway for changing the distributional impacts of this policy. However, many of the financing resources explored could have relevance in the ETS sectors as well as in the Effort Sharing Sectors.

This paper explains the significance of the Effort Sharing Decision in the context of EU climate policy and in particular the 2009 climate and energy package. It sets out the logic of the distribution of effort between Member States as proposed prior to 2009 and with reference to the current 30 per cent debate, where earlier proposals from the Commission are also relevant. Opportunities for lower cost emission reductions appear to lie disproportionately in the less affluent new Member States. It is clear that EU climate policy has pursued a compromise between a strategy that might be regarded as cost-effective at an EU scale and a distribution that puts more responsibility and cost on Member States that are more affluent.

Against this background the impact of four different approaches to distributing the additional effort required to meet the 30 per cent target among Member States were modelled resulting in four different scenarios.

Scenario 1: The distribution of additional effort follows the same pattern as for the current 20 per cent target, based on GDP per capita. This results in a distribution whereby more affluent Member States are allocated a greater proportion of the additional reductions, whereas less affluent Member States are allocated a smaller proportion.

Scenario 2: The additional effort is distributed on the basis of the estimated marginal cost of abatement (using the POLES model). This approach would result in the lowest overall cost for the EU, but also means that the additional effort would fall more heavily on a group of generally less affluent Member States, as this is where the POLES model suggests that the additional cost-effective potential for reduction is mostly located.

Scenario 3: The additional effort is distributed based on a hybrid distribution key which softens the impact of a distribution based on the estimated marginal cost by including a GDP weighting so that the cost of accessing the potential represents the same proportion of GDP in all Member States. It could be seen as a compromise between the GDP per capita based approach in Scenario 1 and the cost-effectiveness approach in Scenario 2.

Scenario 4: The additional effort is distributed according to Member States' projected share of emissions in 2020. This approach results in a distribution of additional effort which reflects the absolute scale of emissions in 2020 allocating a larger proportion of additional emission reductions to Member States with a higher proportion of overall emissions. It also takes into account the increase in emissions permitted to some Member States between now and 2020.

The additional cost in 2020 has been estimated for the EU for each of the four effort sharing scenarios based upon the marginal abatement cost curves in 2020 from the POLES model.

The geography of additional cost effective reduction in the effort sharing sectors is a challenge to greater policy ambition in Europe and needs to be addressed. Notwithstanding the progress that has been made in recent years to demonstrate the co-benefits of greater investment in tackling climate change, including avoided costs and the advantages of a green economic transition, the challenge of mobilising the resources for upfront investment especially in less affluent Member States remains. In addition to this, the broader and less quantifiable transaction costs of the wider social and economic change required for creating a lower carbon economy need to be borne in mind.

Whatever the distribution of additional effort between Member States, significant public and private investment is likely to be required on a relatively short time scale in order to help unlock additional greenhouse gas emission reductions, particularly in Central and Eastern Europe. This will be all the more challenging since it will have to take place against a background, at least in the first years, of a general picture of fiscal restraint.

Given the above, it is important to consider what resources might be mobilised at a European level in order to make such tightened targets more acceptable to Member States that might otherwise have reservations.

A review was undertaken of the potential of various mechanisms which could be deployed within the EU policy framework to generate additional revenue to less affluent Member States, and how these might interact with a more ambitious target.

One group of options consists of the flexibility mechanisms to be found under the EU Effort Sharing Decision on the one hand and the ETS Directive on the other. Under the Effort Sharing Decision the prospects for both the transfer of Annual Emission Allocations (AEAs) between Member States and Joint Implementation projects entirely within the EU were considered. Under the ETS we looked at the revenues which could be generated by auctioning of allowances. In each case we considered the potential of these mechanisms for mobilising resources to support a 30 per cent target and how the different mechanisms

might interact with such an enhanced target. We also considered their different logics, and who would be the recipient of such resources.

AEAs constitute a potential source of revenue for Member States, in particular those Member States which find themselves with more AEAs than they need. The potential income would depend on the size of the surplus and the price that such transferred AEAs could fetch. Given that the market is 'in the making', the estimation of the price of AEAs is an uncertain science. An increase in the ambition of the overall EU target would reduce the number of surplus AEAs for a given Member State. However, the increase in the value of AEAs could in principle outweigh this and a further option of increasing the 5 per cent limit on the transfer of AEAs should be explored further.

Joint Implementation projects within the EU could be a way of mobilising an investment flow towards less affluent Member States in which a significant cost efficient potential for greenhouse gas emissions is located. A more ambitious target might increase this form of investment flow. In the absence of a second commitment period under the Kyoto Protocol, one option might be that the EU sets up its own scheme, although this would have significant transaction costs. There is also some concern about the environmental integrity of Joint Implementation schemes in general. And more affluent Member States may prefer to channel investments internally for their own low carbon transitions.

As far as the auctioning of allowances under the ETS is concerned, a more ambitious target would mean the tightening of the ETS cap. There would thus be fewer allowances for all Member States to auction. At the same time we might expect a tightening of the cap to increase the value of allowances. The existing 'early effort' and 'solidarity and growth' adjustments could be seen as amplifying the potential revenue effect of a more ambitious target in the Member States entitled to these adjustments. The additional income would go to governments, while the costs would fall on industry. The appropriateness of increasing the volume of the current "solidarity and growth", and the "early effort" allowances, in the context of more ambitious target could be explored further.

The potential for utilising the flexibility mechanisms under the Kyoto Protocol more broadly, for this purpose also were explored, with a focus on the question of AAU trading. It is clear that there are divided opinions on this issue, and that while some see the development of an EU financial mechanism along the lines of a Green Investment Scheme as the pragmatic way forward for enabling the move to a 30 per cent target, others are concerned about the capacity of such an approach to safeguard environmental integrity.

In summary therefore, a number of potentially interesting sources of revenue and investment can be identified, all of which will require further consideration as to the scale of benefit and workability and some of which have potential to make a contribution to a political compact in which a 30 per cent target was accepted by all Member States.

The process of setting an EU Budget for 2014 – 2020 is now underway. This will be cast within a "Multi-Annual Financial Framework" supported by policies in the areas where EU funding is most concentrated, e.g. cohesion and regional aid, research and development, agriculture, fisheries, and the environment. There are opportunities to strengthen the

climate elements both in the Budget as a whole and in several specific policies, particularly within the Cohesion Policy funding instruments. These are also interesting because they contain a specific re-distributional element.

There are several possible ways forward which could offer potentially helpful incentives for less affluent Member States in the context of the Budget.

Firstly, by the creation of a new fund dedicated to climate mitigation and adaptation issues, whether freestanding or framing part of a restructured LIFE + fund. The measures in such a fund could include support for a range of activities of particular relevance to new and less-affluent Member States including capacity building and measures targeted at energy efficiency.

Secondly, existing funds have considerable potential to address climate themes more fully, both through the use of ear-marked budget lines dedicated to mitigation of adaptation objectives, and through broader “mainstreaming” of climate objectives into other expenditure. The scope for larger scale infrastructure, energy conservation and renewable energy investment is particularly high and the share of new and less affluent Member States in the Cohesion Funds will be high.

Thirdly, the allocation of certain funds and the budgets within them between different Member States is derived on a variety of criteria, most of which are socio-economic. Environmental criteria could be introduced as a more prominent element in the “distribution key”, beginning with climate related criteria.

This study shows that there are in principle several different means by which adjustments in both climate policy and the EU Budget could be made so as to support a more ambitious EU wide emission reduction target. None are entirely straightforward and some have distinct drawbacks. Nonetheless, these avenues deserve further attention given the urgent need to resolve the 30 per cent issue in 2011.

Whatever the combination of options employed, sufficient attention must be dedicated to ensuring the environmental integrity of both the individual measures and the policy settlement as a whole.

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1 INTRODUCTION

Over the next months EU governments are expected to debate stepping up the EU's carbon target to 30 per cent. Much has been done in recent years to make more visible the benefits of a timely transition to a low carbon economy. Nicolas Stern made an important contribution to this debate when he communicated the advantages of strong early action over delayed action in economic terms.¹ We now talk much more easily about 'co-benefits' and 'avoided costs' of climate action. In addition arguments can be, and have been, made about the benefits of a green economic transition e.g. in relation to innovation and global competition. However, the challenge of finding the upfront investment, and balancing this against other pressing calls for investment, remains.

According to the European Commission's Communication on moving beyond 20 per cent from May 2010², the cost of meeting the 20 per cent target has now dropped from €70 billion to €48 billion per annum by 2020, and the cost of meeting a 30 per cent target would be €81 billion per annum in 2020. The additional cost of moving to a 30 per cent target will therefore be some €33 billion per annum in 2020, but only €11 billion more compared to the original cost of the climate and energy package.

The Commission's analysis suggested that a 30 per cent target would have a number of additional benefits. Firstly, it would increase the incentive for innovation reduced by the 20 per cent target. This, argues the Commission, would be beneficial for the EU's competitiveness by helping to maintain a strong position in a rapidly growing global market for low carbon technologies. Secondly it would increase energy security by reducing imports of oil and gas by some €40 billion in 2020 (at an assumed oil price of US\$ 88 per barrel in 2020). The money saved could then be available for reorientation towards promoting green jobs in low carbon technologies in the EU (such as a more energy efficient housing stock). Thirdly, there would be benefits in terms of air quality through reducing the need for investment in pollution control equipment (thus reducing the cost of achieving air quality goals by some €3 billion), and through improved air quality bringing additional health benefits (estimated between €3.5 to 8 billion in 2020).

However, lack of clarity on how to distribute the costs among Member States is putting a break on increasing the EU's climate ambitions. The purpose of this paper is to contribute to the debate in a constructive manner. Firstly, by exploring how individual EU Member States could contribute to moving from a 20 per cent greenhouse gas emission reduction by 2020 to 30 per cent under the Effort Sharing Decision.³ Secondly, by estimating the additional

¹ Stern, N. (2006). Stern Review on The Economics of Climate Change (pre-publication edition). Executive Summary. HM Treasury, London.

² CEC (2010) Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage. COM(2010)265. Brussels, 26.5.2010.

³ CEC (2009) Decision on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. Decision 406/2009/EC. Brussels, 23.4.2009.

costs of non-ETS emission reductions in 2020 for the EU,⁴ and, finally, by exploring the financial resources that could be mobilised in support of stepping up to a 30 per cent target.

The paper is structured as follows:

Section 2 explains the significance of the Effort Sharing Decision in the context of EU climate policy and in particular the 2009 climate and energy package. In Section 3 we model the distribution of effort among EU Member States on the basis of four different distribution scenarios, and the additional costs in 2020 for individual Member States under the different scenarios are estimated. Section 4 then considers how a diverse set of resources might be mobilised in order to enable a 30 per cent target especially in less affluent Member States. Potential sources of revenue from existing flexibility mechanisms in the climate and energy package and the Kyoto Protocol are highlighted and the potential for mobilising the funding instruments of the EU budget is reviewed. Section 5 concludes.

2 THE EFFORT SHARING DECISION IN THE CONTEXT OF THE CLIMATE AND ENERGY PACKAGE

Before we consider how additional effort under the Effort Sharing Decision might be distributed among the Member States per cent, it is important to briefly set the Decision in the context of the 2009 climate and energy package and EU's climate policy in the broader sense.

The climate and energy package contained four pieces of legislation: a revision of the 2003 Emission Trading Directive⁵, the Decision on sharing the effort of greenhouse gas emission reductions in the non-ETS sectors among Member States, a new Renewable Energy Directive, and a Directive on carbon capture and storage. Amended guidelines on state aid for environmental measures formed a fifth element of the package.

The Effort Sharing Decision covers sectors such as transport, buildings, agriculture and waste. The ETS conversely covers CO₂ emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board.

⁴ “[a]s regard the geographical distribution, the emission reduction potential for moving from 20% to a 30% target is proportionally higher in the poorer Member States. It will be necessary to mobilise the public and private financial resources to enhance emission reduction without jeopardising economic growth.”

⁵ CEC(2009) Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community. Brussels, 23.4.2009.

The Commission's impact assessment of the climate and energy package⁶ considered the three *legislative* elements together. Importantly in the context of this paper, this involved decisions about the relationship and balance between the different elements. The 20 per cent renewable energy target and the 20 per cent reduction in greenhouse gas emissions by 2020 were taken as given. The main focus then was on identifying an approach where both targets could be reached simultaneously within the EU at least cost for the EU as a whole, under a set of framework conditions such as no exogenous strengthening of energy efficiency improvements or no import of JI/CDM credits. It was assumed that the marginal costs across all Member States and all sectors were equalised, both for greenhouse gas emission reductions within and outside of the EU ETS as well as for the deployment of renewable energy. However, this assessment demonstrated that a pure cost efficient allocation would lead to substantial differences in the economic costs between Member States. The resulting costs were considered to be disproportionately high for the Member States with the lowest GDP per capita. Consequently, alternatives were examined in order to find a balance between cost efficiency and 'fairness' for the Member States.

The cost effective distribution led to an allocation of two thirds of the emission reduction to the ETS sectors, and one third to the non-ETS sectors. The overall emissions in the ETS sectors would need to be reduced by about 21 per cent compared to 2005, and outside the EU ETS, by around 10 per cent compared to 2005. This overall split of effort between the sectors covered by the EU ETS and the non-ETS sectors was held constant in the exploration of alternatives in the impact assessment and was also the split that eventually found its way into the legislation.

Several policy options were analysed against the core cost efficient reference option, with a view to reaching a fair distribution between Member States without incurring a significant increase in the overall economic cost. This included a consideration of how the emission reductions required under what was to become the Effort Sharing Decision, should be distributed among Member States, if not purely on the basis of cost efficiency. The impact assessment set out an approach whereby the contribution of different Member States to the 20 per cent target was distributed on the basis of GDP per capita relative to the EU average. In this model, Member States with a GDP per capita less than the EU average, were allowed to increase their emissions but by less than would have otherwise been the case. Member States with higher than average GDP per capita were required to reduce their absolute overall emissions. This was the distribution which eventually found its way into the legislation and is illustrated in Figure 1.

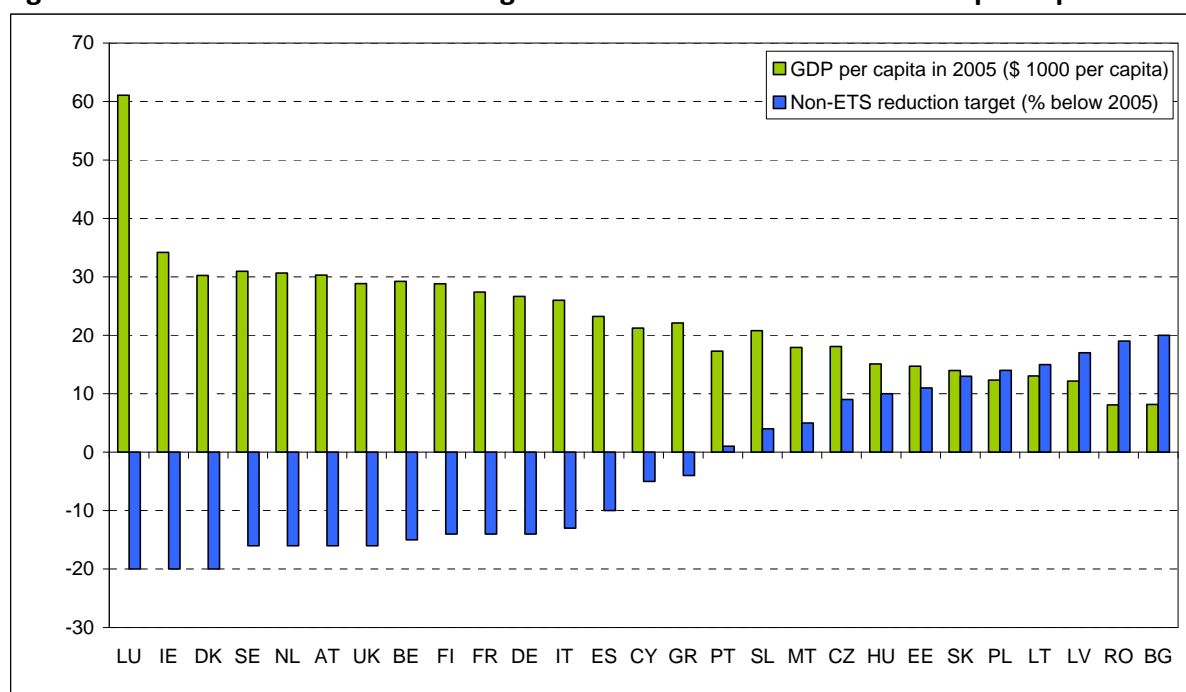
From 2013 onwards, certain activities previously covered by the Effort Sharing Decision, such as industrial N₂O emissions, will be covered by the EU ETS. As a consequence it is specified in Article 10 of Decision No 406/2009/EC⁷ that the non-ETS reduction targets of each Member State will be adjusted to account for the extended scope of the EU ETS in

⁶ CEC (2008) Commission staff working document. Impact Assessment. Document accompanying the Package of Implementation Measures for the EU's objectives on climate change and renewable energy for 2020.

⁷ CEC (2008) Proposal for a Decision on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. Brussels, 23.1.2008.

Phase III. At the time of publication the procedure for adjusting these non-ETS emissions was still ongoing with significant uncertainties remaining on how best to account for the EU ETS scope extension. Therefore the non-ETS emissions data used in this study is based on inventory sources (i.e. UNFCCC, CITL) and does not include any scope adjustments.

Figure 1 2020 GHG emission targets of EU Member States and GDP per capita⁸



Source: Eurostat (2010); IEA (2010); CEC (2008)⁹ adapted by Öko Institut

As with the rest of the climate and energy package, the Effort Sharing Decision contains provisions which would allow it to be updated in light of the adoption of a more ambitious overall target. The Commission’s proposal for a Decision therefore also considered what should happen if this were the case.

It was proposed, firstly, that the distribution of effort between ETS and non-ETS sectors for the additional 10 percentage points (to move from a 20 per cent to a 30 per cent target) should be the same, so that two-thirds of the additional reductions would be achieved through the ETS, and one third through the non-ETS sectors. It was proposed, secondly, that each Member State would contribute to the additional reduction effort in proportion to its share of the Community’s total emissions from sources not covered under the EU ETS for

⁸ The GDP (PPP) values in Figure 1 are based on US \$ (2000) from the IEA (2010). The population data for the Member States is sourced from Eurostat (2010) data in order to derive GDP per capita values (measured as \$1000 per capita).

⁹ CEC (2008) Commission staff working document. Impact Assessment. Document accompanying the Package of Implementation Measures for the EU’s objectives on climate change and renewable energy for 2020. Brussels, 23.1.2008.

the year 2020.¹⁰ Thirdly, it was proposed that for the additional 10 per cent the limit for the use of credits generated through projects in third countries should be increased to 50 per cent of the additional reduction effort through projects in third countries.¹¹

Most of this detail did not make it into the final Decision. Recital 26 states that in the event of an international agreement, Member State emission limits should be adjusted taking into account the principle of solidarity between Member States and the need for sustainable economic growth across the Community, thus repeating the language in Recital 8 which sets out the distribution of effort in the context of the 20 per cent target. Member States would however be allowed to achieve half of the additional reduction effort through projects in third countries.

Overall the sectors covered by the Effort Sharing Decision had to achieve a 10 per cent reduction by 2020 over 2005. If the overall EU target was increased to 30 per cent, and assuming that the split between the ETS and non-ETS sectors stayed the same, then the target in the non-ETS sector would have to increase to 16 per cent. Thus, under the 30 per cent case we are exploring how the EU member states could contribute to achieving 6 percentage points of additional emission reductions.

The distribution of effort for the 20 per cent target has been agreed, and in some cases enshrined in national legislation. However the question of how any *additional* effort should be distributed in the event of the Union adopting a more ambitious target is still open. It is therefore important to explore how this could be distributed among Member States.

3 MEMBER STATE CONTRIBUTIONS TO A 30 PER CENT TARGET

To explore how emission reductions in the non-ETS sectors of each Member State could contribute to an increased EU wide climate target of 30 per cent, we have developed four scenarios with the help of four distribution keys.

Scenario 1: the additional effort will be distributed in the same way as is the case under the 20 per cent target, namely on the basis of relative GDP per capita.

Scenario 2: the additional effort will be distributed on the basis of the marginal abatement cost of mitigation. This means that individual Member State targets will be determined on the basis of where the cheapest potential for emission reductions lies.

Scenario 3: the additional effort will be distributed on the basis of the marginal cost of mitigation but taking account of GDP so that the estimated total cost of accessing the potential would make up the same percentage of GDP in all Member States.

¹⁰ CEC (2008) Proposal for a Decision on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. Brussels, 23.1.2008.

¹¹ It should be noted that this was, as was the increase of the target, predicated on the conclusion of an international agreement and that such emission reduction credits should only be accepted from countries that had ratified the agreement.

Scenario 4: the additional effort will be distributed as per the Commission's proposal in 2008. The distribution key will be Member State share of total non-ETS emissions in 2020.

We will explore each scenario in more detail below, but in essence, while Scenario 1 is based on relative wealth as reflected in GDP, Scenario 2 is based purely on where the cheapest emission reductions are assumed to be. Scenario 3 tries to find a middle way between Scenarios 1 and 2, aiming for cost-efficiency but taking into account also the capacity, reflected in GDP, to access the potential for additional emission reductions. Scenario 4 is based on the share of emissions in 2020 and mirrors the Commission's original proposal for moving from a 20 per cent to a 30 per cent target in light of a satisfactory international agreement.

These are of course not the only distribution keys which could be explored. However they represent different rationales for the distribution of additional effort that are rooted in the policy discussion to date.

Our approach involved three distinct steps. Firstly, the non-ETS reduction effort required under a 30 per cent target was determined. Secondly, four keys for distributing the additional effort were identified. Finally these were deployed to model four corresponding scenarios for a 30 per cent target respectively.

3.1 Setting the non-ETS reduction effort

In order to be able to model the distribution of the additional effort under a more ambitious target, we first had to make some assumptions about the distribution of effort between the ETS and non-ETS sectors under a more ambitious target.

When the Commission recently examined the options for moving beyond the 20 per cent target, it concluded that the cost-effective split between the ETS and the non-ETS sectors would be the same for a 30 per cent target as it had been for the 20 per cent target with approximately two thirds of the emissions reduction being achieved under the ETS and one third through the non-ETS sectors. This translates to a 16 per cent reduction target below 2005 emission levels for the non-ETS sectors. For the EU ETS this would mean a 34 per cent reduction below 2005 emission levels.¹² While there is increasing discussion about whether retaining this overarching split is appropriate, re-examining the split was beyond the scope of this project. The implication of the Commission's analysis is clear though: a deviation from the current split would be less cost-efficient for the EU as a whole.

Another important assumption made was that all of the additional effort was assumed to be achieved without the use of international offset credits.¹³ The domestic reduction targets in

¹² CEC (2010) Commission staff working document. Background Information and Analysis. Document accompanying the Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage. Brussels, 26.5.2010.

¹³ Domestic reduction target means that all of the reduction occurs in the Member State without CDM use.

the ETS and the non-ETS sectors compared to the year 2005 for the 20 per cent and 30 per cent case are presented in Table 1.

Table 1 Domestic reduction targets for the ETS and the non-ETS sectors

	20% case	30% case
ETS reduction [% below 2005]	21%	34%
Non-ETS reduction [% below 2005]	10%	16%

Source: COM (2010)

3.2 The distribution keys

The GHG Effort Sharing Tool was developed by the Öko-Institut to support the setting of reduction targets by providing a shared information base. For the purpose of this study the GHG Effort Sharing Tool¹⁴ has been adapted in order to distribute the additional non-ETS reduction effort of each Member State for a 30 per cent target. The function of the GHG Effort Sharing Tool is to allocate the additional non-ETS reduction targets to the Member States in accordance with their performance compared to other Member States in a range of indicators.

Ambitious and less ambitious targets were selected for three indicators providing an upper and lower limit of additional non-ETS reduction targets. The Member State with the worst indicator performance was attributed the maximum additional non-ETS reduction target, whilst the country with the best indicator value was attributed the minimum additional non-ETS reduction target. The additional non-ETS reduction values for the remaining Member States were subsequently proportional to their indicator score within the range of additional non-ETS reductions that were specified.

In this study, the least ambitious target for each indicator is set at 3 percentage points.¹⁵ This minimum threshold ensures that all Member States contribute to the additional non-ETS reduction effort. The ambitious target was then variably set for each indicator to ensure that the additional non-ETS reduction effort of 6 per cent below 2005 emission levels was achieved in each scenario.

Here we use the tool to assess how the additional non-ETS effort required to reach a more ambitious overall EU level target would affect the non-ETS targets of individual Member States applying the four different distribution keys.

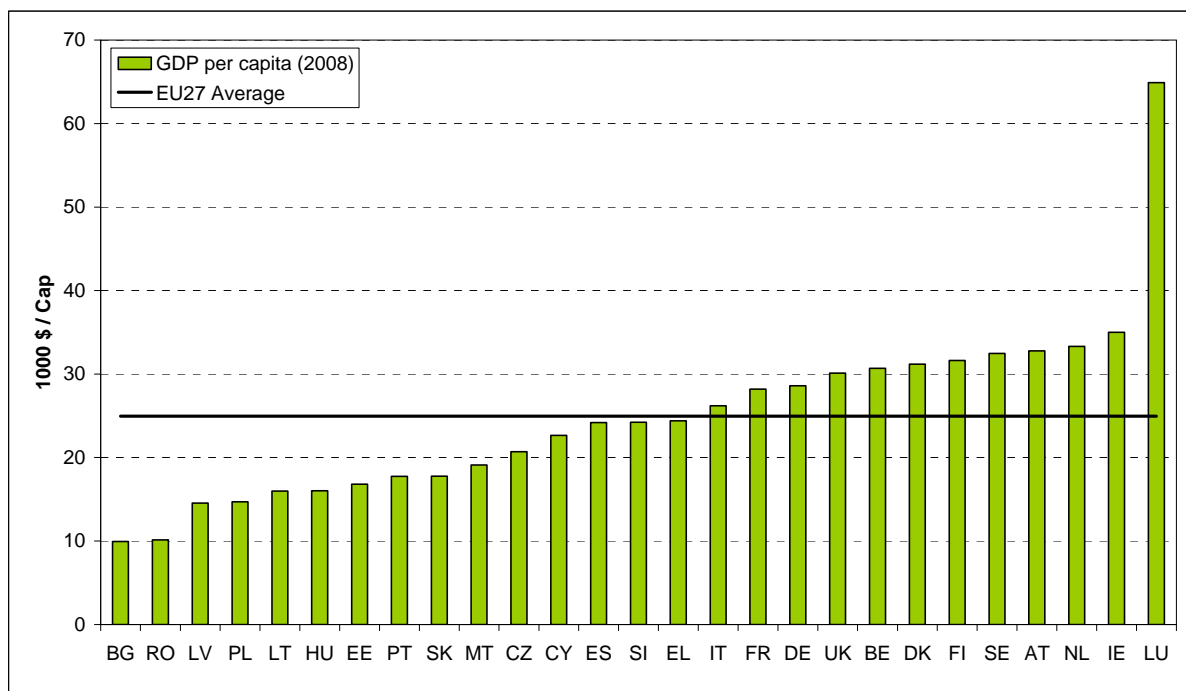
¹⁴ A full description of the GHG Effort Sharing Tool is provided in Annex A.

¹⁵ According to the Commission proposal to distribute the additional non-ETS effort in the 30 per cent case, it is implied that all Member States should reduce their emissions relative to their non-ETS targets in the 20 per cent case in order to contribute to the additional effort. Therefore a minimum reduction target of 3 percentage points was set for Scenario 1, 2 and 3 to be more comparable with Scenario 4.

3.2.1 GDP per capita (1)

GDP per capita is frequently used in the literature to reflect the capability of the Member States to pay for mitigation abatement.¹⁶ Figure 2 ranks Member States in terms of GDP per capita in 2008.

Figure 2 Distribution Key for Scenario 1



Source: Eurostat (2010); IEA (2010)¹⁷

3.2.2 Marginal abatement cost (2)

Marginal abatement cost is often used to determine where cost efficient mitigation potential exists. Here it has been calculated by using the non-ETS marginal abatement cost (MAC) curves of the Member States, which have been produced by the POLES model.¹⁸ The non-ETS MAC curves provide an estimation of the marginal abatement cost in 2020 of reducing CO₂e emissions in each Member State, reflecting their different abatement potentials.¹⁹

¹⁶ M.G.J. den Elzen et al (2008) Sharing developed countries' post-2012 greenhouse gas emission reductions based on comparable efforts, Netherlands Environmental Assessment Agency.

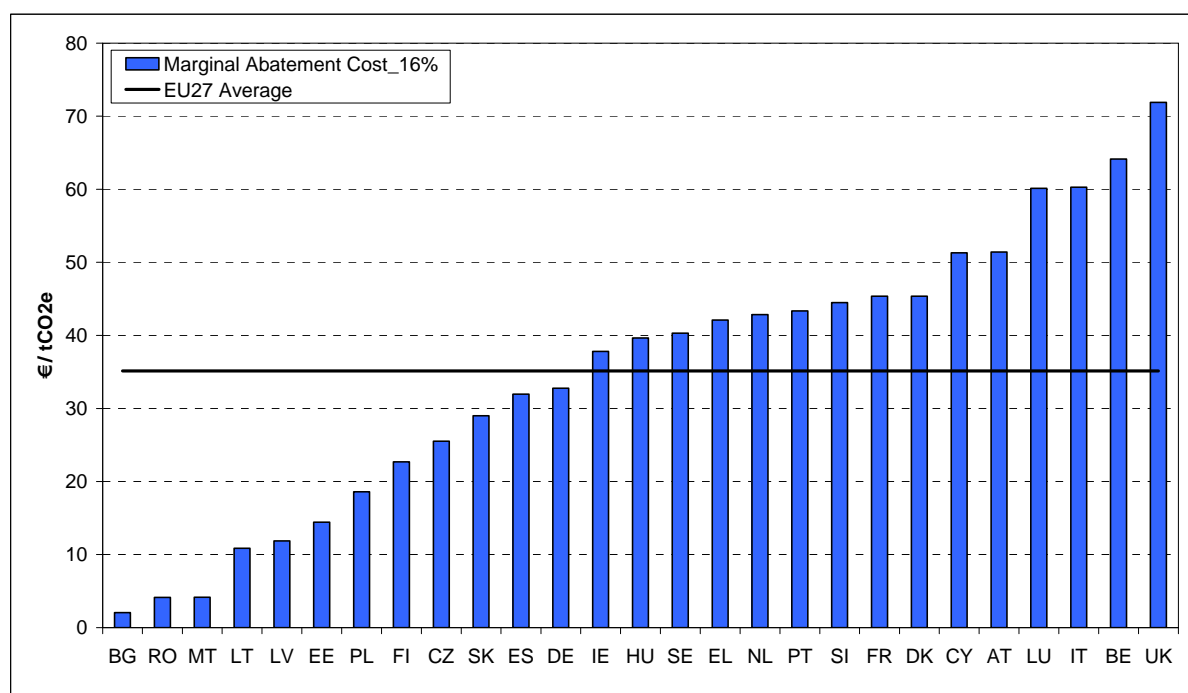
¹⁷ The GDP (PPP) values in Figure 2 are based on US \$ (2000) and are sourced from the CO₂ Emissions from Fuel Combustion (2010 Edition), IEA. Paris.

¹⁸ The POLES model is an econometric, partial equilibrium world model, which simulates energy demand and supply in the long term, projecting the development of CO₂e emissions and the availability and cost of CO₂e abatement options. More information on the model and the assumptions used are provided in Annex D.

¹⁹ Given that these marginal abatement costs are based upon assumptions within the POLES model (i.e. GDP growth, rate of CCS deployment); the output is not used directly to determine the effort sharing

In order to determine where the cost efficient mitigation potential exists in the EU27, a flat rate reduction of 16 per cent below 2005 non-ETS emission levels was applied to all of the Member States. Figure 3 illustrates that the marginal abatement cost of each Member State ranges from 2€/t CO₂e to €72/t CO₂e and shows that certain Member States are considerably below the EU27 average and therefore have access to low cost CO₂e reduction potential.²⁰

Figure 3 Distribution Key for Scenario 2



Source: Low Growth POLES Scenario data accessed via the ClimStrat tool (2011)

3.2.3 Equal share of GDP (3)

The geographical distribution of the most cost efficient emission reduction potential does not say anything about the capacity, financially or institutionally, of accessing that potential. Therefore the distribution key based on marginal abatement cost has been tempered by taking account of differences in wealth. Under this distribution key each Member State would reduce their non-ETS emissions by an equal per cent share of GDP.

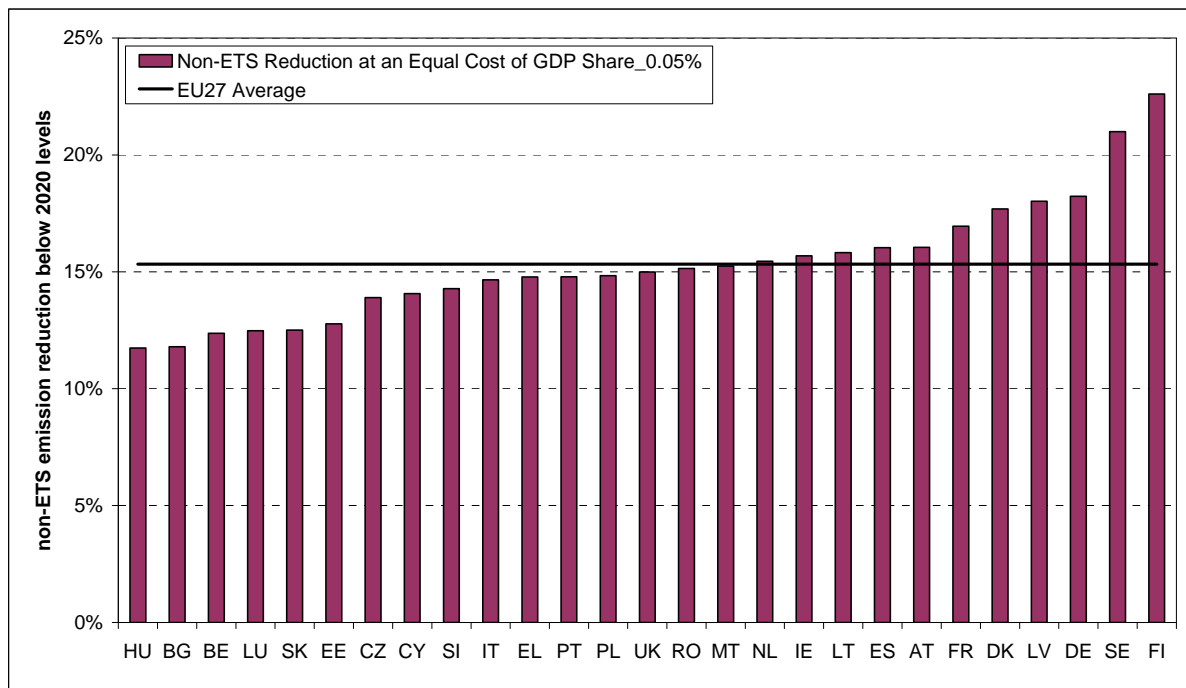
We have calculated this by applying the EU27 average abatement cost for achieving a 16% non-ETS reduction below 2005 levels as a percentage of GDP in 2020 for each Member State. Every country would have to reduce their non-ETS emissions until their abatement

arrangement. Instead, the marginal abatement costs are used only to provide an indication of where the low cost abatement potential exists within the EU27.

²⁰ However Member States with low cost potential often do not have the necessary investment capital to realise their abatement options.

costs are equal to 0.05 per cent of their projected GDP in 2020.²¹ The fact that the total abatement costs are determined by total GDP ensures that the relative wealth loss is equal across all countries.

Figure 4 Distribution Key for Scenario 3



Source: Low Growth POLES Scenario data accessed via the ClimStrat tool (2011)

3.2.4 Share of non-ETS emissions in 2020 (4)

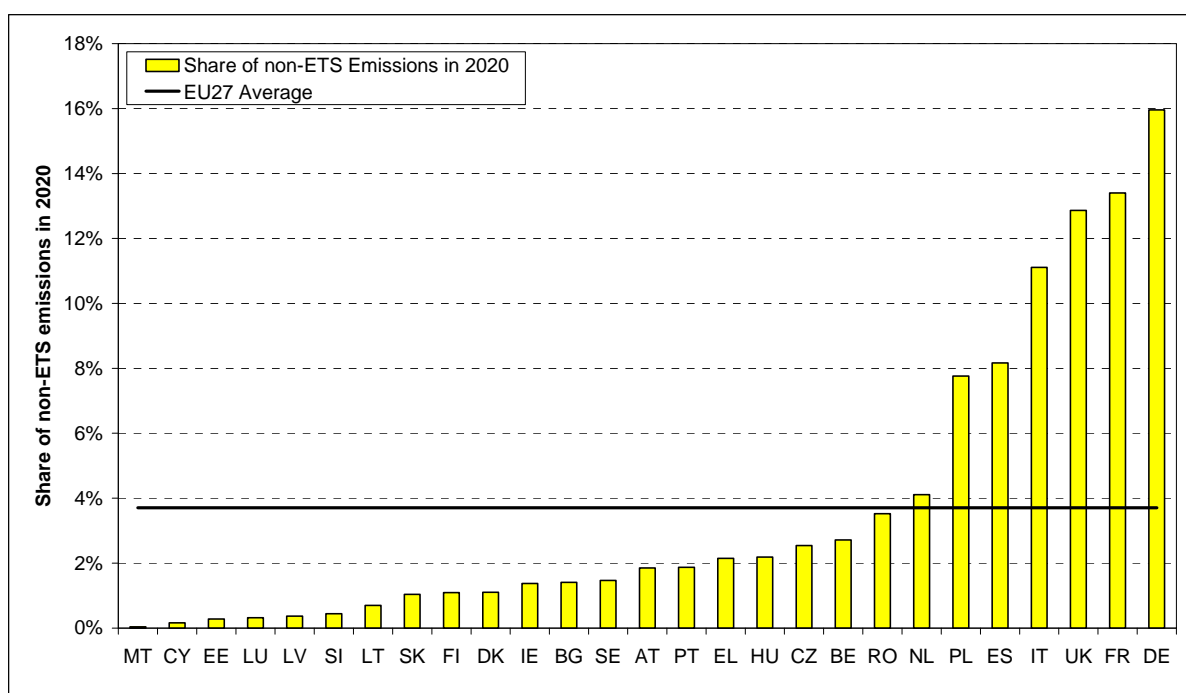
This distribution key was based on the Commission’s proposal in 2008 and the distribution key is thus Member State share of total non-ETS emissions in 2020.

The approach and the associated scenario differ from the previous three. The reduction effort of each Member State was calculated in a straightforward way by multiplying the total additional non-ETS reduction for the EU27 in the 30 per cent case by the share of each Member State’s non-ETS emissions in 2020.²² The assumed non-ETS emission shares of all the Member States in 2020 are illustrated in Figure 5

²¹ POLES scenario 4_Low Growth was used in this study to project the GDP of each Member State in 2020. The projection assumes that several Member States will have a lower GDP than in 2008.

²² CEC (2008) Proposal for a Decision of the European Parliament and the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community’s greenhouse gas emission reduction commitments up to 2020. Brussels, 23.1.2008.

Figure 5 Distribution Key for Scenario 4



Source: CITL submission (2010); UNFCCC submission (2010)

3.3 Comparison of the effects of the four distribution keys

For every scenario considered in this study an additional non-ETS reduction of 178 MtCO_{2e} is achieved in total, which is equivalent to a non-ETS reduction of 6 per cent below 2005 emission levels.

The additional non-ETS reduction targets under the four scenarios are displayed for all of the Member States in Table 2. The distribution of the additional effort is described in terms of an additional reduction (in percentage points) relative to the existing non-ETS target in the 20 per cent case and as an absolute emission reduction (in MtCO_{2e}) below 2005 levels.

An illustration of how the additional non-ETS reduction effort could be distributed amongst the Member States, based upon effort sharing principles, is presented in Figure 6, Figure 7, Figure 8 and Figure 9. In each of the following graphs, three important variables are shown. Firstly the non-ETS emissions limit in the 20 per cent case for each of the Member States. Secondly the additional non-ETS reduction allocated to each Member State in the 30 per cent case. Thirdly, the black bar represents the new level of non-ETS emissions for each Member State in 2020 in the 30 per cent case.

Table 2 Distribution of non-ETS additional reduction targets in 2020 ²³

			Scenario 1 (GDP/Cap)		Scenario 2 (MAC 2020)		Scenario 3 (Equal Cost per GDP)		Scenario 4 (COM Proposal)		
	non-ETS 2005	20% Target		Additional non-ETS reduction		Additional non-ETS reduction		Additional non-ETS reduction		Additional non-ETS reduction	
	[Mt CO2e]	[% of 2005]	[Mt CO2e]	[% points]	[Mt CO2e]	[% points]	[Mt CO2e]	[% points]	[Mt CO2e]	[% points]	[Mt CO2e]
AT	59	-16%	-10	-8%	-5	-5%	-3	-6%	-4	-6%	-3
BE	86	-15%	-13	-7%	-6	-4%	-3	-4%	-3	-6%	-5
BG	32	20%	6	-3%	-1	-10%	-3	-3%	-1	-8%	-3
CY	5	-5%	0	-5%	0	-5%	0	-5%	0	-6%	0
CZ	63	9%	6	-5%	-3	-8%	-5	-5%	-3	-7%	-5
DK	37	-20%	-7	-7%	-3	-6%	-2	-7%	-3	-5%	-2
EE	7	11%	1	-4%	0	-9%	-1	-4%	0	-7%	0
FI	35	-16%	-6	-7%	-3	-8%	-3	-10%	-4	-6%	-2
FR	420	-14%	-59	-6%	-27	-6%	-24	-7%	-28	-6%	-24
DE	500	-14%	-70	-7%	-33	-7%	-36	-8%	-38	-6%	-28
EL	60	-4%	-2	-5%	-3	-6%	-4	-5%	-3	-6%	-4
HU	54	10%	5	-3%	-2	-6%	-3	-3%	-2	-7%	-4
IE	46	-20%	-9	-8%	-4	-7%	-3	-6%	-3	-5%	-2
IT	344	-13%	-45	-6%	-20	-4%	-15	-5%	-18	-6%	-20
LV	8	17%	1	-3%	0	-9%	-1	-7%	-1	-8%	-1
LT	16	15%	2	-3%	-1	-10%	-2	-6%	-1	-8%	-1
LU	11	-20%	-2	-8%	-1	-4%	0	-4%	0	-5%	-1
MT	1	5%	0	-4%	0	-10%	0	-6%	0	-7%	0
NL	132	-16%	-21	-8%	-10	-6%	-8	-6%	-8	-6%	-7
PL	184	14%	26	-3%	-6	-9%	-16	-5%	-10	-8%	-14
PT	50	1%	0	-4%	-2	-6%	-3	-5%	-3	-7%	-3
RO	80	19%	15	-3%	-2	-10%	-8	-5%	-4	-8%	-6
SK	25	13%	3	-4%	-1	-8%	-2	-4%	-1	-7%	-2
SI	11	4%	0	-5%	-1	-6%	-1	-5%	-1	-7%	-1
ES	245	-10%	-24	-5%	-13	-7%	-18	-6%	-15	-6%	-15
SE	48	-17%	-8	-8%	-4	-6%	-3	-9%	-4	-5%	-3
UK	413	-16%	-66	-7%	-29	-3%	-12	-5%	-22	-6%	-23
EU27	2973	-9%	-276	-6%	-178	-6%	-178	-6%	-178	-6%	-178

Source: Öko Institut Calculation (2011)

Scenario 1 reflects the differences in the economic resources available in different Member States to contribute to the additional non-ETS reduction effort. Given that Luxembourg has the highest GDP per capita of all the Member States, the country receives the most stringent additional non-ETS reduction target of -8 percentage points. In contrast, Bulgaria is characterised by a low GDP per capita and therefore is allocated the lowest additional non-ETS reduction target of only -3 percentage points, which will still enable the country to increase their non-ETS emissions by 17 per cent compared to 2005 levels in 2020 in the 30 per cent case (Figure 7).

Scenario 2 is based upon the principle of cost efficiency and distributes the additional non-ETS reduction effort to the Member States according to the availability of low cost abatement potentials. Romania receives the most ambitious additional non-ETS reduction of -10 percentage points. Figure 3 shows that Romania is associated with relatively low abatement costs in the POLES model. In contrast, the UK is set the lowest additional non-ETS reduction target of -3 percentage points due to the fact that the potential to reduce non-ETS emissions cheaply are limited in this country according to the marginal abatement cost curves in the POLES model (Figure 8).

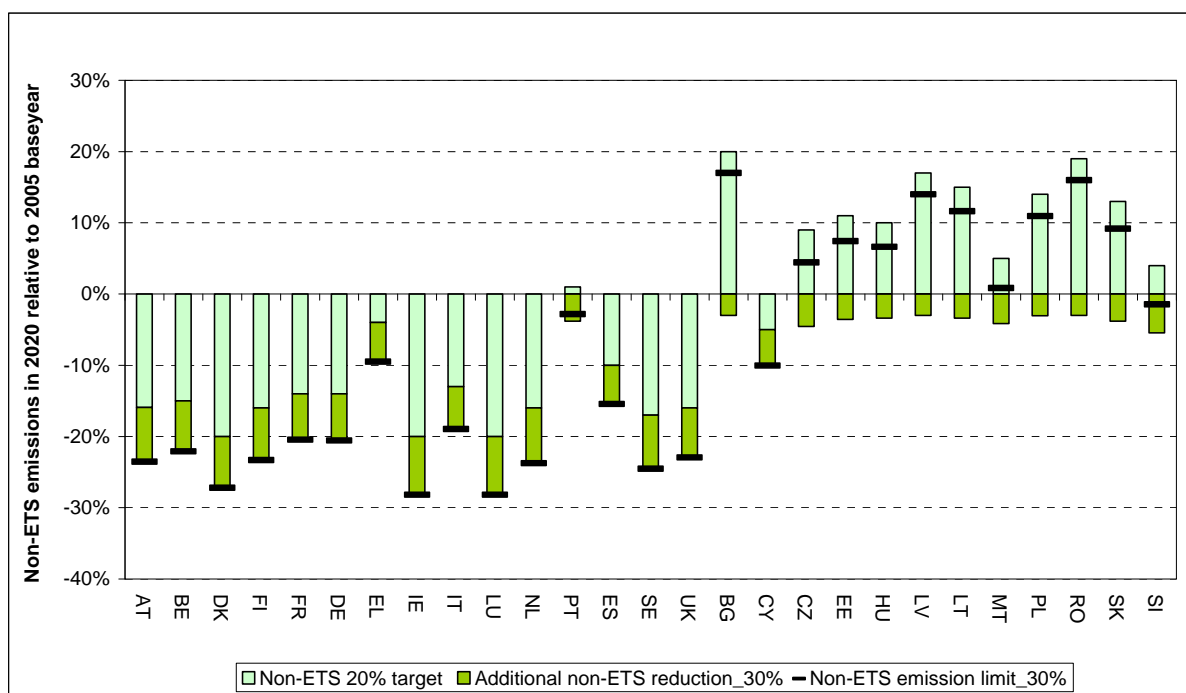
Scenario 3 is also based on marginal abatement costs but modifies this approach by taking account of the differences in the economic resources available. Under this distribution key

²³ The non-ETS reduction target below 2005 emission levels in the 20 per cent case in Table 2 slightly differs from the 10 per cent target specified by the Commission; this is due to the use of different emission inventories as the basis for the respective calculations.

non-ETS abatement potential is only realised up to a cost of 0.05 per cent of a Member State's projected GDP in 2020 and the non-ETS reductions that could be achieved determines the additional non-ETS targets allocated for each country. As a consequence, Bulgaria receives the lowest additional non-ETS reduction target of -3 percentage points under this scenario, which reflects the fact that although Bulgaria has low cost abatement potential the country has less financial capacity to achieve these non-ETS reductions. In contrast, Finland receives the highest additional non-ETS reduction target of -10 percentage points because the country has a greater financial capacity to realise their non-ETS reduction abatement potential (Figure 9).

Scenario 4 allocates the additional non-ETS reduction amongst the Member States based upon their share of the total non-ETS emissions in 2020. Under this distribution key, countries such as Lithuania and Romania are expected to reduce their emissions by -8 percentage points. Given that many of the poorer Member States are allowed to increase their emissions under the Effort Sharing Decision in the 20 per cent case, the allocation of the additional non-ETS effort based upon this distribution key results in higher reduction targets for these Member States.²⁴

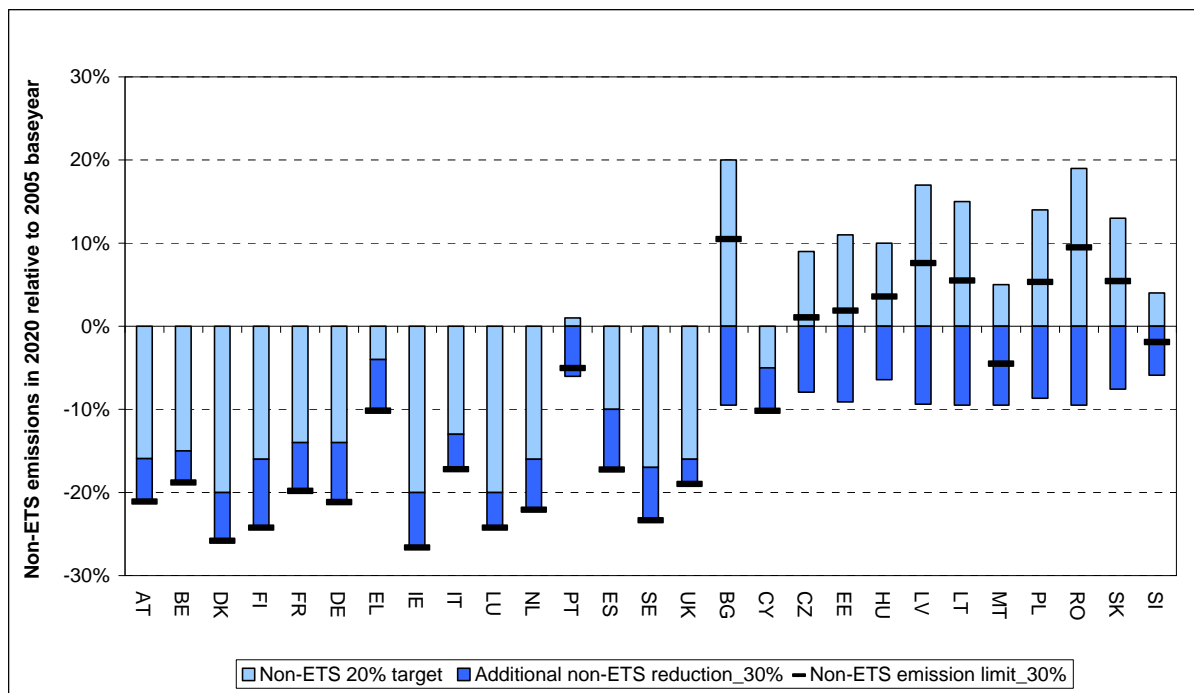
Figure 6 Distribution of additional non-ETS reduction effort according to Scenario 1



Source: Öko Institut Calculation (2011)

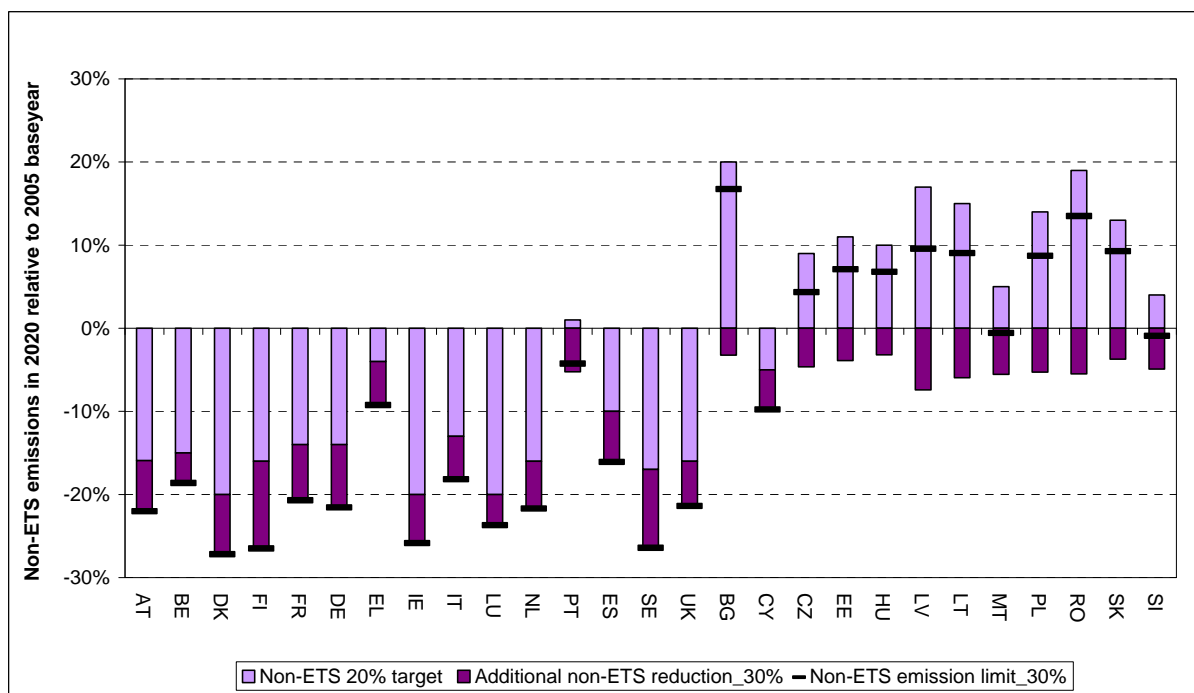
²⁴ The black bars in Figure 6, 7, 8 and 9 represent the non-ETS emission level of each Member State in 2020 after the additional reduction targets have been achieved in the 30 per cent case.

Figure 7 Distribution of additional non-ETS reduction effort according to Scenario 2



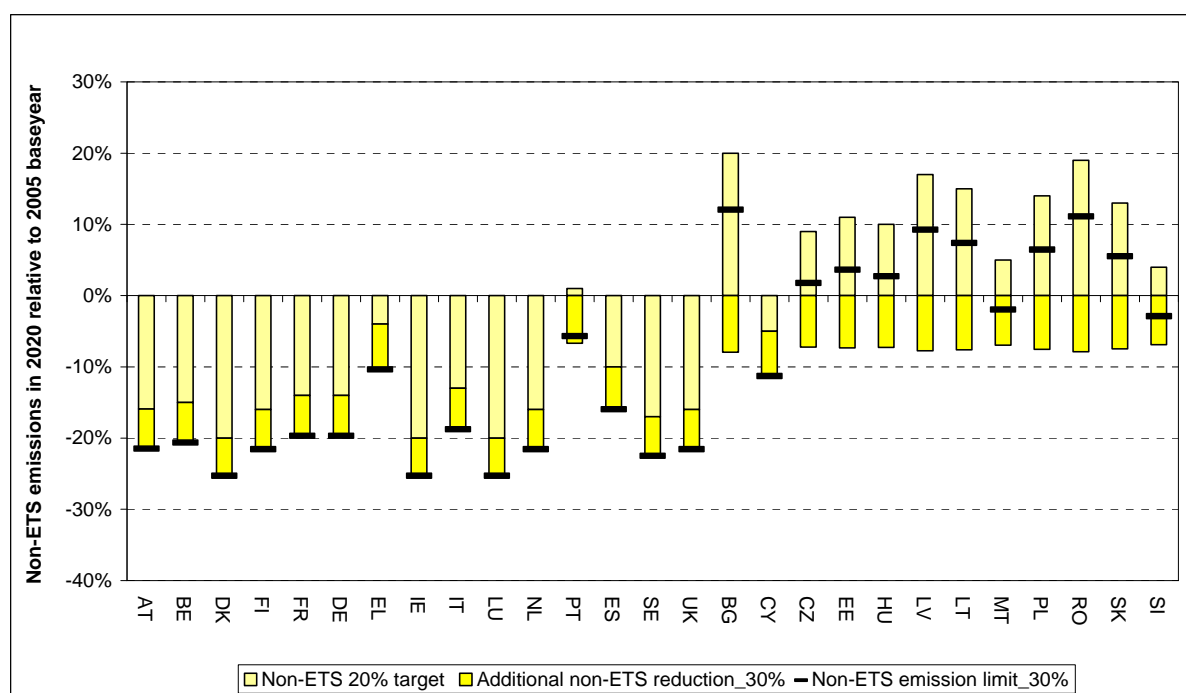
Source: Öko Institut Calculation (2011)

Figure 8 Distribution of additional non-ETS reduction effort according to Scenario 3



Source: Öko Institut Calculation (2011)

Figure 9 Distribution of additional non-ETS reduction effort according to Scenario 4



Source: Öko Institut Calculation (2011)

3.4 The additional cost of non-ETS reductions in 2020

The additional cost of the non-ETS reduction effort has been estimated for each Member State under the four scenarios using marginal abatement cost curves from the POLES model in 2020. The basic approach involved three main steps.

Firstly it was necessary to estimate the cost of the non-ETS reduction effort in the 20 per cent case, which was determined by setting an emission limit in 2020 for each Member State based on the non-ETS emission targets agreed in the Effort Sharing Decision. The domestic abatement cost associated with each Member State reaching their emission limit in 2020 was then derived from the marginal abatement cost curves.

Secondly the cost of the non-ETS reduction effort in the 30 per cent case was estimated based on the emission targets that were allocated to each Member State under the four scenarios. Based upon these non-ETS reduction targets, lower emission levels in 2020 were set for each Member State compared to the 20 per cent case and the marginal abatement cost curves were again used to derive the domestic abatement costs.

Thirdly the additional cost of the non-ETS reduction effort was then simply calculated by subtracting the non-ETS reduction costs in the 30 per cent case from the 20 per cent case.

Table 3 An estimation of the additional cost of non-ETS reductions in 2020 ²⁵

	Additional Cost in 2020 for the EU27 [M. €]
Scenario 1 (GDP per capita)	-4,300
Scenario 2 (MAC 2020)	-3,500
Scenario 3 (Equal Cost per GDP)	-3,900
Scenario 4 (COM Proposal)	-3,400

Source: Öko Institut Calculation (2011)

The illustrative additional costs in 2020 for the EU27 under the four effort sharing scenarios are outlined in Table 3 and are relative to the 2020 baseline associated with the low economic growth POLES model run (See Annex C).²⁶ In the 20 per cent case, the non-ETS reduction cost for the EU27 is estimated to be approximately €1.7 billion in 2020. In contrast, if the 30 per cent target was agreed upon by the Member States then the additional cost in the non-ETS sector for the EU27 in 2020 would be between approximately €3.4 and €4.3 billion depending upon the scenario.

The variation in the additional cost in 2020 for the EU27 reflects the fact that Member States have different non-ETS reduction targets under the four scenarios, which will result in either an increase or decrease in their additional cost in 2020. The allocation of the additional non-ETS reduction based upon the principle of marginal abatement cost (Scenario 2), whereby countries with cheaper abatement options are expected to accept higher non-ETS reduction targets, would require lower levels of financial resources in 2020 than for alternative allocation methods (Scenario 1 and 3) that are perceived as being fairer.

4 UNLOCKING ADDITIONAL GREENHOUSE GAS EMISSION REDUCTIONS

All of the distribution keys that we have explored allocate some responsibility to all Member States for making the additional greenhouse gas reductions associated with a more ambitious target. They are therefore in line with the approach taken in the climate and energy package. No Member State is outside the sharing of responsibility. While the distribution key based on GDP per capita minimises the share of less affluent Member States, the distribution key based on cost efficiency allocates a greater share of the additional savings to a group of the relatively less affluent Member States.

²⁵ Given that Scenario 4 (COM proposal) was based upon a different methodology to the remaining scenarios in Table 3, the illustration of cost for this scenario is not directly comparable to the other scenarios.

²⁶ The additional cost of the non-ETS reduction in 2020 is calculated based on the low growth scenario of the POLES model marginal abatement cost curves. The additional costs in 2020 presented in Table 3 are not comparable with figures released by the Commission projecting the additional cost in 2020 for the EU27 from moving from the 20 per cent to 30 per cent target. Differences in modelling techniques, assumptions (i.e. GDP development, energy efficiency improvements and renewable energy deployment within the POLES model run baseline, definition of cost) and the coverage of emissions (i.e. ETS and or non-ETS) make direct comparisons difficult.

Whatever the distribution of effort, and the share of the non-ETS sector, significant public and private investment is likely to be required on a relatively short time scale in order to help unlock additional greenhouse gas emission reductions. This will take place against a background, at least in the first years, of fiscal restraint and a significant EU commitment to help finance climate action outside its borders as well. Consequently, distributional issues will be sensitive and will influence the composition of the final decision.

For the Union as a whole the additional cost-effective potential tends to be located in the less affluent Member States, most of which will have relatively fewer resources to access such a potential. This makes it doubly important to examine the financial resources which could be mobilised in support of a 30 per cent target, as recognised in the Commission's analysis of the options for moving beyond the 20 per cent target when it observed that it would be "necessary to mobilise the public and private financial resources to enhance emission reduction without jeopardising economic growth" and that the EU's cohesion policy would be an important instrument in this regard.

There is increasing interest in where such financing might come from, as evidenced for example in the increasing attention paid to the so-called innovative financial mechanisms. There is also a substantial debate about the way in which existing EU funds should be spent, a debate that is intensifying as the negotiation of the next multi-annual financial framework progresses. In addition, it should be noted that the climate and energy package also contains some opportunities for raising revenue either flowing to the government exchequers or to the private sector.

In section 4.1 we begin by exploring some of the mechanisms contained in the climate and energy package which have the potential to generate revenue, and consider how these might evolve, given a more ambitious target. We also consider the controversial issue of surplus AAU under the Kyoto Protocol (Section 4.1.3). In Section 4.2 we focus on the EU budget in the context of the recent budget review and the current preparation of a legislative proposal for the post-2013 multi-annual financial framework²⁷ which will define the spending priorities and overall envelope of EU funding in the 5-7 years following 2013. Because of the need for fiscal restraint, and because of new challenges such as addressing climate change, the discussion about how the EU raises the money that it spends is also resurfacing. We consider some of the options on the table, as these have direct relevance to the topic of our paper.

²⁷ Most EU Member States now engage in setting multi-annual spending priorities over the medium term. Since 1988, this is also the case for the EU as a whole and so far four 'multiannual perspectives' have been adopted, each lasting five to seven years. These are now referred to as 'multiannual financial frameworks'. The MFF sets an overall budgetary ceiling to keep expenditure within the Community's 'own resources' and in this way forms an overarching framework for the negotiations between the Commission, the Council and the Parliament on the annual budgets for the duration of the financial framework. The Lisbon Treaty introduced a number of changes in relation to budgetary and financial matters. They include the formalisation of the practice of drawing up a MFF by introducing this in the Treaty of the Functioning of the European Union (TFEU) as well as the procedures through which the framework should be adopted. The legislative proposal for the next MFF is expected in July 2011.

4.1 Review of potential revenue and investment streams from ‘flexibility mechanisms’

There are various ‘flexibility mechanisms’ in the climate and energy package with potential for generating additional revenue, to contribute to meeting a more ambitious target. Mobilising some of these resources in the less affluent Member States might contribute to making a 30 per cent target more acceptable for some that might otherwise find additional reduction commitments difficult to agree to.

4.1.1 Flexibility in the Effort Sharing Decision

There is some room for flexibility in the Effort Sharing Decision, notably through transfer of (a part of) annual emission allocations (AEAs)²⁸ between Member States, and through the so-called Community-level ‘project activities.’ These are in effect Kyoto Protocol Joint Implementation Projects implemented on EU territory.

Transfer of Annual Emission Allocations

The Effort Sharing Decision allows Member States to transfer a part of their annual emission allocation to other Member States (Art. 3 §4-5). This was justified (in Recital 10) with reference to evening out the differences in abatement costs faced by different Member States, increased geographical flexibility, and as a means of enhancing the overall cost-effectiveness of the total commitment of the Community. Such transfers may be carried out in a way that is ‘mutually convenient’ including by means of auctioning, the use of market intermediaries acting on an agency basis, or by way of bilateral arrangements.²⁹ Trading in AEAs will be possible from January 2013.³⁰

A Member State can transfer up to 5 per cent of its annual emission allocation for a given year to other Member States (§4). In addition, Member States can transfer any excess allocation (due to actual emissions being less than the allocation) to other Member States (§5). In both cases the transferring Member State (the seller) must be in compliance with the requirements of the Decision. The receiving Member State (the buyer) can use this transfer in any subsequent year to 2020.

As explained in Section 2, the balance struck between cost-efficiency and ‘fairness’ in the distribution of effort under the 20 per cent target meant that overall the cost of making the greenhouse gas reduction increased to the Union taken as a whole. The Article 3 flexibilities allowing Member States to transfer 5 per cent of their allowance in any year, as well as unlimited surplus allowances, to other Member States, in principle allows the ‘system’ to adjust itself back in the direction of cost-efficiency. They also constitute a potential source of revenue for Member States, in particular those who may find themselves with surplus AEAs.

²⁸ Article 2 § 2 of the Effort Sharing Decision defines Annual Emission Allocations as “the annual maximum allowed greenhouse gas emissions in the years 2013 to 2020.”

²⁹ Thus, at one end of the spectrum such exchanges may take place in a more or less liquid market situation, similar to, but distinct from, the trading in the EU ETS. At the other end of the spectrum, AEA exchanges may mostly be bi-lateral exchanges between governments.

³⁰ Point Carbon (November 2010) New EU market could create huge CER demand: analysts <http://www.pointcarbon.com/news/1.1487660>.

As such, transfers are not expected to begin before January 2013, there is presently little information available on the extent of the surplus or which Member States may be in possession of such surpluses. However, in the present situation of public sector fiscal constraint, finance ministries are likely to begin to look at this more closely alongside the role of innovative financial instruments. According to one source, the EU Commission expects 10 countries (Bulgaria, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Portugal and Romania) to have surplus AEA with the current 20 per cent target.³¹ We are not aware of any sources on the precise scale or distribution of surpluses under a more ambitious target. The distribution of surplus would be strongly influenced by a) the ETS/non-ETS split, and b) the distribution of effort between Member States in respect of the sectors covered under the Effort Sharing Decision.

However, for some Member States, transfers could be a significant source of revenue, depending on the size of the surplus and the price that such transferred AEAs were able to fetch. As we are talking about a market 'in the making', the estimation of the price of AEAs is an uncertain science. According to Point Carbon, while the value and volume of trade in AEAs is likely to be low with the existing 20 per cent target, both could increase if the EU was to move to a 30 per cent target. Point Carbon suggests that in this case, the price of AEAs could go from €4-5 to €30-55. This suggests that, while an increase in the ambition of the overall EU target would reduce the number of surplus AEAs for a given Member State, the increase in the value of AEAs might well more than compensate for this. Detailed modelling of how this might affect different Member States is beyond the scope of this paper but this is a potential means of transferring funds to less affluent Member States.

It could also be explored whether it would be appropriate to increase the 5 per cent limit on transferable AEAs (in addition to any surplus) as an accompanying measure to a more stringent target. This would have the effect putting more AEAs in circulation, which would, ceteris paribus, put a downward pressure on the price but may increase the potential revenue further for some Member States with the potential to make lower cost mitigation investments.

'Project activities' (Kyoto Protocol Joint Implementation projects based in the EU)

Another opportunity for flexibility under the Effort Sharing Decision relates to the use of credits from Community level 'project activities' as defined under Article 5. These are essentially the Joint Implementation projects³² under the Kyoto Protocol, but in this case between EU Member States.

³¹ Point Carbon (November 2010) *ibid*.

³² "Joint Implementation," is defined in Article 6 of the Kyoto Protocol, and allows a country with an emission reduction or limitation commitment under the Kyoto Protocol (Annex B Party) to earn emission reduction units (ERUs) from an emission-reduction or emission removal project in another Annex B Party, each equivalent to one tonne of CO₂, which can be counted towards meeting its Kyoto target. http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php

Article 5 (§7) of the Effort Sharing Decision enables a given Member State to achieve *any* quantity of its emission reductions in another Member State through the Joint Implementation mechanism under the Kyoto Protocol.

The use of Community-level project activities can be seen as an additional device for allowing the overall 'system' to adjust itself in the direction of cost-efficiency. In this case the direction of investment would be from those Member States with challenging targets and comparatively expensive abatement options, to those Member States with less expensive abatement options. As such it is a way of generating investments in Member States with a relatively cost-efficient emission reduction potential, against a contribution to the emission reduction target for the investing Member State. While the transfer of AEAs would generate income to governments, internal EU Joint Implementation projects would generate a flow of income to the private sector.

Figure 3 gave an illustration of the geographical distribution of the cost efficient potential for additional greenhouse gas emission reduction, echoing the Commission's 2010 Communication that much of the additional cost-efficient potential is to be found in less affluent Member States. All other things being equal, this mechanism could therefore be a way of mobilising an investment flow towards a sizeable group of less affluent Member States.

More affluent Member States can choose whether they prefer to make more expensive reductions domestically, or whether they prefer to make the savings more cheaply in another Member State. As such its logic is different from flexibility relating to the transfer of AEAs. But it could have advantages in terms of inward investment for less affluent member states with a significant cost-efficient potential for emission reductions.

Overall, the more the distribution of effort is based on cost-efficiency, the less likely Member States would be to make use of this mechanism. Conversely, the more it is based on a wealth based distribution key, the more likely will be the use of Community based project based activities. Since the distribution of effort between Member States in the non-ETS sectors is already based on GDP per capita, we might, *ceteris paribus*, expect there to be some interest in this option.

All Member States will have more challenging individual targets with a more ambitious overall EU target. Therefore, a more ambitious target, all other things being equal, would also be likely to increase this form of investment flow from affluent Member States with relatively more expensive abatement options to Member States with relatively less expensive abatement options (see also Section 3.2.3).

Whether it could be deployed in practice on any scale in the non-ETS sector is less obvious however. It remains to be seen how such investments might be concretised given the multiple smaller scale dispersed mitigation options that tend to characterise the potential in the effort sharing sectors. Furthermore, Joint Implementation, as presently constituted, is inextricably linked to targets under the Kyoto Protocol. At the time of writing, it is still uncertain whether there will be a second commitment period under the Protocol. In principle, if there were no second commitment period, there would be no Community-level

‘project activities.’ One option, favoured by some, would be for the EU to set up its own Joint Implementation mechanism even if the Kyoto Protocol and its mechanisms do not go beyond one commitment period. However, this would require time and further internal negotiations.

The question is also whether this is politically viable on a large scale. In addition to the challenges of implementing such activities (including monitoring and verification, and ensuring the environmental integrity of such schemes), we might also question whether more affluent Member States might not wish to make such investments internally, to put their own domestic economies on track for a low carbon transition. While in the short term it may be attractive and tempting to go for cheaper savings outside, there will arguably also be an opportunity cost attached to such external investments in a carbon constrained world.

4.1.2 *Auctioning allowances under the revised ETS Directive*

Changes made by the 2009 ETS Directive amending its 2003 predecessor included provisions regarding the auctioning of allowances. It also sets out the basis upon which allowances were to be distributed between Member States. A total of 88 per cent of allowances were distributed according to Member States’ share in verified emissions under the EU ETS in 2005 or the average for the period from 2005-2007 (whichever was highest). This approach is effectively a form of ‘grandfathering.’

The remaining 12 per cent was distributed on a different basis with 10 per cent distributed among certain Member States for the purpose of ‘solidarity and growth’ within the Community, thus increasing the number of allowances of certain Member States by a percentage specified in Annex IIa of the Directive (Table 4). Two per cent of allowances were distributed in recognition of ‘early effort’ to achieve a reduction in greenhouse gas emissions. These were allocated to the Member States that were, in 2005, at least 20 per cent below their emissions in the base year applicable to them under the Kyoto Protocol. The Member States concerned and their proportion of the share of the 2 per cent are set out in Annex IIb of the Directive (Table 5). It can be seen from Table 4 and Table 5 that all of the nine Member States who received ‘early effort’ allowances also received ‘solidarity and growth’ allowances and that less affluent Member States figure prominently on both lists.

Table 4 Increase in Member State allowances for the purpose of ‘solidarity and growth’

Member State	%
Belgium	10
Bulgaria	53
Czech Republic	31
Estonia	42
Greece	17
Spain	13
Italy	2
Cyprus	20
Latvia	56
Lithuania	46

Luxembourg	10
Hungary	28
Malta	23
Poland	39
Portugal	16
Romania	53
Slovenia	20
Slovakia	41
Sweden	10

Source: Annex IIa of Directive 2009/29

Table 5 Distribution of ‘early effort’ allowances

Member State	%
Bulgaria	15
Czech Republic	4
Estonia	6
Hungary	5
Latvia	4
Lithuania	7
Poland	27
Romania	29
Slovakia	3

Source: Directive 2009/29 Annex IIb

While Member States determine the use of revenues generated from the auctioning of both sets of allowances, at least 50 per cent “should”³³ be spent on one or more of a menu of nine activities relating to the mitigation of, as well as the adaptation to, climate change.

A more ambitious target would mean the tightening of the ETS cap. There would thus be fewer allowances for all Member States to auction. At the same time we might expect a tightening of the cap to increase the value of allowances.

The existing distribution of allowances on the basis of Member States’ share of verified emissions (in 2005) appears to make the at least implicit assumption that the location of the cost efficient potential *within* the ETS follows the scale of verified emissions in a straightforward way, and that this approach to distributing allowances therefore is a cost efficient distribution of allowances *between* Member States. The ‘early effort’ and ‘solidarity

³³ Art. 1(§11).

and growth' adjustments might then be seen as kind of departure from this cost efficient equilibrium. On this basis such allowances could then, ceteris paribus, be conceived of as amplifying the potential revenue effect of a more ambitious target in the Member States concerned. The additional income would go to governments, while the costs would fall on industry, which would, to a greater or lesser extent, be able to pass these through to consumers depending on market conditions.

The distribution of allowances between Member States could in principle be adjusted further to favour certain countries as part of a package of measures to meet the 30 per cent target. The impact on the ETS system would have to be examined.

4.1.3 Revenue streams from flexibility mechanisms in the Kyoto Protocol

Parties with commitments under the Kyoto Protocol (Annex B Parties) have accepted targets for limiting or reducing emissions. These targets are expressed as levels of allowed emissions, or "assigned amounts" over the 2008-2012 commitment period. The allowed emissions are divided into "assigned amount units" (AAUs).

There are three flexibility mechanisms under the Kyoto Protocol: emission trading, the Clean Development Mechanism (CDM) and Joint Implementation. The latter two are also known as the project-based mechanisms and their allowances can be traded on the carbon market. Joint Implementation enables industrialised countries to carry out projects with other developed countries and the aspect relevant to this study, ie where only EU Member States are involved, was discussed in Section 4.1.1. The Clean Development mechanism aims to spur investment in sustainable development projects that reduce emissions in developing countries. CDM is therefore not relevant in this context. So the focus is here is on AAU trading.

Assigned Amount Units trading

Under the Kyoto Protocol, the Assigned amounts (AAs) represent the total greenhouse gas emissions that each Annex B country has agreed not to exceed in the first commitment period (2008 to 2012). An assigned amount unit (AAU) is equal to 1 tonne (metric ton) of CO₂-equivalent emissions.³⁴ Emissions trading, as set out in Article 17 of the Protocol, allows countries that have emission units to spare - emissions permitted them but not "used" - to sell this excess capacity to countries that are exceeding their targets (Article 3 §13).³⁵

It is estimated that industrialised countries with Kyoto targets have some 10 billion surplus credits under the Kyoto Protocol for the period 2008-2012. Europe is thought to have some

³⁴ IPCC (2001). Appendix II Glossary. IPCC Third Assessment Report - Climate Change 2001. Working Group III: Mitigation. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.grida.no/publications/other/ipcc_tar/?src=/climate/ipcc_tar/wg3/454.htm

³⁵ As noted above, it is not at present clear if there will be a second commitment period under the Kyoto Protocol. It is not clear either what the implications for the international carbon markets of this will be. This uncertainty can only have a dampening effect on the liquidity of that market and we should expect this to be increasingly the case as we move towards the end of 2012, if the future arrangements for the international market in emission reductions and removals are not clarified. The stabilising factor in this may be the importance of the EU-ETS in the context of global trading.

3 billion surplus credits.³⁶ The ten Central European Countries that joined the EU in 2004 are expected to collect some 2.2 billion surplus AAUs in total.³⁷ Poland is estimated to be the third largest holder of surplus AAUs after Russia and Ukraine. The European Investment Bank believes that Poland has some 500 million AAUs.³⁸

Such large excesses of credit are also seen as a threat to the environmental integrity of the Kyoto Protocol, and AAUs were therefore not permitted as currency in the context of the climate and energy package, to the chagrin of a number of Member States at the time. In the UNFCCC, a number of solutions have been put forward, notably in the run-up to COP15 in Copenhagen. It was for example proposed that the EU should buy up the surplus from the Community budget,³⁹ a proposal that did not meet with sufficient support to be taken forward. So far there is no agreement on the way forward, neither internationally or internally in the EU. The issue is due to be discussed at COP 17 in Durban at the end of 2011.

For the EU, some stakeholders remain in favour of an EU level financial mechanism that would buy up surplus AAUs accrued in Central and Eastern European Member States under the Kyoto Protocol. This is a development of the earlier idea of using the EU budget, and recognises the fact that alternative sources of financing would have to be found given the general picture of fiscal restraint. On this approach, the Member States concerned would in return commit themselves to investing the revenues of the AAU sales in emission reduction options contributing to a 30 per cent climate target. They would thus be required to go beyond their commitments in the climate and energy package under a 20 per cent target. This would in effect be a form of EU level Green Investment Scheme (GIS).⁴⁰

As noted above, opinions are divided on what to do with the large amounts of surplus AAUs at a global level, and in the context of this paper, on EU surplus AAUs in particular. While some stakeholders point out the untested nature of Green Investment Schemes,⁴¹ and certain find it tantamount to 'green wash', others point out that Member States with surplus are entitled to these AAUs (according to the Kyoto Protocol) and that the painful

³⁶ ENDS 21 October 2009, EU fails to agree strategy for surplus carbon credits. <http://www.endseurope.com/22438>

³⁷ EurActiv 22 October 2009, Russian 'hot air' threatens UN climate deal. <http://www.euractiv.com/en/climate-change/russian-hot-air-threatens-un-climate-deal/article-186633>

³⁸ ENDS 10 November 2009, Poland sells first surplus Kyoto carbon credits.

³⁹ Ibid.

⁴⁰ The Green Investment Scheme (GIS) is a form of AAU trading. It was introduced as an attempt to enhance the environmental integrity of such trading. The GIS aims to combine a transfer of AAUs with an activity that has a positive effect on GHG emission reductions and is financed with revenues from selling surplus AAUs.

⁴¹ The concept has only recently been tested in practice. There are no international regulations regarding the GIS. Its success in environmental terms, argues Fujiwara (2009) will depend on the credibility of the host country's pledge to implement actions, ranging from allocation of revenues to the designated activity to monitoring and verification of greening. (Fujiwara, N. 2009, Flexible Mechanisms in Support of a New Climate Change regime. The Clean Development Mechanism and Beyond. CEPS Task Force Report).

restructuring in Eastern Europe that followed in the wake of the fall of the Soviet Union, resulted in real emission reductions. Finally, some stakeholders take a more pragmatic stance, suggesting that addressing the AAU issue in this way may afford a way out of the current impasse between Member States over moving to a 30 per cent target.⁴²

The objections to a GIS deal on AAUs are clearly considerable and it would not be easy to agree a new EU funding line for this purpose, even if the value of AAUs was fixed at a modest level. However, the issue needs to be resolved eventually and there are merits in doing so now at a time when it could make the greatest impact both on the EU position and on the wider world at Durban. The option needs exploring further.

4.1.4 Concluding remarks

There are several flexibility mechanisms which have at least in principle, the potential to provide transfer of resources or other economic benefits to less affluent Member States and so could contribute to creating the conditions in which a 30 per cent reduction in EU emissions could be agreed. All are subject to some level of uncertainty; some particularly so. No one mechanism stands out as being clearly preferable in relation to efficacy, scale of contribution to the problem, fair and ethical or politically acceptable. However, they are not mutually exclusive and the possibility of deploying more than one mechanism could be the most attractive way of reaching a settlement and balancing the distributional outcomes.

For this reason there is a case for exploring each of these options further as a matter of some urgency, taking account of current and prospective market conditions as well as the importance of ensuring the safeguarding environmental integrity. Mechanisms which can be verified effectively and have low transaction costs have clear merits in this context. So do those which benefit national governments. This latter criterion could be an argument in favour of utilising higher levels of AEA trading and against the use of Joint Implementation, which faces other objections as well. Re-balancing ETS allowances might be a supplementary measure but could also weaken the carbon market unless the overall level of allowances was kept the same or reduced. Moreover, the signal for change in the Member States concerned would then be weakened. Finally, the adoption of a GIS approach, buying out AAUs on a conditional basis would raise considerable objections and a political challenge to secure the necessary funding but would resolve a long running conflict with benefit to the overall level of global emissions.

4.2 Review of potential sources of funding in the context of the EU budget

The preparatory work for the negotiation of the next multi-annual financial framework which will to a large extent define EU spending post-2013 and the five to seven years that follow is already well on its way. The legislative proposal for the next MFF is expected in July 2011. Directorate Generals and Member States have been gearing up for getting their slice

⁴² If the EU was to go forward with such a scheme, it would clearly be of the utmost importance to ensure its environmental integrity. In this context the World Bank's distinction between 'hard greening' and 'soft greening' is of interest. 'Hard greening' means that the activities financed through the proceeds of the sale have generated one unit of emission reductions measured against a baseline scenario describing what would have happened in the absence of the greening activity; and 'soft greening' means that the effective implementation of certain pre-defined activities such as implementation of a demand-side management programme, dismantling of energy subsidies, capacity building activities related to climate change and activities for managing the GIS (Fujiwara, N. 2009).

of the cake, all in the context of fiscal constraint. Baldock et al. (2011)⁴³ have recently argued that the next MFF is more important for the environment and the sustainability of the European economy than any of its predecessors. This is particularly pertinent in the context of European action on climate change mitigation (*and* adaptation). It is therefore useful to pause a moment to consider the political context against which the legislative proposal is being developed and against which an eventual agreement will be negotiated.

The current 2007-2013 MFF, was proposed by the Commission in 2004 in the Communication 'Financial Perspectives 2007-2013'.⁴⁴ It was the subject of a political agreement by EU Heads of State and Government in December 2005 and was finally agreed in a new Inter-Institutional Agreement with the European Parliament in May 2006. As such it reflected the political priorities at the time. Climate change has without a doubt moved closer to the centre of European policy since the 2007-2013 MFF was agreed, as is evidenced e.g. by the climate and energy package (agreed at the end of 2008) and the inclusion of current climate objectives as one of the five headline targets of the 2010 Europe 2020. Indeed, what was eventually to become the climate and energy package was launched at the March 2007 European Council Conclusions, just as the current MFF got underway.

It is fair to say therefore, that the EU budget is not at present well-aligned with policy priorities in respect of climate change, and we should expect there to be some attempt to bring the next MFF up to date. While finding the money will be an important challenge for the post-2013 MFF, at least as important will be ensuring that any spending in relation to climate change (however they are arranged) will have greater coherence, critical mass, strategic import and catalytic potential than was the case under the current MFF.

There are essentially three types of questions that will have to be addressed: what the money should be spent on (and on what grounds); the scale of funding; and the way in which that funding should be arranged in terms of the proportion of funding that is best spent through funding instruments which are not principally about the environment, and the proportion of spending that is best arranged through some form of dedicated funding instrument.⁴⁵

It is unlikely that the structure of the budget will change to a very great extent in terms of the different funding instruments in existence. It would however, given the need to align the EU budget with the extant political priorities, be reasonable to expect climate change related spending to account for a bigger part of the overall budget than is currently the case (assuming a stable budget or overall decrease, but an absolute increase in climate related funding).

⁴³ Baldock, D., Medarova-Bergström, K., Volkery, A., Gantioler, S., Hart, K., Kettunen, M., Schiellerup, P. (2011) The Post-2013 EU Multiannual Financial Framework: Time to be Bolder. IEEP Policy Brief 1/2011. February 2011.

⁴⁴ CEC (2004). Communication Financial Perspectives 2007-2013 (COM(2004)487)

⁴⁵ See Medarova-Bergström, K., Volkery, A., Schiellerup, P., Withana, S., Baldock, D. (2011) Strategies and Instruments for Climate Proofing the EU Budget. IEEP, Brussels.

Table 6 gives an overview of the existing funding instruments in the EU budget. It gives an impression of the scale of funding and how it is distributed between different funding instruments.

Table 6 Overview of EU funding instruments in the current MFF

Funding instrument	Sub-programme	2007-2013 budget allocations (€ Bill.)
Structural and Cohesion Funds (European Regional Development Fund, European Social Fund, Cohesion Fund)	Convergence objective	283
	Regional Competitiveness objective	55
	European Territorial Co-operation objective	8.7
European Agricultural Fund for Rural Development		95
LIFE+		2.1
European Fisheries Fund		3.8
European Union Solidarity Fund		Maximum 1 billion per annum
Civil Protection Financial Instrument		0.2
Competitiveness and Innovation Framework Programme	Entrepreneurship and Innovation Programme	2.2
	Information and Communication Technologies Policy Support Programme	0.7
	Intelligent Energy Europe Programme	0.7
Seventh, Research and Technology Development Framework Programme	Cooperation Programme	50.5
	The Ideas Programme	
	People Programme	
	Capacities Programme	

Source: IEEP (2010) Manual of European Environmental Policy

While there is scope for some climate change related expenditure under most funding instruments (with the possible exception of the European Fisheries Fund) the nature and scale of this is often difficult to get a handle on. The reasons for this are extensively discussed in Medarova-Bergström and Schiellerup (2011).⁴⁶ Both the 'what' and the 'how much' of EU budget spending on climate is will have to become a lot more transparent in

⁴⁶ Medarova-Bergström, K., and Schiellerup, P. (2011) Strategies and Instruments for Climate Proofing the EU Budget. Interim Report. IEEP, Brussels.

the future. Indeed such enhanced transparency is a sine qua non of climate proofing the budget.

It was clear from the recent Communication on the EU budget review⁴⁷ that the existing ‘mainstreaming’ approach to environmental policy is likely to continue to be the central plank of EU level spending on climate change, which means that we should continue to look for the bulk of climate related spending to come from existing funding instruments. Nevertheless, some form of dedicated climate funding instrument is under discussion. While at the end of the summer, the Commission was exploring a separate instrument on climate action, the option now under consideration by the Commission would be a joint environment and climate action funding instrument. Such an instrument would have both an adaptation and a mitigation concern.⁴⁸

Here we are not addressing the overall scale of funding which should be dedicated to climate change action in the next MFF, this is being addressed elsewhere, nor, directly, how this should be arranged (mainstreamed in other funding instruments or as part of a more dedicated instrument). We are however, addressing an aspect of the question of *what* such funding should be spent on. In particular we are interested in how the EU budget, and thus the next MFF, could be deployed to allow Member States that might otherwise have reservations e.g. on the grounds of cost, to feel more comfortable with a more ambitious target.

Of central importance in this context is the basis on which EU funds are currently distributed and any changes that might be required to this. There are a number of general ‘tests’ that EU funding has to meet, the mobilisation of such tests form part of the negotiation of the MFF. An important dimension of this is the extent to which the ‘added value’ of EU level spending as opposed to Member State level spending can be established.⁴⁹

These broader considerations are then concretised in the allocation principles (or distribution keys) for specific funding instruments. Taken together these form a picture of the geography of disbursements in the Union. Of particular interest in here are disbursements based on relative wealth and climate change. We therefore reviewed the allocation principles forming the basis of spending through existing funding instruments. This was in order to establish a picture of the funding instruments through which funding for climate change related measures is currently available and the extent to which this coincides with distribution of funding on the basis of relative wealth. This then allowed for an evaluation of the extent to which the ensemble of instruments that makes up the budget could help unlock ^{more} climate ambition by bringing together the presence of a cost-efficient

⁴⁷ CEC (2010) The EU Budget Review. COM(2010)700, Brussels, 19.10.2010.

⁴⁸ Two studies for DG Environment and DG CLIMA are currently underway exploring the dimensions of respectively LIFE and climate action in the context of the next MFF, both are due to report at the end of May 2011. At the beginning of the year, the Commission invited views on a future instrument on environment and climate change in a public consultation period ending in February 2011.

⁴⁹ See also Adelle, C., Baldock, D., and Pallemarts, M. (2008) Turning the EU Budget into an Instrument to Support the Fight Against Climate Change. Swedish Institute for European Policy Studies

potential, with inadequate resources to access this, as a rationale for distributing EU level funding.⁵⁰

4.2.1 **Review of funding instruments within the 2007-2013 MFF**

Structural and Cohesion Funding Instruments

The basis for allocating funding very much relates to relative wealth, and therefore could be used to direct funding towards regions where with a greater cost-efficient mitigation potential. However, some evolution would need to take place to ensure that funding reached areas within which such a cost-efficient potential was located, and it would be important that emission cuts were demonstrable and demonstrated, and locked in.

*European Agricultural Fund for Rural Development*⁵¹

Rural development support measures are based around four 'axes' of rural development. Axis 2 has the most opportunities for environmental spending. This aims to improve the environment and the countryside, including agri-environmental schemes and Natura2000 payments. There are also some opportunities in Axis 4 – Leader which includes area-based local development strategies, local public-private partnerships, bottom-up approach, multi-sectoral design and implementation of strategies.⁵²

Climate change related activities can be financed under different measures under Axes 2 and 4 and received stronger attention after the CAP Health Check in 2009 when it was identified as one of the 'new challenges' that the CAP faces. While there is thus some scope for targeting funding towards climate objectives on the one hand, and certain amounts have been reserved for convergence objectives, the geography of agricultural disbursements in relation to rural development therefore would appear to have little relationship to the geography of the cost-efficient mitigation potential. A significant change in the rationale for rural development funding would have to be made.⁵³

LIFE+

Indicative allocations among the 27 Member States are made on the basis of respective population size and density; the area of Sites of Community Interest (SCIs) under the Habitats Directive 92/43/EEC; and the percentage of a Member State's territory occupied by SCIs. A minimum of 78 per cent of the LIFE+ budget is required to be spent on projects in the Member States, whereas the remaining 22 per cent can be spent directly by the Commission. At least 50 per cent of the spending on Member State projects must be for the Nature and Biodiversity component of LIFE+. Although climate change action is integrated

⁵⁰ In the interest of economy, we only provide a very condensed version of the summary of the review here.

⁵¹ From IEEP (2010) Manual of European Environmental Policy.

⁵² From IEEP (2010) Manual of European Environmental Policy.

⁵³ In addition, the contribution of land-use, land use change and forestry, to the regulatory architecture that governs climate change still has to be determined. In relation to agriculture's role in mitigation, there is uncertainty in the science and the implementation challenges would be significant.

into LIFE+, it could not at present be said to drive the LIFE+ instrument in the way that the Nature and Biodiversity component does.

European Fisheries Fund

The EFF does not allow for climate change projects.

European Union Solidarity Fund

The mobilisation of the fund occurs on an ad-hoc basis. It is invoked by Member States which have to submit applications for assistance from the fund ten weeks after the first damage caused by the disaster. The fund is responsive only, and is therefore unsuitable as a source of funding for climate change mitigation. The fund is outside the MFF structure

Civil Protection Financial Instrument

While the Civil Protection Financial Instrument is not confined to responding, but does include e.g. prevention which would be of relevance in the present context. It is difficult to see how this could be made the home of significant climate change mitigation spending. Moreover, the instrument does not seem to have a geographical dimension which would enable such funding to be naturally targeted towards those member states where the most cost-efficient mitigation potential is available.

Competitiveness and Innovation Framework Programme

There seems little opportunity for guiding the funding available through CIP (even in the context of the Intelligent Energy Europe strand) towards areas where the greatest cost-efficient potential for mitigation exists. This would at least require some adjustment in the way in which funding is allocated.

Seventh, Research and Technology Development Framework Programme

While there is funding both for energy and for climate change in FP7 in terms of the funding of research, and while there is some attention to building and reinforcing research capacities in less well off areas of the Union in the Capacities programme, these are not brought together, and so would not provide a suitable base for funding additional climate ambition on a geographic basis.

Summary

Our review of the allocation principles for funding instruments under the existing MFF shows that while some instruments (and a high proportion of the overall funding due to the importance of the cohesion policy funding instruments) allocate by reference to the relative wealth of member states. It also shows that while there is scope for some climate change related expenditure under most instruments (with the exception of the EFF), none allocate funding with specific reference to the presence of EU level cost-efficient mitigation potential (nor indeed degree of vulnerability to climate change).

4.2.2 Looking towards the post-2013 MFF

This suggests that it might be appropriate to reconsider the allocation keys of some, if not all EU funding instruments in a way that starts to bring together, in a single allocation criteria the presence of cost-efficient mitigation potential of EU level significance AND lack of resources to access this potential without support. Here some are more obvious and

appropriate for the purpose than others, clearly there is already some precedent in the context of cohesion policy funding instrument. There may also be room in the context of agricultural policy funding, but this would have to be reconceptualised to include much more of a climate mitigation angle, and funding would have to be able to be targeted on the basis of a combination of the distribution of cost efficient mitigation potential and the availability of resources to access this. In relation to agriculture, potential savings are also more uncertain as are the extent to which they can be secured and locked in. Which instruments might be most relevant would clearly also depend on the nature of the mitigation potential. It may also be that at least some of this funding would be most appropriately located in the context of a new instrument for climate action (whether or not this eventually is a joint environment and climate instrument) as is currently under discussion.

4.2.3 *Raising EU level funding*

The issue of new 'own resources' for the EU budget has resurfaced in the context of national austerity and budget consolidation. Baldock et al. (2011) argue that this could be seen as a window of opportunity to appraise alternatives to at least some of what is currently three quarters of the EU budget revenues, i.e. direct contributions from Member States, as it offers a way of reducing the pressure on their balance sheets. The Commission has a clear interest in this and the issue was prominent in the Budget Review Communication. This put forward quite a bold non-exclusive list of 'potential candidates' for generating revenue which include an EU VAT, taxation on the financial services sector, on aviation, on energy, on corporate income and auctioning of EU-ETS allowances. In addition, the Commission has reiterated several times since then its determination to table a proposal for a Draft Decision on new own resources in June 2011. Environmental taxes are in principle complementary to other policies pursuing climate objectives in Europe and could raise considerable sums. Related revenue estimates need to be updated and some difficult questions addressed, such as the distribution of burdens on different Member States. The potential advantages of EU level environmental taxes or ETS auction revenues would be that they can be geared to EU ambitions with respect to climate and energy policies while fostering wider behavioural changes in consumption patterns and production processes. At the same time, the regressive nature of energy taxes and their interaction with fuel poverty would require examination. However, given the outlook for public financing, it is unlikely that the interest in other ways of raising revenue for the EU budget is going to go away, in spite of substantive reservations and political sensitivities.

4.2.4 *Concluding remarks*

The EU Budget for the period 2014-2020 is already a topic of fierce debate, with regard to the scale and composition of spending, the weight given to strategic themes, amongst them climate change, and the potential sources of revenue. A powerful group of Member States has declared a wish that the total EU Budget should be frozen at around its current level and therefore decline significantly in real terms by 2020. However, others, including the European Parliament, have greater ambitions for what might be included in a new Budget. New Member States will be sensitive to their share of expenditure. There is much to play for before an agreement is reached in 2013.

There are three possibilities for offering potentially helpful incentives for less affluent Member States in the context of the Budget.

Firstly, by the creation of a new fund dedicated to climate mitigation and adaptation issues, whether freestanding or forming part of a restructured LIFE + fund. The measures in such a fund could include support for a range of activities of particular relevance to new and less-affluent Member States including capacity building and measures targeted at energy efficiency.

Secondly, the existing funds, particularly ERDF, have considerable potential to address climate themes more fully, both through the use of ear-marked budget lines dedicated to mitigation of adaptation objectives, and through broader “mainstreaming” of climate objectives into other expenditure. The scope for larger scale infrastructure, energy conservation and renewable energy investment is particularly high and the share of new and less affluent Member States in the Cohesion Funds will be high.

Thirdly, the allocation of certain funds and the budgets within them between different Member States is derived on a variety of criteria, most of which are socio-economic. Environmental criteria could be introduced as a more prominent element in the “distribution key”, beginning with climate related criteria. One way of taking this forward would be to develop a “climate investment need” criterion on the basis of a ratio between the level of investment required in a country to comply with EU climate objectives and the resources available, which could be measured as GDP per capita as a simple proxy.

5 CONCLUSIONS

The distribution of the additional effort required to move to a 30 per cent target for emissions reductions is a matter of political sensitivity as well of technically and economically robust policy making. The purpose of this paper has been to identify a number of distribution options and their implications and so to contribute to the current debate on a new European target.

In the design of the 2008 climate and energy package, the EU has sought to strike a balance between a cost-effective route to emission reductions, and fairness between Member States. The geography of cost-effective savings in the Effort Sharing sectors remains a challenge that needs to be addressed.

Four different ways of distributing the additional effort required outside the ETS sector to meet a 30 per cent target were explored.

On the one hand Scenario 1 allocated additional effort on the basis of relative wealth, based on GDP per capita. At the other end of the spectrum, Scenario 2, allocated additional effort on the basis of where the most cost effective additional emission reductions could be found based on estimated marginal abatement curves. Scenario 3 represented a way of soften the impact of Scenario 2 on less affluent Member States by also taking account of relative

wealth. Finally, Scenario 4 followed quite a different logic, by allocating additional savings on the basis of Member State share of emissions by 2020.

Whatever the distribution of additional effort between Member States, significant public and private investment is likely to be required on a relatively short time scale in order to help unlock additional greenhouse gas emission reductions, particularly in Central and Eastern Europe. This will be all the more challenging since it will have to take place against a background, at least in the first years, of general fiscal restraint.

A second way this paper has sought to contribute to the debate has therefore been to review a diverse set of resources which might be mobilised in order to make more ambitious targets more acceptable to Member States with more limited resources. Potential revenue and investment streams from various flexibility mechanisms in the climate and energy package as well as in the Kyoto Protocol were considered, as were some options that could be taken forward in the context of the EU Budget.

As far as the review of flexibility mechanisms was concerned, a number of potentially interesting sources of revenue and investment were identified, all of which require further consideration as to the scale of benefit and workability. Some have potential to make a contribution to a political compact in which a 30 per cent target was accepted by all Member States.

With regard to the EU budget, the importance of the upcoming legislative proposal for the next MFF was highlighted, and three ideas were put forward as ways of addressing the lack of concordance within Europe between cost-effective reductions and the resources to access these. First is through a dedicated funding instrument on climate change within the next MFF structure; second is through 'ear-marking' dedicated funding *within* existing funding instruments such as the cohesion policy funds as well as by 'mainstreaming' climate policy objectives into other expenditures within these funds. The third is through the development of an allocation key for the distribution of key funds which could combine a climate indicator such as cost-effective mitigation potential, with an indicator referring to the capacity to access reductions.

There are in principle several different means by which resources may be mobilised in support of a 30 per cent EU economy-wide target. None are entirely straightforward and some have drawbacks. Nonetheless, the ensemble deserves further attention given the urgent need to resolve the 30 per cent issue in 2011.

ANNEX A: THE GREENHOUSE GAS EFFORT SHARING TOOL

Description of Approach

The function of the GHG Effort Sharing Tool is to allocate GHG reduction targets to the Member States in accordance with their performance in a range of socio-economic indicators. Based upon the distribution keys that have been selected in this study, the performance of each Member State according to GDP per capita, marginal abatement cost and equal cost per GDP share have been calculated. The indicator value of each distribution key for every Member State (Figure 10) is then used to determine the allocation of the additional non-ETS reduction effort. If a value is significantly above or below the average indicator value, the Member State with the extreme indicator value will be capped.

Figure 10 Indicator value table in the GHG Effort Sharing Tool

Member State	Distribution Key		
	GDP/Cap (2008)	MAC 2020	Equal GDP Share
	[1000 \$]	[€/t]	[%]
EU27	25.0	35	0.15
Austria	32.78	51.40	0.16
Belgium	30.69	64.13	0.12
Bulgaria	9.95	2.05	0.12
Cyprus	22.65	51.30	0.14
The Czech Republic	20.71	25.51	0.14
Denmark	31.17	45.36	0.18
Estonia	16.80	14.44	0.13
Finland	31.62	22.68	0.23
France	28.18	45.36	0.17
Germany	28.60	32.76	0.18
Greece	24.39	42.10	0.15
Hungary	16.01	39.64	0.12
Ireland	35.00	37.80	0.16
Italy	26.20	60.28	0.15
Latvia	14.54	11.88	0.18
Lithuania	15.98	10.87	0.16
Luxembourg	64.90	60.13	0.12
Malta	19.11	4.16	0.15
The Netherlands	33.30	42.84	0.15
Poland	14.71	18.58	0.15
Portugal	17.75	43.35	0.15
Romania	10.13	4.15	0.15
Slovakia	17.76	28.99	0.13
Slovenia	24.23	44.49	0.14
Spain	24.19	31.96	0.16
Sweden	32.46	40.31	0.21
The United Kingdom	30.11	71.90	0.15

Source: Öko Institut (2011)

In the user interface of the GHG Effort Sharing Tool it is possible to select, weight and scale the set of indicators. An indicator can be selected by assigning a weighting to the preferred criteria in the orange coloured cells. Ambitious and less ambitious reduction targets were set in the yellow coloured cells for three indicators providing an upper and lower limit for emission reductions (Figure 11). The reduction range for each indicator was set to ensure that a non-ETS emission reduction of 178 MtCO₂e was achieved. The Member State with the worst indicator score was attributed the maximum GHG reduction target, whilst the country with the best value was allocated the minimum GHG reduction target. The GHG reduction targets for the remaining countries were proportional to their indicator value within the range of non-ETS reductions that were specified.

Figure 11 Results table of the GHG Effort Sharing Tool

RESULT				Year	2005
Country	GDP/Cap (2008)	MAC 2020	Equal GDP Share	Non-ETS Emission Reductions from 2005	
	[%]	[%]	[%]	[%]	[Mt CO₂e]
Weighting	1.00	0.00	0.00		
Less Ambitious Reduction [%]	3	3	3	Min	3%
Ambitious Reduction [%]	8	10	10	Max	8%
	6%	6%	--	6%	178
Austria	8%	--	--	8%	5
Belgium	7%	--	--	7%	6
Bulgaria	3%	--	--	3%	1
Cyprus	5%	--	--	5%	0
The Czech Republic	5%	--	--	5%	3
Denmark	7%	--	--	7%	3
Estonia	4%	--	--	4%	0
Finland	7%	--	--	7%	3
France	6%	--	--	6%	27
Germany	7%	--	--	7%	33
Greece	5%	--	--	5%	3
Hungary	3%	--	--	3%	2
Ireland	8%	--	--	8%	4
Italy	6%	--	--	6%	20
Latvia	3%	--	--	3%	0
Lithuania	3%	--	--	3%	1
Luxembourg	8%	--	--	8%	1
Malta	4%	--	--	4%	0
The Netherlands	8%	--	--	8%	10
Poland	3%	--	--	3%	6
Portugal	4%	--	--	4%	2
Romania	3%	--	--	3%	2
Slovakia	4%	--	--	4%	1
Slovenia	5%	--	--	5%	1
Spain	5%	--	--	5%	13
Sweden	8%	--	--	8%	4
The United Kingdom	7%	--	--	7%	29

Source: Öko Institut (2011)

ANNEX B: THE ADDITIONAL COSTS IN 2020 BY MEMBER STATE

Figure 12 illustrates the additional non-ETS costs in 2020 by Member State relative to the baseline considered in the low GDP growth POLES model run.⁵⁴

Figure 12 An estimation of the additional non-ETS reduction cost in 2020⁵⁵

	Scenario 1 (GDP/Cap)	Scenario 2 (MAC 2020)	Scenario 3 (Equal Cost per GDP)	Scenario 4 (COM proposal)
	[M. €]			
AT	-113	-65	-77	-65
BE	-180	-77	-64	-143
BG	0	-5	0	-4
CY	-4	-4	-4	-9
CZ	0	0	0	0
DK	-301	-217	-301	-197
EE	-1	-3	-1	-3
FI	-38	-52	-75	-22
FR	-1,002	-874	-1,002	-874
DE	-829	-939	-939	-618
EL	0	-2	0	-2
HU	0	0	0	0
IE	-375	-278	-242	-222
IT	-293	-168	-206	-293
LV	-3	-9	-9	-6
LT	-8	-41	-23	-31
LU	-58	-32	-17	-32
MT	0	0	0	0
NL	-356	-242	-242	-242
PL	0	0	0	0
PT	0	-2	-1	-3
RO	-4	-17	-9	-14
SK	0	0	0	0
SI	-4	-4	-4	-5
ES	-259	-374	-315	-315
SE	-114	-93	-173	-73
UK	-375	-47	-221	-221
EU27	-4,317	-3,543	-3,924	-3,395

Source: Öko Institut (2011)

⁵⁴ It is likely that the inclusion within the POLES baseline of renewable energy deployment, energy efficiency improvements and the projection of low GDP growth result in several of the Member States having no additional costs in 2020. This occurs because the emission targets set for these countries in the 30 per cent case are above the projected baseline emissions level in 2020.

⁵⁵ The additional costs in 2020 in Scenario 4 are not directly comparable to the other scenarios, as a different methodology was used to replicate the work of the Commission that resulted in a smaller range of non-ETS reduction targets being set for the Member States under Scenario 4.

ANNEX C: THE CLIMSTRAT TOOL AND THE POLES MODEL

The Climate Strategies Tool (ClimStrat)

The Climate Strategies Tool (ClimStrat) is a partial equilibrium modelling framework that allows the user to perform quick and flexible analyses of international climate agreement proposals with respect to their effects on greenhouse gases and abatement costs. Targets for up to 137 countries and regions with differing target types, base years and country-specific rules for the use of offsets can be analysed with respect to their environmental and economic implications. Indicators for the economic effects include (for energy-related CO₂ emissions) the marginal abatement costs for all countries and the total mitigation costs per GDP. Furthermore, ClimStrat provides information on the amount of emissions reduced domestically, the amount of offsets and AAUs traded for all countries and regions. The environmental and economic analyses may be based on historical emissions and socio-economic data as well as the data projections and marginal abatement cost curves provided by the energy system model POLES.

General outline

The main area of application for ClimStrat is the analysis of GHG reduction pledges of parties. Two main priorities during the program's development were therefore to include as many countries as possible and a wide variety of target types. 137 countries and regions were able to be included based on the available historical data. In addition to absolute targets with varying base years, per capita targets as well as no-lose and dual targets for developing countries can be applied. In addition, sectoral targets can be specified for 4 main sectors (cement, iron & steel, electricity and aviation).

ClimStrat also contains a database with historical data on emissions, population and economic development starting from the year 1990. The analyses of future climate regimes may be performed up to the year 2020. For cost calculations, annual marginal abatement cost curves are available for the years 2006/2008 to 2020/2030. At present, target setting is only available for the year 2020. Calculations are based on specific targets for 2020 that provide the CO₂ price necessary to reach that target. Based on the CO₂ price for the year 2020, the pathway starting in 2006/2008 is endogenously given by the model based on a linearly increasing CO₂ price path between 2005/2008 and 2020. Path dependencies for technology development are accounted for by remaining within the linearly increasing CO₂ price path for the years 2005/2008 to 2020. However, banking and borrowing of emission allowances or credits as well as analyses of trading periods are not possible with ClimStrat.

Two markets are modelled within ClimStrat: An international emission trading market (IET) and a market for offsetting credits. Targets can be defined for countries in both markets. However, countries within the offsetting market facing a reduction target can only create credits after they have met the reduction target domestically.

Basic modelling structure

The ClimStrat analysis tool consists of two parts. The main item is a sizeable database containing more than 600,000 records including historical and projected emissions and production data as well as abatement cost information and scenario specifications. For

convenient handling, the database is separated from the main program and saved in a separate file labelled *climstratdb*. The latest version of the database is automatically uploaded at each program start. When closing the program, changes to data sets are automatically saved in the database for the next session.

The actual program code and the user interface forms are contained in the main file labelled *climstrat*. ClimStrat consists of three different sections that allow the user to retrieve information and to specify and analyse reduction scenarios.

- The **information module** provides data on emissions, production or socio-economic indicators for single countries or regions from different data sources.
- The **reduction scenario module** allows the user to create and analyse climate agreement scenarios with respect to their global environmental effectiveness.
- The **trade scenario module** allows the user to analyse the costs of realizing these targets based on scenario- and country-specific assumptions about emissions trading and the use of offsets.

ClimStrat's main function, the analysis of emission reduction scenarios, uses the reduction and the trade scenario modules. In the reduction scenario, all the country-specific information about target type, level of ambition, base year and use of offsets can be specified. The definition of the reduction scenario is sufficient for an analysis of the environmental implications. To permit the economic analysis of a proposal, parameters regarding the trade of emission allowances and credits have to be defined in the trade scenario module. The trade scenario module allows the user to specify which countries participate in the international emissions trading market, which countries are only allowed to participate via an offsetting market and which countries are not included in the trading at all. After the different trading groups have been specified, marginal abatement cost curves are used to determine the amount of domestic reduction, the amount of emission allowances and credits traded as well as the marginal and total abatement costs.

POLES scenarios

The POLES model is a partial equilibrium model that simulates the demand and supply of energy for 32 countries and 18 world regions. There are 15 energy demand sectors (main industrial branches, transport modes, residential and service sectors), about 40 technologies of power and hydrogen production. For the demand, behavioural equations take into account the combination of price and revenue effects, economic constraints and technological trends. Oil and gas supply profiles are projected for the main producing countries from a simulation of the drilling activity and discovery of new reserves, given the price, the existing resources and the cumulative production. The integration of import demand and export capacities of the different regions is included in the international energy market module, which balances the international energy flows. The changes in international prices of oil, gas and coal are endogenous, taking into account the Gulf capacity utilization rate for oil, the reserve on production ratio for oil and gas, and the trend in productivity and production costs for coal.

Six baseline scenarios are available for analyses in ClimStrat. They were provided by the energy system model POLES and adjusted using the most recent emissions data. They differ by assumptions about future economic growth and the diffusion of Carbon Capture and Storage (CCS) and renewable electricity technologies. The main specifications for the six scenarios are given below.

- **Poles-Scenario1_noCCS:** Baseline scenario with no CCS before the year 2021; data available up to the year 2020
- **Poles-Scenario2_earlyCCS:** Scenario with CCS starting in 2006 already; data available up to the year 2020
- **Poles-Scenario3_mediumCCS:** scenario with CCS starting in 2018; data available up to the year 2020
- **Poles-Scenario4_lowEconomicGrowth:** Scenario with a lower economic growth rate than in the baseline scenario Poles-Scenario1_noCCS; other assumptions are as in Poles-Scenario1_noCCS; data available up to the year 2030
- **Poles-Scenario5_highRenewables:** Scenario with a higher growth in renewable energy than in the baseline scenario; other assumptions are as in Poles-Scenario1_noCCS; data available up to the year 2030
- **Poles-Scenario6_highOilPrice:** Scenario with a higher oil (and gas) price than in the baseline scenario; other assumptions are as in Poles-Scenario1_noCCS; data available up to the year 2030

For the purpose of this study, the POLES model was accessed via the ClimStrat tool to provide information on the marginal cost of abatement for each Member State. An important output of the POLES model is marginal abatement cost curves. The following assumptions in Table 7 are associated with the POLES Scenario 4_low growth, which was the scenario run used in the study to determine the marginal abatement costs of each Member State.

Table 7 Assumptions for POLES Scenario 4_Low Growth

	1990	2005	2010	2020
Population (Millions)	440	490	496	500
GDP (G\$95)	7570	10336	10906	12835
% of renewables in Gross Inland Cons	4	6,9	8,1	10,5
% of renewables in electricity	13	15,2	18,5	22,8
CO2 Sequestration (Mt CO2) of Emissions in electricity generation	0%	0%	0%	0%

Source: ClimStrat tool (2011)